Nursing Resource Allocation
in an
Intensive Care Unit

by

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To each other, a friendship that will last a lifetime.

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CHAPTER I

INTRODUCTION

Patient classification systems have a significant place as one of the primary manpower planning and management information tools available to nurse managers today. Utilization of a patient classification system makes it feasible for nursing administrators to monitor, justify and project needs, productivity levels and manpower expenses. Of these objectives, the allocation of staffing resources is the most critical. Patient classification facilitates staff resource allocation and has as its primary goal the matching of perceived patient needs with available nursing resources (Alward, 1983).

Although there are many patient classification systems and each methodology may vary, each system offers a method of categorizing or grouping individual patients according to perceived nursing care requirements (Giovanetti, 1979). In general, a workload index based on the particular case mix of patient categories for each nursing unit, or hospital as a whole, is produced daily to encourage efficient use of nursing personnel by continually alerting nurse managers of either staffing deficiencies or excesses.

There are two traditional ways of quantifying nurse staffing needs. One is calculation of nursing hours per patient day (NHPD) and the other is determination of the ratio of nursing staff to patients. The ratio of nursing staff to patients is the most common method used in critical care areas and by nursing staff involved in direct patient care. While an established average NHPD provides a useful standard for staffing guidelines, it is not always an appropriate method to quantify the staffing requirements for a given day and shift on a nursing unit. Because of the need for nursing staff to respond to daily fluctuations in patient census and case mix, the estimated nursing hour per patient day is not as effective in matching available resources to patient need as the quantification of workload as measured by a patient classification system.

Whereas a patient classification system alone cannot solve staffing problems, it does offer a useful means for establishing an appropriate baseline of staff and for allocating personnel to meet daily fluctuations. A discrete, appropriately used patient classification system has the potential for solving problems, such as identifying appropriate staff assignment according to shift needs, matching nursing skill level requirements with identified patient care needs, and projecting and monitoring budgetary labor requirements. Solutions are based on the professional experience and judgment of the decision makers and the proper use of the information generated by the patient classification system (Hanson, 1983).

Statement of the Problem

The primary purpose of patient classification is to respond to the variable nature of the demand for nursing care (Huckaby, 1981). Medicus is the patient classification system used to measure required hours of nursing care at Good Samaritan Hospital and Medical Center, Portland, Oregon. Nursing administrators have questioned whether Medicus, a generic patient classification system that identifies patient needs and is used in all patient care areas, allocates the same nurse resources in the Intensive Care Unit as the Therapeutic Intervention Scoring System (TISS), a patient classification system developed to measure the needs of the critical care patient populations based on technical tasks administered to the patient by the nurse. TISS is reported to be a more efficient method of allocating nursing resources in critical care areas (Cullen & Keene, 1983). The present study was done to address this question by comparing Medicus with this second patient classification system, TISS. In this study allocation of nurse resources, that is, the amount of nursing staff recommended by each system to meet the variable nursing care needs of given ICU patient groups, are compared.

Review of Literature

Historical Development of Patient Classification Systems

From the inception of the concept of organized patient care by nurses, attempts were made to rationally utilize manpower resources effectively and efficiently in order to meet the needs of patients and to contain costs. Early patient classification systems, however, were rudimentary, informal, and unsophisticated. For example, Florence Nightingale placed patients requiring the most care and frequent observation nearest to the nurses' work area. Patient classification remained informal until the late 1930's when the National League for Nursing conducted a systematic study of fifty New York hospitals. This study formalized the concept of patient classification system, and recommended an average of 3.4 to 3.5 total nursing hours per patient day (National League of Nursing Education, 1937).

Since this NLN study, the concept of patient classification has been increasingly refined to take into account the intensity of nursing care required by various types of hospitalized patients (Giovanetti, 1978). During the period from 1940 to 1960, various studies were conducted which focused on meeting problems of nursing care delivery through the provision of adequate manpower supply and utilization (Abdellah & Strachan, 1959; Haldeman, 1959; NLN, 1949; Wright, 1954). These studies attempted to quantify workload demand based on variables such as patient census, medical diagnosis, specialty and age.

In the early 1960's, the Johns Hopkins Operation Group produced a landmark effort which grouped patients into classes according to patient characteristics such as mobility, consciousness, emotional disturbance, inadequate vision, and isolation (Connor, 1961). This classification system was the first to measure nursing care time for each patient class; and, therefore, was the first to quantify the nursing workload associated with direct patient care. For the first time, the value of providing variable staffing to meet the fluctuating needs of patients was demonstrated. This method of variable staffing represented a significant change from the traditional view of providing a fixed number of staff for patient care regardless of variations in patient need.

Other researchers built on Connors' concept of variable staffing. Wolfe and Young (1965) developed the concept of controlled variable staffing. This system defined a minimum number of staff on each unit necessary to satisfy minimum daily demands; additional staff could be assigned to meet peak demands. Barr, Moores & Rhys-Hearn (1973) demonstrated that using individual scores on individual clinical indicators resulted in increased accuracy in predicting amount of total nursing care-time required, again showing an improvement in the use of these patient classification methods over the use of the average care-time approach.

These studies stimulated more research as both individual hospitals (Bardour & Hill, 1977; Jackson & Resnick, 1982; Reinert & Grant, 1981) and consulting firms working with hospitals (Edgecumbe, 1965; Finlayson, 1976; Jelinek, Zimmerman & Brya, 1973; Plummer, 1967) began to experiment with different classification systems.

Today patient classification systems are one of the primary manpower planning tools specifically developed for nursing management in acute care settings. Patient classification systems have expanded in use from a few selected applications to wide usage throughout the United States, Great Britain, and Canada (Giovanetti, 1978; Jackson & Resnick, 1982; MacDonnel, 1976; Barr et al, 1973).

