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This study was conducted to determine if case severity is significantly related to surgical mortality and morbidity outcomes. Inpatient records were reviewed to retrieve information on case severity and whether mortalities or complications had occurred during the surgical procedures. A significant association between case severity prior to surgery and surgical outcome. The author highly recommends incorporating case severity information into outcome predictions to better assess deviations from predicted outcomes as a means of physician care quality assessment.

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FOR ASSESSING
HEALTH CARE PROVIDER PERFORMANCE

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the Requirements of the U.S. Army - Baylor University
Graduate Program in Health Care Administration

By
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I. INTRODUCTION

Background Information

Efforts to implement quality assurance programs are hindered by difficulties in the conceptualization, measurement and assessment of quality in the provision of health care. Any attempt to define quality of care produces as many responses as there are providers, administrators and ancillary support personnel. Failure to accurately define quality care results in disagreements regarding appropriate approaches to its measurement, and the selection of the necessary statistical tool. Most institutions cannot resolve these differences prior to implementing a quality assurance plan. Instead, the typical plan represents a rational response to prevailing resource and behavioral constraints existing within the health care environment. Assessment of patient care is a necessary component of any quality assurance program. Health care providers may be reluctant to participate or even actively oppose the assessment of provider performance. Common barriers to provider support are opposition to change, fiscal constraints and autonomy expectations of health care professionals.¹

Participation by physicians in the quality assurance process is critical to the success of the program. Several motivations exist for physician participation. Physicians are concerned about quality of care. Most are motivated by a strong desire to help people and the provision of quality care fulfills this need. Preservation of the respectability of the medical profession collectively, and as it impinges upon one's own practice,

forms a second reason to support quality assurance. Finally, economic motivations exist because the individual's right to practice and the institution's charter depend upon a social contract that minimum standards of care will be achieved. The factors which favor physician involvement in the quality assurance process are opposed by practical considerations. Time constraints, concerns regarding the fairness of the review process and fears of peer retribution mitigate against physician involvement.²

The health care administrator should play a forceful role in the development and evaluation of institutional standards, including those dictating quality of care. Any acceptable system of quality control must include the following components: "1. Definition of the outcomes sought in the medical care process; 2. formulation of criteria by professionals; 3. conversion of outcome criteria into numerical scores to permit machine processing; and 4. experimentation to improve prediction of outcome, use of data and refinement of the total quality-control system."³ Institutional performance is best measured by an organization's ability to meet predetermined, formally expressed objectives; however, the hospital administrator has too often abdicated responsibility for setting quality control standards. The hospital is no longer immune to the growing public demand for accountability. Rampant health care costs and increased customer awareness have contributed to the development of stringent expectations regarding the performance of health care providers and the operation of medical treatment facilities (MTFs). The administrator must participate in the process to measure the hospital's compliance with valid expectations.⁴

The perceived failure of military hospitals to meet community expectations of care has resulted in costly malpractice litigation. One of

the earlier cases to achieve media notoriety involved Colonel William Stanford, former chief of cardiac surgery at Wilford Hall Medical Center, Lackland Air Force Base, San Antonio, Texas. In May 1978, Colonel Stanford was serving on the staff of Lutheran Hospital in Milwaukee, Wisconsin in a civilian re-education program. Colonel Stanford incorrectly hooked up the heart-lung machine and this mistake caused the patient to suffer brain damage which left her as a quadriplegic without speech. Ironically, the coronary bypass procedure was successful. The chief surgeon settled the malpractice case out of court for \$575,000. The Air Force, on Stanford's behalf, contested the suit. Resultant testimony revealed a pattern of apparently substandard care provided by Colonel Stanford while assigned at Wilford Hall Medical Center. Forty-three percent of Stanford's patients died during or immediately after their operations. Two anesthesiologists refused to assist Stanford despite a 1978 Air Force evaluation which rated the surgeon as fully qualified. The defense attempted to argue that Colonel Stanford performed surgery on the most serious cases and that the extremely poor health of his patients prior to surgical intervention contributed significantly to the high mortality rate. This argument was ineffective and a \$1.8 million award was rendered on behalf of the complainants.⁵ Rising litigation costs and continued media scrutiny have highlighted a need to continue to assess the quality of patient care rendered at military hospitals. As a reaction to growing public demand, the Assistant Secretary of Defense for Health Affairs has published the Department of Defense (DoD) Directive 6025.1, subject: "Standards for DoD Health Care Provider Performance," dated 19 April 1983. Each military department has been directed to prescribe mortality and complication rate norms against which the performance of DoD health care

providers may be assessed. Under the provisions of this directive, MTF commanders are required to establish procedures for reviewing all cases involving deaths and complications and for computing the mortality and the complication rates for all providers assigned to the facility. The record of each DoD health care provider's mortality and complication rates will be the subject of annual review by the hospital credentials committee and results of this review will be maintained in the provider's credentials file. At the conclusion of each calendar year (CY), the MTF commander is required to forward a report summarizing the mortality and complication rates for the hospital through the Office of the Surgeon General to the Department of Defense. This report identifies the number of providers exceeding established thresholds and details corrective actions taken when deemed necessary.⁶

During CY 1983 only mortality rates for health care providers performing selected surgical procedures were reported in accordance with the DoD directive.⁷ Recently received correspondence from Headquarters, Department of the Army, implements an interim basis morbidity review, Phase II of the DoD Standards for Health Care Provider Performance (Appendix A). The first report of morbidity data will be required for the last quarter of CY 84. The morbidity review incorporates an assessment technique known as "occurrence screening" to identify medical or surgical outcomes complicated by untoward events or occurrences. Eighteen separate occurrence screening criteria, categorized by elements, exceptions and instructions/definitions have been published as an enclosure to the basic correspondence from Headquarters, Department of the Army. Attending physicians are required to complete "occurrence found" when applicable for each patient upon discharge,

at the death of a patient, or at the earliest time after an occurrence is identified. A random audit of 10 percent of the records of patients discharged will be performed monthly by designated personnel to insure the accuracy and timeliness of the provider screens. Results will provide a data base for appropriate quality assurance/risk management actions. Two annual morbidity reports noting occurrences by specialty per 1000 discharges, and occurrences per 1000 patient discharges will be forwarded annually through the major command to Headquarters, Department of the Army.

Many physicians have become skeptical of performance evaluations integrated into the quality assurance process because of poorly designed criteria. Unfortunately, Standards for DoD Health Care Provider Performance may be justifiably criticized. The standard mortality rate by procedure was established for CY 1983 from a review of surgical results for 1982 at fifteen DoD MTFs. The threshold for mandatory review by the hospital commander was established as one standard deviation from a procedural mean mortality rate.⁸ This method of assessment fails to account for individual case differences which impact on the success or failure of provider intervention. This shortcoming allows the provider who is identified for exceeding a procedural threshold mortality rate to argue that high risk patients rather than provider shortcomings were the source of the high mortality rate. As noted earlier, the lawyers representing Colonel Stanford and the United States Air Force attempted to use patient health prior to surgery as a factor mitigating against successful surgical outcomes. In fact, the mandatory review by the hospital commander is required to allow such determinations to be made. Regardless of the results of the hospital commander's review; however, the result becomes a permanent part of the provider's credentials

file. Presently, complication norms for selected procedures have not been established as forecast by previous directives. Any attempt to set morbidity standards without incorporating the concept of case severity will suffer similar criticism.

Severity of illness indexes use clinical data to place patients into distinct categories of interest. Recent applications have involved classification of patients into distinct clinical and financial categories to facilitate more cost-effective case-mix management. The indexes are touted as an improvement over diagnosis related groups (DRGs) because of the incorporation of clinically meaningful data which improves communication with physicians. Because severity of illness indexes are adjusted for severity, physicians may not justify disproportionate resource use based upon the position that their patients are more severely ill. Use of severity of illness indexes encourages the comparison of length of stay and other measures of resource consumption among members of the physician staff. Thus, the major indexes have the potential to measure physician performance regarding resource use and to act as a catalyst for changing inefficient provider behavior.⁹ By extension, the author contends that severeness of illness scales may be used to assess the outcome of patient care by enabling comparison of mortality and morbidity rates adjusted for case severity.

Statement of the Problem ✓

The problem is to determine if case severity is significantly related to surgical mortality and morbidity outcomes.

Objectives

The objectives of this research were to:

1. Review the CYs 1983 and 1984 reports of mortality rates by Landstuhl Army Regional Medical Center (LARMC).
2. Identify appropriate severity of illness indexes to apply to mortality review target cases.
3. Incorporate the selected indexes into the quantitative analysis of surgical mortalities and morbidities.
4. Determine the association between the selected severity of illness indexes, and mortality and morbidity outcomes.

Criteria

A level of $\alpha = .05$ was used to determine the association between case severity and surgical outcomes.

Assumption /

For the purposes of this study, it was assumed that the historical data base provided by LARMC records will be representative of current hospital activities.

Limitations

Known limitations are that:

1. The study was be limited to surgical cases at LARMC. Standards for Health Care Provider Performance, the initial attempt to assess provider performance against threshold mortalities, were limited to selected surgical cases. An examination of the same set of surgical procedures

provided a convenient subset of all therapeutic interventions at LARMC. The definitive nature of surgery facilitated easy determination of case severity before intervention and mortality/morbidity outcomes which followed.

2. The data obtained from medical records has been subjected to retrospective analysis. This was a limitation because the determination of case severity and surgical outcomes depended upon the accuracy of information contained in the medical records. Concurrent analysis would have permitted real-time education of health care providers and records administrators regarding mortality and morbidity complications of interest thereby enhancing the accuracy of records entries.
3. The research was limited to CYs 1983 and 1984. The determination of surgical outcomes resulted from a systematic review of narrative summaries and inpatient medical records. Inpatient records prior to CY 1983 have been retired and were thus not available for review.

Study Methodology

A review of the LARMC response to DoD directive 6025.1 reveals that one provider exceeded the procedural mortality threshold during the period of 1 August 1983 until 1 January 1984. No corrective action was considered necessary by the commander because the provider was not deemed to be at fault.¹⁰ The annual review conducted for CY 1984 revealed that no surgeon exceeded established mortality norms. No credentials actions were taken in those cases where mortalities occurred. A hospital-wide summary of mortality data revealed that mortality rates for each of the selected procedures were within established norms.¹¹ The sparsity of information

contained in each reponse failed to reveal whether mortality cases were reviewed to determine which factors contributed to patient mortalities. Specific criteria for examining provider performance, aside from the procedural mean mortalities for the selected surgical procedures, also were not discussed. This informational void provided the historical background from which a systematic examination of surgical outcomes was conducted.

A review of inpatient records was necessary to retrieve the information regarding case severity, and whether mortalities or complications had occurred during the designated surgical procedures. Exclusive reliance on manual selection of the inpatient records would have proven difficult and time consuming. Appendix B contains correspondence directed to the Special Studies Branch, Patient Administration Systems and Biostatistics Activity (PASBA). A special retrieval of information from the Individual Patient Data System (IPDS) was requested to provide information regarding the study variables. Results of the special study were used to retrieve inpatient medical records for further analysis. This selection of records contained the set of surgical cases deemed complicated when judged against recently published occurrence screening criteria. Records from each sample were classified according to surgery type, case severity, presence of complications and whether the patient died. A separate random sample selected approximately five percent of the surgical case records excluded by the IPDS retrieval. This random sample represented the surgical cases without complications.

