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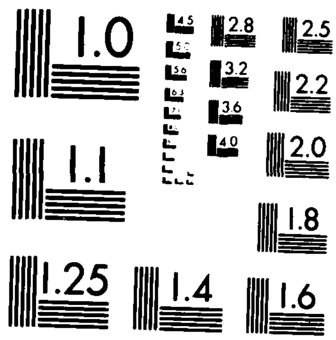

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August 1986

EVALUATING THE HCU FOR PERFORMANCE MONITORING AND RESOURCE ALLOCATION DECISIONS USING NAVY AMBULATORY CARE UCA EXPENSE AND WORKLOAD DATA

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This report provides a brief overview and critique of the Composite Work Unit (CWU) and the Health Care Unit (HCU). In addition, the report describes the methodology and results of a study designed to (1) empirically evaluate the validity of the HCU for measuring outpatient productivity in Navy facilities; (2) evaluate the utility of using UCA three-digit account codes in a revised HCU; and (3) explore the ability of facility characteristics variables, such as size, mission, and location, to explain differences in outpatient performance across Navy units. Results showed that the current HCU weights poorly reflect

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the normative costs of outpatient care with Navy data. A composite index of current HCU weights explains less then 2% of the variation in cost per outpatient visit across 45 Navy UCA reporting facilities. Similar indices derived from Navy UCA data using two and three-digit account codes explained 12% and 19% of the variation in cost per outpatient visit respectively. Using the three-digit index and incorporating additional facility characteristic variables into a multiple regression analysis, a resource allocation model developed by the investigator accounted for 49% of the variation in facility cost per visit with FY84 data.

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EXECUTIVE SUMMARY

STUDY: Evaluating the HCU for Performance Monitoring and Resource Allocation Decisions Using Navy Ambulatory Care UCA Expense and Workload Data.
Research Report 1-86

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PURPOSE:

In recent years, case-mix methodologies have been developed as a basis for measuring hospital performance and for identifying normative costs of providing care to homogenous groups of patients. Two notable efforts in this area that are relevant to the military have been the development of the Health Care Unit (HCU) and the work done in prior years at the Naval School of Health Sciences exploring the applicability of Diagnosis Related Groups (DRGs) to Navy hospital performance measurement. These efforts have demonstrated that incremental improvements are possible using currently available data. The work presented in this report has used the methodologies employed in these previous efforts as a foundation for exploring a means of measuring outpatient performance across all Navy medical facilities.

The purpose of this study was threefold and focused on the following main objectives: 1) evaluating the validity of the HCU in measuring outpatient productivity in Navy facilities; 2) evaluating the utility of using three-digit Uniform Chart of Accounts (UCA) final account codes; and 3) exploring the ability of facility characteristic variables such as size, location, and mission to explain differences in performance across UCA reporting Navy units.

Keywords: MHCS (Military Health Care System); productivity

FINDINGS AND DISCUSSION:

With regard to evaluating the validity of the HCU, two findings indicated that current HCU outpatient weights are inappropriate when applied to Navy data. Substantial changes in the ranking of normative costs for two-digit UCA accounts occurred when a partial replication of the Vector Research tri-service HCU methodology was conducted with Navy data. (Navy weights were derived from combined FY82-Fy84 UCA data, inflation adjusted and screened for out of range values.) The result of such rank changes was substantial shifts in productivity figures across Navy hospitals. Additionally, the HCU as a single index was able to explain less than 2% of the variation in cost per outpatient visit among all Navy UCA reporting facilities in FY84.

In contrast to the HCU, an index formed from weights derived for each two-digit outpatient UCA account from Navy data explained 12% of the variation in cost per outpatient visit among Navy facilities in FY84. Such an improvement was to be expected, given that the weights were based on Navy costs and not tri-service costs. However, this increase in explanatory power was also probably due in part to substantive methodological differences employed in this study for identifying and treating outliers.

In an effort to determine whether further progress toward explaining differences in hospital cost per visit could be achieved using UCA outpatient account codes, three-digit UCA weights were produced from the same data set and used to form an outpatient resource index (ORI) for each facility. The amount of variation explained increased significantly from 12% to over 17%. The number of UCA outpatient accounts involved increased from 11 to 48. This result showed that using existing three-digit expense data could improve the ability to explain differences in cost per outpatient visit among Navy facilities with only a minor increase in calculation complexity.

As a means for exploring the ability of facility characteristic variables to explain additional variation in overall cost per visit, multiple regression analyses were performed. Selected facility characteristic variables that consistently correlated with cost per outpatient visit for FYs 82-84 were identified. Using FY84 untrimmed Navy data, variance explained was approximately 49%, with the following variables included in the model: ORI index (a complex outpatient mix was more costly), CONUS vs OUTUS (OUTUS facilities were more costly), hospital vs clinic (clinic commands were more costly), size (a significant, but non-linear effect), teaching mission (teaching programs increased costs), and proximity to a large active duty training population (proximity was less costly).

Clearly, the consideration of facility characteristics is important to understanding differences in performance across facilities. Although numerous variables could theoretically explain variations in productivity across hospitals, the present study was limited to readily available data. Moreover, the intention of this study was to evaluate existing methods and to explore possibilities for improvement. Thus, the work presented here serves primarily to illustrate and emphasize the need for further work in developing more comprehensive hospital performance measures, particularly when such measures are intended to be used in resource allocation decision-making. Given the findings of the present study, utilization of productivity statistics derived from the current HCU for resource allocation is premature.

RECOMMENDATIONS:

1. The problem of inaccurate and/or suspect data in the UCA needs to be further investigated and remedied. Implementing record and distribution screens such as those employed in this study would identify suspect values which could then be verified by the submitting facility. Trend screens (workload and expense comparisons over uniform time periods) should be developed and implemented to detect substantial shifts in costs per visit within each UCA subaccount within each facility. In addition to detecting data errors, trend screens would provide a control against facilities "gaming" the system to appear productive and would also provide a mechanism for monitoring the

implementation of planned policy changes, such as shifting toward increased outpatient surgery.

2. There should be increased emphasis placed on minimizing the unnecessary use of cost pools within the UCA. Justification for the use of each cost pool should be provided by each facility UCA coordinator. The historical use of various cost pools within facilities does not in itself provide justification and needs to be questioned. Extensive use of cost pooling across UCA accounts results in an averaging of direct expenses across three-digit accounts, thus diluting real cost differences that may exist between these subaccounts. The effect of this with regard to the HCU is imprecise specification of standardized costs and a resultant loss of accuracy as a hospital performance measure.

3. The Navy should continue to support the developmental efforts of the Tri-Service Performance Measurement Working Group (PMWG). More specifically, the Navy should identify personnel with collective methods expertise in health-care operations research or a related field and extensive experience with the Navy biometrics database and Navy UCA data. These individuals should be assigned full-time to represent the interests of the Navy in the work of the PMWG. The recommendations of the PMWG stand an extremely high probability of becoming reality for all the services. Representation and continued active participation by the Navy in the work of the PMWG will provide a means for influencing OASD(HA) mandates, as well as provide much needed input regarding the differences between the Navy and the other services which impact on hospital performance measurement.

INTRODUCTION

The development of a valid hospital workload measure for the Military Health Care System (MHCS) has been a concern since the late 1950's.[1] The complexity of defining and measuring productivity in this highly labor-intensive field has proven a major obstacle to measuring productivity growth rates in the hospital industry.[2] Currently, there is increased interest in measuring hospital productivity as a basis for monitoring and comparing facilities and for equitably allocating diminishing resources to meet the health care needs of the beneficiary population. Productivity can be described as the ratio of output to resources consumed. However, to appropriately apply such a formulation requires homogenous units of output and standardized units of input. This is often not the case in service industries and is particularly problematic with regard to the health care industry.[3]

The earliest measures of hospital workload were often nothing more than the total number of patients occupying the hospital on any given day.[4] Although this information was simple to obtain, it was seriously deficient in quantifying the heterogenous product of health care facilities. Moreover, such a summary measure was incapable of reflecting the gradual decrease in inpatient lengths of stay and the increasing volume of outpatient visits. Later studies, designed to identify and quantify additional factors that contributed to patient care workload, resulted in the Composite Work Unit (CWU).[5] This measure, originally intended for staffing and manpower analyses, eventually was used in both the military and the federal sector as an overall hospital resource allocator.[6,7] Criticism regarding the development and application of the CWU led to the creation in 1980 of an alternative performance measure, the Health Care Unit (HCU).[8] The HCU represents an improvement over the CWU as a hospital performance measure and has been mandated for implementation by the Assistant Secretary of Defense for Health Affairs (ASD-HA).[9] However, it too has received substantial criticism since its inception.[10,11,12]

Recent progress toward quantifying and describing hospital performance has been made in the inpatient care arena by identifying and classifying patients into over 400 distinct Diagnosis Related Groups (DRGs). Each DRG is defined by patient related factors such as medical condition, demographic characteristics, admission status and treatment procedures received. These factors are used to categorize patients into groups that are both medically meaningful and relatively homogeneous with regard to hospital resource consumption.[13] Using the DRG methodology for productivity measurement, the final unit of output is the number of patients discharged by DRG category, and the unit of input is the dollar amount of hospital resources that were consumed in providing care to a particular patient during the entire period of hospitalization.

While DRGs have proven useful as a basis for monitoring hospital performance and setting reimbursement levels for inpatient care in the civilian and federal sectors,[14,15,16] and hold promise for like applications in the military sector,[17,18,19,20,21] a similar methodology is only recently being developed and applied to outpatient care. Further, in the Military Health-Care System (MHCS), where costs are not linked to individual patient accounts, evaluation of resources consumed per patient is problematic.

This report will provide a brief historical background on the development of the HCU and the measure it replaced, the Composite Work Unit (CWU), and will evaluate and discuss existing limitations of the HCU. In addition, the report will describe the methodology and results of a study designed to: a) evaluate the validity of the HCU when applied to Navy outpatient care cost and performance data; b) explore the utility of using three-digit ambulatory care cost and performance data from the Uniform Chart of Accounts (UCA) to incrementally improve outpatient performance measurement; c) identify additional facility specific variables that significantly account for variation in outpatient care cost between facilities; and d) using readily available data, develop a resource allocation model that will illustrate potential improvements in the current system for resource allocation decisions.

BACKGROUND

Composite Work Unit (CWU)

The CWU was developed in 1957 through a tri-service study of 34 military hospitals. This study was initiated as a result of a series of discussions by the Surgeons General of the military services, the Department of Defense, and the Bureau of Budget. The developers wanted a single unit of measure that was more sensitive than occupied bed day (OBD) and outpatient visit to "describe patient care workload in relation to staffing".[5(p.10)] Implicit in the study was the recognition that certain activities or functions in patient care required more staff time.

The objective of the study was to develop a patient care workload index as a basis for manpower (staffing) comparisons across military hospitals using a weighted combination of four aspects of medical activity. The four components of medical activity identified were OBDs, admissions, outpatient visits, and live births. The weights assigned to the four components of the CWU focused on relative amounts of staff time allocated to each of the identified components. For example, it was determined that "staff utilization during the first three to five days of hospitalization was about 10 times greater than in later periods of consecutive hospitalization".[5(p.10)] This is reflected in the CWU formula by giving 10 times the credit to each admission and each live birth on any given day. In order to provide a single index, the staff time used for one outpatient visit had to be placed in a relationship with the amount of staff time consumed by one patient during a normal hospital day. It was determined that three outpatient visits entailed essentially the same amount of workload as one occupied bed day. Thus, the CWU, which was revalidated in 1967,[22] is defined as:

(average daily occupied beds) +
(average daily admissions x 10) +
(average daily births x 10) +
(average daily outpatient visits x 0.3).

The CWU was used by the Navy Medical Department from the mid 60's to October 1985 as the measure of activity expended in patient care throughout all Naval Medical facilities. Although inaccurate in describing the total activity of any facility, it was useful for showing year to year changes in the components of workload it did measure. Therefore, the CWU could be used as a relative activity measure but could not be used as an absolute value upon which any resources or dollars were allocated. This is because inherent in the model were the assumptions of homogeneity within both input and output values that did not exist in reality.

There were five basic deficiencies in the CWU that created concern when it began to be viewed as a tool for resource allocation.[6] First, all patient days (and outpatient visits) were considered in the model as requiring the same amount of labor time. There was no accounting for differences in case mix or patient severity of illness. Second, the model was based on a study conducted at one point in time. Therefore, the CWU could not accommodate changes in the way health care is delivered nor be responsive to advances in technology. Third, when deriving weights, hours of work were treated as equivalent. That is, admissions were weighted by 10 because this activity was seen to require 10 times more staff utilization. No distinction was made, however, between physician time or nurse time or ancillary personnel time. The CWU credited the same amount of workload to different manpower combinations whenever the total manhours expended were equivalent, regardless of the relative value of such manhours. Because of this inability to determine an appropriate mix of manpower, the utility of the CWU as a predictor of staffing needs was limited. Fourth, The CWU was originally designed as a staffing tool. Only later, in the absence of a suitable alternative, did the CWU come to be seen as a "more generally applicable measure of workload. The implied rationale underlying such a generalization centered upon the assumption that if the CWU was a valid tool for distributing manpower, then it must have some validity for allocating funds for supplies and equipment."[6(p.18)] Fifth, the model did not incorporate a mechanism for accommodating the effects of variables such as facility size or mission that could significantly impact on productivity measurement and comparisons.

As a productivity measure the CWU was only slightly better than simply counting occupied bed days and outpatient visits. It still ignored the individual complexity and unique needs of the patients occupying those beds. Moreover, any output measure for productivity should be the final product and not an intermediate service. For outpatient care the number of patient visits per day would be the appropriate final service output. For inpatient care the number of patients discharged should be the final service output related to the labor hours required (or total dollars used) to move that patient to the point of discharge. Because the occupied bed day is not a final output but an intermediate measure of patient workload, this "productivity measure" could be "gamed" by keeping patients hospitalized longer than medically warranted. Additionally, since more "credit" is received for inpatient versus outpatient services, there is a disincentive for performing cost effective outpatient surgery. Such "gaming" could give a facility the appearance of high productivity, when, in fact, the facility could have served the same number of patients using fewer hospitalized days, dollars, and resources. The CWU, therefore, did not promote efficient use of resources.

Because of the deficiencies in the CWU, in January 1979 the Assistant Secretary of Defense for Health Affairs (ASD-HA) sponsored a study to create a new hospital performance measure. Utilizing cost and performance data available from the newly established Uniform Chart of Accounts (UCA) database, this effort resulted in the development of the Health Care Unit (HCU).[8]

Uniform Chart of Accounts (UCA)

When the UCA was first implemented in FY80, its development was driven in part by the recognized need for an improved health care product measure. In 1973 a joint study of the MHCS was conducted by the Office of Management and Budget (OMB), the Department of Defense (DoD), and the Department of Health, Education and Welfare (DHEW).[23] The results of the recommendations for standardizing the accounting system across all military medical facilities was the development of the UCA. The UCA is a cost accounting system unique to military medical facilities and is primarily a managerial accounting tool. Its purpose is not to account for actual dollars spent, especially where salaries are concerned, but rather to associate the funds that relate to resources consumed in a given period to particular work centers. In theory, the primary utility of the UCA is to provide expense and workload information for each medical treatment facility using a standardized methodology and shared account definitions. This standardization of cost and performance elements was intended to enable performance, cost, and productivity comparisons both within and across all military health care facilities and with the civilian sector.[24]

Organization of the UCA

In order to understand the development of the HCU which follows in the next section, a rudimentary understanding of the UCA is necessary. For our purposes, only a breakdown of the structure of final operating accounts is presented.*

The UCA allows for reporting expense and workload data for each facility at varying levels of specificity. There are two-digit, three-digit, and four-digit codes that identify specific operating accounts. At the two-digit level there are 20 unique two letter combinations describing six inpatient categories (AA - AF), eleven ambulatory care categories (BA - BK), and three dental care accounts (CA - CC). These two-digit accounts can be further broken down into subaccounts or workcenters and are identified by a third digit specifying greater functional detail. Currently there are 49 separate three-digit ambulatory clinic codes. A fourth digit that was used at each facility's discretion until FY86 is now used as a specified location code.[28] (See Appendix A for a listing of the three-digit ambulatory care account definitions.) The procedures for compiling data are standardized, and the end product of the UCA is a large database of categorized expense and workload information for

*For additional discussion of the development, organization, and application of the UCA see references 25 - 28. These references also discuss significant deficiencies of the UCA which limit its utility for the purposes intended by its developers.

each fixed military health care facility. This information is reported in a Medical Expense and Performance Report (MEPR) and provides the data for calculation of the HCU.