Within the last decade impetus for widespread implementation has come from the Joint Commission for Accreditation of Hospitals. One JCAH standard requires that each nursing department "shall define, implement and maintain a system for determining patient care requirements for nursing care on the basis of demonstrated patient needs, appropriate nursing intervention and priority of care" (JCAH, 1981). In light of the fact that over five thousand hospitals are using various patient classification systems (Alward, 1983) and that these hospitals spend an estimated $15,000,000 yearly on nursing staffing studies (Vaughn & McLeod, 1980), there is impetus to standardize across hospitals and geographic settings the definitions, classifications, and time figures used for calculating nursing care requirements. Standardization is considered desirable so that administrators can begin to evaluate nursing productivity by comparing it with that of comparable hospitals (Vaughn & McLeod, 1980).

The movement toward standardization of classification systems has stimulated comparative research between the different patient classification systems. Roehrl (1979) compared three different methodologies in order to determine which was best suited and most applicable to the needs of the Medical Center Hospital of Vermont. Results of this study indicated that two of the tools were highly correlated, suggesting that it was possible to use two comparable classification systems simultaneously. One advantage of using two comparable classification systems is that the personal preferences of the staff for one system over another can be accommodated, which will in turn enhance user satisfaction and reliability. Another study by Jackson and Resnick (1982) argued that is was not possible to standardize classification systems because it was necessary to adapt coefficients to reflect uncontrolled variables from unit to unit and institution to institution. However, Schroeder, Rhodes and Shields (1984) have demonstrated that when the Commission for Administrative Services in Hospitals System (CASH), a category-oriented patient classification system, and GRASP, a task-oriented system, were used simultaneously, the identical nurse:patient ratios resulted.

Types of Patient Classification Systems

The purpose of all nursing patient classification systems is to categorize patients according to the magnitude of their need for nursing care. Nursing resources are allocated based on the documentation of the amount of time necessary for the care of an individual patient. There are two major types of patient classification systems currently in use. In the first, prototype evaluation, categories are determined, parameters for each category are defined, and assignments of patients are made as the description of care needs indicate. In the second type, factor evaluation, predetermined descriptors of care are defined and rated separately for each patient, and then combined to determine the category of the particular patient. Descriptors of care or clinical indicators include activities of daily living, treatments required, and psychosocial needs. The factor evaluation type is considered objective while the prototype is described as subjective. However, both methods involve some subjectivity because they are dependent upon nursing judgment (Giovanetti, 1979).

There are four common elements to patient classification systems. All include: 1) a method for grouping patients (that is, defined classification categories); 2) guidelines describing a) the way in which patients are to be classified, b) the frequency of classification, and c) the method for reporting the data; 3) the average amount of time required for care of a patient in each category; and, 4) a method for calculating required staffing and required nursing hours (Johnson, 1984).

Patient classification systems are used to quantify the nursing care resources associated with each category of care. The two most common methods of quantification are: 1) those based on average care times for each patient category, and 2) those based on standard care times for specific nursing procedures (Giovanetti, 1979).

Using the first method, the average amount of direct nursing care provided within each care category is determined from observational studies. The number of patients in each care category multiplied by the corresponding average care times for each category provides an estimate of the total average direct care time required for each patient class. This figure, coupled with an estimate of the total average indirect care time (also determined from observational studies), gives the total average nursing care time for a specified group of patients (Giovanetti, 1979).

The second method, standard care times, is accomplished by calculating each time required to perform each nursing care activity. Total direct care time is determined by multiplying the number of times each activity occurs by its associated standard time. Total care time is then determined by the addition of a coefficient representing indirect care time (Giovanetti, 1979).

One of the most difficult aspects of patient classification is defining patient categories. Ideally, the system should not allow ambiguity or overlap among categories of patients. Clearly defined categories will result in precise definitions of both patient care needs and the intensity of services required to meet those needs. Experience has shown that when categories are too broad, the patient care actually required varies greatly within the classification (Johnson, 1984). Ambiguity and overlap of categories contribute to classification errors and lower interrater reliability (Alward, 1983).

There is also some debate about whether there should be an odd or even number of categories. With an odd number of categories, nurses tend to categorize patients in the middle category (Johnson, 1984). Developers of the Medicus system recommended four categories to provide the most accurate classification of patients. They found that the variance within a classification was too large with a three category system; and, that statistical probability of error was higher with five categories, without yielding a significant increase in discrimination among patient types (Jelinek, 1974).

The two patient classification systems under study, Medicus and the Therapeutic Intervention Scoring System (TISS), are both factor evaluation tools. However, Medicus is quantified using average care time; whereas TISS uses standard care time. In the present study, TISS and Medicus were studied to determine allocation of nursing resources or the amount of staffing recommended by each system.

Conceptual Framework

Classification has been defined as the ordering or arrangement of objects into groups or sets on the basis of their relationships. These relationships can be based either on observable or inferred properties.

Purposes of classification include facilitating the summarization and communication of large amounts of information; facilitating the manipulation and retrieval of information; describing the structure and relationships of the constituent objects to each other and to similar objects; and the simplification of these relationships in such a way that general statements can be made about the classes of objects (Sokal, 1974).

Patient classification may be generally defined as the grouping of patients according to their observable or inferred characteristics. In nursing, patient classification refers to the categorization of patients according to some assessment of their nursing care requirements over a specified period of time. The most common purpose has been for determination and assignment of nursing care personnel (Giovanetti, 1979).