Two methodologies were employed for assessing patient severity of illness. Staging is one method for segregating patients by case severity. The method calls for the classification of a medical problem or a disease

into discrete stages.¹² Variations of this concept exist and selection of an appropriate methodology facilitated comparison of states of wellness between patients. Disease stages were determined by use of disease staging criteria sets developed by SysMetric, Inc., Santa Barbara, California. In the staging methodology adopted, diseases are divided into four major categories:

- STAGE I: Conditions with no complications or problems of minimal severity.
- STAGE II: Problems limited to an organ or system; significantly increased risk of complications.
- STAGE III: Multiple site involvement; generalized systemic involvement; poor prognosis.
- STAGE IV: Death.

A panel of 23 medical consultants was formed to transpose specific diagnoses onto the staging framework described above on the basis of clinical findings and standard diagnostic nomenclature. These "medical staging criteria" were then translated into "coded criteria" by assigning diagnostic codes to describe each stage. All diseases were not included in the staging algorithm. The project focused on major diseases of each etiology-body system class which characterized the admissions of typical, short-term hospitals in the United States. Each disease of the target group was assigned to two members of the panel to be staged independently. Each condition was divided into at least the four basic staging categories, and the development of subcategories was encouraged as seemed appropriate. The results of the independent staging efforts of the two physicians were reviewed by a third physician. Joint discussions ensued to reach a consensus

of opinion. An example of the medical criteria set developed for Diabetes Mellitus is included in Appendix C.

The medical criteria sets were then translated into coded criteria sets using the three most recent international diagnostic classification systems: ICDA-8, H-ICDA-2 and ICD-9-CM. Each statement in the medical criteria sets was represented by the codes or combinations of codes reflective of the conditions described. The use of combinations of codes permits the consideration of the entire set of diagnostic data contained in the discharge summary, rather than the principle diagnosis only. Appendix D provides the coded staging criteria set for Diabetes Mellitus.¹³

A simpler measure of case severity is the "body systems affected" approach. The logic underlying this approach is simple. The number of body systems affected is an indication of the severity of the disease. One easy method of calculation is to treat each Major Diagnostic Category as a body system. The Commission on Professional and Hospital Activities (CPHA) employed the body systems approach to analyze length of stay, margin under prospective payment by diagnosis related group (DRG) and number of body systems affected.¹⁴ Conversation with Stanley Mendenhall, Case Mix Development Manager, CPHA and a presenter at the 1985 American College of Hospital Administrators Congress on Administration convinced the author to include this index of case severity.

The contingency table depicted in Table 1 provides the basic model for analysis. The two criteria of classification will be case severity and surgical outcome. Case severity refers to the assessment of patient health as determined from the selected severity of illness index prior to surgical intervention. Surgical outcome refers to the presence or absence of

mortalities or other selected complications resulting from surgery. Surgical mortalities were the initial focus of the published standards for DoD Health Care Provider Performance. Complications have become an additional item of concern with the publication of interim guidance from DoD and have been included to assess morbidity in this study. Chi square tests of homogeneity and independence will be employed to determine the relationship between case severity and surgical outcome.

TABLE 1

MODEL FOR ANALYSIS

CY 1983-1984 Surgical Cases

First criterion of classification	Second Criterion of Classification				Total
	1	2	3	C	
1	N_{11}	N_{12}	$N_{13}...$	N_{1c}	N_1
2	N_{21}	N_{22}	$N_{23}...$	N_{2c}	N_2
3	N_{31}	N_{32}	$N_{33}...$	N_{3c}	N_3
.	.	.	.	.	.
.	.	.	.	.	.
r	N_{r1}	N_{r2}	$N_{r3}...$	N_{rc}	N_r
Total	N_1	N_2	$N_3 ...$	N_c	N

Source: Wayne W. Daniel, Applied Nonparametric Statistics (Boston: Houghton Company): p. 163.

II. DISCUSSION

Sampling Results

Results of the requested records screen from PASBA indicated that LARMC had 1592 records containing the specified surgical codes for CY 1983. Comparative figures for Frankfurt Army Medical Center and the eight stateside Army medical centers totalled 20,938 records.¹⁵ A second screen of LARMC records was requested for surgical cases occurring during CY 1984. One thousand three hundred eighty-seven records were selected. This total reflects only those records coded during CY 1984.¹⁶ Detailed selection criteria and results are provided by Table 2. Selection criteria employed by PASBA did not always closely approximate occurrence screening criteria published by DoD. Items 5, 7, 9, 12, and 17 captured a broader range of records than were prescribed by occurrence screening criteria. Items 4, 13 and 15 reflect categories from which records could not be selected. Finally, one screening category, number 10, did not apply to surgical cases.

In spite of these screening deficiencies, information provided by PASBA regarding the selected LARMC records facilitated more accurate determination of those surgical cases with mortalities and other complications. Appendix E provides an extract of those surgical cases resulting in patient mortalities during CY 1983. Data provided by the extracts allowed for some records to be excluded from further consideration. For those records not excluded, a thorough review of available narrative summaries or complete inpatient records was undertaken to determine the

TABLE 2
OCCURRENCE SCREEN APPROXIMATION

Screening Criteria	Disposition	ICD-9	1983		1984	
			LARMC	Group	LARMC	Group
#1	Unable to make selection					
#2			555	12,543	24	718
#3		9952,9998	0	32	0	29
#4	Unable to make selection.					
#5	S,T,U		37	446	34	349
#6		9971,9973	0	332	0	261
#7		9970,9971 9973,9975	0	360	0	339
#8	Q,V,W		7	366	7	353
#9		9970	0	10	0	24
#10	Not required.					
#11		664,665, 9982	36	292	26	329
#12			546	11,315	570	11,447
#13	Unable to make selection.					
#14		996-999	18	1345	19	1334
#15	Selected as #6.					
#16		9987	0	0	0	1
#17			12	1179	32	1133
#18	P		0	19	0	17

¹Numbers cited correspond to occurrence screening criteria listed in Appendix A.

presence of mortalities or complications following surgery.

Results obtained from the two-fold PASBA screen and manual selection process represent a sample of surgical cases with complicated outcomes. Results are presented for CYs 83 and 84 in Appendix F and Appendix G respectively. Categories of information provided include the last four numbers of each patient's social security number, register number, procedure and occurrence found. A manual screen of 187 narrative summaries and/or inpatient records resulted in the identification of 49 surgical cases with complications. Thirteen of the complicated cases were mortalities. Severity of index scores provided by the Disease Staging and Body Systems methodologies are listed for each record, although discussion of the procedures used to obtain these results will be deferred until later in the text.

A five percent selection of records was also used to obtain a pertinent sample of uncomplicated cases. An index of operations performed during CYs 83 and 84 and available on microfiche from PASBA aided the selection process. Records which could not be located were eliminated from the sample without replacement. Cases which evidenced complications during a manual review of records and/or narrative summaries were also excluded. A total of 149 surgical cases were reviewed total and 115 were determined to be free of complications. Again, severity indexes were applied to each record and scores assigned following evaluation using the Disease Staging and Body Systems methodologies. Appendix H and Appendix I catalog results for CYs 1983 and 1984 successively.

Severity of Illness Indexes

Application of the two chosen severity of illness indexes, Disease Staging and Body Systems, proved to be the most arduous task faced in collecting data and conducting analyses. As the association between patient health prior to surgery and surgical outcome as measured by the presence or absence of mortalities and complications are the variables of interest, great care had to be taken to code the state of health presented prior to surgery.

Assignment of disease stages to each of the surgical cases proved to be a difficult, time consuming process. Staging software has been developed to implement the Disease Staging methodology. The software package is designed to assign a stage of illness from standard hospital discharge abstract data. All diagnostic codes contained in the record, gender and discharge status, plus specific procedure codes are examined in two distinct phases. First, a patient record is staged for every disease category indicated by the diagnostic codes in the discharge abstract data. Second, software flags are posted to determine whether the principal diagnosis was used to stage the secondary diagnoses. The patient is staged in the disease category with the highest numerical score related to the principal diagnosis.¹⁷ Unfortunately, neither the software package nor automation support were available to permit computer assisted staging of the surgical cases identified in this study. Microfiche copies of ICD-9-CM coded criteria for Disease Staging were purchased from the National Technical Information Service and used to manually approximate the algorithm employed by the staging software. For each surgical case identified in the samples of complicated and uncomplicated cases, principal and related diagnoses were

identified and staged by narrative description and ICD-9-CM code contained in the inpatient record. The highest stage identified by this process was then recorded as an index of case severity prior to surgery. Several difficulties were encountered in employing this methodology. The coding accomplished by Inpatient Records Branch at LARMC appeared to be consistent and of generally high quality. Narrative descriptions of the disease or condition of the patient varied considerably. Although this is not unexpected, use of a medical dictionary was necessary to identify where synonyms were employed. Application of the staging algorithm required practice and several attempts per case during the initial staging process. As experience was gained, staging proceeded more quickly and results could be expressed more confidently. The staging scores presented in Appendices F through I represent a correct application of the methodology and therefore, an accurate index of case severity. Disease Staging failed to index every case represented by the two samples. Some difficulties were encountered in staging trauma cases. Three of 49 complicated cases could not be staged, and 12 of 115 of the uncomplicated cases defied staging attempts.

The Body Systems approach was much easier to employ. A simple count was taken of Major Diagnostic Categories as reflected by the principal and secondary diagnoses listed in the narrative summary for each case. Only one case with complicated outcomes, a premature birth which resulted in death, could not be coded effectively. One fallacy was detected. The Body Systems methodology failed to quantify the extent of injury or disease when just one body system was affected. Requirements for support services, an indication of case severity, were sometimes not reflected by conditions covered by the primary and secondary diagnoses. Body Systems results listed in Appendices F

through I provide the second indication of case severity for the samples of complicated and uncomplicated surgical case results.

Chi Square Tests of Homogeneity

The chi square test of homogeneity is used to determine whether two populations are homogeneous regarding the proportion of members possessing the variable of interest. The null hypothesis, H_0 , states that the populations of interest are homogeneous. The alternative, H_1 , states that the populations of interest are heterogeneous.¹⁸ The two populations to be examined are represented by the samples of complicated and uncomplicated surgical cases. The variable of interest is case severity as reflected separately by the two severity of illness indexes. Subsets of the sample of complicated cases have been analyzed for specific complications of interest: mortalities, postoperative complications and intraoperative damage to body parts or organs during surgery. Results of the analyses are summarized in Table 3. Contingency tables and computations for each statistical analysis have been placed in the appendices noted.

Results of the chi square test of homogeneity comparing complicated and uncomplicated surgical cases reveal that the two populations are heterogeneous regarding case severity as measured by both the Disease Staging and Body Systems methodologies. An examination of the contingency table charting observed cell frequencies reveals a much higher proportion of cases assigned to Stage 3 for complicated cases, 12 of 46, compared to uncomplicated cases, one of 103. Similarly, three or more body systems are involved in nine of 48 complicated cases compared to 1 of 115 uncomplicated cases (Appendix J).