Health Care Unit (HCU)

To take advantage of the expense and workload information available as a result of the UCA implementation and to rectify some of the limitations of the CWU, a preliminary HCU was developed in 1980. Although the HCU more accurately accounts for various components of patient care than did the CWU, it does not account for all the differences in resources used by the patient nor all the functions performed by the facility. For example, a hospital that is a teaching facility has quantities of education and research that should be associated with its productivity statistics. However, at the present time there is no single summary statistic that captures the total output of any hospital. Recognizing this, the developers of the HCU emphasized that "no measure of hospital output, however sophisticated, should be used exclusively in allocating resources".[8(p.1)] The HCU should be used as one input into a multidimensional fiscal and manpower resource allocation model.

In 1983 a modification to the HCU was completed under contract by Vector Research Incorporated that resulted in twelve inpatient weights, eleven outpatient weights, and two dental weights for a total of 25 product categories.[29] The total number of HCUs associated with a given facility are the weighted sum of dispositions, bed days, visits, and dental procedures in the appropriate product categories. (See Appendix B for a list of the current HCU weights, product categories, and computational procedures.)

The inpatient component of the HCU is categorized by six clinical areas of service. For each of the inpatient services a cost weight is specified per disposition and per occupied bed day to total twelve product categories. The outpatient area has a cost weight assigned to each of eleven different types of clinics. The final two product categories are dental services and dental labs. Each category weight reflects the cost of providing care in that category relative to the cost of the average inpatient stay in FY82. Therefore, each HCU represents the unit value of one inpatient stay.

All HCU weights were derived from a tri-service UCA database using CONUS facility data only. The inpatient weights were computed from trimmed FY80 to FY82 data. The outpatient cost weights were computed from trimmed FY82 data only. The trimming procedure used to develop the current HCU cost weights eliminated category data from facilities in the upper and lower quartiles based on the volume of dispositions and outpatient visits. Thus, the cost weights are based on facilities operating in the middle fifty percent of the tri-service CONUS facility population.

Evaluation of the HCU

In evaluating the utility of the HCU as a measure of productivity or as an input for resource allocation one must look at its inherent advantages and disadvantages. One must also identify the limitations of the UCA database as an accurate collector of expense and workload data. The HCU can only be as accurate as the data it is based upon.

Hodson, Shields, and Smith, the developers of the preliminary HCU, specified several desirable characteristics and capabilities that should be present in a productivity measure such as the current HCU.[8] First, the measure should be expressed as a single number that is easy for managers to understand and to compare across military facilities. Second, the surrogate measure of output should be as closely related as possible to actual health care delivered. Third, the measure should use an existing database (the UCA) in order to minimize implementation and maintenance costs. Fourth, as the configuration of the underlying database adapts to changes in the health care system, the measure itself should also adapt. Similarly, the measure should be amenable to updating and therefore capable of reflecting current health care costs.

It can be seen that the HCU methodology possesses advantages both in terms of identifying more specific product categories and in its ability to be reflective of current costs and technologies. Nevertheless, it still has some significant limitations. Despite the fact that the 25 product categories of the HCU represent a theoretical improvement over the four categories used in the CWU, they still do not reflect variations in intensity of care within inpatient cases or outpatient visits. For example, in a pediatric clinic a child seen during a follow-up visit for an ear infection would be given the same weight as a child with pneumonia seen in the same clinic. The first child would require five minutes of a clinician's time; whereas, the second child would require considerably more time for full vital signs, physical exam, lab work, a chest x-ray, and a pharmacy prescription. Whether the input measure is staff time or dollars of resources consumed, the second child consumes more resources during this one recorded visit to the same clinic. Clearly, increased specificity of care provided is needed to reduce the amount of unmeasured variation in resource consumption.

Greater specificity of care provided is possible through using three-digit UCA subaccount codes; the utility of such a procedure will be evaluated later in this report. Nevertheless, the usage of UCA codes as the basis for the HCU appears to be a pragmatic one; one has to accept the underlying organization of the UCA system as the price for data availability. The homogeneity of costs within each HCU product category is an empirical question that also will be addressed. In any event, case-mix differences in resource consumption within product categories are still likely.*

A further limitation of the HCU is the substantial correlation between dispositions and occupied bed days.[10] A serious consequence of this collinearity is the unstable and unreliable cost weights for these measures.[34] If occupied bed days were removed from the calculation of inpatient weights, the weights would be more statistically reliable, and the incentive to allow long lengths of stay would be eliminated. Thus, the HCU would be an improved measure of final output, better representing the number of persons returned to health.

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*Work continues on defining homogenous product categories despite the widespread use of payment and resource allocation systems based on Diagnosis Related Groups (DRGs).[30] The DRG methodology classifies inpatients into 472 groups that are: 1) clinically similar and interpretable, 2) readily available from variables in standard hospital abstracts, 3) composed of all possible disease conditions without being unwieldy in number, 4) similar in expected hospital resource consumption, and 5) comparable across different coding methods.[31] Even with this classification scheme, however, there is concern that the methodology does not adequately capture variations in patient illness severity.[32,33] In the outpatient sector development of case-mix groupings has begun. However, developmental work has been retarded because of the lack of outpatient biometric data beyond simple tallying of visits.

Another limitation of the HCU is that it does not have the capability to incorporate ancillary services workload data. Pharmacy, laboratory, and radiology department expenses, for example, are indirectly charged to the two-digit UCA codes used in the HCU product measure. The expenses of these departments are allocated to inpatient and outpatient UCA codes on the basis of workload share. Until there is a direct link between patients that actually use these services, accurate resource allocation will not be possible. Consider the pediatric example -- the visit of the child with the ear infection receives a HCU of .017. The visit of the child with pneumonia also receives a HCU of .017. If the hospital was reimbursed for delivery of care to those children by HCU, the dollars given the facility for care of the child with the ear infection would probably be more than the actual cost of care. The reimbursement for the child with pneumonia would most likey be less than the actual cost of care. Ideally, with the HCU the cumulative discrepancies would all balance out in the end. However, in reality, one facility could potentially treat more complicated cases in its pediatric clinic than another facility. The cost per visit for that facility when viewed in a UCA summary report would be high, and the facility would appear to be inefficient. Moreover, if money was allocated by HCU, the facility could be underfunded and would be unable to meet its legitimate resource consumption requirements.

An additional shortcoming of the HCU is that it currently provides incentives for admitting patients as opposed to treating certain patients on an outpatient basis. This is particularly a problem with regard to minor surgery. Today, more and more surgeries can be performed in the outpatient clinic; however, the current HCU does not adequately credit this cost effective practice. One potential solution to this dilemma is to develop additional

UCA categories and identify appropriate HCU weights for outpatient surgeries.

Difficulties with admitting practices are not limited to minor surgeries. There is evidence that differences exist between the military services in admission policies regarding minor illnesses. For example, a 1980 comparison study of admission rates between the three services found that the Navy treats more upper respiratory infection (URI) patients on an outpatient basis than does the Army (admission rates of 0.3% versus 16.8% of total, respectively).[35] This difference still existed in FY85, where URI admissions ranked number 3 in Army admissions and number 50 in Navy admissions.[36] In this case the Navy would obtain less workload credit because of the difference in treatment mode for the same diagnosis. Thus, one can see that systematic differences in admission policies can distort comparisons of productivity between services.

The above problem is exacerbated and confounded by the trimming methodology employed by Vector Research in their modification of the HCU. As noted previously, fifty percent of the data were eliminated from consideration in deriving HCU category weights. This could have biased military service representation in the development of specific category weights, thus favoring one service over the other. From the published reports on the development of the HCU it is not possible to directly assess the extent of this possibility. Therefore, it would be informative to develop HCU type weights derived from Navy UCA data only and compare them with the current tri-service derived HCU weights.

Purpose of the Present Study

The purpose of the present study was to identify and evaluate the implications of monitoring productivity and allocating resources to Navy health care facilities using various outpatient case-mix measures in conjunction with other facility characteristic variables. Specifically, the study addresses three main objectives: 1) to evaluate the validity of the HCU for measuring outpatient productivity in Navy facilities; 2) to evaluate the utility of alternative weighting schemes for outpatient data, such as the three-digit UCA subaccount codes; and 3) to explore the ability of facility characteristic variables such as size, location, and mission to explain differences in performance across UCA reporting Navy units.

Several factors affected the decision to focus primarily on outpatient performance measurement to the exclusion of inpatient performance. First, it was considered appropriate to defer continued work with DRGs until an updated and revised ICD9 to ICD9-CM coding conversion map was completed by the U.S. Army Health Care Studies and Clinical Investigation Activity (HCSCIA) in conjunction with Yale University. It should be noted that the seminal work in developing this coding bridge for military data was performed in earlier research by the Naval School of Health Sciences Research Department.[18] Second, based upon recommendations of the Blue Ribbon Panel on Sizing DoD Medical Treatment Facilities,[37] ASD(HA) mandated implementation of the HCU across all military services,[9] and established the Tri-Service Performance Measurement Working Group (PMWG) "to develop productivity measures which will promote efficient delivery of cost effective, quality care as well as eliminate incentives for over-utilization of services".[38] The early objectives of the PMWG were to develop a tri-service biometrics database, complete development of the DRG map, and continue case-mix research toward improving the HCU.[39] Thus, it was considered appropriate to focus our efforts in areas that would be useful to the Navy Medical Department and would contribute to the developmental efforts of the PMWG without being redundant with work being performed by the Army.

VALIDITY OF THE HCU USING NAVY DATA

Methodological Issues

As noted previously, the HCU was developed using a tri-service UCA database that was trimmed of one-half of the data. In addition, only CONUS facility data was included in the derivation of HCU weights. This data selection methodology is problematic for several reasons. First, by excluding OUTUS facilities, the HCU does not incorporate the cost of doing business in these facilities, and yet it is still applied to them as a measure of productivity. Although experts agree that it would be unwise to use the HCU as the only measure of performance,[8,29] presently no additional data are collected to systematically "credit" possible differences between CONUS and OUTUS facilities. Furthermore, if the HCU (or some derivation of it) is used in a multivariate model of resource allocation as recommended, it is the "relative" value of each service to each other rather than the "actual" dollar amounts of each service that are important in the development of HCU weights. This is because the HCU would be one of several weighted components in the algorithm. In this regard OUTUS facility data would be as useful for developing weights as CONUS facility data. Therefore, to omit OUTUS facility data unnecessarily restricts the derivation sample.

A second problem with the data selection methodology of the current HCU is the exclusion of a great deal of legitimate expense and workload data by trimming one-half of the available data. There are alternative procedures for deriving group centroid values with asymmetrically distributed data that would still allow for the trimming of suspect values (e.g., use of the median, or log transformation of the data). Given that there are "winners" as well as "losers" when normative values are defined for clinical services and that there are documented differences between the military medical departments in the treatment of some illnesses, the current HCU workload trim points for each clinical service category probably distort the relative cost of providing care in favor of one service branch over another. To avoid this distortion, the data adjustment and selection procedure used to develop the HCU must include all of the legitimate expense and workload data available.

A third concern with the development methodology of the HCU centers around a lack of evidence to support the assumption that the a priori account structure of the UCA represents a reasonably valid grouping of cost centers. That is, at present it is only conjecture whether there is sufficient homogeneity of costs within UCA work center accounts to make them a useful grouping strategy for explaining costs within facilities. This is an empirical issue that has not been addressed.

In the following several sections we will describe a partial replication of the development of the HCU using Navy UCA data from FY82-FY84 and compare the current HCU weights with newly derived Navy weights. In addition, the general utility of using the existing UCA cost center groupings will be explored.

Data Source and Data Adjustment

The source of data for the following analyses was the UCA P-COMM file, which is maintained by the Naval Medical Data Services Center, Bethesda, Maryland. The P-COMM database contains the total dollar expenses and the number of outpatient visits associated with each UCA code to the fourth digit at each reporting Naval facility. (See Appendix C for an example of the contents of the

UCA P-COMM data file for one facility.) Workload and expense data were aggregated to the two-digit level for analysis of the HCU. Although all Navy outpatient clinics (including branch clinics) provide input into the UCA system, prior to FY86 this input was reported to the central database through only 45 identifiable core facilities. At the time this research was initiated, data were available through the third quarter of FY85. The use of quarterly data was initially considered as a means of obtaining a large sample size for analysis; however, correlational analyses of the consistency of two-digit cost per outpatient visit (COSTPOV) across quarters revealed large variations within facilities. Because of this lack of reliability in quarterly data, fourth quarter cumulative data were used from FY82-FY84 (FY85 cumulative data became available later). Correlational analyses of untrimmed data across years within workcenters and facilities revealed acceptable consistency of costs per outpatient visit (mean r = .72) and number of outpatient visits (mean r = .96). It should be noted that this finding leads one to <u>question the utility of continuing the practice of producing quarterly UCA reports</u>. Such reports can be extremely misleading due to data instability, particularly if used for comparative purposes.

The decision to use multiple year data was based on the premise that averaging several years of recent cost data would result in normative COSTPOV values with more stability than those derived from a single year. In order to accomplish this, however, it was necessary to adjust costs for inflation to a single base year. Official DoD deflators were used to adjust FY82 and FY83 military personnel, civilian personnel, and "other" costs (comprising 51%, 22%, and 27% of total expenses, respectively) to base year FY84 equivalents.* Regression analysis using dummy codes for fiscal years revealed no significant differences in COSTPOV between years on the adjusted data. Results of this manipulation check supported the effectiveness of the inflation adjustment procedure.

A final adjustment to the UCA data involved log transforming COSTPOV to rectify the non-normal, positively skewed distribution of this variable. Use of the log transformation effectively normalized the distribution of COSTPOV and enabled a methodology based on probability of occurrence to be employed for identifying and removing data outliers.

Data Screening

The guiding approach toward removing outliers was to retain as much data as possible for the purpose of computing weights for each two-digit UCA account. Only those data which were either clearly erroneous or extremely unlikely occurrences were to be removed. Therefore, a two stage record and distribution screening process was employed which involved identifying and removing all two-digit records that showed either no workload/total expense, negative workload/total expense, or COSTPOV greater than $200. In those facilities where negative values existed, a judgement had to be made whether to retain the remainder of the data for those facilities in the given fiscal year. This is because significant errors caused doubt as to the validity of all the data reported from such facilities. Ultimately, 5.3% of the two-digit data was eliminated during the record screening process.

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*FY82 & FY83 adjustment multipliers were computed as:
FY82 -- .51(1.0713) + .22(1.0789) + .27(1.0795) = 1.0752
FY83 -- .51(1.3000) + .22(1.0308) + .27(1.0379) = 1.0323

Following the record screens, a distribution screen was conducted on the remaining data. The first step in the distribution screening process was to log transform COSTPOV for each two-digit workcenter as described previously. Then, a +-2.58 standard deviation trim point was selected for identifying and removing records from the dataset to be used for computing cost weights. In probabilistic terms, values that were removed had an approximate chance of normally occurring in only 5 of 1000 cases (either high or low). A total of 1.6% of the two-digit records remaining after the record screens were identified as outliers through the distribution screening process. (See Appendix D for a listing of two-digit record and distribution screened records.)

Homogeneity of Two-Digit UCA Cost Centers

The utility of using any grouping strategy is based on the assumption that there is less variation in a given variable within groups than across groups. That is, knowledge of subgroup norms explains group variation. To date, no evaluation of this assumption has been made with regard to COSTPOV and the two-digit UCA outpatient account codes. To test this assumption an analysis was conducted using screened FY82-FY84 inflation adjusted data by regressing COSTPOV (log transformed) on two-digit accounts. Results showed that two-digit codes explained 15% ($p < .0001$) of the variation in COSTPOV over the entire data set. This result indicates that there is some utility in using two-digit UCA groups as a form of case complexity, but that there is still a considerable amount (85%) of variation in outpatient costs within facilities that is unexplained.

Computing Navy Two-Digit Weights

Because the data were log transformed to achieve normality, the geometric mean was used to derive centroid values for each two-digit UCA workcenter.* The geometric mean is the antilog of the sum of the logarithms of the COSTPOV values in each two-digit account divided by the number of values in the account. Use of the geometric mean is appropriate when averaging ratios (where COSTPOV = costs/visits) and where the data are distributed logarithmically.[40] Since COSTPOV was adjusted to base year FY84, the geometric mean for each two-digit account was computed using FY82-FY84 data. For comparative purposes, mean fiscal year values reported by Vector Research[29] (using their original data selection methodology) for tri-service FY82-FY84 UCA data were inflation adjusted and averaged over the three years. The resulting COSTPOV values were compared with the Navy derived values to see the effects of applying tri-service derived weights to the Navy outpatient population. Table 1 lists the normative COSTPOV values derived from the screened Navy sample with the adjusted Vector COSTPOV values.

Validating the HCU on Navy Data

An examination of the ambulatory care account COSTPOV values in Table 1 reveals large discrepancies between the adjusted Vector Research values and Navy values in both dollars and in rank order. A Spearman rank order correlation was performed on the two sets of costs and tested for significance. Results showed that the two sets of values were not significantly correlated (rho = .55). Clearly, the inflation adjusted Vector Research values do not

*The exception to this was UCA account BK (Underseas Medicine). In this case COSTPOV values were distributed more normally and the arithmetic mean provided a better estimate of normative cost.

describe the relative cost relationships between Navy two-digit UCA accounts.