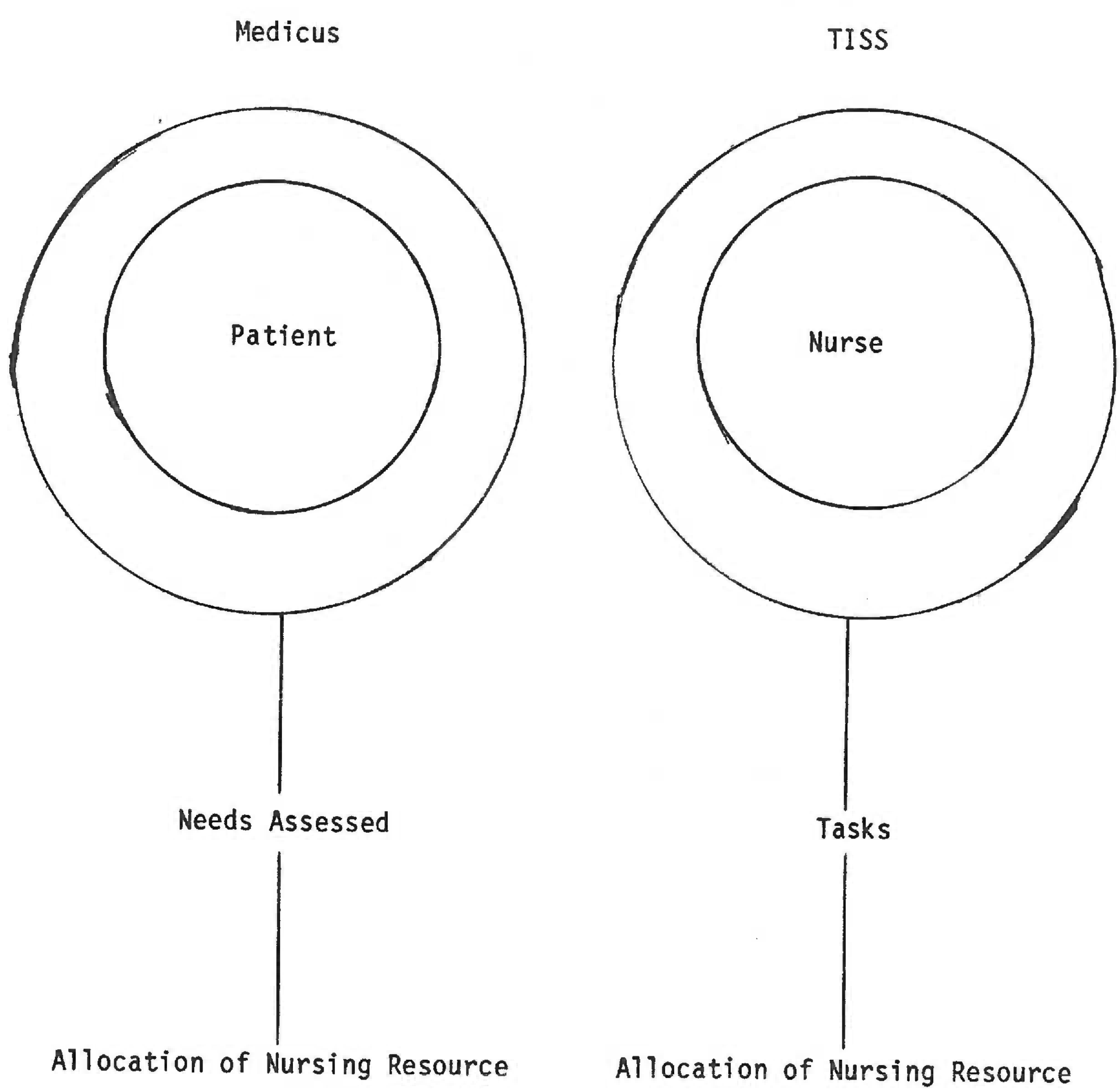
Development of patient classification systems in nursing has been in response to the variable nature of nursing care demands. Nursing patient classification empirically quantifies a unique situation by measuring or assessing the needs of patients in one specific setting at one point in time. The interconnectedness within the microsystemic setting (nurse:patient dyad), the economic realities of the mesosystem (the nursing unit), the exosystem (the hospital), and the macrosystem (government regulations, cultural socioeconomic expectations) are all defined in some way (Bronfenbrenner, 1979).

Medicus and TISS both classify patients. However, each system approaches classification based on different properties of patient care. Medicus identifies patient needs to determine nursing resource allocation; TISS focuses on technical tasks. See Figure 1.

Research Question

The primary question of the present study was whether there would be a difference in nursing resource allocation when patients in the Intensive Care Unit (ICU) were classified under both Medicus and TISS. To answer this question, Medicus was compared with the Therapeutic Intervention Scoring System (TISS). TISS, a patient classification system specifically designed to determine critical care population nursing needs, has gained wide acceptance as a method for classifying critically ill patients (Cullen & Keene, 1983; Silverman, Goldiner, Kaye, Howland & Turnbull, 1975; Yeh, Pollack, Holbrook, Fields & Rutiman, 1982). TISS is an inventory of

Figure 1. Medicus and TISS Quantify Patient Care Based on Different Properties of Patient Care.



therapeutic interventions or services consumed by ICU patients. It is important to remember that TISS categorizes patients according to consumption of services rather than assessed need. Unlike Medicus, TISS does not include elements of patient education or emotional support needs. Both systems indicate or suggest specific nurse:patient ratios, but the question is do they indicate the same staffing allocation for the same group of patients?

Operational Definitions

Nursing resource allocation is the process of determining the number and mix of nursing personnel determined to be necessary to provide a specified level of care (Jelinek, 1976, p. 44).

Patient classification system refers to a system of identification and classification of patients into care groups or categories, based on some measure of nursing effort required (Giovanetti, 1979, P. 409).

Acuity is the patients' requirement for nursing care. It is not a direct measure of level of illness (Giovanetti, 1985).

Critical indicators are the patient characteristics or descriptors used in the process of patient classification (Giovanetti, 1983, p. ii).

Classification monitoring is the process by which the reliability of a classification tool is established, maintained and tested (Giovanetti, 1984).

Interrater reliability is the measure of consistency with which collectors observe and record required data (Giovanetti, 1984, p. 44).

Nursing hours per patient day (NHPD) refers to nursing hours per patient per twenty-four hours (Hanson, 1983, p. 55).

Quantification coefficients are the average number of nursing care hours required for a patient in each category. These are based on direct and indirect components of the desirable level of care, not on the actual level of care delivered (Alward, 1983, p. 16).

Workload index is a weighted census of a patient population. It is determined by multiplying the number of patients in each classification category and by summing the products to produce a total (Medicus, 1981).

Chapter II

Method

Design

The design of this study was correlational and provided information about how closely the two systems agreed or disagreed in the recommendation of staffing allocation.

$$(X)\text{-------}\begin{matrix} 0_1 \\ 0_2 \end{matrix}$$

(X) represents the patient. 0_1 represents Medicus and 0_2 TISS. 0_1 and 0_2 indicate the same patient has been observed in two different ways to compute the outcome of recommended staffing.