TABLE 3
CHI SQUARE TESTS OF HOMOGENEITY

Sample 1	Sample 2	Measurement of Severity	Statistical Result	Decisions	Appendix
Complicated cases	Uncomplicated cases	Disease Staging	$\chi^2 = 26.8$	Reject H_0	J
Complicated cases	Uncomplicated cases	Body Systems	$\chi^2 = 28.3$	Reject H_0	J
Mortalities	Uncomplicated cases	Disease Staging	$\chi^2 = 81.6$	Reject H_0^*	K
Mortalities	Uncomplicated cases	Body Systems	$\chi^2 = 72.9$	Reject H_0^*	K
Post/op complications	Uncomplicated cases	Disease Staging	$\chi^2 = 2.6$	Accept H_0	L
Post/op complications	Uncomplicated cases	Body Systems	$\chi^2 = 1.0$	Accept H_0	L
Intra/op damage	Uncomplicated cases	Disease Staging	$\chi^2 = 0.8$	Accept H_0	M
Intra/op	Uncomplicated cases	Body Systems	$\chi^2 = 4.1$	Reject H_0^*	M

*Cell expectancy < 1.

This pattern holds for a comparison of a subset of complicated cases, those which result in patient mortalities; and all uncomplicated cases. The samples are heterogeneous when both Disease Staging and Body Systems (Appendix K) methodologies are employed to index case severity. Because of the small number of mortalities, expected cell frequencies are small. One cell in the contingency tables reflecting each severity of illness index is fractional and this condition violates guidance usually tendered regarding minimum cell frequencies.¹⁹ However, at least one author suggests that use of chi square tests remains appropriate with expectations in excess of .5, a constraint met by the results of this study.²⁰

Different results are achieved when other subsets of complicated cases are compared with uncomplicated cases. Cases with postoperative complications were homogeneous with uncomplicated cases regarding both indexes of case severity (Appendix L). Cases with intraoperative damage to body parts or organs were homogeneous with uncomplicated cases regarding Disease Staging, and heterogeneous when the Body Systems index was used (Appendix M).

Consideration of the results of these analyses leads one to believe that case severity may indeed be related to surgical outcome when considering complications in total, or the subset of complications represented by mortalities. Conclusions regarding the relationship between intraoperative damage and case severity as measured by the Body Systems index seems less certain because the expected values are so small and the threshold for significance is barely met. A chi square test of independence has been used to determine whether case severity and surgical outcome are associated.

Chi Square Test of Independence

The chi square test of independence is used to determine association between the two variables of interest. The null hypothesis, H_0 , states that the variables are independent. The alternative hypothesis, H_1 , states that the variables are associated.²¹ The two variables examined by this study are case severity and surgical cases with complicated outcomes. The ideal situation would have permitted sampling from the larger population of all surgical cases targeted by this study. Unfortunately, the relative infrequency of all complications, and more specifically, mortalities, forced exclusive consideration of complicated surgical cases. Based upon the results of the chi square tests of homogeneity, surgical outcome as defined by mortalities/nonmortalities and case severity as defined by both the Disease Staging and Body Systems indexes were tested to determine whether they were associated. Specific categories of complications have been compared individually against the remainder of the sample regarding distribution across the Disease Staging and Body Systems indexes used to measure case severity.

Table 4 summarizes the results of each analysis. Contingency tables and statistical computations have been placed in Appendix N. Results indicated that case severity as measured by both Disease Staging and Body Systems indexes, and mortalities following surgery are associated. Nine of 11 case mortalities were indexed as Stage 3 as compared to 3 of 35 nonmortalities. Seven of 12 mortalities resulted from injuries or diseases affecting three or more body systems. Only two of 36 nonmortalities involved injuries or diseases affecting three or more body systems.

TABLE 4
CHI SQUARE TESTS OF INDEPENDENCE

Row Variable Cells	Measurement of Severity	Statistical Result	Decisions	Appendix
Mortality/ Nonmortality	Disease Staging	$\chi^2 = 23.3$	Reject H_0	N
Mortality/ Nonmortality	Body Systems	$\chi^2 = 22.7$	Reject H_0	N

III. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Results of the statistical analyses compel one to conclude that populations of surgical cases with complicated outcomes and those which are uncomplicated differ regarding the proportion of each receiving assignment to differing levels of severity as reflected by Disease Staging and Body Systems methodologies. Both indexes reflect a higher proportion of complicated cases rated more severely prior to surgical intervention than cases which conclude without complication. This trend continues when a subset of complicated cases, surgical mortalities, is compared with the sample of uncomplicated cases. Further analysis by chi square tests of independence strongly supports the direct association between case severity prior to surgery and surgical outcome.

The incorporation of severity of illness indexes into provider performance standards facilitates accurate assessment of quality of care. A measurement tool incorporating a severity of illness index would possess all of the aforementioned necessary components: 1) Desired outcomes may be defined as the change in stages or body systems affected. 2) Both Disease Staging and Body Systems criteria have been formulated by professionals. 3) Each severeness of illness indexes is scored numerically which permits automated processing. 4) Finally, a recorded pattern of observed surgical outcomes differentiated by severity of illness index will improve prediction of outcome and significant deviations from predicted outcome.

Severity of illness indexes could also be incorporated into outcome oriented evaluations of MTFs. Recent criticism has been leveled at the conditions of the physical plants of many DoD hospitals. Brooke Army Medical Center and overseas facilities in general have been condemned as inadequate.²² Type of hospital and facility size have also proven to be crucial determinants in the quality of physician performance.²³ Any comparison of facility performance regarding surgical mortalities would be enhanced by using severity of illness indexes to exclude case severity biases.

A comparison of Disease Staging and Body Systems involves several important considerations. Both reflect the relationship between case severity and surgical outcome. Disease Staging fails to classify every disease or condition and seems to fall short during mass trauma when several major body systems are involved. In contrast, the Body Systems count fails to estimate the extent of injury when only one body system is involved. Disease Staging is more cumbersome to employ manually than the application of the Body Systems methodology; however, Disease Staging has been incorporated into a software package which runs on an IBM mainframe computer. Both systems require familiarity with medical records and are labor intensive.

Recommendations

As the relationship between case severity and surgical outcome has been established, comparisons between outcomes afforded by individual providers or MTFs should incorporate an index of disease severity. In the absence of fully automated indexing systems, manual employment of Disease Staging or Body Systems should be continued retrospectively on an exceptional

basis. The relatively few number of complications recorded during this study and the small expected frequencies obtained through computation make further examination of the severity of illness indexes imperative.

ENDNOTES

¹Roice D. Luke and R. Wayne Boss, "Barriers Limiting the Implementation of Quality Assurance Programs," Health Services Research 16 (Fall 1981): 305-314.

²Joyce W. Craddock, "Using Existing Motivations to Involve Physicians in Risk Management," Hospitals 55 (1 June 1981): 63-64.

³William McKillop, "Assessing Quality of Medical Care," Hospital Administration (Fall 1974), p. 28, quoted in Paul B. Hofman, "Establishing Standards of Institutional Performance," Hospital Progress, 57 (February 1976): 52.

⁴Paul B. Hofman, "Establishing Standards of Institutional Performance," Hospital Progress 57 (February 1976): 51-53.

⁵"Unmasked M.D.," Time (1 February 1982): 48.

⁶U.S., Department of Defense, Standards for DoD Health Care Provider Performance, Directive No. 6025.1, dated 19 April 1983, pp. 1-3.

⁷Message, Office of the Surgeon General (DASG-ZX), subject: "Standards for DoD Health Care Provider Performance, Interim Reference (A) DoD Directive 6025.1, 'Standards for DoD Health Care Provider Performance,' 19 April 1983," dated 22 July 1983, p. 1. Hereinafter referred to as: Message, OTSG.

⁸Message, OTSG, p. 3.

⁹Michael Nathanson, "More hospitals Turn to SOIs, But Experts Question Their Usefulness," Modern Healthcare 15 (15 February 1985): 63.

¹⁰Correspondence, Headquarters, Landstuhl Army Regional Medical Center, subject "Review of Mortality Rates," dated 13 January 1984, p. 1.

¹¹Correspondence, Headquarters, Landstuhl Army Regional Medical Center, subject: "Annual Provider Mortality Review for 1984," dated 15 January 1985, p. 1. and enclosure.

¹²Nancy O. Graham, ed., Quality Assurance in Hospitals (Rockville, MD.: Aspen System Corporation, 1982), p. 169.

¹³Daniel Z. Louis et al., Disease Staging: A Clinically Based Approach to Measurement of Disease Severity, vol 1: Executive Summary (Springfield, Va.: National Technical Information Service): 7-15.

¹⁴Stanley Mendenhall, "DRGs Must Be Changed To Take Patient's Illness Severity Into Account," Modern Healthcare 14 (15 November 1984): 86, 88.

¹⁵Correspondence, U.S. Army Patient Administration Systems and Biostatistical Activity, subject: "Request for Occurrence Screen," dated 20 February 1985.

¹⁶Correspondence, U.S. Army Patient Administration Systems and Biostatistical Activity, subject: "Request for Occurrence Screen," dated 26 April 1985.

¹⁷Louis et al., Disease Staging, p. 17.

¹⁸Wayne W. Daniel, Applied Nonparametric Statistics (Boston: Houghton Mifflin Company): 174-175.

¹⁹Ibid., pp. 166-167.

²⁰R.C. Lewontin and J. Felsenstein, "The Robustness of Homogeneity Tests in 2XN Tables," Biometrics (March 1965): 31.

²¹Daniel, pp. 163-164.

²²Donald Robinson, "The Mess in Military Medicine," Reader's Digest (February 1985): 50.

²³Sang-O Rhee, "Factors Determining the Quality of Physician Performance in Patient Care," Medical Care 14 (September 1976): 749.

APPENDIX A

OCCURRENCE SCREENING



REPLY TO
ATTENTION OF

DASG-PSQ (M) (17 Oct 84)

DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, DC 20310-2100

HQDA LTR 40-84-5

16 November 1984

Expires 16 November 1986

SUBJECT: Occurrence Screening

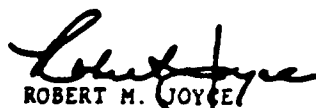
SEE DISTRIBUTION

1. This letter implements on an interim basis morbidity review, Phase II of the DOD Standards for Health Care Provider Performance. The Military Services have adopted occurrence screening as the review technique.

2. The attached procedure (Incl 1) has been established and will be implemented by all medical treatment facilities within your command. The first reporting of this data will be for the Fourth Quarter of Calendar Year 1984, with subsequent annual reports beginning with Calendar Year 1985. Any questions concerning this procedure should be directed to HQDA(DASG-PSQ), Washington, DC 20310-2100 (AUTOVON 227-2362).