TABLE 1

Average Cost per Visit in Two-Digit Ambulatory Accounts (FY84 dollars)[a]

UCA Account	Adjusted Vector[b]		Navy Data[c]	
	COSTPOV	Rank	COSTPOV	Rank
BA Medical	$38.71	6	$53.14	10
BB Surgical	$47.82	9	$58.78	11
BC OB/GYN	$36.54	3	$36.10	3
BD Pediatric	$29.38	2	$32.20	1
BE Orthopedic	$45.86	8	$49.20	7
BF Psychiatric	$43.22	7	$45.36	5
BG Family Practice	$38.57	5	$43.10	4
BH Primary Care	$37.52	4	$33.67	2
BI Emergency	$48.06	10	$49.01	6
BJ Flight Medicine	$48.55	11	$53.03	9
BK Undersea Medicine	$25.16	1	$50.02	8

[a]Based on inflation adjusted FY82-FY84 expense data
[b]Derived from arithmetic mean
[c]Derived from geometric mean

A second way to assess the validity of the current HCU weights for Navy outpatient data is to determine whether a weighted composite index can account for variation in the overall COSTPOV between facilities, and then compare this result with the variance accounted for by a similar index formed with the newly derived Navy weights. The procedure for developing an outpatient resource index (ORI) is described below and illustrated in Table 2:

1. Calculate the proportion of the facility's total outpatient visits that fall in each two-digit account.
2. Multiply each proportion by the specified cost weight for each two-digit account.

3. Sum the products.

4. Divide the sum by the Navy-wide average cost per visit to obtain the index value for the facility.

TABLE 2

Example Calculation of the Outpatient Resource Index (ORI)[a]

Facility	Percent of Outpatient Visits by Two-Digit UCA Account[b]					
	BA	BB	BC	BD	Expected Cost per Visit[c]	ORI Index[d]
A	7.5	31.8	14.7	46.0	$47.45	1.1005
B	32.5	11.5	41.6	14.4	$43.89	1.0179
C	6.1	19.4	63.5	11.0	$38.09	.8834
D	2.1	1.5	66.5	29.9	$41.62	.9653
E	0.6	4.7	52.3	42.4	$44.55	1.0332
	Navy-Wide Percent					
	9.76%	13.78%	47.72%	28.74%		
	Navy-Wide Two-Digit COSTPOV Weight					
	$53.14	$36.10	$33.67	$58.78	$43.12	

[a] Adapted from Pettengill & Vertrees (1982)[41(p.109)]
[b] Example based on a hypothetical system using only four accounts
[c] Facility A, computed: .075(53.14)+.318(36.10)+.147(33.67)+.460(58.78)=$47.45
[d] Facility A, computed: $47.45/$43.12 = 1.1005

An ORI index value of 1.0 indicates expected outpatient costs equal the average value for all outpatient facilities in the system from which the weights were computed. Such an index, if developed using reasonable weights, should predict the expected relative cost per outpatient visit for each facility, given its mix of outpatients, independent of other possible influencing variables, such as mission, size, or military readiness requirements. In the present case, there are numerous elements of outpatient resource consumption that the current data do not reflect. This is primarily because of the lack of any outpatient biometrics data beyond simple visit counts. Therefore, the ORI index developed here will be only a modest predictor of expected relative costs. Nevertheless, given that the HCU is currently implemented, it will be informative to assess the predictive power of its component ambulatory weights when applied to Navy outpatient data. Such predictive validity is essential if the HCU is to be of any use for performance monitoring. An additional utility of deriving the ORI index is that it enables one to consider outpatient mix as one variable among several in a multiple variable model to aid in resource allocation decision-making. (Appendix G lists computed index values for FY84 using HCU weights and Navy derived weights.)

An HCU index (developed using the currently implemented HCU weights) and a newly derived Navy ORI index (developed using the previously described FY82-FY84 Navy sample weights) were computed for each reporting Naval outpatient core facility using FY84 outpatient visit percentages. Pearson correlations were calculated between the index and the overall COSTPOV (log transformation not necessary) for each facility in FY84. Results showed that the HCU index accounted for less than 2% of the variation in aggregate COSTPOV between the 45 Naval facilities. The ORI index, however, accounted for 12% ($p < .02$) of the variation in COSTPOV between facilities. These findings indicate that there is some utility to partitioning and weighting outpatient visits by UCA categories for monitoring hospital performance, but that the current HCU weights are invalid for use with Navy Medical Department outpatient facilities.

A final evaluation of the validity of current HCU weights applied to Navy data can be made from a pragmatic analysis (i.e., dollars and cents). That is, if the current HCU were to be applied as a resource allocator for Navy outpatient facilities, what would the "bottom line" look like in relation to actual allocations? The previous two findings indicate that substantial shifts from current funding to facilities within the Navy would occur if the HCU were used for resource allocation (considering outpatient care only). To address this issue FY84 HCUs were computed for each Naval facility using both the current HCU weights and the Navy sample derived two-digit weights. The total HCUs for each facility were then multiplied by the FY84 average MHCS inpatient visit cost of $1690.7 to obtain an estimated ambulatory care budget for each facility.* Table 3 lists HCUs and budgets derived for each facility using the two different sets of two-digit weights.

An examination of Table 3 shows that the current HCU underestimates the outpatient productivity of Navy facilities by 7% in FY84, and would result in reduced funding to the Navy Medical Department if used as the sole basis for resource allocations. In addition, one can see substantial differences in the rank ordering of facilities by the two different HCU computations. Although the two-digit UCA categories which form the basis for the HCU have sufficient homogeneity to be useful (see p. 24.), the present results show that, even using Navy derived cost weights, large shifts in resource allocations to individual facilities would result from using the HCU as the

*Recall that one HCU equals an average tri-service inpatient stay. This value is the amount reported by Vector Research as the average inpatient cost in the MHCS for FY84.[29] It is used here for comparative purposes against the current HCU. It would be interesting to use the Navy average inpatient cost as well, and compare results. If the average inpatient cost in the Navy was less than that in the total MHCS, Navy predicted expenses would be less than those shown. However, that data was not available for this study.

TABLE 3

FY84 HCUs, Actual Expenses, and Predicted Expenses in Naval Outpatient Care Facilities Using Current HCU and Navy Derived Two-Digit Weights

FACILITY NAME	VECTOR WEIGHTED OUTPATIENT HCUs	TWO-DIGIT NAVY WEIGHTED OUTPATIENT HCUs	ACTUAL FY84 OUTPATIENT COSTS	VECTOR ESTIMATED OUTPATIENT COSTS	TWO-DIGIT NAVY ESTIMATED OUTPATIENT COSTS	DIFFERENCE BTWN NAVY VS VECTOR OUTPATIENT COSTS
ADAK NH	405	417	$875,360	$684,734	$705,275	$20,540
ANNAPOLIS NMCL	1,662	1,623	$3,868,955	$2,809,943	$2,743,864	($66,079)
BEAUFORT NH	8,203	8,159	$8,522,559	$13,868,812	$13,794,259	($74,553)
BETHESDA NH	9,994	11,921	$27,752,916	$16,896,856	$20,155,523	$3,258,667
BREMERTON NH	4,321	4,885	$9,202,509	$7,305,515	$8,258,300	$952,785
CAMP LEJEUNE NH	8,123	8,683	$13,087,099	$13,733,556	$14,680,050	$946,494
CAMP PENDLETON NH	11,297	12,260	$21,448,126	$19,099,838	$20,727,950	$1,628,112
CHARLESTON NH	9,501	10,357	$13,903,662	$16,063,341	$17,511,005	$1,447,665
CHERRY POINT NH	3,050	3,356	$5,250,647	$5,156,635	$5,673,753	$517,118
CORPUS CHRISTI NH	4,235	4,451	$7,789,501	$7,160,115	$7,524,551	$364,436
GREAT LAKES NH	13,977	14,189	$14,634,835	$23,630,914	$23,988,770	$357,857
GUAM USNH	2,816	3,105	$7,182,188	$4,761,011	$5,248,809	$487,798
GUANTANAMO BAY USNH	1,148	1,178	$2,413,069	$1,940,924	$1,992,420	$51,496
JACKSONVILLE NH	12,314	13,355	$23,267,000	$20,819,200	$22,578,508	$1,759,308
KEFLAVIK NH	851	907	$1,298,687	$1,438,786	$1,534,039	$95,254
KEY WEST NMCL	967	1,007	$2,429,347	$1,634,907	$1,701,789	$66,883
LEMOORE NH	2,971	3,309	$3,782,811	$5,023,070	$5,594,114	$571,045
LONG BEACH NH	8,724	9,426	$18,194,037	$14,749,667	$15,937,060	$1,187,393
MILLINGTON NH	3,815	4,138	$8,660,521	$6,450,021	$6,995,897	$545,877
NAPLES USNH	2,430	2,470	$5,030,517	$4,108,401	$4,176,684	$68,283
NAT CAPITOL REGION NMCL	1,614	1,537	$2,877,816	$2,728,790	$2,599,102	($129,687)
NEW LONDON NH	5,327	5,768	$8,806,247	$9,006,359	$9,751,495	$745,136
NEW ORLEANS NMCL	1,502	1,472	$2,223,972	$2,539,431	$2,489,384	($50,047)
NEWPORT NH	3,489	3,814	$8,543,201	$5,898,852	$6,448,685	$549,833
NORFOLK NMCL	13,681	14,101	$19,184,392	$23,130,467	$23,840,540	$710,074
OAK HARBOR NH	2,652	2,779	$3,511,566	$4,483,736	$4,698,614	$214,877
OAKLAND NH	15,244	16,174	$23,045,423	$25,773,031	$27,344,623	$1,571,592
OKINAWA USNH	3,729	3,985	$10,806,270	$6,304,620	$6,737,365	$432,745
ORLANDO NH	6,205	6,849	$11,910,951	$10,490,794	$11,579,728	$1,088,935
PATUXENT RIVER NH	1,864	2,039	$2,501,663	$3,151,465	$3,446,599	$295,134
PEARL HARBOR NMCL	6,026	6,192	$10,025,191	$10,188,158	$10,468,719	$280,561
PENSACOLA NH	10,302	10,850	$18,947,551	$17,417,591	$18,344,532	$926,940
PHILADELPHIA NH	5,634	5,915	$10,058,025	$9,525,404	$9,999,782	$474,378
PORT HUENEME NMCL	1,823	1,795	$3,254,107	$3,082,146	$3,034,520	($47,626)
PORTSMOUTH NH	10,621	12,323	$21,811,108	$17,956,925	$20,833,754	$2,876,829
PORTSMOUTH NMCL	1,002	950	$2,313,214	$1,694,001	$1,606,103	($87,979)
QUANTICO NMCL	4,205	4,281	$5,714,889	$7,109,394	$7,237,056	$127,662
ROOSEVELT ROADS USNH	1,964	2,072	$5,102,658	$3,320,535	$3,503,322	$182,788
ROTA USNH	1,343	1,400	$2,335,693	$2,270,610	$2,367,578	$96,968
SAN DIEGO NH	16,347	18,842	$31,071,232	$27,637,873	$31,856,157	$4,218,284
SAN DIEGO NMCL	8,916	8,640	$10,860,062	$15,074,281	$14,608,006	($466,275)
SEATTLE NMCL	915	1,084	$2,034,201	$1,546,991	$1,831,903	$284,912
SUBIC BAY USNH	4,792	4,835	$5,500,060	$8,101,834	$8,174,300	$72,466
YOKOSUKA USNH	4,095	4,334	$8,525,077	$6,923,417	$7,327,380	$403,963
YUMA MCAS	1,023	1,046	$1,511,295	$1,729,586	$1,768,167	$38,581
FY84 TOTALS:	245,119	262,270	$431,098,290	$414,422,693	$443,420,115	$28,997,422

sole measure for allocation. From the present data it is not possible to assess the impact of the HCU on allocations to the other military services.

ASSESSING THE UTILITY OF THREE-DIGIT HCU WEIGHTS

The findings of the previous section indicate that the present two-digit partitioning of expense and workload data in the UCA can be useful for explaining, to a limited extent, variations in COSTPOV both within and across outpatient facilities. However, the limited variance accounted for in COSTPOV using two-digit groupings leads one to ask whether it is possible to improve upon the current HCU methodology by using three-digit UCA data. Three-digit workcenters should provide even greater specificity of function; therefore, they should result in greater homogeneity of costs per outpatient visit within each UCA account. The idea of using three-digit UCA account data as a means for explaining additional case-mix variation is not new,[8,29] however, the potential improvement in explanatory power by doing so has never been empirically assessed.

In the following several sections of this report, we will describe the methodology employed in developing a three-digit HCU and a three-digit ORI index, examine the results of several validity tests, and discuss the advantages and disadvantages of using three-digit UCA data to modify the current HCU.

Data Selection and Adjustment

A similar methodology to that employed using two-digit UCA data was used to adjust and screen three-digit data. FY82-FY84 four-digit P-COMM file expense and workload data were aggregated to the three-digit account level. A record screen eliminated records with either zero or negative cost or zero workload values, or COSTPOV greater than $200 (11.4% of the records). Expense values were then adjusted for inflation to base FY84. COSTPOV was calculated for each three-digit account at each facility for each FY; and once again, COSTPOV was log transformed to normalize the distribution. Trim points were set at +-2.58 standard deviations for each account code, resulting in 1.5% of the remaining data being identified as outliers. (See Appendix E for a listing of three-digit record and distribution screen failures.)

<u>Evaluating the Homogeneity of Three-Digit Outpatient Accounts</u>

Two analyses were conducted to evaluate the homogeneity of three-digit outpatient UCA accounts. The first analysis involved a t-test comparison of the average coefficient of variation (CV) in COSTPOV for two-digit versus three-digit UCA accounts. The CV is the ratio of the standard deviation of COSTPOV divided by the mean COSTPOV for each UCA account and is expressed as a percentage. The lower the value of this ratio, the lower the relative amount of variation existing in the account category and, therefore, the more homogenous the category. Results of the t-test showed that the mean CVs for two-digit ($\bar{x}$ = .432, SD = .130) and three-digit ($\bar{x}$ = .486, SD = .143) outpatient accounts do not significantly differ from each other. This finding indicates that, for the present sample, three-digit UCA outpatient accounts are no more homogenous with regard to costs than two-digit accounts.

A second analysis to evaluate the homogeneity of three-digit accounts was conducted using screened FY82-FY84 inflation adjusted data by regressing COSTPOV (log transformed) on dummy coded three-digit accounts. Results showed that three-digit codes explained 34% ($p < .0001$) of the variation in COSTPOV over the entire data set. This finding indicates that, although three-digit work centers may not be any more homogenous in general than two-digit accounts, there is a considerable reduction in unexplained variation on COSTPOV within the total sample because of the addition of more group categories. The question of whether three-digit weights would result in a more valid HCU for monitoring performance and for allocating resources across facilities will be addressed next.

Validating a Three-Digit HCU

Three-digit HCUs and ORIs were calculated using the same methodology as was used for two-digit data, except that three-digit data were used. Three-digit HCU cost weights were derived based on the geometric mean of COSTPOV for each three-digit UCA account using the record and distribution screened FY82-FY84 data set. (See Appendix F for a listing of two and three-digit Navy derived cost weights.) A three-digit ORI index was calculated for each Navy outpatient facility using FY84 unscreened outpatient visit proportions. (See Appendix G for a listing of the HCU index and the two-digit and three-digit ORI index values for each facility.) To evaluate the expected increase in predictive power of three-digit weights over two-digit weights, a Pearson correlation was computed between the three-digit ORI index and the overall COSTPOV for each facility. Then, a significance test for the difference between the two dependent correlations was conducted. Results revealed that the three-digit ORI index accounted for 17% ($p < .005$) of the variation in overall COSTPOV between facilities; this is 5% more variation in COSTPOV than was explained by the two-digit ORI. This increase in explanatory power was statistically significant ($t = 2.614$, $df = 42$, $p < .01$).

A further evaluation of the effects of the three-digit weights can be made by looking at expected total expenses for each facility based on the Navy sample derived three-digit HCU, using FY84 outpatient workload data. Table 4 lists: actual COSTPOV; expected overall COSTPOV based on Vector Research tri-service HCU weights and Navy derived two and three digit weights; and total expected expenses at each facility based on the new three-digit weights. A review of Table 4 reveals that for several facilities there are substantial shifts in expected COSTPOV based on Navy three-digit versus two-digit weights. It can also be seen that, as a result, total expected costs shift considerably, despite a relatively small ($1,809,616) difference in the total expected outpatient budget.

There are several potential advantages to modifying the HCU to incorporate three-digit data, not the least of which is that the data is already available in the UCA system. Moreover, as the foregoing findings indicate, using three-digit HCU weights will increase the validity of the HCU for monitoring hospital performance, although this seems to be primarily due to the increase in grouping categories, as opposed to improvements in category homogeneity. It is likely, however, that to the extent the HCU is actually used as a basis for facility comparisons and resource allocation, the quality of the submitted data will improve.