Setting

The setting for the study was the nineteen bed Intensive Care/Cardiac Surgery Unit at Good Samaritan Hospital and Medical Center, Portland, Oregon. The patient census averaged approximately twelve patients per day.

Sample and Sample Size

The patient sample observed by both patient classification systems (Medicus and TISS) included all those patients admitted to the ICU during a four week period beginning March 19, 1986. Medicus data were collected at 1030 each morning, seven days a week, on all patients according to the Department of Nursing routine. The same patients were also classified using the TISS patient classification system. These data were collected at 0830 seven days a week by one of the two night shift nurses hired and trained for this express purpose. Three hundred twenty-nine observations were made during this four week period, using the total patient sample.

Data Collection Instruments

Both TISS and Medicus patient classification systems are ordinal measures. Both systems group and rank the need for a patient's hours of nursing care on a continuum from low to high. The categories within each system (TISS, 1 - 4; Medicus, 1 - 5), however, are not of equal proportion (See Table 1), but reflect differing amounts of the observed characteristic or hours of nursing care required by the individual patient.

Medicus is a patient classification system based upon an assessment of patient needs projected over a twenty-four hour period. It is not based on tasks or nursing care assignments. In this system, patients are assigned to one of five categories according to these projected needs for nursing care. Thirty-seven objectively defined critical indicators are utilized as the basis for this comprehensive assessment. Indicators include physical, psycho-emotional and

Table 1. TISS and Medicus Patient Classification Categories

	TISS Points	Range	Medicus Points	Range
TYPE I	0-9	(10 points)	0-23	(24 points)
TYPE II	10-19	(10 points)	24-49	(26 points)
TYPE III	20-39	(20 points)	50-109	(60 points)
TYPE IV	40-75	(36 points)	110-181	(72 points)
TYPE V	-	-	181-235	(55 points)

teaching needs (see Appendix A). Each of the indicators has an assigned numerical weight or value and the summation of weights of applicable indicators for a patient determines the classification of the patient.

Categories are defined by a specific range of hours of care required per twenty-four hours. A Type I patient is a person who requires 0 to 3 hours of nursing care per day; a Type II, 3 to 5 hours; a Type III, 5 to 10 hours; a Type IV, 10 to 16 hours; and a Type V, 16 or more hours.

The process of classification in Medicus centers around the use of a pre-printed form which lists the critical indicators. Each day at a predesignated time, nurses on each unit record the required information by marking the indicators appropriate to each patient. A Medicus item is marked, i.e. "indicated," if the projected patient need is to be met in the next twenty-four hours. The forms are then scored either manually or by Scan-Tron reader. Patient categories are determined by point accumulation. The classification process yields two key parameters which describe the nursing workload for a given unit. These parameters are <u>workload index</u> and <u>acuity</u>.

Workload index is a weighted census of the patient population. It is determined by multiplying the number of patients in each classification category by the specific numerical factor for each category and finally summing to produce a total. The weighting factor for a Type II patient is higher than that for a Type I. For example, the weight for a Type II patient is 1.0 compared to 0.5 for a Type I.

Acuity is an index that provides a single measure describing the overall mix of patients in an area population. Technically, it is computed by dividing the workload index of the area by the census of that area. Its particular qualities enable this measure of intensity to be used for cross comparisons of populations and as a basis for determining staff mix and distribution.

Reliability is assured within the system through objective definition of indicators and through the utilization of a research-derived system of scoring and weighting (Jelinek, 1966). The system includes mechanisms for monitoring accuracy and consistency of the classification process. Development of the instrument took more than three years, during which it was tested extensively for reliability and validity. From more than 180 critical indicators, 37 were defined to be accurate for a Type V category system. This was achieved through a process of observation and validation of results. Medicus is applicable for medical, surgical, pediatric, nursery, rehabilitative, post-partum, geriatric, and special care units (Medicus Corporation, 1981).

Though there are no published reports of Medicus reliability, this system seemingly meets the criteria that describe the characteristics of a reliable tool (Giovanetti, 1978). The three major types of reliability (stability, homogeneity, and equivalence) are maintained through a built-in classification monitoring system. High interrater reliability coefficients provide assurance that the same category of care will be determined for the same patient by nurse raters. A coefficient of 0.9 is necessary to provide agreement of greater than 80 percent (Giovanetti, 1978). Good Samaritan Hospital and Medical Center maintains a percentage agreement of 95 percent which is acceptable (Giovanetti, 1984).

Evidence of the validity (the extent to which an instrument actually measures what it is supposed to measure) of Medicus has not been mentioned in the literature until recently when Halloran (1985) compared the Medicus System with the CASH (Commission for Administrative Services in Hospitals) system. CASH measures direct care time in minutes provided to each patient. In both instances there was a strong positive correlation found ($r = <.920$ and $.853$, $p<.01$) between the two measures providing evidence that Medicus is thought to provide a valid measure of nursing workload.

The second classification system under study was the Therapeutic Intervention Scoring System (TISS) developed at Massachusetts General Hospital as a means of quantifying the medical and nursing care required by critically-ill patients (Cullen, Civetta, Briggs & Ferrara, 1974). Seventy-five items of therapeutic intervention are scored on a one to four basis according to the intensity of involvement (see Appendix B for these specific interventions). Values of these interventions based on nursing care time and effort were originally assigned by a committee of intensive care physicians and nurses.

The system has been widely used for the determination of severity of illness, establishment of nurse:patient ratios in ICU, assessment of current utilization of a hospital's intensive care beds, and the forecasting of future utilization of and need for ICU beds. The system was revised in 1983 to reflect recent innovations in critical care. During this revision some items were deleted, others added, and some point scores adjusted. However, a comparison of the 1983 system in 100 consecutive patients revealed no difference in total point scores, indicating that TISS remained a reliable measure of critical care patient needs (Cullen & Keene, 1983).