BY ORDER OF THE SECRETARY OF THE ARMY:

1 Incl
as


ROBERT M. JOYCE
Major General, USA
The Adjutant General

DISTRIBUTION:

HQDA(DASG-PSQ)
COMMANDER IN CHIEF
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US ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

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COMMANDEPS
7TH MEDICAL COMMAND, EUROPE
18TH MEDICAL COMMAND, KOREA
US ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

OCCURRENCE SCREENING

1. Occurrence screening is a Quality Assurance (QA) assessment technique to identify specifically potentially important unaccepted or untoward results of medical or surgical treatment and to ensure timely staff review and analysis of these cases. It also serves to quickly identify such cases to the facility QA coordinator and risk manager for appropriate management action when indicated.
2. The 18 occurrence screens on DA Form 5365-R (Occurrence Screening Checklist) will be used. Additional screens may be added, as desired. See Inclosure 1 for exceptions, instructions, and definitions. Attending practitioners, or designated persons, complete "occurrence found" for each patient at discharge, at the death of the patient, or at the earliest time after an occurrence is identified. (Any additional variations noted for that patient during a single hospitalization should be added to the existing form.) The checklist will be sent to the MTF QA coordinator. DA Form 5365-R will be locally reproduced on 8½ x 11 inch paper. A copy for local reproduction purposes can be found at the back of this letter.
3. The MTF QA coordinator does the following:
 - a. Determines which department or service chief or committee chairperson should evaluate the identified occurrence. Following the evaluation, the Clinical Analysis of Occurrence portion is completed and returned to the QA coordinator.
 - b. Coordinates occurrences with the risk manager.
 - c. Prepares DA Form 5365-1-R (Provider Occurrence Screening Summary) monthly and sends it to the MTF QA Committee and Credentials Committee for review and consideration. DA Form 5365-1-R will be locally reproduced on 8½ x 11 inch paper. A copy for local reproduction purposes can be found at the back of this letter.
 - d. Presents appropriate cases for discussion at the QA committee meetings.
 - e. Prepares a quarterly and annual summary by clinic service groupings. The mission template of the MTF will determine the clinic services established in that facility.
4. The MTF QA Committee monitors compliance with the program and continually reports pertinent information to the Credentials Committee.
 - a. Validation of the accuracy of the "No" determinations in the "Occurrence Found" column of the DA Form 5365-R is essential for accuracy and reliability.
 - b. A random audit of at least 10 percent of the records of patients discharged will be performed monthly by designated personnel. Checklists noted to contain inappropriate responses (or where the correctness of a determination is in doubt) should be referred to the QA Committee for review and followup action.

5. The occurrence screening program applies to all military and civilian health care practitioners who, under regulations of the AMEDD, are credentialed to provide medical treatment in Army MTFs as well as interns, residents, and fellows.

6. The occurrence screening program does not negate the completion of DA Form 4106 (Report of Unusual Occurrence) per paragraph 9-8, AR 40-66.

7. Two annual reports (RCS: DD-HA(A) 1637) submitted through the MACOM are due to HQDA (DASG-PSQ), Washington, DC 20310-2300 by 15 February. These reports, to accompany the report of mortality rates, will consist of DA Form 5366-R (Occurrences by Specialty Per 1000 Patient Discharges) and DA Form 5366-1-R (Occurrences Per 1000 Patient Discharges). All specialties will be aggregated into the four categories of Pediatrics, OB/GYN, Surgery, and Medicine. All rates will be computed by type of occurrence. DA Forms 5366-R and 5366-1-R will be locally reproduced on 8½ x 11 inch paper. Copies for local reproduction purposes can be found at the back of this letter.

1 Incl

EXCEPTIONS/INSTRUCTIONS/DEFINITIONS

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
1	APPLICABLE TO HOSPITAL WITHIN 1 MONTHS FOLLOW- ING ER/OPD MANAGEMENT FOR CONDITION RELATED TO OR SUGGESTIVE OF ADVERSE RESULTS OR COM- PLICATION OF SUCH PRIOR MANAGEMENT.	1A. TREATMENT OCCURRED AT A NON-FEDERAL FACILITY.	ELEMENT 1. THE FOLLOWING ARE EXAMPLES OF ADVERSE RESULTS OF ER/OPD MANAGEMENT: -CONDITIONS RELATED TO DRUG THERAPY, E.G.: ---DIGITALIS INTOXICATION ---PHLEBITIS WITH ORAL CONTRACEPTIVES ---ANAPHYLACTIC OR OTHER DRUG REACTIONS -CONDITIONS RELATED TO ER/OPD TREATMENTS OR PROCEDURES, E.G.: ---MALUNION, NONUNION, OTHER ADVERSE RESULTS OF FRACTURE MANAGEMENT ---IRRADIATION BURNS -CONDITIONS SUGGESTIVE OF MISSED OR DELAYED DIAGNOSIS, E.G.: ---FRACTURE ---ADVANCE CHRONIC CONDITIONS NOT PREVIOUSLY DIAGNOSED (ADVANCED TUBERCULOSIS, METAS- TASIZED CANCER, ETC.) ---PERFORATED APPENDIX ---MYOCARDIAL INFARCTION

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
2	READMISSION WITHIN 6 MONTHS FOR A CONDITION REPRESENTING EITHER A COMPLICATION OF TREATMENT OR INCOMPLETE TREATMENT OF A PROBLEM PRESENT ON THE PREVIOUS ADMISSION AT THIS HOSPITAL.	1A. READMISSION FOR CHRONIC CONDITION TO MODIFY OR CHANGE THERAPEUTIC REGIMEN. 2B. MULTI-STAGE THERAPY REQUIRING REASONABLE REFRACTORY PERIODS INBETWEEN.	EXCEPTION 2A. CHRONIC CONDITIONS INCLUDE DIABETES, ASTHMA, CONGESTIVE HEART FAILURE, CHRONIC RENAL DISEASE, CANCER, CHRONIC OBSTRUCTIVE PULMONARY DISEASE, ALCOHOLISM AND DEPRESSION. THE PATIENT ADMITTED FOR CARE OF THE ACUTE STAGE OF A CHRONIC CONDITION IS EXCLUDED FROM THIS EXCEPTION.
3	HOSPITAL-INCURRED INCIDENTS INCLUDING DIAG AND TRANSFUSION REACTIONS.	3A. RESULTING PROBLEM MINOR/TRANSITORY AS EVIDENCED BY NO INCIDENT-SPECIFIC TREATMENT AND NO DELAY IN DISCHARGE.	ELEMENT 3. HOSPITAL-INCURRED INCIDENTS INCLUDE: ENVIRONMENTAL ACCIDENTS, SUCH AS FALLS, LACERATIONS, DAMAGE TO TEETH; BURNS FROM EQUIPMENT SUCH AS HEATING PAD/BLANKET, ELECTRIC SHOCK, ETC.; THERAPEUTIC MISHAPS SUCH AS FLUID OVERLOAD, IV INTERRUPTION, OR INFILTRATE, IRRADIATION BURNS, ADVERSE REACTIONS/INTERRECTIONS ATTRIBUTABLE TO BLOOD OR BLOOD PRODUCTS, CONTRAST MATERIAL, ETC.; ACTUAL/ATTEMPTED SUICIDE; INAPPROPRIATE THERAPEUTIC REGIMEN.

NOTE: A DA FORM 4106 (REPORT OF UNUSUAL OCCURRENCE) WILL BE PREPARED PER PARA 9-8c, AR 40-66.

EXCEPTION 3A. EXAMPLES OF MINOR/TRANSITORY PROBLEMS ARE HEMATOMAS, FALIS RESULTING IN BRUISES ONLY AND LACERATIONS NOT REQUIRING SUTURES.

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
4	UNEXPECTED TRANSFER FROM GENERAL CARE BED TO SPECIAL CARE UNIT, ISOLATION OR FOR EMERGENCY SURGERY OR UNEXPECTED TRANSFER FROM OPERATING ROOM TO SPECIAL CARE UNIT.	4A. TRANSFER FROM ER DIRECTLY TO SPECIAL CARE UNIT, ISOLATION OR SURGERY. 4B. TRANSFER FROM OPERATING ROOM TO SPECIAL CARE UNIT PLANNED PREOPERATIVELY.	ELEMENT 4. NONE.
5	UNANTICIPATED TRANSFER TO ANOTHER ACUTE CARE FACILITY.	5A. MANDATORY TRANSFER FOR ADMINISTRATIVE REASONS. 5B. TRANSFER FOR TEST, PROCEDURES OR SERVICES NOT AVAILABLE IN THIS MTF. 5C. TRANSFER OF STABLE PATIENT FOR PATIENT/FAMILY CONVENIENCE.	ELEMENT 5. NONE.
6	CARDIAC OR RESPIRATORY ARREST (IN ALREADY HOSPITALIZED PATIENT) INCLUDING NEWBORN HYPOXIA.	6A. PRESENCE OF A "DO NOT RESUSCITATE" ORDER. 6B. PATIENT ADMITTED FOR PLANNED TERMINAL CARE.	ELEMENT 6. ASSUME ARREST IF CODE IS CALLED OR CARDIOPULMONARY RESUSCITATION (CPR) IS PERFORMED. NEWBORN RESUSCITATION METHODS INCLUDE INTUBATION AND SUCTION, POSITIVE PRESSURE O₂, RAC BREATHING, ASPIRATION OF TRACHEA, AND ARTIFICIAL VENTILATION.

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
6 (CONT.)		6C. PATIENT IN CORONARY CARE UNIT (CCU).	
7	ORGAN FAILURE (HEART, KIDNEY, LUNG) NOT PRESENT ON ADMISSION	7A. PATIENT ADMITTED FOR PLANNED TERMINAL CARE.	ELEMENT 7. ASSUME FAILURE IF: -KIDNEY (UREAL): THE PATIENT IS PLACED ON BLOOD OR PERITONEAL DIALYSIS.
		7B. PRESENCE OF A "DO NOT RESUSCITATE" ORDER.	-ALTERNATIVE CLUES ARE: URINE OUTPUT LESS THAN 15CC/HOUR OR LESS THAN 300/CC/24 HOURS AND/OR SERUM CREATININE GREATER THAN 3MG/.
		7C. HEART FAILURE IN THE PATIENT WITH A CONFIRMED ACUTE MYOCARDIAL INFARCTION.	-LUNG: THE PATIENT IS PLACED ON A VENTILATOR.
			-HEART: THERE ARE X-RAY AND/OR CLINICAL FINDINGS OF ACUTE PULMONARY EDEMA (E.G., FROTHY SPUTUM).
8	DEATH, INCLUDING DEATH IN THE ER, DOW, AND SCIENTIFIC.	8A. PATIENT ADMITTED FOR PLANNED TERMINAL CARE.	EXCEPTIONS: 8A & B. HISTORY/ADMITTING NOTE SHOWS TERMINAL CONDITION AND ORDERS REFLECT AMPLIATIVE OR PALLIATIVE EFFORTS, NOT DIAGNOSTIC OR THERAPEUTIC MANEUVERS.
		8B. PRESENCE OF A "DO NOT RESUSCITATE" ORDER.	