Several caveats should be considered that limit a full endorsement for employing three-digit weights in a refined HCU. First, there is a significant decrease in the number of facilities providing services in many specific three-digit accounts. Because of this, there is less stability in many of the normative values that have been derived for each account.* The use of tri-service data will increase the N for each account; however, it is still problematic whether tri-service derived weights can be validly applied to any one of the three military services using present methodologies. A further

TABLE 4

FY84 Actual COSTPOV, Vector Estimated COSTPOV, Navy Estimated COSTPOV, and Three-Digit Navy Sample Estimated Total Expenses for UCA Reporting Outpatient Navy Facilities

FACILITY NAME	ACTUAL COSTPOV	VECTOR TWO-DIGIT ESTIMATED COSTPOV	NAVY TWO-DIGIT ESTIMATED COSTPOV	NAVY THREE-DIGIT ESTIMATED COSTPOV	NAVY TWO-DIGIT ESTIMATED TOTAL EXPENSES	NAVY THREE-DIGIT ESTIMATED TOTAL EXPENSES	DIFFERENCE
ADAK BH	$46.65	$36.49	$37.59	$38.94	$705,273	$730,584	$25,311
ANNAPOLIS NMCL	$49.70	$36.10	$35.25	$36.57	$2,743,864	$2,846,840	$102,976
BEAUFORT NH	$22.42	$36.49	$36.29	$38.65	$13,794,259	$14,689,872	$895,613
BETHESDA NH	$64.34	$39.17	$46.73	$43.59	$20,155,523	$18,803,614	($1,351,908)
BREMERTON NH	$48.59	$38.37	$43.60	$43.44	$8,258,300	$8,227,202	($31,098)
CAMP LEJEUNE NH	$35.52	$37.27	$39.04	$41.20	$14,680,050	$15,210,190	$530,140
CAMP PENDLETON NH	$41.34	$36.81	$39.95	$39.76	$20,727,950	$20,630,612	($97,338)
CHARLESTON NH	$32.18	$37.18	$40.53	$39.95	$17,511,005	$17,259,383	($251,622)
CHERRY POINT NH	$38.34	$37.66	$41.43	$41.41	$5,673,753	$5,670,508	($3,246)
CORPUS CHRISTI NH	$41.70	$38.33	$40.28	$41.52	$7,524,551	$7,755,728	$231,177
GREAT LAKES NH	$23.07	$37.25	$37.81	$36.30	$23,988,770	$23,033,544	($955,226)
GUAM USNH	$55.52	$36.80	$40.57	$41.09	$5,248,809	$5,316,042	$67,233
GUANTANAMO BAY USNH	$46.44	$37.35	$38.35	$40.20	$1,992,420	$2,088,591	$96,171
JACKSONVILLE NH	$42.01	$37.59	$40.76	$41.81	$22,578,588	$23,160,178	$581,590
KEFLAVIK BH	$36.04	$39.93	$42.57	$44.58	$1,534,039	$1,606,324	$72,284
KEY WEST NMCL	$53.65	$36.10	$37.58	$39.89	$1,701,789	$1,806,402	$104,613
LEMOORE NH	$29.19	$38.75	$43.16	$41.33	$5,594,114	$5,356,830	($237,284)
LONG BEACH NH	$46.27	$37.51	$40.53	$40.83	$15,937,060	$16,054,439	$117,379
MILLINGTON NH	$50.58	$37.67	$40.86	$41.36	$6,995,897	$7,081,862	$85,965
NAPLES USNH	$45.23	$36.94	$37.55	$40.44	$4,176,684	$4,498,277	$321,593
NAT CAPITOL REGION NMCL	$37.90	$35.94	$34.23	$32.25	$2,599,102	$2,448,169	($150,935)
NEW LONDON NH	$35.50	$36.31	$39.31	$39.88	$9,751,495	$9,892,867	$141,372
NEW ORLEANS NMCL	$30.77	$35.14	$34.44	$35.77	$2,489,384	$2,585,479	$96,096
NEWPORT NH	$54.31	$37.50	$40.99	$42.11	$6,448,685	$6,624,205	$175,520
NORFOLK NMCL	$28.88	$34.82	$35.89	$35.86	$23,840,540	$23,821,675	($18,866)
OAK HARBOR NH	$29.90	$38.18	$40.01	$40.82	$4,698,614	$4,793,705	$95,092
OAKLAND NH	$33.81	$37.81	$40.11	$40.31	$27,344,623	$27,475,571	$130,948
OKINAWA USNH	$65.95	$38.48	$41.12	$41.77	$6,737,365	$6,844,984	$107,619
ORLANDO NH	$43.76	$38.54	$42.54	$42.67	$11,579,728	$11,614,190	$34,462
PATUXENT RIVER NH	$29.94	$37.72	$41.25	$41.43	$3,446,599	$3,461,386	$14,787
PEARL HARBOR NMCL	$36.00	$36.58	$37.59	$38.83	$10,468,719	$10,813,326	$344,607
PENSACOLA NH	$40.27	$37.02	$38.99	$39.81	$10,344,532	$10,729,841	$385,310
PHILADELPHIA NH	$39.72	$37.62	$39.49	$42.24	$9,999,782	$10,696,840	$697,058
PORT HUENEME NMCL	$37.78	$35.79	$35.23	$36.09	$3,034,520	$3,108,098	$73,577
PORTSMOUTH NH	$47.43	$39.05	$45.30	$43.83	$20,833,754	$20,156,937	($676,817)
PORTSMOUTH NMCL	$48.49	$35.51	$33.67	$35.99	$1,606,103	$1,716,936	$110,833
QUANTICO NMCL	$29.71	$36.96	$37.62	$38.42	$7,237,056	$7,390,317	$153,261
ROOSEVELT ROADS USNH	$58.67	$38.18	$40.28	$42.56	$3,503,322	$3,701,425	$198,103
ROTA USNH	$39.66	$38.23	$39.86	$42.41	$2,367,578	$2,518,854	$151,276
SAN DIEGO NH	$42.97	$38.22	$44.05	$42.62	$31,856,157	$30,823,113	($1,033,044)
SAN DIEGO NMCL	$26.32	$36.51	$35.38	$34.97	$14,608,006	$14,440,400	($167,606)
SEATTLE NMCL	$46.68	$35.50	$42.04	$41.31	$1,831,903	$1,800,157	($31,746)
SUBIC BAY USNH	$26.13	$38.49	$38.84	$40.40	$8,174,300	$8,502,800	$328,500
YOKOSUKA USNH	$47.11	$38.26	$40.49	$42.54	$7,327,380	$7,698,229	$370,850
YUMA NCAS	$35.12	$40.19	$41.09	$40.51	$1,768,167	$1,743,197	($24,970)
FY84 TOTALS:					$443,420,115	$445,229,730	$1,809,616
FY84 AVERAGES:	$40.92	$37.39	$39.58	$40.19			
MINIMUM VALUE:	$22.42	$34.82	$33.67	$32.25	$705,273	$730,584	
MAXIMUM VALUE:	$65.95	$40.19	$46.73	$44.58	$31,856,157	$30,823,113	

concern is the increase in calculation complexity of a three-digit HCU. This problem is not a significant issue, since any enhancements to a measure with such important ramifications for each facility would probably be readily accepted.

In summary, despite the increase in ability to capture outpatient case-mix differences, a three-digit HCU still leaves a great deal of variation (83%) in overall outpatient costs unaccounted for between facilities. Thus, whether a three-digit methodology is adopted or not, work should continue to identify additional variables that can account for variation in costs both within and between facilities.

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*Although it was not specifically addressed in this study, consideration should be given to the possibility of collapsing those three-digit UCA codes (in the same two-digit series) that do not differ significantly in COSTPOV. This would not require any revision of the UCA system (merely a modification of the HCU weights), and could possibly increase the stability of the weights for several three-digit accounts.

ADDING FACILITY CHARACTERISTICS TO THE EQUATION

In the foregoing sections we have seen incremental improvements in the ability to explain variations in COSTPOV across facilities by applying appropriate weights to categories of outpatient care and by increasing the number of categories of care to develop indices of the complexity of cases seen at any given facility. As has been demonstrated, these indices have been only coarse measures of outpatient resource consumption. Two primary data deficiencies in the UCA limit further refinement of the HCU with regard to outpatient costs: 1) the costs that are accumulated into each UCA category can not be differentiated into fixed versus variable costs, and 2) the biometric data for outpatient care consists only of a visit tally. Given this situation, and the fact that the HCU is a basis for resource allocation decisions, additional facility characteristic variables were examined to determine whether further variation in COSTPOV could be explained.

Variable Selection and Definition

The three-digit ORI index was considered as only one variable in a multiple regression model to account for differences in productivity across 45 facilities. No special study was conducted to obtain additional data beyond that which was readily available through integrated systems. Thus, it was expected that results of the present efforts to identify additional relevant variables (or surrogates) would represent only modest improvements in explanatory power. Although numerous variables could explain variations in productivity across hospitals, the availability of data limited analyses to the following variables:

teaching mission	number of types of outpatient services offered
hospital vs clinic	number of subordinate reporting clinics
conus vs outus	size
staffing ratios	location
ORI index (3-digit)	beneficiary status

Teaching mission was operationalized by developing an index of teaching activity computed as:

$$\text{T-index} = \#\ \text{teaching programs} + \log(\text{residents} + \text{interns} + \text{fellowships})^{*}$$

Using this formula would credit the expenses associated with maintaining each teaching program in a facility but limit the relative costs associated with each additional student. Table 5 lists the T-index value associated with each teaching facility in FY84.

TABLE 5

Teaching Facility T-index Values for FY84

NH Bethesda	29.34
NH San Diego	25.44
NH Portsmouth	14.26
NH Oakland	13.17
NH Camp Pendleton	2.64
NH Jacksonville	2.61
NH Charleston	2.58
NH Pensacola	2.58
NH Bremerton	2.26

*The T-index formulation was suggested by LTCOL John A. Coventry, MSC, USA

Hospital size was based on the number of authorized operating beds for each facility. Size was coded for each of the four categories listed in Table 6. Nominal groups based on size were used in the model to reduce the collinearity of operating beds with other variables in the model. Additionally, the particular categories defined here were chosen to eliminate redundancy with the T-index and achieve a more balanced number of facilities in each category. No attempt, however, was made to classify facilities in size categories to maximize correlations with COSTPOV.

TABLE 6

Breakdown of Navy Facility Size Categories

Group Code	Definition	N
Clinic	operating beds <= 1	12
Size 1	1 < operating beds <= 50	9
Size 2	50 < operating beds <= 150	14
Size 3	150 < operating beds	10

The location of each facility was considered in several ways. First, each facility was classified as either CONUS or OUTUS. Second, GEOCOM region was coded as a nominal variable. Third, proximity of the facility to a large training center was coded as a location variable (trainpop). Facilities identified as near large training centers were: Great Lakes, San Diego, Orlando, Beaufort, Camp Lejeune, and Camp Pendleton. Close proximity to a training center was expected to reduce the overall COSTPOV since the beneficiary population would tend to be younger and healthier.

Beneficiary status was considered to be a potentially useful variable as a surrogate for illness severity. That is, the proportion of a facility's outpatient visits which were active duty, retirees, and dependents were used as variables that could potentially differentiate facility costs. Data on this variable were not readily available for clinic commands at the time of this study.

Overall facility staffing was considered a potentially important predictor of productivity. Because staffing totals were highly colinear with other variables under consideration, staffing ratios were computed as the proportion of nurses and ancillary personnel who support each physician. This variable was then log transformed to obtain a normal distribution. Various other staffing measures were analyzed for high correlations with COSTPOV, but none were as highly correlated as the above described variable. Data to create this variable were not available for clinic commands at the time of this study.

Two additional exploratory variables considered were: 1) the number of active three-digit UCA accounts at each facility, and 2) the number of subordinate clinics reporting UCA data through the core facility. The former variable was viewed as a surrogate for facility outpatient care capability that might be associated with productivity. The latter variable could potentially identify facilities with a greater proportion of fixed costs due to the support of remote sites.

Specification of the Model

Using unscreened data, overall facility COSTPOV was regressed on all independent variables in a series of stepwise regression analyses for fiscal years

FY82 - FY84. Those variables that consistently contributed to variance reduction in each year were identified. This process resulted in the elimination of several variables from further consideration: a) region, b) number of active UCA accounts, and c) number of subordinate clinics reporting UCA data. Two additional variable classes, beneficiary status proportions and physician support ratios were dropped from further analyses because data were not available for all facilities; to include these variables severely reduced the size of an already small sample.

To illustrate the potential utility of adding selected facility characteristic variables to a case-mix type measure such as the ORI index, COSTPOV was regressed on the remaining variables using FY84 unscreened data including all facilities in the sample. Variance accounted for was 39% ($p < .01$) with seven variables in the model. This represented a significant increase in explanatory power over the 17% variance explained by the three-digit ORI index alone. An examination of the residuals (the difference between actual costs and predicted costs) revealed that NH Subic Bay was an extreme outlier (studentized residual = -2.78). This facility was removed from the sample and a second regression analysis was conducted with the same variables specified. Variance accounted for in overall facility COSTPOV increased from the previous 39% to 49%. Table 7 presents the results of the analysis.

The parameter estimates in Table 7 show the dollar change in COSTPOV estimated for each unit change in each variable specified in the model. A review of Table 7 shows that COSTPOV increases as outpatient case-mix (ORI index) and/or teaching intensity (T-index) increases. COSTPOV is reduced if the facility is a hospital (as opposed to a clinic), located in CONUS, and/or situated near a large military training center.

TABLE 7

FY84 Facility Characteristics Regression Model Results

Dependent Variable: COSTPOV

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
Model	7	2204.521	314.932	4.964	.0005
Error	36	2283.841	63.440		
C Total	43	4488.362			

Root Mean Squared Error:	7.96	R-Squared:	.4912
Dependent Variable Mean:	41.26	Adj. R-Sq:	.3922

Variable	DF	Parameter Estimate	Standard Error	Standardized Estimate	Variance Inflation
Intercept	1	-9.407	26.700	0.000	0.000
size 2	1	9.916	3.601	0.448	1.872
size 3	1	7.421	4.994	0.308	3.038
ORI index	1	63.808	28.258	0.406	2.284
hospital	1	-12.005	4.969	-0.529	3.396
conus	1	-11.350	3.604	-0.453	1.466
T index	1	0.409	0.544	0.252	1.775
trainpop	1	-6.376	4.079	-0.217	1.359

Because the number of facilities in the analysis was small, particularly for the number of independent variables specified, a large degree of shrinkage of R^2 is to be expected when facility COSTPOV is regressed on the same set of independent variables in a different fiscal year. The adjusted R^2 shown in Table 7 is a formula estimate of such shrinkage. Although the model presented is primarily for illustrative purposes, an empirical procedure for estimating the degree of shrinkage was employed to further evaluate the stability of the current parameter estimates. That is, the regression equation derived from FY84 was applied to the predictor variables in the FY85 data as a cross validation.[42] Then a Pearson correlation was calculated between actual FY85 COSTPOV and the predicted FY85 COSTPOV. The resultant R^2 for the FY85 application of the FY84 derived equation was .37. The difference between R^2 from FY84 (.49) and FY85 was .12. Thus, it can be seen that the weights derived from a given year are likely to be relatively unstable.

Since the shrinkage of R^2 was substantial using the regression coefficients, a methodology for unit weighting predictor variables was used to compare predictive power.[34] Although the weights in a regression analysis represent optimal weights in the sample under analysis, they are less than optimal in a different sample. Unit weighting predictor variables eliminates shrinkage because the weights are not unstable regression coefficients, rather they reflect the fundamental positive or negative relationships of each predictor to the dependent variable. To assess the predictive power of unit weights relative to regression coefficients, a Pearson correlation was computed between a unit weighted composite and actual COSTPOV for FY84 data. The resultant R^2 was .48, virtually the same as the variance explained using regression coefficients. A cross validation of the unit weights with FY85 data showed that unit weights performed as well as the FY84 regression weights ($R^2 = .37$). Because unit weights are simple to compute and not subject to instability, it appears that unit weighting of predictor variables may be a reasonable strategy to employ should a regression approach be adopted in the future.

Allocation of Resources Based on the Model

As the results of the previous section illustrated, the consideration of fixed facility characteristics is important to understanding differences in productivity across facilities. Certainly the model is not a complete specification of all relevant variables, given the variation in COSTPOV that remains unexplained. Nevertheless, the approach used here sheds light on the impact of several variables on the performance of Navy outpatient care facilities. It is difficult to determine, however, precisely what portions of the remaining variance are due to the poor quality of the UCA data, inadequate model specification, or efficiency differences in the operations of certain facilities. Despite these uncertainties it is useful to develop and examine estimated allocations to facilities based on the proposed regression model. Table 8 lists FY84 actual costs and estimated costs for each Navy outpatient facility.