Like Medicus, TISS data are collected at the same time each day (morning preferably) by the same observer. A TISS item should be marked, i.e. "indicated," if the intervention was performed at anytime during the previous twenty-four hours on the individual patient. In this regard, then, TISS is a retrospective system.

Based on this point scoring system, patients are classified into four categories which reflect the number of interventions or services which have been provided to a patient during the past twenty-four hour period. In the four categories, Class I patients are assigned less than 10 points; Class II, 10 - 19 points; Class III, 20 - 39 points; and Class IV, more than 40 points.

Nurse:patient ratios are then assigned according to each classification. Class IV patients require 1:1 ratio because of the intensity of care and patient instability. Class III patients, who require intensive care nursing but are relatively stable, require a 1:2 ratio. Class II patients require a 1:3 ratio, and Class I, 1:4. A Class III patient and a Class II patient can be combined to require a 1:2 ratio (Cullen & Keene, 1983). Ideally nurse:patient ratios depend on matching the skill level of the nurse to the severity of patient illness.

TISS has been widely used across settings and applied to a variety of patient groups. For example, Silverman et al. (1975) applied it to acutely ill cancer patients and Yeh et al. (1982) to a group of pediatric intensive care patients. Both investigations concluded that TISS was helpful both in assessing the amount of care received and in providing a method for evaluating severity of illness.

There is scant material reporting the reliability and the validity of the TISS instrument in the allocation of nursing resources. In determining these psychometric properties, it is necessary to know the assumptions upon which the use of TISS is predicated. First, TISS assumes that specific and appropriate interventions will occur in the presence of critical illness; second, that these interventions are discrete, easily identifiable, and consistently applied by the individual physician evaluating the patient; third, that the degree of illness is related to the number and type of interventions; and, fourth, that the philosophies of intensive care are relatively comparable in different units such that similar degrees of intervention will occur in comparably ill patients (Cullen et al., 1974).

The reliability of the TISS system was tested against independent clinical estimates of the severity of illness (Cullen et al., 1974) at the Massachussets General Hospital Acute Care Unit. Points determined using TISS were related to each independent clinical classification. The following results were reported: 30 Class I patients averaged 5 $\pm$ 0.2 points; 30 Class II patients averaged 11 $\pm$ 0.7 points; 30 Class III averaged 23 $\pm$ 1 point; and, 126 Class IV patients averaged 43 $\pm$ 1 point per patient. The distant separation between the four classes suggested that clinical classification of patients into four groups was valid and consistent.

There are no stated reports of interrater reliability for the TISS system. However, TISS is relatively simple to apply. Critical indicators are objective and well defined (see Appendix B). Guidelines or directions for use are clear and precise (see Appendix B). Categories are discrete, homogenous, and mutually exclusive. These factors should contribute to a high level of interrater reliability.

The issue of the validity of TISS to measure and predict the nursing care required by a specific patient or population of patients is also not clearly reported. Keeping in mind the original assumptions upon which TISS is based, the availability of comparable resources, and the similarity of treatments performed on ICU patients by physicians, factors used to determine TISS categories appear to be a valid reflection of severity of illness and hours of nursing care required by each level of patients. It has been established that the TISS clinical indicators of care are objective. It is likely, then, that TISS is a valid representation of those activities that have the greatest impact on nursing care time, and that it does have content validity as assured by the panel of experts who developed the tool and those who have applied it (Silverman et al., 1975; Yeh et al., 1982).

Criterion-related validity is the extent to which the instrument corresponds to some other observation that accurately measures the phenomena of interest. Criterion-related validity of TISS has been established vis-a-vis the areas of severity of illness, mortality, and utilization. However, there has been little mentioned concerning the criterion-related validity of the TISS nursing resource allocation, aside from what Cullen et al. (1983) have determined. Jackson and Resnick (1982) did not establish a strong measure of this validity, since low correlation was found between TISS and the Montefiore Patient Classification. However, this measure of validity is difficult to establish because it is difficult to accept the premise that the classification instrument used as the criterion is valid, particularly outside of the setting in which it was developed (Giovanetti, 1979). In the above case, one cannot be assured of the Montefiore system's validity.

Predictive validity, which compares classification results with findings from observational studies of nursing care actually provided, was established for TISS in the study which tested the categories of patients in the Massachusetts General Hospital Recovery Room and Acute Care Unit. Predictive validity is also strengthened by the underlying assumptions of the TISS system itself.

While varying degrees of reliability and validity of TISS have been established and estimated, Knaus, Wagner, Draper, Lawrence, and Zimmerman (1981) criticized the sensitivity of the system. They charged that TISS does not reflect well those patients requiring frequent arterial blood gases, monitoring, or intensive types of therapy. Classification by therapy alone assumes that all therapy is appropriate. They maintain that monitored patients require more nursing care than is routinely available on most nursing units under most current nurse:patient ratios.

Data Collection Procedures

The following steps in data collection were followed:

1. Two night shift ICU nurses were hired and trained to observe each ICU patient daily for the four week period of data collection using the TISS patient classification system. The support of these two nurses was enlisted to ensure that TISS observations would be completed daily and to avoid overburdening the ICU day shift staff.

2. The two nurses responsible for the TISS observations were trained and interrater reliability of 100 percent using percentage agreement was achieved using designated clinical scenarios (see Appendix C for clinical scenarios describing critical care patients which were derived from observations recorded from randomly selected ICU patients). The patient

scenarios were reviewed by a Critical Care Nurse Specialist to ascertain the validity of this tool for the purpose of training and achieving interrater reliability in TISS observations. Initial interrater reliability of 100 percent through percentage agreement using the scenarios was achieved among the following: a) the two researchers conducting the study; b) the two classification monitors assigned to the ICU during the period of data collection; and, c) the two ICU nurses responsible for collecting the TISS data. Percentage agreement was the method used to measure interrater reliability. It is the established standard currently used at Good Samaritan Hospital and Medical Center.

3. Upon completion of orientation to the TISS system by the nurse data collectors and the two nurse interrater reliability (classification) monitors, a four week period of data collection (March 19, 1986 - April 15, 1986) was implemented. This involved observing each ICU patient using both the TISS and Medicus systems everyday of the week during that time period.