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
9	SIGNIFICANT NEUROSENSORY OR FUNCTIONAL DEFECT OR INTRACTABLE PAIN NOT PRESENT ON ADMISSION.	9A. NONE.	ELEMENT 9. NEUROSENSORY OR FUNCTIONAL DEFECTS INCLUDE: -MAJOR CONVULSION, SEIZURE, OR DYSKINESIA -SIGNIFICANT LOSS OF CONSCIOUSNESS, COMA OR SIGNIFICANT LOSS OF MENTAL CAPACITY -MAJOR SENSORY IMPAIRMENT (TASTE, SIGHT, HEARING, OR TOUCH) -DIMINISHED MOTOR FUNCTION, SIGNIFICANTLY IMPAIRED USE OF AN EXTREMITY OR OF SPEECH (PARALYSIS, LOSS OF USE OF EXTREMITIES, HEMIPARESIS, PARA-, QUADRA- OR TETRAPLEGIA), STROKE, CEREBROVASCULAR ACCIDENT (CVA) OR WEAKNESS OF FACE, ARACHNOIDITIS -FECAL OR URINARY RETENTION, INCONTINENCE PERSISTING TO DISCHARGE -INTRACTABLE PAIN EVIDENCED BY ADMINISTRATION OF PARENTERAL (INTRAMUSCULAR, INTRAVENOUS, SURCUTANEOUS) ANALGESIC ON THE LAST FULL DAY PRIOR TO AND/OR DAY OF DISCHARGE EXCEPT IF ADMINISTERED AS POST OPERATIVE MEDICATION 48 HOURS SUBSEQUENT TO AN OPERATIVE PROCEDURE OR UNLESS PATIENT HAS TERMINAL CANCER. CONSULT HOSPITAL PHARMACY FOR A LIST OF ANALGESICS.

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
10	LAD VEGAR SCORE	10. NONE.	A VEGAR SCORE OF FOUR OR FIVE AT ONE MINUTE OR SEVEN OR LESS AT FIVE MINUTES.
11	LACERATION, PERFORATION, FLAK, FRACTURE OF AN ORGAN OR BODY PART OCCURRING DURING AN INVASIVE PROCEDURE, AND REQUIRING SURGICAL INTERVENTION FOR REPAIR.	11. NONE.	ELEMENT 10. INVASIVE PROCEDURES INCLUDE: -INTUBATIONS: TRACHEAL, ESOPHAGEAL, GASTRIC. -PERCUTANEOUS ASPIRATIONS: THORACENTESIS, AMNIOCENTESIS, PARACENTESIS, PERICARDIOCENTESIS, BLADDER OR BONE MARROW ASPIRATIONS. -PERCUTANEOUS BIOPSY OF: HEART, LIVER, KIDNEYS, LUNGS, PROSTATE, PANCREAS. -CATHETERIZATION OF: HEART, BLADDER, VASCULAR SYSTEM, SWAN-GANZ INSERTION, CVP INSERTION. -X-RAY PROCEDURES: ARTERIOGRAMS, VENTRICULOGRAMS, BRONCHIOGRAMS, PNEUMOCEPHALOGRAM, RENOVGRAMS. -ENDOSCOPES: BRONCHOSCOPY, CYSTOSCOPY, LARYNGOSCOPY, GASTRODUODENOSCOPY, PROCTOSIGMOIDOSCOPY, ESOPHAGOSCOPY, MEDIASTINOSCOPY, RETROGRADE BILIARY/PANCREATIC DUCT CANNULIZATION, PERITONOSCOPY, COLONOSCOPY, LAPAROSCOPY, URETEROSCOPY.

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
11. (CONT.)			
12.	UNEXPECTED RETURN TO THE OPERATING ROOM DURING SAME ADMISSION OR TRANSFER TO OPERATING ROOM FOLLOWING DELIVERY.	17. PREPLANNED AND/OR MULTISTAGE OPERATIVE PROCEDURE.	-MISCELLANEOUS: PACEMAKER INSERTION, UTERINE BOUNDING, EMBRYOS, RECTAL TEMPERATURES, PERITONEAL DIALYSIS, PERCUTANEOUS CHOLANGIOGRAPHY OR OTHER INVASIVE PROCEDURE. EXCEPTION 12. PLAN FOR MULTISTAGE PROCEDURE ON SAME ADMISSION MUST BE DOCUMENTED PRIOR TO FIRST SURGERY.
13.	UNPLANNED REMOVAL, PARTIAL REMOVAL OR REPAIR OF A NORMAL ORGAN OR BODY PART DURING AN OPERATIVE PROCEDURE.	13A. INCIDENTAL APPENDECTOMY. 13B. LYMPH NODE REMOVAL. 13C. OOPHORECTOMY IN ASSOCIATION WITH HYSTERECTOMY.	NONE.
14.	POST OPERATIVE COMPLICATIONS.	14A. URINARY TRACT INFECTION: POST GYN SURGERY. 14B. SUPERFICIAL VENOUS THROMBOPHLEBITIS. 14C. MINIMAL ATELECTASIS (X-RAY SIGNS ONLY). 14D. ENDOMETRITIS (POST CESAREAN SECTION).	EXAMPLES: WOUND SEPARATION, INFECTION, AND DEHISCENCE; PNEUMONIA; PULMONARY EDEMA; HEMATOMA WOUND; THROMBOEMBOLISM.

CRITERIA NUMBER	ELEMENTS	EXCEPTIONS	INSTRUCTIONS/DEFINITIONS
15.	AMI OR CVA DURING OR WITHIN 48 HRS OF ELECTIVE SURGERY.	15. NONE.	NONE.
16.	OPERATION FOR REMOVAL OF FOREIGN BODY LEFT IN OPERATIVE SITE.	16. NONE.	NONE.
17.	REPEAT INVASIVE DIAGNOSTIC PROCEDURE, SAME ADMISSION.	17. NONE.	EXAMPLES: BARIUM ENEMA, INTRAVENOUS PYELOGRAM, CYSTOSCOPY, ENDOSCOPY, CHOLANGIOGRAM, ARTERIOGRAM, AND AMNIOCENTESIS.
18.	DISCHARGED AGAINST MEDICAL ADVICE.	18. NONE.	NONE.

OCCURRENCE SCREENING CHECKLIST				
For use of this form see HCDA Letter 40845 the proponent agency is the Office of The Surgeon General				
CRITERIA NUMBER	TYPE OF OCCURRENCE	OCCURRENCE FOUND		ADDITIONAL DESCRIPTIVE COMMENTS (IF ANY)
		YES	NO	
1	Admission within three months for condition which may represent complication of previous outpatient treatment			
2	Readmission within six months for condition which is possibly a complication of previous treatment			
3	Hospital incurred incident including drug or transfusion reaction			
4	Unexpected transfer from general care bed to special care unit			
5	Unanticipated transfer to another acute care facility			
6	Cardiac or respiratory arrest			
7	Organ failure (heart, kidney, lung, brain) not present on admission			
8	Death			
9	Neurosensory or functional deficit (intractable pain) not present on admission			
10	APGAR score of four or less at one minute or seven or less at five minutes			
11	Injury of organ/body part during invasive procedure (including obstetric delivery)			
12	Unexpected return to the OR			
13	Unplanned removal or repair of normal body part during surgery (not documented on the informed consent)			
14	Post operation complication			
15	Acute MI or CVA within 48 hours after elective surgery			
16	Operation for removal of foreign body left in operative site			
17	Repeat invasive diagnostic procedure during same admission			
18	Discharged against medical advice			
PATIENT'S NAME, REGISTER NUMBER AND WARD		NAME OF PRACTITIONER AND DATE COMPLETED		

CLINICAL ANALYSIS OF OCCURRENCE	
REVIEWING DEPARTMENT SERVICE CHIEF COMMITTEE CHAIRPERSON	
EVALUATION	
OCCURRENCE WARRANTS FURTHER REVIEW BY QA COMMITTEE ☐ YES ☐ NO	
SIGNATURE OF EVALUATOR (After signing forward to QA Coordinator,	DATE
ACTION TAKEN BY QA COMMITTEE	
☐ NONE REQUIRED ☐ YES (Explain)	
SIGNATURE OF QA CHAIRPERSON	
DATE	

OCCURRENCES BY SPECIALTY PER 1000 PATIENT DISCHARGES		REPORTS CONTROL SYMBOL DD-HA-A-163
For use of this form see HQDA Letter 40-845. The proponent agency is the Office of The Surgeon General.		
NAME AND ADDRESS OF MEDICAL TREATMENT FACILITY	SPECIALTY (Check one block) ☐ PEDIATRICS ☐ OB/GYN ☐ SURGERY ☐ MEDICINE	SERVICE
		REPORTING PERIOD
		TOTAL SPECIALTY DISCHARGES IN REPORTING PERIOD
CRITERIA NUMBER	TYPE OF OCCURRENCE	RATE 1000 SPECIALTY DISCHARGES BY TYPE OF OCCURRENCE
1	Admission within three months for condition which may represent complication of previous outpatient treatment	
2	Readmission within six months for condition which is possibly a complication of previous treatment	
3	Hospital incurred incident including drug transfusion reaction	
4	Unexpected transfer from general care bed to special care unit	
5	Unanticipated transfer to another acute care facility	
6	Cardiac or respiratory arrest	
7	Organ failure: heart, kidney, lung, brain not present on admission	
8	Death	
9	Neurosensory or functional deficit, intractable pain not present on admission	
10	APGAR score of four or less at one minute or seven or less at five minutes	
11	Injury of organ/body part during invasive procedure (including obstetric delivery)	
12	Unexpected return to the OR	
13	Unplanned removal or repair of normal body part during surgery (not documented on the informed consent)	
14	Post operation complication	
15	Acute MI or CVA within 48 hours after elective surgery	
16	Operation for removal of foreign body left in operative site	
17	Repeat invasive diagnostic procedure during same admission	
18	Discharged against medical advice	
PREPARED BY (Type name and signature)		DATE
SIGNATURE OF APPROVING OFFICIAL		DATE

OCCURRENCES PER 1000 PATIENT DISCHARGES				REPORTS CONTROL SYMBOL DD-HAIA-1637	
For use of this form, see HQDA Letter 40845 the proponent agency is the Office of The Surgeon General					
NAME AND ADDRESS OF MEDICAL TREATMENT FACILITY		SERVICE	TOTAL DISCHARGES IN REPORTING PERIOD		
		REPORTING PERIOD			
CRITERIA NUMBER	TYPE OF OCCURRENCE	FACILITY RATE 1000 DISCHARGES BY OCCURRENCES	PROVIDER RANGE BY OCCURRENCE		
			LOWEST PROVIDER RATE 1000 DISCHARGES	HIGHEST PROVIDER RATE 1000 DISCHARGES	
1	Admission within three months for condition which may represent complication of previous outpatient treatment				
2	Readmission within six months for condition which is possibly a complication of previous treatment				
3	Hospital incurred incident including drug transfusion reaction				
4	Unexpected transfer from general care bed to special care unit				
5	Unanticipated transfer to another acute care facility				
6	Cardiac or respiratory arrest				
7	Organ failure (heart, kidney, lung, brain) not present on admission				
8	Death				
9	Neurosensory or functional deficit, intractable pain not present on admission				
10	APGAR score of four or less at one minute or seven or less at five minutes				
11	Injury of organ/body part during invasive procedure (including obstetric delivery)				
12	Unexpected return to the OR				
13	Unplanned removal or repair of normal body part during surgery (not documented on the informed consent)				
14	Post operation complication				
15	Acute MI or CVA within 48 hours after elective surgery				
16	Operation for removal of foreign body left in operative site				
17	Repeat invasive diagnostic procedure during same admission				
18	Discharged against medical advice				
PREPARED BY (Typed Name and Signature)		DATE			
SIGNATURE OF APPROVING OFFICIAL		DATE			