Looking at the difference between predicted versus actual COSTPOV in Table 8 highlights those facilities that the model under and over predicts. Subic Bay, which was deleted from the regression equation, is considerably different in actual expenses from those predicted by the model. By focusing on those facilities at the top and bottom of Table 8 that are not well fitted by the model, informed analysts may be able to identify unique characteristics or conditions that apply to such facilities and incorporate them in a revised model. It is anticipated that as the quality of UCA data improves through its utilization, the differences between predicted and actual costs will diminish.

An examination of the differences between predicted versus actual total outpatient expenses reveals that the model estimates an additional 21 million

TABLE 8

FY84 Actual Costs Versus Regression Model Predicted Costs Ranked by COSTPOV Difference

FACILITY NAME	ACTUAL COST PER OUTPATIENT VISIT	MODEL PREDICTED COST PER OUTPATIENT VISIT	DIFFERENCE	ACTUAL FY84 OUTPATIENT COSTS	NAVY FY84 MODEL PREDICTED COSTS	DIFFERENCE
ROOSEVELT ROADS USNH	$58.67	$46.13	($12.54)	$5,102,658	$4,011,790	($1,090,869)
ANNAPOLIS NMCL	$49.70	$37.28	($12.42)	$3,868,955	$2,902,029	($966,925)
PORTSMOUTH NMCL	$48.49	$36.36	($12.13)	$2,313,214	$1,734,510	($578,704)
OKINAWA USNH	$65.95	$54.80	($11.15)	$10,806,270	$8,979,101	($1,827,169)
KEY WEST NMCL	$53.65	$42.55	($11.10)	$2,429,347	$1,926,719	($502,628)
NEWPORT NH	$54.31	$43.98	($10.33)	$8,543,201	$6,918,185	($1,625,016)
CAMP PENDLETON NH	$41.34	$32.46	($8.87)	$21,448,126	$16,843,357	($4,604,770)
BETHESDA NH	$64.34	$55.83	($8.51)	$27,752,916	$24,080,210	($3,672,706)
MILLINGTON NH	$50.58	$42.80	($7.79)	$8,660,521	$7,327,103	($1,333,418)
LONG BEACH NH	$46.27	$39.45	($6.82)	$18,194,037	$15,512,766	($2,681,271)
ADAK BH	$46.65	$40.38	($6.27)	$875,360	$757,652	($117,708)
NAT CAPITOL REGION NMCL	$37.90	$32.00	($5.90)	$2,877,816	$2,429,650	($448,166)
CHERRY POINT NH	$38.34	$32.95	($5.39)	$5,250,647	$4,512,302	($738,345)
ORLANDO NH	$43.76	$38.49	($5.27)	$11,910,951	$10,476,687	($1,434,264)
GUANTANAMO BAY USNH	$46.44	$42.38	($4.06)	$2,413,069	$2,201,955	($211,115)
SEATTLE NMCL	$46.68	$44.80	($1.88)	$2,034,201	$1,952,223	($81,977)
GUAM USNH	$55.52	$53.72	($1.80)	$7,182,188	$6,949,157	($233,031)
CAMP LEJEUNE NH	$35.52	$33.80	($1.72)	$13,087,099	$12,451,944	($635,154)
BREMERTON NH	$48.59	$47.01	($1.58)	$9,202,509	$8,903,820	($298,689)
PORT HUENEME NMCL	$37.78	$36.51	($1.27)	$3,254,107	$3,144,658	($109,449)
JACKSONVILLE NH	$42.01	$42.08	$0.08	$23,267,080	$23,308,954	$41,874
PENSACOLA NH	$40.27	$41.38	$1.11	$18,947,551	$19,469,734	$522,184
CORPUS CHRISTI NH	$41.70	$43.04	$1.34	$7,789,501	$8,040,441	$250,940
OAK HARBOR NH	$29.90	$32.02	$2.12	$3,511,566	$3,760,215	$248,650
PORTSMOUTH NH	$47.43	$50.04	$2.61	$21,811,108	$23,013,163	$1,202,055
GREAT LAKES NH	$23.07	$25.90	$2.83	$14,634,835	$16,430,135	$1,795,300
PATUXENT RIVER NH	$29.94	$32.99	$3.04	$2,501,663	$2,755,916	$254,252
SAN DIEGO NH	$42.97	$46.32	$3.35	$31,071,232	$33,493,697	$2,422,465
LEMOORE NH	$29.19	$32.82	$3.64	$3,782,811	$4,254,554	$471,743
PHILADELPHIA NH	$39.72	$44.19	$4.47	$10,058,025	$11,190,152	$1,132,127
PEARL HARBOR NMCL	$36.00	$40.86	$4.86	$10,025,191	$11,379,447	$1,354,256
NEW LONDON NH	$35.50	$40.44	$4.94	$8,806,247	$10,032,204	$1,225,957
NEW ORLEANS NMCL	$30.77	$36.01	$5.24	$2,223,972	$2,602,818	$378,846
ROTA USNH	$39.66	$45.89	$6.23	$2,355,693	$2,725,463	$369,770
CHARLESTON NH	$32.18	$39.11	$6.93	$13,903,662	$16,896,640	$2,992,978
NORFOLK NMCL	$28.88	$36.15	$7.27	$19,184,392	$24,014,917	$4,830,525
NAPLES USNH	$45.23	$52.69	$7.46	$5,030,517	$5,859,981	$829,464
YUMA MCAS	$35.12	$43.53	$8.41	$1,511,295	$1,873,186	$361,891
SAN DIEGO NMCL	$26.32	$34.74	$8.42	$10,868,062	$14,344,973	$3,476,911
YOKOSUKA USNH	$47.11	$56.01	$8.90	$8,525,077	$10,136,370	$1,611,293
BEAUFORT NH	$22.42	$32.11	$9.69	$8,522,559	$12,205,014	$3,682,455
OAKLAND NH	$33.81	$44.00	$10.20	$23,045,423	$29,995,894	$6,950,471
QUANTICO NMCL	$29.71	$40.21	$10.50	$5,714,889	$7,734,986	$2,020,097
KEFLAVIK BH	$36.04	$49.33	$13.29	$1,298,687	$1,777,611	$478,924
SUBIC BAY USNH	$26.13	$52.31	$26.18	$5,500,060	$11,009,633	$5,509,573
FY84 TOTALS:				$431,098,290	$452,321,921	$21,223,631
FY84 AVERAGES:	$40.92	$41.51	$0.00			
MINIMUM VALUE:	$22.42	$25.90		$875,360	$757,652	
MAXIMUM VALUE:	$65.95	$56.01		$31,071,232	$33,493,697	

dollars should be budgeted. This is primarily due to the fact that Subic Bay and several large volume facilities were greatly over-estimated. Although it is recognized that facilities are funded on the basis of inpatient as well as outpatient requirements, it would be interesting to know whether those facilities that have been over estimated by this model are also facilities that have indicated a significant requirement for additional funding in the past.

A reasonable approach to using the results of this analysis would be to:

1) Investigate in greater detail facilities that are greatly over or under estimated for unidentified causal factors (e.g., bad data, unique requirements).

2) Phase in implementation of estimated budgets (e.g., 90% prior spending plus inflation plus planned changes plus 10% model estimated spending) for those facilities not estimated as requiring large budget increases.

3) As changes in allocations, policy, and technology affect facility operations over time, recalculate UCA account weights (based on more than one year) and revalidate facility characteristic variables.

RECAPITULATION AND RECOMMENDATIONS

Historically, Navy hospitals have been allocated resources based primarily on prior years funding and on productivity statistics defined by the CWU. This funding rationale has been problematic in that it did not systematically incorporate normative costs of providing specific services, nor did it take into account facility specific differences that existed among the various Navy units. Moreover, the Composite Work Unit (CWU) was originally developed as a basis for determining manpower requirements and has been used as a default measure for budget decision making because no other suitable measure existed.

In recent years, case-mix methodologies have been developed as a basis for measuring hospital performance and for identifying normative costs of providing care to homogenous groups of patients. Two notable efforts in this area that are relevant to the military have been the development of the Health Care Unit (HCU) and the work done in prior years at the Naval School of Health Sciences exploring the applicability of Diagnosis Related Groups (DRGs) to Navy hospital performance measurement. These efforts have demonstrated that incremental improvements are possible using currently available data. The work presented in this report has used the methodologies employed in these previous studies as a foundation for exploring a means of measuring outpatient performance across all Navy medical facilities.

Study efforts were directed toward three main objectives: 1) evaluating the validity of the HCU in measuring outpatient productivity in Navy facilities; 2) evaluating the utility of using three-digit Uniform Chart of Accounts (UCA) final account codes; and 3) exploring the ability of facility characteristic variables such as size, location, and mission to explain differences in performance across UCA reporting Navy units. A fundamental limitation of the present study was the deliberate use of readily available data only. That is, despite the fact that additional data on both fixed and variable expenses within facilities would be useful, no special study to obtain such information was attempted. Thus, results of the present study represent only modest improvements in outpatient performance measurement primarily due to the quality and availability of the data.

Two findings of the study indicated that although the HCU may represent an improvement over the CWU as a performance measure, there exist problems when currently proposed outpatient weights are used. An examination of the ability of the HCU to explain differences in cost per outpatient visit revealed that current HCU outpatient weights are inappropriate when applied to Navy data. Substantial changes in the ranking of normative costs for two-digit UCA accounts occurred when a partial replication of the Vector Research tri-service HCU methodology was conducted with Navy data. (Navy weights in the present study were derived from combined FY82-FY84 UCA data, inflation adjusted and screened.) The result of such rank changes was substantial shifts in productivity figures across hospitals, depending upon the weights used. Additionally, the HCU as a single index was able to account for less than 2% of the variation in cost per outpatient visit among all Navy UCA reporting facilities in FY84.

In contrast to the HCU, an index formed from weights derived for each two-digit outpatient UCA account from Navy data explained 12% of the variation in cost per outpatient visit among Navy facilities in FY84. Such an improvement was to be expected, given the source of the data; however, this result also was partially due to substantive differences in the identification and treatment of outliers.

In an effort to determine whether further improvements in variance reduction could be reliably made from UCA outpatient account codes, three-digit UCA weights were produced from the same data set and used to form an outpatient resource index (ORI) for each facility. Variation explained increased from 12% to over 17%. The number of UCA outpatient accounts involved increased from 11 to 48. This result demonstrated that three-digit expense data could improve the ability to explain differences in cost per outpatient visit among Navy facilities with only minor changes in current UCA data collection and with only minimal increases in calculation complexity.

Considering the three-digit ORI Index as only one variable in a model to account for differences in productivity, additional variables were examined to assess for systematic impact on facility cost per outpatient visit using multiple regression. Although numerous variables could potentially explain variations in productivity across hospitals, the availability of data limited analyses to the following variables:

teaching mission	number of types of outpatient services offered
hospital vs clinic	number of subordinate reporting clinics
conus vs outus	size
staffing ratios	location
ORI index (3-digit)	beneficiary status

Variables that consistently correlated with cost per outpatient visit across fiscal years were identified. Using FY84 data,* variance explained was approximately 49% with the following variables included in the model: ORI index (complex outpatient mix more costly), CONUS vs OUTUS (OUTUS more costly), hospital vs clinic (clinic commands more costly), size (a non-linear effect), teaching mission (more costly), and proximity to a large active duty training population (proximity less costly).

Clearly, the consideration of facility characteristics is important to understanding differences in performance across facilities. For this reason alone, the HCU if considered as a sole measure of productivity, is inadequate. Given the findings of the present study, utilization of productivity statistics derived from the HCU for resource allocation decision-making may be premature.

Recommendations

Based on the findings presented in this report, the following recommendations are submitted:

1. The problem of inaccurate data in the Uniform Chart of Accounts UCA data needs to be explored and remedied. Two issues are pertinent to this recommendation. First, the only systematic edit checks currently used in the handling of UCA data are those present in the statistical software that enable computer processing of the raw facility data. These edits, however, are concerned with the expense stepdown methodology only and do not pertain to the accuracy of actual workload or expense values. Presently, inaccurate or suspect data

*Subic Bay was the only facility deleted from the regression as an outlier.

values that may be present after statistical processing are only fortuitously discovered by visual examination of summary reports that may be generated. Implementing record and distribution screens such as those employed in this study would identify suspect values which could then be verified by the submitting facility.

The second issue relevant to enhancing UCA data quality is the problem of potential manipulation of workload and expense data through assignment to inappropriate UCA accounts. The methodology of the Health Care Unit (HCU) establishes normative costs per visit in numerous UCA accounts. Creative shifting of workload and expense data could easily be accomplished by facilities to appear more "productive" without appropriate controls for such a possibility. Trend screens should be developed and implemented to detect substantial shifts in costs per visit within each UCA subaccount at the facility level. These screens would not only provide a safeguard against "gaming" the system but would also provide a mechanism for monitoring the implementation of planned policy changes, such as shifting toward increased outpatient surgery.

2. There should be increased emphasis on minimizing the unnecessary use of cost pools within the UCA. Justification for the use of each cost pool should be provided by each facility UCA coordinator. The historical use of cost pools within facilities needs to be questioned. Extensive use of cost pooling across UCA accounts results in an averaging of direct expenses across three-digit accounts, thus diluting real cost differences that may exist between these subaccounts. The effect of this with regard to the HCU is imprecise specification of normative costs and a resultant loss of accuracy as a hospital perfor-

mance measure.

3. The Navy should continue to support the developmental efforts of the Tri-Service Performance Measurment Working Group (PMWG).* Specifically, the Navy should identify personnel with methods expertise in healthcare operations research or a related field and extensive experience with the Navy biometrics database and UCA data. These individuals should be assigned full time to represent the interests of the Navy in the work of the PMWG. The recommendations made by the PMWG have an extremely high probability of becoming reality for all the services. Representation and continued active participation by the Navy in the work of the PMWG will provide a means for influencing OASD(HA) mandates as well as providing much needed input regarding the differences between the Navy and the other services which impact on performance measurement.

*Recent findings and recommendations of the PMWG are detailed in reference 43.

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APPENDIX A

THREE-DIGIT AMBULATORY CARE DEFINITIONS

B. Ambulatory Care	BA Medical Care	BAA Internal Medicine
		BAB Allergy Clinic
		BAC Cardiology Clinic
		BAE Diabetic Clinic
		BAF Endocrinology (Metabolism) Clinic
		BAG Gastroenterology Clinic
		BAH Hematology Clinic
		BAI Hypertension Clinic
		BAJ Nephrology Clinic
		BAK Neurology Clinic
		BAL Nutrition Clinic
		BAM Oncology Clinic
		BAN Pulmonary Disease Clinic
		BAO Rheumatology Clinic
		BAP Dermatology Clinic
	(NEW CODE)	BAQ Infectious Disease Clinic
		BAZ Medical Care Not Elsewhere Classified
	BB Surgical Care	BBA General Surgery Clinic
		BBB Cardiovascular and Thoracic Surgery Clinic
		BBC Neurosurgery Clinic
		BBD Ophthalmology Clinic
		BBE Organ Transplant Clinic
		BBF Otorhinolaryngology Clinic
		BBG Plastic Surgery Clinic
		BBH Proctology Clinic
		BBI Urology Clinic
	(NEW CODE)	BBJ Pediatric Surgery Clinic
		BBZ Surgical Care Not Elsewhere Classified
	BC Obstetrical and Gynecological Care	BCA Family Planning Clinic
		BCB Gynecology Clinic
		BCC Obstetrics Clinic
	BD Pediatric Care	BDA Pediatrics Clinic
		BDB Adolescent Clinic
		BDC Well Baby Clinic
		BDZ Pediatric Care Not Elsewhere Classified
	BE Orthopedic Care	BEA Orthopedics Clinic
		BEB Cast Clinic
		BEC Hand Surgery Clinic
		BED Neuromusculoskeletal Screening Clinic
		BEE Orthopedic Appliance Clinic
		BEF Podiatry Clinic
	BF Psychiatric Care	BFA Psychiatric Clinic
		BFB Psychology Clinic
		BFC Child Guidance Clinic
		BFD Mental Health Clinic
	(CODE CHANGE)	BFE Social Work Services
	BG Family Practice Care	
	BH Primary Medical Care	BHA Primary Care Clinics
	(BHB DELETED)	BHC Optometry Clinic
		BHD Audiology Clinic
		BHE Speech Pathology Clinic
	BI Emergency Medical Care	
	BJ Flight Medicine Care	
	BK Undersea Medicine Care	

APPENDIX B

CURRENT HCU WEIGHTS, PRODUCT CATEGORIES, AND COMPUTATIONAL PROCEDURES

I. INPATIENT

Inpatient Account	Projected Dispositions	X	HCU Weight	=	Result 1	+	Projected Occupied Bed Days	X	HCU Weight	=	Result 2	=	HCU
AA Medical	______	X	.097	=	______		______	X	.137		______		______
AB Surgical	______	X	.319	=	______		______	X	.154		______		______
AC OB/GYN	______	X	.216	=	______		______	X	.148		______		______
AD Pediatrics	______	X	.121	=	______		______	X	.120		______		______
AE Orthopedics	______	X	.604	=	______		______	X	.078		______		______
AF Psychiatric	______	X	.330	=	______		______	X	.107		______		______
TOTAL INPATIENT													______

II. AMBULATORY

Ambulatory Account	Projected Outpatient Visits	X	HCU Weight	HCU
BA Medical	______	X	.022	______
BB Surgical	______	X	.028	______
BC OB/GYN	______	X	.021	______
BD Pediatric	______	X	.017	______
BE Orthopedic	______	X	.028	______
BF Psychiatric	______	X	.026	______
BG Family Practice	______	X	.021	______
BH Primary Medicine	______	X	.021	______
BI Emergency	______	X	.027	______
BJ Flight Med	______	X	.030	______
BK Undersea Med	______	X	.015	______
TOTAL AMBULATORY				______

III. TOTAL HCU ______

WORKSHEET INSTRUCTIONS

SECTION I: INPATIENT

1. Enter projected dispositions and projected occupied bed days for each inpatient summary account category in the appropriate columns of the worksheet.