During the first week classification monitoring was conducted twice to assure interrater reliability. Classification monitoring included random observations of twenty percent of the ICU patients (a minimum of four observations each time). These observations measured the accuracy of the patient classification through the assessment and use of appropriate indicators for each particular patient selected.

4. During the initial week of data collection an interrater reliability of 100 percent was achieved based on eight random observations for both systems. Classification monitoring was conducted weekly during the remaining three weeks of data collection. Based on the total of twenty observations a percentage agreement of 90 percent was established for both TISS and Medicus systems.

5. Upon completion of the four week data collection period, the data, TISS and Medicus observations, were compared to determine a level of correlation between the two systems for allocation of nurse resource required for each observation of the sample (N = 329). Data were scored and tabulated using descriptive statistics. Means, frequencies and standard deviations were calculated for the number of agreements and disagreements between the two systems on the same group of patients. Pearsons R, crosstabulation and Chi Square were also calculated.

Threats to the external and internal validity of this project include the Hawthorne effect; interaction of patient and rater history with the observations; experimenter effects; measurement effects; maturation; and testing effects. These threats were controlled for in the following manner:

1) The Hawthorne effect was controlled for through classification monitoring.

2) Interaction of patient and rater history with observations was controlled by hiring and educating the two staff nurses to perform the TISS observations and through the maintenance of an interrater reliability system.

3) Experimenter effects were controlled for by the objective classification monitors who were trained to assure reliability of the tools.

4) Measurement effects were controlled for through consistent data collection techniques, utilizing the same patient population and the same group of people to gather data. Simultaneous classification of patients into both systems was conducted; and both instruments contained the same format.

Internal validity was controlled for in the following manner:

1) Maturation was controlled by classification

monitoring. This controlled for potential biases reflected toward Medicus by the nursing staff at large.

2) Testing was controlled by the classification monitoring system.

In a correlation design study there are inherent weaknesses. There is no ability to actively manipulate the independent variable and there is no ability to randomly assign individuals to experimental treatment. There is also a strong possibility for faulty interpretation; thus, any interpretation made from this study will be viewed as tentative and as a suggestion for other avenues to be pursued (Polit & Hungler, 1983).

CHAPTER III

Results and Discussion

The information from this study was analyzed and will be presented in the following manner:

1. Data were examined to determine the degree of correlation in nursing resource allocation for an intensive care population by two patient classification systems, TISS and Medicus. The results of this comparison are presented descriptively.

2. The strength of the relationship or correlation between the two systems is demonstrated through Pearson's R and Chi Square application.

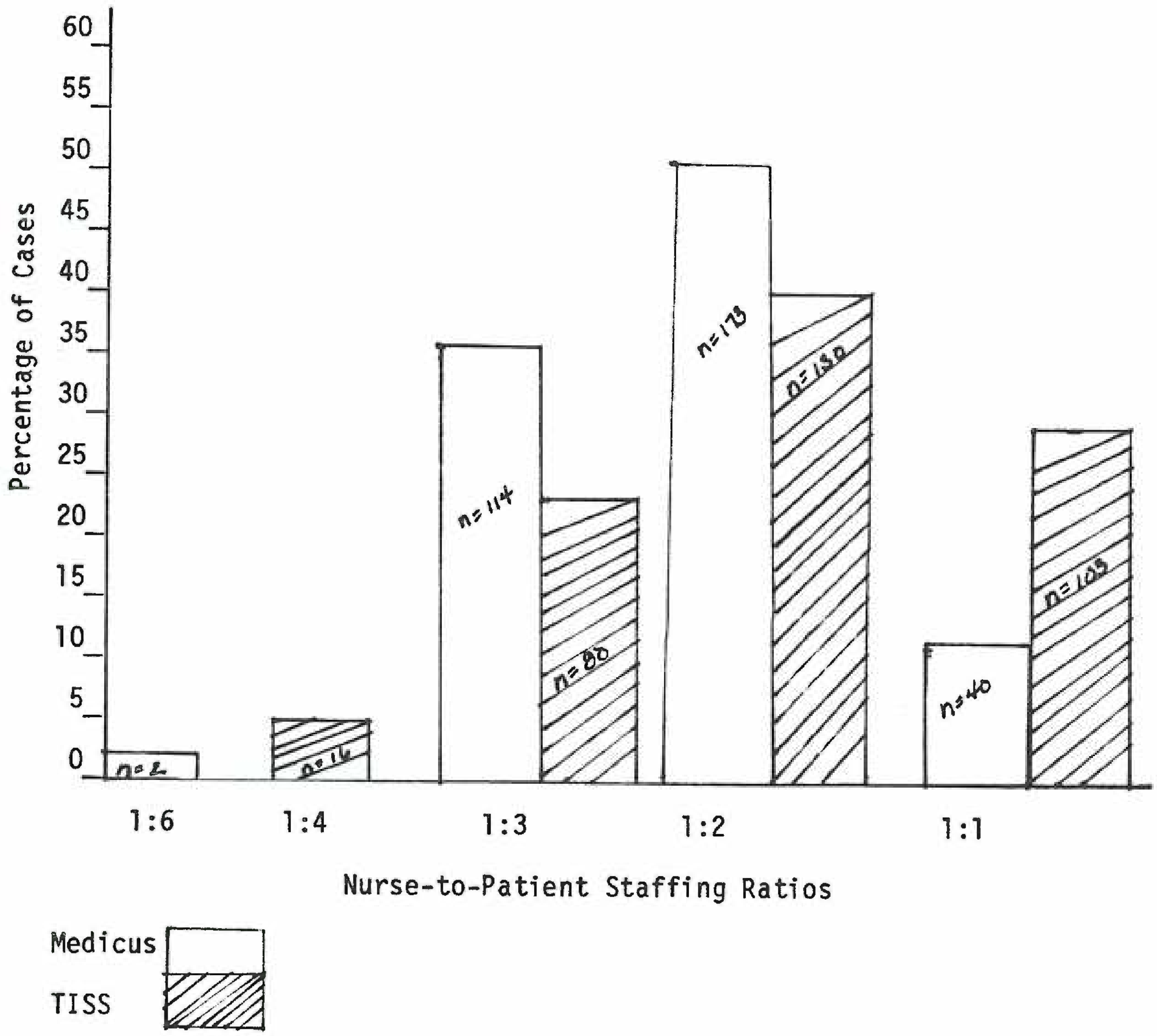
3. Though the correlations appear strong, there are discernible differences in the allocation of nurse resources. This will be discussed and described at length.