APPENDIX B

CORRESPONDENCE WITH SPECIAL STUDIES BRANCH

PATIENT ADMINISTRATION SYSTEMS AND BIOSTATISTICS ACTIVITY

AEMLA-AG

19 November 1984

SUBJECT: Request for Occurrence Screen

THRU: Commander
2d General Hospital
ATTN: AEMLA-XO
APO 09180

TO: Commander
US Army Patient Administration Systems &
Biostatistics Activity (PASBA)
ATTN: Ms. Joyce Hutchins
Ft. Sam Houston, TX 78234

1. As advised during my phone call of 9 November 1984, I am submitting this correspondence to request a special retrieval from the IPDS data base.

a. PASBA is currently producing "selective procedure mortality data" in response to DOD Directive No. 6025.1. Recent correspondence from OTSG, Subject: "Occurrence Screening" (Encl 1) seeks to incorporate 18 occurrence screens into the assessment of quality assurance in military medical treatment facilities. Request that the assessment of selected surgical procedures be extended to include these occurrence screens which have been designed to detect complications as well as mortalities. Enclosure 2 provides a proposal for retrieval of data from the IPDS data base.

b. Request that the retrieval of requested information be conducted from CY 83 data for

1) 2d General Hospital and,

2) As a roll-up of 2d General Hospital IPDS record submissions and those of similar facilities whose CY 83 IPDS submissions have been complete enough to permit meaningful comparison.

2. This special retrieval will serve a twofold purpose:

a. 2d General Hospital will be able to determine the usefulness of the IPDS data base in accomplishing occurrence screening.

AEMLA-AG

19 November 1984

SUBJECT: Request for Occurrence Screen

b. Information gained will be used to effect analysis of the quality assurance assessment effort.

3. Point of contact for further information is CPT Michael H. Kennedy. Telephone number is AUTOVON 483-1110 (Kaiserslautern, West Germany). Ask the operator to provide a connection to Landstuhl Military 7190 or 8107.

2 Encl

MICHAEL H. KENNEDY
CPT, MSC
Administrative Resident

REQUESTED MODIFIED ASSESSMENT OF SELECTED SURGICAL PROCEDURES

1. Modify the selected mortality data gathering procedures to screen the following:

a. For the selected surgical procedures (no change), identify:

1) Mortalities and

2) Complications as noted by the following occurrence screens (potential sources of information in parentheses).

a) Readmission within six months (DA Form 2985, Fields 17 or 18).

b) Drug or transfusion reaction (ICD-9:995.2 & 999.8).

c) Unexpected transfer from general care bed to special care bed (?).

d) Unanticipated transfer to another acute care facility (DA Form 2985; Field 15, Codes S, T, U).

e) Cardiac or respiratory arrest (ICD-9:997.1 & 997.3).

f) Organ failure (heart, kidney, lung, brain) not present at admission (ICD-9:997.0, 997.1, 997.3, 997.5).

g) Neurosensory or functional deficit or intractable pain not present on admission (?).

h) Injury of organ/body part during invasive procedure, including obstetrical delivery (ICD-9:998.2, 664, 665).

i) Unexpected return to operating room (DA Form 2985, Fields 46-53).

j) Unplanned removal or repair of normal body part during surgery (?).

k. Post-operative complications (996-999).

1) Acute MI or CVA after surgery (same as e?).

m) Operation for removal of foreign body left in operative site (ICD-9: 998.7).

n) Repeat of the same invasive procedure during the same (DA Form 2985, Fields 46-53).

o) Discharged against medical advice (DA Form 2985; Field 15, Code P).

As selected by the proposed data retrieval, the complications listed are post-operative in nature. An attempt has been made to list applicable DA Form 2985 and ICD-9 Codes, although this effort should not be considered comprehensive and requires further examination and confirmation.

2. Suggested format for output:

PATIENT'S SSN

AGE

GENDER

DIAGNOSTIC CODE

SURGICAL PROCEDURE

MORTALITY

COMPLICATION

APPENDIX C

MEDICAL CRITERIA SET

DISEASE STAGING

STAGE	COMMON DESCRIPTION OR NAME OF THE CONDITION	ALTERNATE DESCRIPTION OR SYNONYM	SUPPORTING EVIDENCE OR CLUES
1.0	DIABETES MELLITUS	HYPERGLYCEMIA; 'SUGAR DIABETES'	NORMAL HISTORY AND PHYSICAL, EXCEPT FOR POSSIBLY HISTORY OF POLYURIA - POLYDIPSIA SUGAR ELEVATION AS DEFINED. FASTING BLOOD SUGAR GREATER THAN 110 MG/DL OR 2-HOUR POSTPRANDIAL GREATER THAN 140 MG/DL AND WITHOUT KETONURIA AND WITHOUT ANY OTHER COMPLICATIONS; OR 2 RANDOM BLOOD SUGARS GREATER THAN 140 MG/DL
2.1	DIABETES MELLITUS WITH AN INFECTION IN ONE OR MORE SYSTEMS (SKIN, GENITAL TRACT, URINARY TRACT INFECTION, ETC.)	DIABETES MELLITUS WITH COMPLICATIONS OF INFECTIONS NATURAL (PYODERMMA, IMPETIGO) FURUNCULOSIS, MONILIAL VULVITIS, MONILIAL SKIN INFECTIONS; CYSTITIS, URETHRITIS, EPIDIDYMITIS PROSTATITIS PYELONEPHRITIS	DESCRIPTION AND/OR CULTURE EVIDENCE OF CUTANEOUS SKIN INFECTIONS; G.U. TRACT SYMPTOMS ASSOCIATED WITH INFECTION-URGENCY, FREQUENCY, DYSDURIA, CLOUDY, MALODOUROUS URINE, HEMATURIA, PYURIA; LAB RESULTS CONFIRMING INFECTIONS; POSITIVE CULTURE (CATN OR MIDSTREAM), POSITIVE URINE ANALYSIS, BACTERIA, MGC'S, POSITIVE GRAM STAIN.
2.2	DIABETES MELLITUS WITH SEPTICEMIA	DIABETES MELLITUS, INFECTION AND ASSOCIATED TOXINS OF BACTERIA IN BLOOD STREAM	DEFINED SOURCE OF INFECTION SUCH AS UTI, PNEUMONIA, PERFORATION OF GI VISCUS, ETC.- WITH ASSOCIATED CHILLS, FEVER, MALAISE, POSSIBLE DECREASE IN BP WITH OR W/O, SEPSIS STRONG POSSIBILITY OF POSITIVE BLOOD CULTURE
2.3	DIABETES MELLITUS WITH ACIDOSIS	DIABETIC ACIDOSIS OR KETOSIS, DIABETES WITH KETONURIA OR KETONEMIA	LAB TESTS AS DEFINED PLUS ELEVATED SUGAR AND HISTORY; INCREASED SOMNOLENCE, FRUITY BREATH, FATIGABILITY AND IRRITABILITY, ANOREXIA, DIABETIC KETOACIDOSIS BUT WITHOUT COMA; SERUM PH LESS THAN 7.35 OR CO2 LESS THAN 25 MG/DL LITER AND PRESENCE OF ACETONE IN URINE
2.4	DIABETES MELLITUS WITH: RETINOPATHY BUT WITHOUT LOSS OF VISION OR GLAUCOMATOCLOSIS (WITHOUT AZIOTIA) OR NEUROPATHY (PERIPHERAL OR AUTONOMIC) OR GANGRENE (TISSUE BREAKDOWN)	NEUROROPATHY KOPPELSTEIN-WILSON DISEASE ARTERIAL INSUFFICIENCY WITH ASSOCIATED TISSUE BREAKDOWN	-FUNDUSCOPY: DELAYATION OF VEINS, MICROANEURYSMS (USUALLY, NEURON MACULA), MANY EXUDATES. AT THIS STAGE NO NEOVASCULARIZATION OR PROLIFERATIVE RETINOPATHY -USUALLY ASYMPTOMATIC ALBUMINURIA; ASSOC. ELEVATION OF BP MAY BE DUE TO RENAL LESION PERIPHERAL NEUROPATHY: -SENSORY: LOSS OF VIBRATORY SENSE, PARESTHESIAS, PAIN -NEUROVASCULAR: WEAKNESS, PARALYSIS, ABSENT TENDON REFLEXES, DIABETIC AMYOTROPHY (THINGS) AUTONOMIC NEUROPATHY: -EYE: EXTRACULAR MUSCLE PALSES, PUPILLARY CHANGES; -GI: DECREASE GASTRIC EMPTYING, AND DYSFUNCTION. NOCTURNAL DIARRHEA; -BL: IMPOTENCE, ATONY OF BLADDER; -VASCULAR: ORTHOSTATIC HYPOTENSION; -SKIN: ABSENT SWEATING, DEPENDENT EDEMA, NEUROGENIC ULCER HISTORY: CLAUDICATION, TRAUMA, EVIDENCE OF NEUROPATHY (PAINLESS FOOT); PE: PULSELESS FOOT, CHARACTERISTIC CHANGES IN TEMPERATURE AND COLOR
3.1	DIABETES MELLITUS WITH: ACIDOSIS AND COMA OR RETINOPATHY AND LOSS OF VISION OR NECROTIZING PAPILLITIS OR AZIOTIA	DIABETIC COMA KETOSIS/ACIDOSIS PROLIFERATIVE RETINOPATHY PAPILLARY NECROSIS, MACULAR NECROSIS	HISTORY: PERHAPS, NO INSULIN IN DIABETES DIABETIC; NAUSEA, VOMITING, ABDOMINAL PAIN, LABORED BREATHING (KUSSMAUL), THIRST, PE: DEHYDRATION SOMNOLENCE, RELATIVE HYPOTENSION, TACHYCARDIA LAB: AS MENTIONED, PLUS INC. BUN, USUALLY ELEVATED POTASSIUM, INC. MET., PH LESS THAN 7.3 CARBON DIOXIDE LESS THAN 10 MG/DL LITER -AS DESCRIBED IN STAGE 2 PLUS NEOVASCULARIZATION, PROLIFERATIVE RETINOPATHY, AND POSSIBLY RETINAL DETACHMENT -AS DESCRIBED PLUS PYELONEPHRITIS, OBSTRUCTIVE SIGNS AND SYMPTOMS, PERHAPS BACTEREMIA, DETERIORATING RENAL FUNCTION TESTS (PAPILLAS IN URINE OR IVP EVIDENCE) -AS STATED PLUS ACIDOSIS (HYPERPHOSPHATEMIA, HYPOCALCEMIA), DECREASED SERUM PH AND MCGS, ELEVATED SERUM K, ANOREXIA, INTERMITTENT PERIPHERAL NEUROPATHY, POSSIBLE PERICARDITIS, AND URINIC-NILAR PNEUMONITIS (BUN GREATER THAN 40 MG/DL OR CREATININE GREATER THAN 3 MG/DL)
3.2	DIABETES MELLITUS WITH HYPEROSMOLAR COMA	NON-KETOTIC, HYPEROSMOLAR HYPERGLYCEMIC COMA	HISTORY: DECREASED FLUID INTAKE, INCREASING SOMNOLENCE, POLYURIA, AVERAGE AGE 61; 40% NEW DIABETES CASES ARE NONINSULIN REQUIRING. PE: RAPID, SHALLOW BREATHING, PROFOUND DEHYDRATION, OBSCURED TO DEEP COMA, OFTEN LOCALIZING NEUROLOGICAL SIGNS SUCH AS FOCAL SEIZURES. LAB: BLOOD GLUCOSE AVERAGE EQUALS 1,800; ONLY UP TO 2 PLUS SERUM ACETONE BY ACETEST; MCGS (MG/DL) 17 PLUS OR MINUS 3 (SD), ART. PH 7.26 (6.81-7.53), OSMOLALITY 409 (348-436), BUN GREATER THAN 80MG/100 ML
3.3	SHOCK		
4.0	DEATH		

SOURCE: Daniel Z. Louis et al., Disease Staging: A Clinically Based Approach to Measurement of Disease Severity, vol 1: Executive Summary (Springfield, Va.: National Technical Information Service): p. 10.