2. Multiply each disposition entry by the appropriate HCU weight and enter the result in the column marked "Result 1". Multiply each occupied bed day entry by the appropriate HCU weight and enter the result in the column marked "Result 2". Add the values in the result 1 and result 2 columns and enter each sum in the HCU column.

3. Add the values down the HCU column for all inpatient clinical areas. Write the result in the HCU column on the line marked "Total Inpatient".

SECTION II: AMBULATORY

1. Enter the projected outpatient visits for each ambulatory summary account category in the appropriate column.

2. Multiply each outpatient visits entry by the appropriate HCU weight and enter the result in the column marked "HCU".

3. Add the values down the HCU column for all ambulatory clinical areas. Write the result in the HCU column on the line marked "Total Ambulatory".

SECTION III: TOTAL HCU

1. Sum inpatient and ambulatory HCUs and enter result as Total HCU.

APPENDIX C

ILLUSTRATIVE P-COMM DATA FOR ONE FACILITY

P-COMM B CODE DATA FOR FY 84(4TH QTR CUMULATIVE)

UIC= FACNAME=

UCACC	FYR	DIRECT EXPENSES	SUPPORT EXPENSES	ANCILLARY EXPENSES	NET PURIFIED EXPENSES	AFTER STEPDOWN	TOTAL EXPENSES	CLINICIAN SALARIES	DISPOSITIONS	OUTPATIENT VISITS	INPATIENT VISITS
BAA	84	553761	132442	551960	-231008	1279163	1047155	0	0	22878	5076
BAC	84	29399	7092	3818	-20435	40309	19874	0	0	1415	1455
BAK	84	14525	3275	3827	-1847	21627	19780	0	0	1081	101
BAP	84	84841	26146	68956	-1796	181943	180147	0	0	7619	76
BBA	84	403677	100874	150285	-163171	654836	491665	0	0	10504	3474
BBD	84	262500	59981	23579	-12381	346060	333679	0	0	9082	236
BBF	84	227655	62289	40681	-23029	330625	307596	0	0	5543	397
BBI	84	93564	35841	35562	-2528	164967	162439	0	0	4368	68
BCB	84	0	29409	280347	404888	309756	714644	0	0	32864	0
BCC	84	0	29155	361402	401402	390557	791959	0	0	32581	0
BCKA	84	630966	156731	18593	-806290	806290	0	0	0	0	0
BDA	84	391375	133167	319744	0	844286	844286	0	0	46132	0
BEA	84	461325	87973	250986	-317147	840284	523137	0	0	9394	1772
BEF	84	0	46549	10576	87972	57125	145097	0	0	3735	98
BFA	84	255333	41464	20791	-153694	317588	163894	0	0	4789	4155
BFB	84	0	10145	38	19173	10183	29356	0	0	814	0
BHAA	84	767816	180880	1001762	-35493	1950458	1914965	0	0	55679	18
BHAB	84	162	224334	150909	417418	375405	792823	0	0	17722	0
BHAC	84	71	144094	165744	397588	309909	707497.	0	0	12546	0
BHAD	84	461306	234279	230619	-197318	926204	728886	0	0	13616	0
BHAE	84	109044	85346	89733	-30179	284123	253944	0	0	10569	0
BHAF	84	173423	87686	54360	-65550	315469	249919	0	0	6962	0
BHAG	84	22009	15491	8664	-5522	46164	40642	0	0	633	0
BHAH	84	207884	121526	103008	-101530	432418	330888	0	0	10706	0
BHAI	84	71325	30296	5310	-22675	106931	84256	0	0	6083	0
BHAJ	84	69296	63729	52065	-18947	185090	166143	0	0	2622	0
BHC	84	74271	63420	1004	104790	138695	243485	0	0	4449	0
BHXB	84	595168	124369	6763	-726300	726300	0	0	0	0	0
BHXC	84	485042	89404	1458	-579904	579904	0	0	0	0	0
BI	84	840077	168905	647528	0	1656510	1656510	0	0	31823	0
BJ	84	0	24810	46932	70702	71742	142444	0	0	2231	0
		7285815	2623102	4787004	-1612811	14699921	13087110	0	0	368440	16926

APPENDIX D

LIST OF TWO-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

TWO-DIGIT RECORD SCREEN FAILURES

FYR-82

CAS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
1	00183	NH PORTSMOUTH	BK	UNDERSEA MED	.	0	0	0
2	00211	NRCL QUANTICO	BB	SURGICAL CAR	224.969	33520	149	0
3	00259	NH SAN DIEGO	BJ	FLIGHT MEDIC	.	14	0	0
4	00259	NH SAN DIEGO	BK	UNDERSEA MED	.	42	0	0
5	04984	NH BETHESDA	BG	FAMILY PRACT	.	0	0	0
6	41338	BH ADAK	BA	MEDICAL CARE	.	0	0	0
7	61337	NH BEAUFORT	BG	FAMILY PRACT	.	15375	0	0
8	61564	USNH GUANTANAMO	BA	MEDICAL CARE	225.917	531583	2353	0
9	65491	USNH SUBIC BAY	BG	FAMILY PRACT	.	0	0	0
10	66097	NH OAK HARBOR	BA	MEDICAL CARE	.	375	0	0
11	66086	NH NEWPORT	BG	FAMILY PRACT	.	29	0	0
12	68090	NH LONG BEACH	BA	MEDICAL CARE	60.387	2001047	33137	4900
13	68090	NH LONG BEACH	BB	SURGICAL CAR	58.016	1494897	25767	5477
14	68090	NH LONG BEACH	BC	OB/GYN	43.014	782331	18188	500
15	68090	NH LONG BEACH	BD	PEDIATRICS	37.022	1123567	30349	1461
16	68090	NH LONG BEACH	BE	ORTHOPEDICS	70.909	800348	11287	332
17	68090	NH LONG BEACH	BF	PSYCHIATRIC	107.317	276877	2580	136
18	68090	NH LONG BEACH	BG	FAMILY PRACT	43.513	1460486	33564	-4878
19	68090	NH LONG BEACH	BH	PRIMARY MEDI	28.672	4692070	163649	-92636
20	68090	NH LONG BEACH	BI	EMERGENCY ME	43.818	2116043	48292	-11779
21	68090	NH LONG BEACH	BJ	FLIGHT MEDIC	.	69619	0	0
22	68098	NRCL PEARL HARB	BG	FAMILY PRACT	.	0	0	0
23	68098	NRCL PEARL HARB	BK	UNDERSEA MED	.	0	0	0
24	68292	USNH YOKOSUKA	BJ	FLIGHT MEDIC	546.211	247980	454	0

FYR-83

CAS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
25	00211	NH GREAT LAKES	BK	UNDERSEA MED	.	0	0	0
26	00259	NH SAN DIEGO	BJ	FLIGHT MEDIC	.	29	0	0
27	00259	NH SAN DIEGO	BK	UNDERSEA MED	.	0	0	0
28	00267	NRCL KEY WEST	BJ	FLIGHT MEDIC	206.855	191547	926	0
29	04984	NH BETHESDA	BG	FAMILY PRACT	.	0	0	0
30	41338	BH ADAK	BA	MEDICAL CARE	.	0	0	0
31	61564	USNH GUANTANAMO	BA	MEDICAL CARE	249.450	503391	2018	38
32	65478	USNH ROOSEVELT	BE	ORTHOPEDICS	201.006	374876	1865	330
33	65491	USNH SUBIC BAY	BG	FAMILY PRACT	.	0	0	0
34	65575	NRCL SEATTLE	BA	MEDICAL CARE	.	0	0	0
35	65575	NRCL SEATTLE	BB	SURGICAL CAR	.	0	0	0
36	65575	NRCL SEATTLE	BD	PEDIATRICS	.	0	0	0
37	65575	NRCL SEATTLE	BE	ORTHOPEDICS	.	0	0	0
38	65575	NRCL SEATTLE	BF	PSYCHIATRIC	.	0	0	0
39	65575	NRCL SEATTLE	BI	EMERGENCY ME	.	0	0	0
40	66097	NH OAK HARBOR	BA	MEDICAL CARE	.	0	0	0
41	68096	USNH GUAM	BJ	FLIGHT MEDIC	.	0	0	0
42	68096	USNH GUAM	BK	UNDERSEA MED	.	0	0	0
43	68098	NRCL PEARL HARB	BG	FAMILY PRACT	.	0	0	0
44	68098	NRCL PEARL HARB	BJ	FLIGHT MEDIC	244.893	473867	1935	0

LIST OF TWO-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

TWO-DIGIT RECORD SCREEN FAILURES

FYR=84

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
45	0049A	NH BETHESDA	BG	FAMILY PRACT	.	0	0	0
46	0049A	NH BETHESDA	BJ	FLIGHT MEDIC	.	0	0	0
47	41334	NH AGAN	BA	MEDICAL CARE	.	0	0	0
48	45020	NRCL SAN DIEGO	BK	UNDERSEA MED	.	0	0	0
49	61564	USNH GUANTANAMO	BJ	FLIGHT MEDIC	213.466	28391	133	0
50	65428	USNH ROOSEVELT	BK	UNDERSEA MED	.	0	0	0
51	65491	USNH SUBIC BAY	BG	FAMILY PRACT	.	0	0	0
52	65575	NRCL SEATTLE	BA	MEDICAL CARE	.	0	0	0
53	65575	NRCL SEATTLE	BB	SURGICAL CAR	.	0	0	0
54	65575	NRCL SEATTLE	BD	PEDIATRICS	.	0	0	0
55	65575	NRCL SEATTLE	BE	ORTHOPEDICS	.	0	0	0
56	65575	NRCL SEATTLE	BF	PSYCHIATRIC	.	0	0	0
57	65575	NRCL SEATTLE	BI	EMERGENCY ME	.	0	0	0
58	66099	NRCL PORT HUENE	BK	UNDERSEA MED	.	0	0	0

TWO-DIGIT DISTRIBUTION SCREEN FAILURES

FYR=82

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	Z SCORE	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
1	00183	NH PORTSMOUTH	BG	FAMILY PRACT	16.320	-2.7855	1484147	90940	0
2	00211	NH GREAT LAKES	BJ	FLIGHT MEDIC	3.497	-3.6160	10483	2998	0
3	00231	NRCL QUANTICO	BI	EMERGENCY ME	15.343	-2.7949	66282	4320	0
4	00232	NH JACKSONVILLE	BJ	FLIGHT MEDIC	5.979	-2.8835	16484	2757	0
5	00285	NH CORPUS CHRIS	BF	PSYCHIATRIC	10.442	-2.6732	234162	22424	14
6	00285	NH CORPUS CHRIS	BH	PRIMARY MEDI	137.209	3.5269	2927903	21339	13309
7	65575	NRCL SEATTLE	BI	EMERGENCY ME	10.509	-3.6981	12043	1146	0
8	66055	NH LEMOORE	BA	MEDICAL CARE	16.711	-2.8582	83288	4984	99
9	66055	NH LEMOORE	BB	SURGICAL CAR	14.668	-3.6738	43900	2993	184
10	66058	NH PATUXENT RIV	BD	PEDIATRICS	13.653	-2.5714	50214	3678	0

FYR=83

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	Z SCORE	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
11	00183	NH PORTSMOUTH	BG	FAMILY PRACT	14.2124	-3.1806	1798540	126547	0
12	00211	NH GREAT LAKES	BJ	FLIGHT MEDIC	3.2233	-3.7284	16839	5229	0
13	66101	USNH ROTA	BB	SURGICAL CAR	18.1043	-3.1190	25581	1413	0

FYR=84

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	Z SCORE	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
14	45020	NRCL SAN DIEGO	BE	ORTHOPEDICS	15.726	-2.6479	403092	25635	0
15	62974	MCAS YUMA	BI	EMERGENCY ME	16.033	-2.6899	156912	9787	0
16	66095	NH LEMOORE	BH	PRIMARY MEDI	11.708	-2.8323	211161	18035	1
17	68096	USNH GUAM	BE	ORTHOPEDICS	159.797	2.5743	397954	2639	379

APPENDIX E

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT RECORD SCREEN FAILURES

FY=82

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
1	00183	NH PORTSMOUTH	BAE	DIABETIC	.	0	0	0
2	00183	NH PORTSMOUTH	BAE	ORGAN TRANSPLANT	.	0	0	0
3	00183	NH PORTSMOUTH	BCA	FAMILY PLANNING	.	2004	0	0
4	00183	NH PORTSMOUTH	BD	PEDIATRICS	.	0	0	0
5	00183	NH PORTSMOUTH	BEO	NEUROMUSCULOSKEL	.	0	0	0
6	00183	NH PORTSMOUTH	BEF	PODIATRY	.	0	0	0
7	00183	NH PORTSMOUTH	BFB	PSYCHOLOGY	208.693	139824	670	458
8	00183	NH PORTSMOUTH	BK	UNDERSEA MEDICINE	.	0	0	0
9	00203	NH PENSACOLA	BAM	ONCOLOGY	.	3209	0	0
10	00211	NH GREAT LAKES	BAG	GASTOENTEROLOGY	.	16580	0	0
11	00211	NH GREAT LAKES	BBH	PROCTOLOGY	.	0	0	0
12	00231	NMCL QUANTICO	BBA	GEN SURGERY	224.969	33520	149	0
13	00259	NH SAN DIEGO	BJ	FLIGHT MEDICINE	.	14	0	0
14	00259	NH SAN DIEGO	BK	UNDERSEA MEDICINE	.	42	0	0
15	00285	NH CORPUS CHRIS	BAM	ONCOLOGY	.	839	0	0
16	00285	NH CORPUS CHRIS	BBI	UROLOGY	.	37014	0	0
17	00285	NH CORPUS CHRIS	BDB	ADOLESCENT	.	8931	0	0
18	00285	NH CORPUS CHRIS	BHB	MEDICAL EXAM	.	258286	0	384
19	00619	NH OAKLAND	BAC	CARDIOLOGY	75.088	366081	4886	-145
20	00619	NH OAKLAND	BAJ	NEPHROLOGY	471.836	215629	457	1
21	00619	NH OAKLAND	BED	NEUROMUSCULOSKEL	.	0	0	0
22	00619	NH OAKLAND	BHB	MEDICAL EXAM	.	92724	0	0
23	00619	NH OAKLAND	BHC	OPTOMETRY	39.815	1551815	38976	-386
24	0498A	NH BETHESDA	BAI	HYPERTENSION	.	-181	0	0
25	0458A	NH BETHESDA	BCA	FAMILY PLANNING	.	0	0	0
26	0498A	NH BETHESDA	BDB	ADOLESCENT	.	0	0	0
27	0458A	NH BETHESDA	BDC	WELL BABY	.	0	0	0
28	0458A	NH BETHESDA	BG	FAMILY PRACTICE	.	0	0	0
29	0458A	NH BETHESDA	BH	PRIMARY MEDICINE	.	0	0	0
30	0458A	NH BETHESDA	BHB	MEDICAL EXAM	.	0	0	0
31	61337	NH BEAUFORT	BG	FAMILY PRACTICE	.	15375	0	0
32	61564	USNH GUANTANAMO	BAA	INTERNAL MED	225.917	531583	2353	0
33	61564	USNH GUANTANAMO	BBH	PROCTOLOGY	.	235	0	0
34	61564	USNH GUANTANAMO	BCA	FAMILY PLANNING	.	0	0	0
35	61564	USNH GUANTANAMO	BDB	ADOLESCENT	.	0	0	0
36	61564	USNH GUANTANAMO	BDC	WELL BABY	.	0	0	0
37	61564	USNH GUANTANAMO	BFD	MENTAL HEALTH	.	0	0	0
38	61726	NH NEW LONDON	BBD	OPHTHALMOLOGY	372.422	1078162	2895	68
39	61726	NH NEW LONDON	BHB	MEDICAL EXAM	.	1749	0	0
40	65428	USNH ROOSEVELT	BAC	CARDIOLOGY	.	247	0	0
41	65428	USNH ROOSEVELT	BBF	OTORHINOLARYNGOLOGY	.	3306	0	0
42	65491	USNH SUBIC BAY	BBD	OPHTHALMOLOGY	.	0	0	0
43	65491	USNH SUBIC BAY	BBF	OTORHINOLARYNGOLOGY	.	0	0	0
44	65491	USNH SUBIC BAY	BG	FAMILY PRACTICE	.	0	0	0
45	65492	NH ORLANDO	BEB	CAST	.	56202	0	0
46	66095	NH LEMOORE	BAC	CARDIOLOGY	.	0	0	0
47	66095	NH LEMOORE	BBD	OPHTHALMOLOGY	.	2012	0	0
48	66095	NH LEMOORE	BDC	WELL BABY	.	0	0	0
49	66095	NH LEMOORE	BFA	PSYCHIATRY	.	61	0	0
50	66097	NH OAK HARBOR	BAA	INTERNAL MED	.	375	0	0
51	66097	NH OAK HARBOR	BAB	ALLERGY	.	0	0	0
52	66097	NH OAK HARBOR	BAE	DIABETIC	.	0	0	0