Data collected consisted of 329 observations using both patient classification systems. These observations were scored, tabulated and compared for frequencies, means and standard deviations using the observed patient as the unit of analysis. For each of the observations four variables are compared: 1) TISS scores, 2) TISS classification, 3) Medicus scores, and 4) Medicus classification. Each of the observations is complete for the variables of analysis, classification scores and categories. There are no missing or collapsed data.

Observations were restricted to an intensive care patient population, resulting in an asymmetrical, unimodal, negatively skewed distribution. Figure 2 demonstrates these population characteristics as reflected in the numbers of patients classified into the five Medicus and four TISS categories. This distribution was anticipated because this study did not draw samples from the total universe of patient populations, but only from an acutely ill patient population. As illustrated in Figure 2 there were no Medicus Type I categories obtained from the sample. The distribution and skewness for each variable largely reflect the higher hours of nursing care required by an acutely ill patient population and the high resource intensity required to care for this population. The descriptive statistics, mean, standard deviation, and skewness are summarized in Table 2.

To further understand and relate the nurse-to-patient ratios recommended by each patient classification system, a classification variable was created for each system. This classification variable is an estimate of hours of care and the associated staffing ratio for each classification category of TISS as established by Cullen et al. (1983) and for

Figure 2. Percentage of Cases for Each Nurse-to-Patient Staffing Ratio as Prescribed by Medicus and TISS.



N = 329

Table 2. Means, Standard Deviation, and Skewness Summarized for TISS and Medicus Scores and Classifications.

Categories	TISS (0-75 points)				Medicus (0-235 points)				
	I	II	III	IV	I	II	III	IV	V
	0-9	10-19	20-39	40-75	0-23	24-49	50-109	110-181	181-235

	TISS Scores	TISS Classification	Medicus Scores	Medicus Classification
Mean	30.450	2.973	127.495	3.763
Standard Deviation	14.187	0.867	41.092	0.661
Skewness	0.120	-0.398	0.952	0.174

each classification category of Medicus as established by Medicus Corporation (1981). Based on the staffing ratios described for TISS by Cullen et al. (1983), the hours of care for each category were estimated, and are presented in Table 3. The Medicus hours of care for each category were established by determining the midpoints of the range of hours designated for each patient type or category. This information is also summarized in Table 3. The shaded areas in Table 3 illustrate the correspondence between patient care types for each patient classification system, based on the nurse-to-patient ratios and recommended hours of care.

Pearson's R correlation comparing the TISS to Medicus classification categories for this sample of 329 was 0.4124 ($p<0.000$) demonstrating a positive linear and highly significant correlation.

To further explore the strength of the relationship between TISS and Medicus in determining nursing resource allocation a crosstabulation and Chi Square were performed. Chi Square is appropriate when there are mutually exclusive and exhaustive categories to be compared, and the data consists of frequency counts. In Figure 2 the frequencies of patients within each category of the two patient classification systems are summarized.

Table 3. Nurse-to-Patient Staffing Ratios Based on Hours of Care Required for each Category in a Twenty-four Hour Period.

	TISS	Medicus
Type I	1:4(6 hrs./24 hrs.)	1:16(1.5 hrs./24hrs.)
Type II	1:3(9.6 hrs./24 hrs.)	1:6(4 hrs./24 hrs.)
Type III	1:2(14.4 hrs./24 hrs.)	1:3(7.5 hrs./24 hrs.)
Type IV	1:1(24 hrs./24 hrs.)	1:2(13 hrs./24 hrs.)
Type V	* * * * * * * * * * *	1:1(20hrs./24 hrs.)

The Chi Square crosstabulation of 4 X 4 dimensions (Table 4) illustrates the TISS/Medicus contrast for nurse-to-patient staffing ratios. Based on the marginal summaries a Chi Square value of 53.09 with 3 degrees of freedom was obtained from the dimensions of this table. This value was found to be significant at $p<0.000$. Since the computed value exceeds the table value, this lends support to the notion that there is a distinct difference between the two systems and the allocation of nursing resources.

Referring to Table 4, there was a 100% correlation in 42.5% (n=140) of the cases regarding nursing resource allocation. This would indicate that with either patient classification system, nurse resource allocation would be the same 42.5% of the time. Another 43.5% (n=143) of the sample correlated within a fraction of a variation. In each of these cases the discrepancy was from .33 to .5 of a nurse per patient per shift across all patient classification categories. The remaining 14% of the sample were considered outliers because there was no correlation found.

As demonstrated, then, classifying patients with TISS or Medicus will result in a difference in allocated nurse staffing. To demonstrate this

Table 4. Crosstabulation of Frequencies Comparing TISS to Medicus Nurse-to-Patient Staffing Ratios.

Medicus Classifications Types/Staffing Ratios

TISS Classifications Types/Staffing Ratios	2 1:6	3 1:3	4 1:2	5 1:1	
1 1:4	0 0 0 0	11o 68.8 9.6 3.3	4o 25.0 2.3 1.2	1o 6.3 2.5 0.3	16
2 1:3	2o 2.5 100.0 0.6	43* 53.8 37.7 13.1	30+ 37.5 17.3 9.1	5o 6.3 12.5 1.5	80
3 1:2	0 0 0 0	47+ 36.2 41.2 14.3	73* 56.2 42.2 22.2	10o 7.7 25.0 3.0	130
4 1:1	0 0 0 0	13o 12.6 11.4 4.0	66+ 64.1 38.2 20.1	24* 23.3 60.0 7.3	103
	2	114	173	40	

Chi Square=53.09 with 3 degrees of freedom

$p \leq 0.000$

* agree

\+ fractional variation

o outliers

Note: There were no Medicus Type I categories obtained from the sample.

difference the actual 329 TISS and Medicus scores were tabulated into weekly totals. These weekly totals were averaged and compared for staffing requirements during an average week in the intensive care unit (Table 5).