APPENDIX D

CODED CRITERIA SET

DISEASE STAGING

SOURCE: Daniel Z. Louis et al., Disease Staging: A Clinically Based Approach to Measurement of Disease Severity, vol 1: Executive Summary (Springfield, Va.: National Technical Information Service): p. 15.

APPENDIX E

PASBA EXTRACTS OF SURGICAL MORTALITIES

CALENDAR YEAR 1983

NO	REG NO	ES	M	30	C	09	20	059466994	N10	7	90	W	84029	84011	84010	000	009	009	3017	000	010	010	1
DIAGNOSIS:																							
8041 0 MULT FX SKULL, FACE W/OTH BONES CLOSED W/INTRACRANIAL INJURY																							
8181 50 ILL-DEFINED FRACTURE OF UPPER LIMB, OPEN																							
8271 50 OTHER, MULTIPLE AND ILL-DEFINED FRACTURE OF LEG, OPEN																							
8002 50 FRACTURE OF VAULT OF SKULL, OPEN																							
SURG/OP/PROC:																							
501101 CRANIOTOMY																							
589901 OTHER REPAIR AND RECONSTRUCTION OF SKIN, SUBCUTANEOUS TISSUE																							
578702 INTERNAL FIXATION OF BONE (WITHOUT FRACTURE REDUCTION)																							
579502 TOILET OF OPEN FRACTURE SITE																							
589001 SUTURE OF SKIN AND SUBCUTANEOUS TISSUE																							
531101 TEMPORARY TRACHEOSTOMY																							
2	0393959	ES	M	45	C	20	100303310	A30	6	PD	W	84096	84095	84095	000	001	001	0371	000	001	001	001	1
DIAGNOSIS:																							
4310 0 ENTRACEREBRAL HEMORRHAGE																							
4019 50 ESSENTIAL HYPERTENSION, UNSPECIFIED																							
SURG/OP/PROC:																							
501101 CRANIOTOMY																							
344001 COMPUTERIZED AXIAL TOMOGRAPHY OF HEAD																							
502201 VENTRICULOSTOMY																							
3	0374044	F	23	N	30	423920741	A50	1	PD	W	84099	84097	000	002	002	000	002	002	002	002	002	1	
DIAGNOSIS:																							
4300 0 SURARACHNOID HEMORRHAGE																							
49981 0 HEMORRHAGE OR HEMATOMA COMPLICATING A PROCEJURE																							
SURG/OP/PROC:																							
501101 CRANIOTOMY																							
538701 OTHER SURGICAL OCCLUSION OF VESSELS																							
344001 COMPUTERIZED AXIAL TOMOGRAPHY OF HEAD																							
330901 ARTERIOGRAPHY(ANGIOGRAPHY) OF HEAD AND NECK																							
351901 RADIOISOTOPE SCAN AND/OR FUNCTION STUDY																							
4	0394287	M	11	C	01	151544204	F50	L	PD	0	84106	84105	000	001	001	000	001	001	001	001	001	5	
DIAGNOSIS:																							
V300 0 SINGLE LIVE BIRTH IN HOSPITAL																							
7650 0 NEWBORN MORBIDITY DUE TO EXTREME IMMATUREITY																							
5860 0 RENAL FAILURE, UNSPECIFIED																							
2767 0 HYPERPOTASSEMIA																							
7721 0 PERINATAL INTRAVENTRICULAR HEMORRHAGE																							
SURG/OP/PROC:																							
534001 INCISION OF CHEST WALL AND PLEURA																							
P83301 CATHETERIZATION OF UMBILICAL VESSEL																							
815501 ASPIRATION OF PLEURAL CAVITY																							

APPENDIX F

SURGICAL CASES WITH COMPLICATED OUTCOMES

CALENDAR YEAR 1983

SURGICAL OUTCOMES WITH COMPLICATIONS, CALENDAR YEAR 1983

Last 4	Register No.	Procedure	Occurrence Found ¹	Stage	Body Systems
0000	383847	5011	#8: Death	3.3	4
6002	388203	5792	#14: Infection	1.1	2
5904	382756	5281	#14: Bleeding	1.1	1
3011	383433	5538/5541 assoc.	#8: Died	3.2	2
9012	386401	5011	#9: Paresis	*	1
3721	379443 380329	5690	#14: Bleeding, rtn membranes	2.2	1
1124	389529	5655	#11: Laceration	1.0	2
1629	385429	5511	#14: Infection	2.1	1
2532	384295	5413/5441 assoc.	#14: ARDS	3.3	4
7936	386144	5683	#14: Fever	1.0	1
9542	377536	5340	#15: Cardiac arrest	3.3	2
2443	386144	5683	#11: Cut bladder	1.0	1
2151	379362	5340	#8: Death	3.0	3
0858	385603	5470	#14: Infection	1.0	1
2559	388116	5340/5020	#6: Respiratory arrest	3.3	6
6861	380196	5863	#11: Cut bladder	1.0	1
3562	383341	5541/5340	#8: Death	3.3	6
7967	388298	5020/5011 assoc.	#8: Death	1.2	4
0169	381122	1475/5690 assoc.	#14: Bleeding	1.2	1
6373	380717	5690	#14: Bleeding	2.0	1

3979	383099	5454/5541 assoc.	#14: Infection	2.0	1
5986	384588	5741	#11: Bladder perforation	0.0	1
9390	386993	5511	#14: Post/op inf.	2.4	2
8192	381900	5340	#8: Death	3.2	2
8595	377838	5690	#14: Bleeding	0.0	1
2496	387499	5653	#14: Fever	1.0	1
5198	380942	5578	#11: Bladder perforation	1.0	2

*Unable to index.

¹Numbers cited correspond to occurrence screening criteria listed
Appendix A.

APPENDIX G

SURGICAL CASES WITH COMPLICATED OUTCOMES

CALENDAR YEAR 1984

SURGICAL OUTCOMES WITH COMPLICATIONS, CALENDAR YEAR 1984

Last 4	Register No.	Procedure	Occurrence Found ¹	Stage	Body System
0900	401249	5324/5340 assoc.	#14: Pneumothorax	2.0	1
4204	394287	5340	#8: Death	*	*
7208	391341	5741	#14: Fever	2.0	1
3310	393958	5011	#8: Death	3.2	5
9120	391292	5792	#12: Return to OR	2.3	1
8321	396511	5541	#8: Death	3.2	2
0139	401706	5541	#8: Death	*	3
0741	394044	5011	#8: Death	3.2	1
2642	392474	5683	#11: Bladder puncture	2.0	1
3652	400881	5683	#14: Hemorrhage	1.0	1
1454	392602	5741	#14: Infection	2.0	1
9463	391747	5601	#14: Bleeding	1.0	1
4968	391164	5470	#14: Dysuria	1.0	1
1070	396096	5541	#8: Death	2.0	4
5272	399638 400878	5664	#2: Return w/i 6 mos.	0.0	1
3380	393369	5573	#14: Headaches	1.1	1
0382	401578	5683	#11: Bladder puncture	1.0	1
6984	390816	5011	#8: Death	3.3	2

8990	393964 396757 397804 397964	5014/5011/ 5890	#2: Return w/i 6 mos.	2.0	1
6294	401207	5683	#14: Cellulitis	1.0	1
1695	392264	5741	#14: Bleeding	2.0	1
7498	394931	5741	#14: Post/op pulmonary embolism & wound hematoma & infection	2.0	1

*Unable to index.

¹Numbers cited correspond to occurrence screening criteria listed in Appendix A.

APPENDIX H

SURGICAL CASES WITH UNCOMPLICATED OUTCOMES

CALENDAR YEAR 1983

SURGICAL OUTCOMES WITHOUT COMPLICATIONS, CALENDAR YEAR 1983

Last 4	Register No.	Procedure	Occurrence Found	Stage	Body Systems
4900	380108	5282	No	1.0	1
7801	389378	5741	No	2.0	1
6002	381998	5741	No	0.0	1
2802	379291	5749	No	2.0	1
2503	384903	5690	No	1.3	1
4909	384486	5741	No	*	1
0011	378332	5664	No	0.0	1
4215	380558	5011	No	*	1
7017	378106	5664	No	0.0	1
8617	378702	5690	No	1.3	1
1018	387433	5741	No	2.0	1
0323	382602	5741	No	1.3	1
8324	379624	5470	No	1.0	1
8125	381883	5664	No	1.1	1
7227	380377	5741	No	1.3	1
1228	389073	5530	No	1.2	1
4929	378698	5511	No	2.4	4
5029	383712	5684	No	2.1	2
0232	385281	5792	No	*	1
0733	388919	5690	No	1.3	1
3135	390184	5741	No	1.3	1
9136	380757	5664	No	0.0	1
1338	383327	5061	No	*	1

6738	388339	5530	No	1.1	1
3741	383612	5804	No	1.0	1
5841	388421	5741	No	2.0	1
6742	380101	5664	No	0.0	1
1543	377160	5282	No	1.0	1
6843	389515	5690	No	1.3	1
1244	388321	5690	No	1.3	1
4545	381300	5340	No	3.1	1
2652	380197	5690	No	1.0	1
0253	379253	5792	No	1.1	1
9853	382608	5741	No	2.0	1
6354	379926	5683	No	*	1
9155	385535	5530	No	1.2	1
9955	378701	5664	No	0.0	1
4359	378989	5470	No	2.2	1
1860	380619	5814	No	*	1
5662	379396	5741	No	2.0	2
7063	379332	5601	No	1.0	1
8063	377555	5381	No	1.2	1
9863	378098	5690	No	1.3	1
3667	383641	5792	No	2.4	2
0569	381481	5530	No	1.0	1
7170	386384	5664	No	0.0	1
0972	386833	5741	No	1.3	1
7973	383592	5511	No	2.1	2
0274	382906	5803	No	2.2	1

9575	386066	5281	No	1.0	1
3476	379926	5683	No	*	1
7478	384142	5741	No	1.3	1
8879	379380	5664	No	0.0	1
3383	387891	5740	No	1.0	1
7083	378958	5792	No	1.1	1
4384	386560	5791	No	2.4	1
1885	384156	5741	No	1.3	1
1288	383909	5690	No	1.3	1
4689	384399	5683	No	1.0	1
3194	387731	5530	No	1.2	1
4094	386830	5530	No	1.2	1
9895	387956	5690	No	1.0	1
2896	378101	5664	No	0.0	1
2896	379268	5684	No	1.2	1

*Unable to index.