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT RECORD SCREEN FAILURES

FY8-82

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
53	66097	NH OAK HARBOR	BBO	OPHTHALMOLOGY	.	0	0	0
54	66097	NH OAK HARBOR	BBI	UROLOGY	.	606	0	0
55	66097	NH OAK HARBOR	BHU	AUDIOLOGY	.	0	0	0
56	66059	NRMC PORT HUENEME	EAP	DERMATOLOGY	.	904	0	0
57	66059	NRMC PORT HUENEME	BDC	WELL BABY	.	0	0	0
58	66101	USNH ROTA	BBF	OTORHINOLARYNGOLOGY	.	0	0	0
59	68086	NH NEWPORT	BAC	CARDIOLOGY	.	0	0	0
60	68086	NH NEWPORT	BG	FAMILY PRACTICE	.	29	0	0
61	68086	NH NEWPORT	BHB	MEDICAL EXAM	86.390	302537	3502	-408
62	68090	NH LONG BEACH	BAA	INTERNAL MED	74.270	1373776	18495	6891
63	68090	NH LONG BEACH	BAC	CARDIOLOGY	.	47737	0	0
64	68090	NH LONG BEACH	BAG	GASTOENTEROLOGY	.	7091	0	0
65	68090	NH LONG BEACH	BAI	HYPERTENSION	7.634	23186	3037	0
66	68090	NH LONG BEACH	BAK	NEUROLOGY	.	94804	0	0
67	68090	NH LONG BEACH	BAL	NUTRITION	29.901	65950	2200	0
68	68090	NH LONG BEACH	BAN	PULMONARY	.	9560	0	0
69	68090	NH LONG BEACH	BAP	DERMATOLOGY	40.197	378056	9405	0
70	68090	NH LONG BEACH	BBA	GEN SURGERY	96.921	469970	4849	-1392
71	68090	NH LONG BEACH	BBB	CARDIOVAS SURGERY	.	1234	0	0
72	68090	NH LONG BEACH	BBD	OPHTHALMOLOGY	29.820	309233	10370	6642
73	68090	NH LONG BEACH	BBF	OTORHINOLARYNGOLOGY	50.835	333324	6557	192
74	68090	NH LONG BEACH	BBI	UROLOGY	95.499	381136	3991	35
75	68090	NH LONG BEACH	BCB	GYNECOLOGY	53.913	382510	7095	43
76	68090	NH LONG BEACH	BCC	OBSTETRICS	24.165	268067	11093	457
77	68090	NH LONG BEACH	BDA	PEDIATRIC	37.929	1019005	26866	1461
78	68090	NH LONG BEACH	BDB	ADOLESCENT	.	6051	0	0
79	68090	NH LONG BEACH	BDC	WELL BABY	28.283	98511	3483	0
80	68090	NH LONG BEACH	BEA	ORTHOPEDIC	60.676	637042	10499	155
81	68090	NH LONG BEACH	BEB	CAST	.	132909	0	0
82	68090	NH LONG BEACH	BEF	PODIATRY	38.575	30397	788	177
83	68090	NH LONG BEACH	BFA	PSYCHIATRY	107.317	276877	2580	136
84	68090	NH LONG BEACH	BG	FAMILY PRACTICE	43.513	1460406	33564	-4878
85	68090	NH LONG BEACH	BHA	PRIMARY CARE	30.906	4306332	139347	-80949
86	68090	NH LONG BEACH	BHC	OPTOMETRY	15.749	360676	22902	-11687
87	68090	NH LONG BEACH	BHE	SPEECH PATHOLOGY	17.903	25064	1400	0
88	68090	NH LONG BEACH	BI	EMERGENCY MEDICAL	43.818	2116043	48292	-11779
89	68090	NH LONG BEACH	BJ	FLIGHT MEDICINE	.	69619	0	0
90	68094	NH CAMP PENDLETON	BBB	CARDIOVAS SURGERY	.	330	0	0
91	68095	NH BREMERTON	BAN	PULMONARY	.	0	0	0
92	68095	NH BREMERTON	BHB	MEDICAL EXAM	.	0	0	0
93	68098	NRMC PEARL HARB	BDC	WELL BABY	.	21069	0	0
94	68098	NRMC PEARL HARB	BG	FAMILY PRACTICE	.	0	0	0
95	68098	NRMC PEARL HARB	BK	UNDERSEA MEDICINE	.	0	0	0
96	68292	USNH YOKOSUKA	BAL	NUTRITION	.	0	0	0
97	68292	USNH YOKOSUKA	BBC	NEUROSURGERY	.	0	0	0
98	68292	USNH YOKOSUKA	BHD	AUDIOLOGY	.	47975	0	0
99	68292	USNH YOKOSUKA	BJ	FLIGHT MEDICINE	546.211	247980	454	0
100	68470	USNH OKINAWA	BAC	CARDIOLOGY	.	0	0	0
101	68470	USNH OKINAWA	BAP	DERMATOLOGY	.	0	0	0

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT RECORD SCREEN FAILURES

FY=83

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
102	00181	NH PORTSMOUTH	BAE	DIABETIC	.	0	0	0
103	00181	NH PORTSMOUTH	BAH	HEMATOLOGY	214.341	372740	1739	1111
104	00203	NH PENSACOLA	BAL	CARDIOLOGY	.	0	0	0
105	00203	NH PENSACOLA	BAE	DIABETIC	.	0	0	0
106	00203	NH PENSACOLA	BAI	HYPERTENSION	.	0	0	0
107	00203	NH PENSACOLA	BAJ	NEPHROLOGY	.	0	0	0
108	00203	NH PENSACOLA	BAK	NEUROLOGY	.	0	0	0
109	00203	NH PENSACOLA	BAM	ONCOLOGY	.	0	0	0
110	00203	NH PENSACOLA	BAN	PULMONARY	.	0	0	0
111	00203	NH PENSACOLA	BEB	CAST	.	0	0	0
112	00211	NH GREAT LAKES	BAB	ALLERGY	.	0	0	0
113	00211	NH GREAT LAKES	BAF	ENDOCRINOLOGY	.	0	0	0
114	00211	NH GREAT LAKES	BAG	GASTROENTEROLOGY	.	0	0	0
115	00211	NH GREAT LAKES	BAH	HEMATOLOGY	.	0	0	0
116	00211	NH GREAT LAKES	BAI	HYPERTENSION	.	0	0	0
117	00211	NH GREAT LAKES	BAN	PULMONARY	.	0	0	0
118	00211	NH GREAT LAKES	BAO	RHEUMATOLOGY	.	0	0	0
119	00211	NH GREAT LAKES	BBB	CARDIOVAS SURGERY	.	0	0	0
120	00211	NH GREAT LAKES	BBC	NEUROSURGERY	.	0	0	0
121	00211	NH GREAT LAKES	BBG	PLASTIC SURGERY	.	0	0	0
122	00211	NH GREAT LAKES	BBH	PROCTOLOGY	.	0	0	0
123	00211	NH GREAT LAKES	BCA	FAMILY PLANNING	.	0	0	0
124	00211	NH GREAT LAKES	BDB	ADOLESCENT	.	0	0	0
125	00211	NH GREAT LAKES	BEB	CAST	.	0	0	0
126	00211	NH GREAT LAKES	BEC	HAND SURGERY	.	0	0	0
127	00211	NH GREAT LAKES	BEE	ORTHOPEDIC APPL	.	0	0	0
128	00211	NH GREAT LAKES	BFB	PSYCHOLOGY	.	0	0	0
129	00211	NH GREAT LAKES	BFC	CHILD GUIDANCE	.	0	0	0
130	00211	NH GREAT LAKES	BFD	MENTAL HEALTH	.	0	0	0
131	00211	NH GREAT LAKES	BHE	SPEECH PATHOLOGY	.	0	0	0
132	00211	NH GREAT LAKES	BK	UNDERSEA MEDICINE	.	0	0	0
133	00259	NH SAN DIEGO	BBH	PROCTOLOGY	.	18410	0	0
134	00259	NH SAN DIEGO	BED	NEUROMUSCULOSKEL	334.612	166637	498	0
135	00259	NH SAN DIEGO	BJ	FLIGHT MEDICINE	.	29	0	0
136	00259	NH SAN DIEGO	BK	UNDERSEA MEDICINE	.	0	0	0
137	00267	NRCL KEY WEST	AJ	FLIGHT MEDICINE	206.855	191547	926	0
138	00285	NH CORPUS CHRIS	AAA	INTERNAL MED	206.951	712946	3445	0
139	00285	NH CORPUS CHRIS	AAM	ONCOLOGY	.	0	0	0
140	00285	NH CORPUS CHRIS	BBI	UROLOGY	.	0	0	0
141	00285	NH CORPUS CHRIS	BDB	ADOLESCENT	.	0	0	0
142	00285	NH CORPUS CHRIS	BHB	MEDICAL EXAM	.	0	0	0
143	00619	NH OAKLAND	BAK	NEUROLOGY	46.301	172980	3736	-58
144	00619	NH OAKLAND	BEJ	NEUROMUSCULOSKEL	.	20	0	0
145	00619	NH OAKLAND	BFC	CHILD GUIDANCE	.	2755	0	0
146	00619	NH OAKLAND	BHD	AUDIOLOGY	.	31512	0	0
147	04908	NH BETHESDA	AAI	HYPERTENSION	.	0	0	0
148	04908	NH BETHESDA	BCA	FAMILY PLANNING	.	0	0	0
149	04908	NH BETHESDA	BDB	ADOLESCENT	.	0	0	0
150	04908	NH BETHESDA	BDC	WELL BABY	.	0	0	0
151	04908	NH BETHESDA	BG	FAMILY PRACTICE	.	0	0	0
152	61564	USNH GUANTANAMO	BAA	INTERNAL MED	249.450	503391	2018	10
153	61564	USNH GUANTANAMO	BBH	PROCTOLOGY	.	0	0	0

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT RECORD SCREEN FAILURES

FYR=83

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
154	61564	USNH GUANTANAMO	BCA	FAMILY PLANNING	.	0	0	0
155	61564	USNH GUANTANAMO	BDB	ADOLESCENT	.	0	0	0
156	61564	USNH GUANTANAMO	BDC	WELL BABY	.	0	0	0
157	61564	USNH GUANTANAMO	BEB	CAST	.	5236	0	0
158	61564	USNH GUANTANAMO	BFD	MENTAL HEALTH	.	0	0	0
159	61726	NH NEW LONDON	BHB	MEDICAL EXAM	.	115314	0	0
160	63032	NH KEFLAVIK	BBI	UROLOGY	.	23	0	90
161	63032	NH KEFLAVIK	BDC	WELL BABY	.	0	0	0
162	65428	USNH ROOSEVELT	BAB	ALLERGY	.	0	0	0
163	65428	USNH ROOSEVELT	BAC	CARDIOLOGY	.	0	0	0
164	65428	USNH ROOSEVELT	BEA	ORTHOPEDIC	201.006	374876	1865	330
165	65491	USNH SUBIC BAY	BG	FAMILY PRACTICE	.	0	0	0
166	65492	NH ORLANDO	BAN	PROCTOLOGY	.	0	0	0
167	65575	NHCL SEATTLE	BAP	DERMATOLOGY	.	0	0	0
168	65575	NHCL SEATTLE	BBA	GEN SURGERY	.	0	0	0
169	65575	NHCL SEATTLE	BDA	PEDIATRIC	.	0	0	0
170	65575	NHCL SEATTLE	BEA	ORTHOPEDIC	.	0	0	0
171	65575	NHCL SEATTLE	BEB	CAST	.	0	0	0
172	65575	NHCL SEATTLE	BFD	MENTAL HEALTH	.	0	0	0
173	65575	NHCL SEATTLE	BHA	PRIMARY CARE	.	0	0	0
174	65575	NHCL SEATTLE	BI	EMERGENCY MEDICAL	.	0	0	0
175	66095	NH LEMOORE	BAC	CARDIOLOGY	.	0	0	0
176	66095	NH LEMOORE	BBD	OPHTHALMOLOGY	.	0	0	0
177	66095	NH LEMOORE	BDC	WELL BABY	.	0	0	0
178	66095	NH LEMOORE	BEA	ORTHOPEDIC	.	0	0	0
179	66095	NH LEMOORE	BFA	PSYCHIATRY	.	0	0	0
180	66097	NH OAK HARBOR	BAA	INTERNAL MED	.	0	0	0
181	66097	NH OAK HARBOR	BAB	ALLERGY	.	0	0	0
182	66097	NH OAK HARBOR	BBD	OPHTHALMOLOGY	.	0	0	0
183	66097	NH OAK HARBOR	BBI	UROLOGY	.	0	0	0
184	66097	NH OAK HARBOR	BHD	AUDIOLOGY	.	0	0	0
185	66099	NHCL PORT HUENEME	BDC	WELL BABY	.	0	0	0
186	66101	USNH ROTA	BBF	OTORHINOLARYNGOLOGY	.	0	0	0
187	68084	NH CHARLESTON	BHD	AUDIOLOGY	-5.306	-77698	14643	68
188	68095	NH BREMERTON	BAN	PULMONARY	.	0	0	0
189	68095	NH BREMERTON	BHB	MEDICAL EXAM	.	0	0	0
190	68056	USNH GUAM	BAP	DERMATOLOGY	.	0	0	0
191	68056	USNH GUAM	BHB	MEDICAL EXAM	.	0	0	0
192	68056	USNH GUAM	BJ	FLIGHT MEDICINE	.	0	0	0
193	68096	USNH GUAM	BK	UNDERSEA MEDICINE	.	0	0	0
194	68098	NHCL PEARL HARB	BBA	GEN SURGERY	.	0	0	0
195	68058	NHCL PEARL HARB	BDC	WELL BABY	.	0	0	0
196	68098	NHCL PEARL HARB	BG	FAMILY PRACTICE	.	0	0	0
197	68058	NHCL PEARL HARB	BJ	FLIGHT MEDICINE	244.893	473067	193[illegible]	0
198	68101	NH PHILADELPHIA	BBI	UROLOGY	.	0	0	0
199	68101	NH PHILADELPHIA	BCC	OBSTETRICS	.	0	0	0
200	68292	USNH YOKOSUKA	BAL	NUTRITION	.	0	0	0
201	68292	USNH YOKOSUKA	BBC	NEUROSURGERY	.	0	0	0
202	68470	USNH OKINAWA	BAC	CARDIOLOGY	.	0	0	0