¹Numbers cited correspond to occurrence screening criteria listed in Appendix A.

APPENDIX I

SURGICAL CASES WITH UNCOMPLICATED OUTCOMES

CALENDAR YEAR 1984

SURGICAL OUTCOMES WITHOUT COMPLICATIONS, CALENDAR YEAR 1984

Last 4	Register No.	Procedure	Occurrence Found	Stage	Body Systems
2803	397961	5281	No	1.0	1
1304	399252	5530	No	1.1	1
5506	401497	5530	No	1.1	1
2707	397168	5741	No	2.0	1
2409	399138	5664	No	1.0	1
3912	393114	5684	No	1.0	1
3313	399618	5791	No	2.2	1
8613	401503	5513	No	1.1	1
0816	402474	5814	No	2.2	1
6520	391039	5741	No	2.0	1
9120	401082	5062	No	1.0	1
3121	398339	5470	No	2.1	1
5822	393484	5664	No	0.0	1
9824	399963	5792	No	1.0	1
3027	398525	5597	No	*	1
5730	396333	5803	No	2.1	1
9431	396498	5511	No	2.1	1
3932	397449	5684	No	0.0	1
4932	393449	5664	No	0.0	1
0536	397462	5470	No	2.1	1
9537	398038	5741	No	*	1
2439	392964	5690	No	1.2	1
4941	398878	5683	No	1.0	2

0442	401246	5653	No	1.0	1
3843	399003	5749	No	*	1
7744	398524	5281	No	1.0	1
0247	392584	5282	No	1.0	1
8947	390423	5381	No	1.0	1
9850	394327	5146	No	1.1	1
9452	393725	5690	No	*	1
4555	396929	5814	No	1.3	1
9456	399007	5530	No	1.1	1
8759	402265	5749	No	2.0	1
9260	396931	5803	No	2.1	1
1161	394621	5741	No	2.0	2
3665	390876	5690	No	1.2	1
9866	392357	5664	No	0.0	1
2269	393364	5281	No	1.0	1
0570	401440	5741	No	2.0	1
9375	400135	5530	No	1.1	1
1377	391132	5470	No	1.0	1
7778	392088	5741	No	*	2
5279	399638	5664	No	0.0	1
7779	394920	5792	No	1.2	1
4787	395494	5530	No	2.2	1
9788	392634	5541	No	2.0	1
0393	389327	5684	No	1.2	1
3594	396763	5664	No	0.0	1
9597	400179	5511	No	2.1	1

1698	393302	5814	No	2.6	1
3998	395243	5803	No	2.2	1

*Unable to index.

¹Numbers cited correspond to occurrence screening criteria listed in Appendix A.

APPENDIX J

CHI SQUARE TESTS OF HOMOGENEITY

COMPARING COMPLICATED AND UNCOMPLICATED SURGICAL CASES

CHI SQUARE TESTS OF HOMOGENEITY

	Disease Stage			Totals
	<u>0.0-1.9</u>	<u>2.0-2.9</u>	<u>3.0-3.9</u>	
Complicated Cases	20 (28.4)	14 (13.6)	12 (4.0)	46
Uncomplicated Cases	72 (63.6)	30 (30.4)	1 (9.0)	103
	<u>92</u>	<u>44</u>	<u>13</u>	<u>149</u>

H_0 : Complicated and uncomplicated cases are homogeneous regarding assignment to Disease Staging index.

H_1 : Complicated and uncomplicated cases are heterogeneous regarding assignment to Disease Staging index.

$$\chi^2 = 26.8 > \chi_{2,0.995}^2 = 10.6$$

Reject H_0 .

	Body Systems			Totals
	<u>1</u>	<u>2</u>	<u>3 or ></u>	
Complicated Cases	30 (40.3)	9 (4.7)	9 (2.8)	48
Uncomplicated Cases	107 (96.6)	7 (11.3)	1 (7.1)	115
	<u>137</u>	<u>16</u>	<u>10</u>	<u>163</u>

H_0 = Complicated and uncomplicated cases are homogeneous regarding assignment to Body Systems index.

H_1 = Complicated and uncomplicated cases are heterogeneous regarding assignment to Body Systems index.

$$\chi^2 = 28.3 > \chi_{2,0.995}^2 = 10.6$$

Reject H_0 .

APPENDIX K

CHI SQUARE TESTS OF HOMOGENEITY

COMPARING SURGICAL CASES WITH MORTALITIES AND UNCOMPLICATED OUTCOMES

CHI SQUARE TESTS OF HOMOGENEITY

	Disease Stage			Totals
	<u>0.0-1.9</u>	<u>2.0-2.9</u>	<u>3.0-3.9</u>	
Mortalities	1 (7.04)	1 (3.0)	9 (0.96)	11
Uncomplicated Cases	72 (66.0)	30 (28.0)	1 (9.0)	103
	<u>73</u>	<u>31</u>	<u>10</u>	<u>114</u>

H_0 : Case mortalities and uncomplicated cases are homogeneous regarding assignment to Disease Staging index.

H_1 : Case mortalities and uncomplicated cases are heterogeneous regarding assignment to Disease Staging index.

$$\chi^2 = 81.6 > \chi_{2,0.995}^2 = 10.6$$

Reject H_0 .

	Body Systems			Totals
	<u>1</u>	<u>2</u>	<u>3 or ></u>	
Mortalities	1 (10.2)	4 (1.0)	7 (0.8)	12
Uncomplicated Cases	107 (97.8)	7 (10.9)	1 (7.2)	115
	<u>108</u>	<u>11</u>	<u>8</u>	<u>127</u>

H_0 : Case mortalities and uncomplicated cases are homogeneous regarding assignment to Body Systems index.

H_1 : Case mortalities and uncomplicated cases are heterogeneous regarding assignment to Body Systems index.

$$\chi^2 = 73.0 > \chi_{2,0.995}^2 = 10.6$$

Reject H_0 .

APPENDIX L

CHI SQUARE TESTS OF HOMOGENEITY
COMPARING SURGICAL CASES WITH POSTOPERATIVE COMPLICATIONS
AND UNCOMPLICATED OUTCOMES

CHI SQUARE TESTS OF HOMOGENEITY

	Disease Stage		Totals
	<u>0.0-1.9</u>	<u>2.0-3.9</u>	
Post/op Complications	12 (15.3)	11 (7.7)	23
Uncomplicated Cases	72 (68.7)	31 (34.3)	103
	84	42	126

H_0 : Cases with postoperative complications and uncomplicated cases are homogeneous regarding assignment to Disease Staging index.

H_1 : Cases with postoperative complications and uncomplicated cases are heterogeneous regarding assignment to Disease Staging index.

$$\chi^2 = 2.6 < \chi_{1,0.95}^2 = 3.8$$

Accept H_0 .

	Body Systems		Totals
	<u>1</u>	<u>2 or ></u>	
Post/op Complications	20 (21.2)	3 (1.8)	23
Uncomplicated Cases	107 (105.8)	8 (9.2)	115
	127	11	138

H_0 : Cases with postoperative complications and uncomplicated cases are homogeneous regarding assignment to Body Systems index.

H_1 : Cases with postoperative complications and uncomplicated cases are heterogeneous regarding assignment to Body Systems index.

$$\chi^2 = 1.0 < \chi_{1,0.95}^2 = 3.8$$

Accept H_0 .

APPENDIX M

CHI SQUARE TESTS OF HOMOGENEITY
COMPARING SURGICAL CASES WITH INTRAOPERATIVE DAMAGE
AND UNCOMPLICATED OUTCOMES

CHI SQUARE TESTS OF HOMOGENEITY

	Disease Stage		Totals
	<u>0.0-1.9</u>	<u>2.0-3.9</u>	
Intra/op Damage	6 (5.0)	1 (2.0)	7
Uncomplicated Cases	72 (73.0)	31 (30.0)	103
	<u>78</u>	<u>32</u>	<u>110</u>

H_0 : Cases with intraoperative damage and uncomplicated cases are homogeneous regarding assignment by Disease Staging index.

H_1 : Cases with intraoperative damage and uncomplicated cases are heterogenous regarding assignment by Disease Staging index.

$$\chi^2 = 0.8 < \chi_{1,0.95}^2 = 3.8$$

Accept H_0 .

	Body Systems		Totals
	<u>1</u>	<u>2 or ></u>	
Intra/op Damage	5 (6.4)	2 (.6)	7
Uncomplicated Cases	107 (105.6)	8 (9.4)	115
	<u>112</u>	<u>10</u>	<u>122</u>

H_0 : Cases with intraoperative damage and uncomplicated cases are homogeneous regarding assignment by Body System index.

H_1 : Cases with intraoperative damage and uncomplicated cases are heterogeneous regarding assignment by Body System index.

$$\chi^2 = 4.1 < \chi_{1,0.95}^2 = 3.84$$

Reject H_0 .

APPENDIX N

CHI SQUARE TESTS OF INDEPENDENCE
TESTING ASSOCIATION BETWEEN
CASE MORTALITY AND INDEX OF SEVERITY

CHI SQUARE TESTS OF INDEPENDENCE

	Disease Stage			Totals
	<u>0.0-1.9</u>	<u>2.0-2.9</u>	<u>3.0-3.9</u>	
Mortalities	1 (4.8)	1 (3.3)	9 (2.9)	11
Nonmortalities	19 (15.2)	13 (10.7)	3 (9.1)	35
	<u>20</u>	<u>14</u>	<u>12</u>	<u>46</u>

H_0 : Disease Staging index and mortality outcomes are independent.

H_1 : Disease Staging index and mortality outcomes are associated.

$$\chi^2 = 23.3 > \chi_{2,0.995}^2 = 10.6$$

Reject H_0 .

	Body Systems			Totals
	<u>1</u>	<u>2</u>	<u>3 or ></u>	
Mortalities	1 (7.5)	4 (2.3)	7 (2.3)	12
Nonmortalities	29 (22.5)	5 (6.8)	2 (6.8)	36
	<u>30</u>	<u>9</u>	<u>9</u>	<u>48</u>

H_0 : Body System index and mortality outcomes are independent.

H_1 : Body System index and mortality outcomes are associated.

$$\chi^2 = 22.7 > \chi_{2,0.995}^2 = 10.6$$

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