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT RECORD SCREEN FAILURES

FYR-84

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
203	00183	NH PORTSMOUTH	BAM	HEMATOLOGY	225.348	402246	1785	871
204	00203	NH PENSACOLA	BAC	CARDIOLOGY	.	0	0	0
205	00203	NH PENSACOLA	BAE	DIABETIC	.	0	0	0
206	00203	NH PENSACOLA	BAI	HYPERTENSION	.	0	0	0
207	00203	NH PENSACOLA	BAJ	NEPHROLOGY	.	0	0	0
208	00203	NH PENSACOLA	BAM	ONCOLOGY	.	0	0	0
209	00203	NH PENSACOLA	BAN	PULMONARY	.	0	0	0
210	00203	NH PENSACOLA	BFB	CAST	.	0	0	0
211	00259	NH SAN DIEGO	BCA	FAMILY PLANNING	.	0	0	0
212	00259	NH SAN DIEGO	BEE	ORTHOPEDIC APPL	.	0	0	0
213	00285	NH CORPUS CHRIS	BAB	ALLERGY	.	0	0	0
214	00619	NH OAKLAND	BEB	CAST	.	0	0	0
215	00619	NH OAKLAND	BEC	HAND SURGERY	.	0	0	0
216	00619	NH OAKLAND	BFC	CHILD GUIDANCE	.	0	0	0
217	0498A	NH BETHESDA	BBA	GEN SURGERY	219.091	1755141	8011	357
218	0498A	NH BETHESDA	BBC	NEUROSURGERY	202.112	393715	1948	504
219	0498A	NH BETHESDA	BCA	FAMILY PLANNING	.	0	0	0
220	0498A	NH BETHESDA	BDB	ADOLESCENT	.	0	0	0
221	0498A	NH BETHESDA	BDC	WELL BABY	.	0	0	0
222	0498A	NH BETHESDA	BG	FAMILY PRACTICE	.	0	0	0
223	0498A	NH BETHESDA	BJ	FLIGHT MEDICINE	.	0	0	0
224	41338	BH ACAA	BAA	INTERNAL MED	.	0	0	0
225	41338	BH ACAA	BHC	OPTOMETRY	.	1563	0	0
226	45020	NMCL SAN DIEGO	BEB	CAST	.	0	0	0
227	45020	NMCL SAN DIEGO	BHB	MEDICAL EXAM	.	144	0	0
228	45020	NMCL SAN DIEGO	BHD	AUDIOLOGY	.	21	0	0
229	45020	NMCL SAN DIEGO	BK	UNDERSEA MEDICINE	.	0	0	0
230	60002	NH MILLINGTON	BHD	AUDIOLOGY	39.161	11944	305	-305
231	61564	USNH GUANTANAMO	BBH	PROCTOLOGY	.	0	0	0
232	61564	USNH GUANTANAMO	BCA	FAMILY PLANNING	.	0	0	0
233	61564	USNH GUANTANAMO	BDB	ADOLESCENT	.	0	0	0
234	61564	USNH GUANTANAMO	BDC	WELL BABY	.	0	0	0
235	61564	USNH GUANTANAMO	BFD	MENTAL HEALTH	.	0	0	0
236	61564	USNH GUANTANAMO	BJ	FLIGHT MEDICINE	213.466	28391	133	0
237	61726	NH NEW LONDON	BHB	MEDICAL EXAM	.	3671	0	0
238	61726	NH NEW LONDON	BHD	AUDIOLOGY	.	4522	0	0
239	65428	USNH ROOSEVELT	BAB	ALLERGY	.	0	0	0
240	65428	USNH ROOSEVELT	BAC	CARDIOLOGY	.	0	0	0
241	65428	USNH ROOSEVELT	BK	UNDERSEA MEDICINE	.	0	0	0
242	65491	USNH SUBIC BAY	BG	FAMILY PRACTICE	.	0	0	0
243	65575	NMCL SEATTLE	BAP	DERMATOLOGY	.	0	0	0
244	65575	NMCL SEATTLE	BBA	GEN SURGERY	.	0	0	0
245	65575	NMCL SEATTLE	BDA	PEDIATRIC	.	0	0	0
246	65575	NMCL SEATTLE	BEA	ORTHOPEDIC	.	0	0	0
247	65575	NMCL SEATTLE	BEB	CAST	.	0	0	0
248	65575	NMCL SEATTLE	BFD	MENTAL HEALTH	.	0	0	0
249	65575	NMCL SEATTLE	BHA	PRIMARY CARE	.	0	0	0
250	65575	NMCL SEATTLE	BI	EMERGENCY MEDICAL	.	0	0	0
251	66095	NH LEMOORE	BAB	ALLERGY	.	0	0	0
252	66095	NH LEMOORE	BAC	CARDIOLOGY	.	0	0	0
253	66095	NH LEMOORE	BBD	OPHTHALMOLOGY	.	0	0	0
254	66095	NH LEMOORE	BBF	OTORHINOLARYNGOLOGY	.	0	0	0

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT RECORD SCREEN FAILURES

FYR=84

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
255	66055	NH LEJEUNE	BBG	PLASTIC SURGERY	323.375	10348	32	0
256	66095	NH LEJEUNE	BDC	WELL BABY	.	0	0	0
257	66055	NH LEJEUNE	BFA	PSYCHIATRY	.	0	0	9
258	66097	NH OAK HARBOR	BHB	MEDICAL EXAM	.	0	0	0
259	66099	NMCL PORT HUENEME	BAA	INTERNAL MED	.	0	0	0
260	66099	NMCL PORT HUENEME	BEB	CAST	.	0	0	0
261	66099	NMCL PORT HUENEME	BHB	MEDICAL EXAM	.	0	0	0
262	66099	NMCL PORT HUENEME	BHD	AUDIOLOGY	.	0	0	0
263	66099	NMCL PORT HUENEME	BK	UNDERSEA MEDICINE	.	0	0	0
264	66101	USNH ROTA	BAF	OTORHINOLARYNGOLOGY	.	0	0	0
265	68095	NH BREMERTON	BAN	PULMONARY	.	0	0	0
266	68095	NH BREMERTON	BHB	MEDICAL EXAM	.	0	0	0
267	68096	USNH GUAM	BCA	FAMILY PLANNING	.	0	0	0
268	68101	NH PHILADELPHIA	BAL	NUTRITION	68.261	14403	211	-6
269	68292	USNH YOKOSUKA	BAL	NUTRITION	.	0	0	0
270	68292	USNH YOKOSUKA	BAC	NEUROSURGERY	.	0	0	0
271	68470	USNH OKINAWA	BAC	CARDIOLOGY	.	0	0	0
272	68470	USNH OKINAWA	BAK	NEUROLOGY	238.952	109440	458	48
273	68470	USNH OKINAWA	BDB	ADOLESCENT	.	0	0	0
274	AF722	NMCL NAPOLA	BAP	DERMATOLOGY	.	0	0	0

LIST OF THREE-DIGIT RECORD AND DISTRIBUTION SCREEN FAILURES

THREE-DIGIT DISTRIBUTION SCREEN FAILURES

FYR=82

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	Z SCORE	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
1	00183	NH PORTSMOUTH	BAL	NUTRITION	2.397	-2.8304	9198	3838	818
2	00183	NH PORTSMOUTH	BG	FAMILY PRACTICE	16.320	-2.7714	1484147	90940	0
3	00203	NH PENSACOLA	BEB	CAST	4.117	-3.4054	15557	3779	334
4	00211	NH GREAT LAKES	BHC	OPTOMETRY	2.672	-3.9437	176536	66070	0
5	00211	NH GREAT LAKES	BJ	FLIGHT MEDICINE	3.497	-3.6160	10483	2998	0
6	00231	NMCL QUANTICO	BI	EMERGENCY MEDICAL	15.343	-2.7949	66282	4320	0
7	00232	NH JACKSONVILLE	BJ	FLIGHT MEDICINE	5.979	-2.8835	16484	2757	0
8	00259	NH SAN DIEGO	BBC	NEUROSURGERY	34.886	-2.7307	88262	2530	0
9	00285	NH CORPUS CHRIS	BBD	OPHTHALMOLOGY	8.481	-3.8033	3163	373	0
10	00285	NH CORPUS CHRIS	BDC	WELL BABY	136.614	2.7533	62296	456	24
11	00285	NH CORPUS CHRIS	BHA	PRIMARY CARE	174.304	3.9264	2420908	13889	13005
12	61337	NH BEAUFORT	BHB	MEDICAL EXAM	7.060	-2.7394	764185	108240	0
13	65575	NMCL SEATTLE	BI	EMERGENCY MEDICAL	10.509	-3.6981	12043	1146	0
14	66095	NH LEMOORE	BBA	GEN SURGERY	14.095	-3.5147	41665	2956	184
15	66095	NH LEMOORE	BBF	OTORHINOLARYNGOLOGY	6.044	-3.9910	224	37	0
16	66856	USNH NAPLES	BFD	MENTAL HEALTH	17.790	-2.9780	135845	7636	0
17	68096	USNH GUAM	BBD	OPHTHALMOLOGY	12.430	-2.9991	198725	15987	0
18	68101	NH PHILADELPHIA	BBI	UROLOGY	167.492	2.7431	265642	1586	53

FYR=83

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	Z SCORE	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
19	00183	NH PORTSMOUTH	BAL	NUTRITION	2.635	-2.7041	13820	5245	904
20	00183	NH PORTSMOUTH	BG	FAMILY PRACTICE	14.212	-3.1650	1798540	126547	0
21	00211	NH GREAT LAKES	BHC	OPTOMETRY	3.398	-3.5253	299954	88286	0
22	00211	NH GREAT LAKES	BJ	FLIGHT MEDICINE	3.220	-3.7284	16839	5229	0
23	00232	NH JACKSONVILLE	BAK	NEUROLOGY	11.016	-2.9776	17582	1596	1118
24	00259	NH SAN DIEGO	BBB	CARDIOVAS SURGERY	173.602	2.5808	154159	888	368
25	61337	NH BEAUFORT	BHA	PRIMARY CARE	11.949	-2.9156	2002695	167598	102
26	65491	USNH SUBIC BAY	BHA	PRIMARY CARE	13.580	-2.5890	1782927	131290	0
27	66101	USNH ROTA	BBA	GEN SURGERY	18.104	-2.9451	25581	1413	0
28	68101	NH PHILADELPHIA	BHC	OPTOMETRY	4.179	-3.1647	17707	4237	0

FYR=84

OBS	UIC	FACILITY NAME	ACCOUNT CODE	ACCOUNT LABEL	COST PER OUTPATIENT VISIT	Z SCORE	TOTAL EXPENSES	OUTPATIENT VISITS	INPATIENT VISITS
29	00211	NH GREAT LAKES	BHC	OPTOMETRY	3.469	-3.4890	288766	83238	0
30	00285	NH CORPUS CHRIS	BAA	INTERNAL MED	21.511	-2.9216	302319	14054	0
31	61337	NH BEAUFORT	BFB	PSYCHOLOGY	3.176	-3.7689	27350	8611	0
32	62574	MCAS YUMA	BAP	DERMATOLOGY	13.446	-2.8926	8794	654	0
33	62974	MCAS YUMA	BI	EMERGENCY MEDICAL	16.033	-2.6899	156912	9787	0
34	65491	USNH SUBIC BAY	BAP	DERMATOLOGY	13.815	-2.8093	2390	173	0
35	66095	NH LEMOORE	BAA	INTERNAL MED	22.529	-2.8057	71934	3193	37
36	68096	USNH GUAM	BEB	CAST	150.803	2.8811	9953	66	0
37	68101	NH PHILADELPHIA	BHC	OPTOMETRY	4.191	-3.1596	23124	5517	0

APPENDIX F

LIST OF TWO AND THREE DIGIT
NAVY SAMPLE UCA ACCOUNT COST WEIGHTS

ACCOUNT CODE	ACCOUNT NAME	N	OUTPATIENT VISIT COST
BA	MEDICAL CARE	104	$53.14
BAA	INTERNAL MEDICINE	95	$69.81
BAB	ALLERGY	23	$16.70
BAC	CARDIOLOGY	23	$44.61
BAE	DIABETIC	10	$25.63
BAF	ENDOCRINOLOGY	13	$33.10
BAG	GASTROENTEROLOGY	14	$76.30
BAH	HEMATOLOGY	10	$59.67
BAI	HYPERTENSION	20	$31.49
BAJ	NEPHROLOGY	11	$78.41
BAK	NEUROLOGY	35	$63.30
BAL	NUTRITION	57	$21.27
BAM	ONCOLOGY	13	$59.13
BAN	PULMONARY DISEASE	13	$52.53
BAO	RHEUMATOLOGY	12	$43.29
BAP	DERMATOLOGY	69	$35.26
BAQ	INFECTIOUS DISEASE	---	-----
BB	SURGICAL CARE	108	$58.78
BBA	GENERAL SURGERY	103	$65.46
BBB	C. V. & THOR SURGERY	11	$45.13
BBC	NEUROSURGERY	10	$88.78
BBD	OPHTHALMOLOGY	68	$53.15
BBE	ORGAN TRANSPLANT	---	-----
BBF	ENT	77	$47.67
BBG	PLASTIC SURGERY	12	$54.92
BBH	PROCTOLOGY	14	$23.82
BBI	UROLOGY	60	$66.99
BBJ	PEDIATRIC SURGERY	---	-----
BC	OB/GYN CARE	107	$36.10
BCA	FAMILY PLANNING	10	$22.57
BCB	GYNECOLOGY	104	$36.46
BCC	OBSTETRICS	97	$35.52
BD	PEDIATRIC CARE	119	$32.20
BDA	PEDIATRIC	118	$31.72
BDB	ADOLESCENT	17	$43.01
BDC	WELL BABY	34	$22.76
BE	ORTHOPEDIC CARE	102	$49.20
BEA	ORTHOPEDIC	95	$59.37
BEB	CAST	47	$29.20
BEC	HAND SURGERY	8	$42.06
BED	NEUROMUSCULOSKELETAL	5	$30.25
BEE	ORTHOPEDIC APPLICANCE	11	$51.14
BEF	PODIATRY	36	$30.86
BF	PSYCHIATRIC CARE	110	$45.36
BFA	PSYCHIATRY	84	$46.63
BFB	PSYCHOLOGY	62	$41.46
BFC	CHILD GUIDANCE	1	$21.89
BFD	MENTAL HEALTH	15	$58.21
BFE	SOCIAL WORK	---	-----
BG	FAMILY PRACTICE	60	$43.10
BH	PRIMARY MEDICAL CARE	125	$33.67
BHA	PRIMARY CARE	119	$35.99
BHB	MEDICAL EXAMINATION	41	$43.23
BHC	OPTOMETRY	115	$27.66
BHD	AUDIOLOGY	46	$16.02
BHE	SPEECH PATHOLOGY	15	$35.01
BI	EMERGENCY MEDICAL	103	$49.01
BJ	FLIGHT MEDICINE	74	$53.03
BK	UNDERSEAS MEDICINE	8	$50.02

APPENDIX G

FACILITY LIST OF HCU INDEX, TWO-DIGIT AND THREE-DIGIT ORI INDEX VALUES

FACILITY NAME	VECTOR BASED TWO-DIGIT HCU INDEX	NAVY BASED TWO-DIGIT ORI INDEX	NAVY BASED THREE-DIGIT ORI INDEX
NAT CAPITOL REGION NMCL	0.9613	0.8649	0.8268
SAN DIEGO NMCL	0.9764	0.8983	0.8698
NEW ORLEANS NMCL	0.9397	0.8702	0.8897
NORFOLK NMCL	0.9313	0.9068	0.8919
PORTSMOUTH NMCL	0.9498	0.8507	0.8952
PORT HUENEME NMCL	0.9571	0.8902	0.8975
GREAT LAKES NH	0.9962	0.9553	0.9029
ANNAPOLIS NMCL	0.9655	0.8906	0.9096
QUANTICO NMCL	0.9884	0.9505	0.9535
BEAUFORT NH	0.9759	0.9169	0.9612
PEARL HARBOR NMCL	0.9704	0.9498	0.9657
ADAK BH	0.9760	0.9497	0.9684
CAMP PENDLETON NH	0.9845	1.0093	0.9889
PENSACOLA NH	0.9900	0.9851	0.9900
NEW LONDON NH	0.9710	0.9932	0.9919
KEY WEST NMCL	0.9656	0.9495	0.9921
CHARLESTON NH	0.9944	1.0240	0.9936
GUANTANAMO BAY USNH	0.9991	0.9688	0.9997
OAKLAND NH	1.0112	1.0135	1.0025
SUBIC BAY USNH	1.0295	0.9813	1.0048
NAPLES USNH	0.9879	0.9488	1.0059
YUMA NCAS	1.0750	1.0382	1.0076
OAK HARBOR NH	1.0212	1.0110	1.0153
LONG BEACH NH	1.0032	1.0240	1.0154
GUAM USNH	0.9843	1.0251	1.0220
CAMP LEJEUNE NH	0.9969	1.0067	1.0267
SEATTLE NMCL	0.9495	1.0621	1.0274
LEMOORE NH	1.0365	1.0905	1.0279
MILLINGTON NH	1.0076	1.0324	1.0288
CHERRY POINT NH	1.0071	1.0468	1.0299
PATUXENT RIVER NH	1.0089	1.0423	1.0304
CORPUS CHRISTI NH	1.0252	1.0178	1.0326
OKINAWA USNH	1.0291	1.0389	1.0390
JACKSONVILLE NH	1.0053	1.0299	1.0399
NEWPORT NH	1.0028	1.0357	1.0472
PHILADELPHIA NH	1.0060	0.9977	1.0506
ROTA USNH	1.0224	1.0071	1.0547
YOKOSUKA USNH	1.0232	1.0230	1.0580
ROOSEVELT ROADS USNH	1.0211	1.0177	1.0585
SAN DIEGO NH	1.0221	1.1130	1.0601
ORLANDO NH	1.0307	1.0748	1.0612
BREMERTON NH	1.0317	1.1017	1.0804
BETHESDA NH	1.0477	1.1806	1.0842
PORTSMOUTH NH	1.0443	1.1446	1.0901
KEFLAVIK BH	1.0679	1.0756	1.1087
FY84 AVERAGES:	1.0000	1.0000	1.0000

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