Comparing the classification scores of TISS and Medicus during an average week in the intensive care unit results in TISS allocating more nurse resources per category of patients (Figure 3).

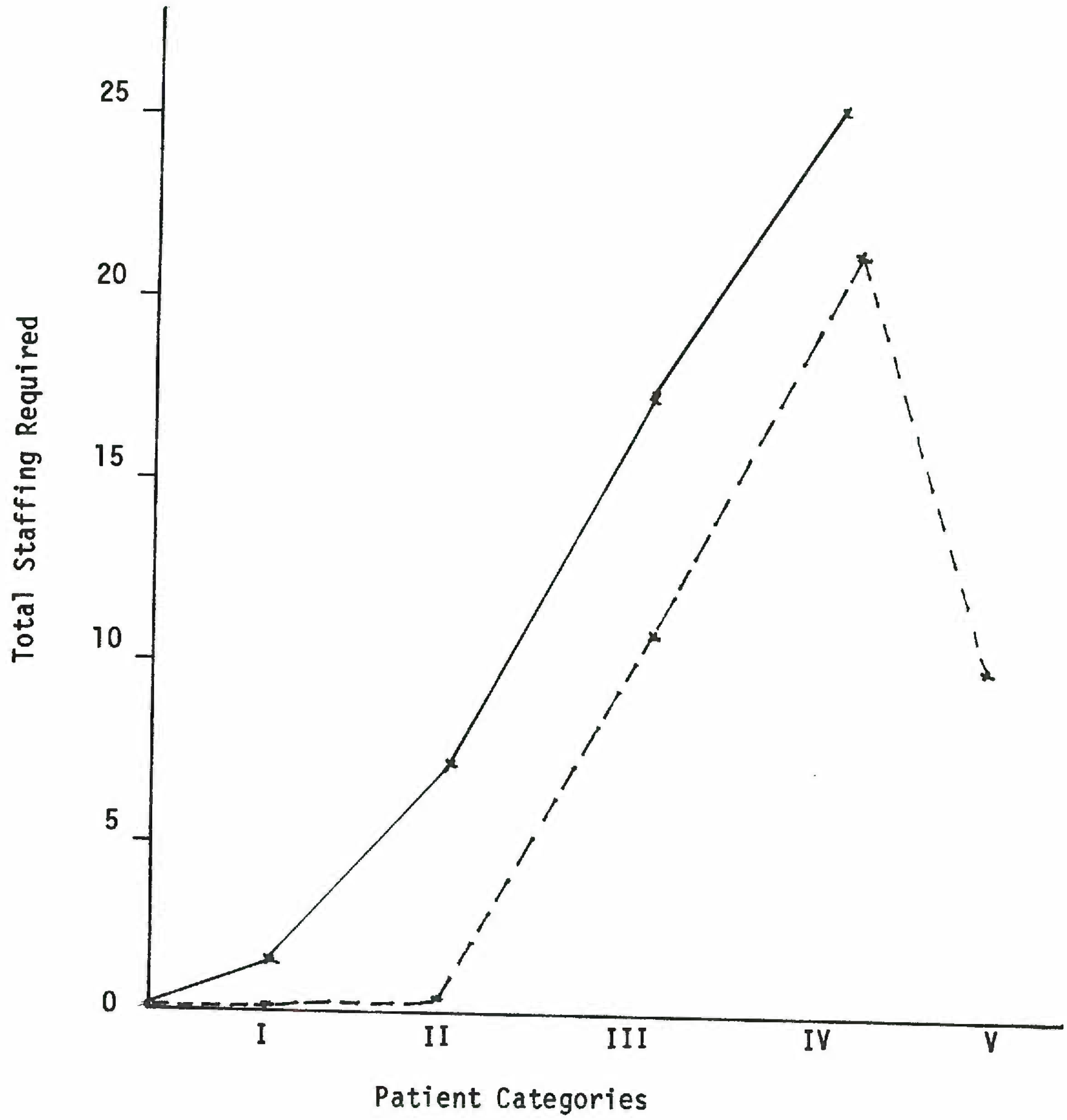
To convert the total nurse staff required per twenty-four hours, the totals must be multiplied by three (representing the number of work shifts per day required for providing care to the patient). To provide the appropriate weekly staff according to Medicus for all shifts would require 125.18 nurses; while TISS would require 148.23 nurses. The TISS system of patient classification would require 23.05 nurses more per week than the Medicus system would to provide the required care to the same group of 82 patients.

From this analysis the difference in staff allocation costs between TISS and Medicus in total dollars per year to staff an intensive care unit can be compared. This was accomplished by multiplying the average weekly staffing requirements by the hours of

Table 5. A Comparison of Averaged Weekly Nurse-to-Patient Staffing Ratios as Determined by the TISS and Medicus Patient Classification Systems.

	TISS						Medicus				
Categories	Number of Patients		Staffing (ratio)		Total required staffing	Number of Patients		Staffing (ratio)		Total Required staffing
Type I	5	+	4(1:4)	=	1.25	.25	+	16(1:16)	=	.02
Type II	19.25	+	3(1:3)	=	6.41	.75	+	6(1:6)	=	.125
Type III	32.5	+	2(1:2)	=	16.25	30.25	+	3(1:3)	=	10.08
Type IV	25.5	+	1(1:1)	=	25.5	43	+	2(1:2)	=	21.5
Type V	* * * *	* * * *	* * * *	* *	* * * * *	10	+	1(1:1)	=	10
			Total nurses/ week		49.41			Total nurses/ week		41.73

Figure 3. Nursing Resource Allocation Determined by TISS and Medicus Classification Systems for an Averaged Week.



– – – – Medicus

———— TISS

care in a day (24), times the number of weeks per year (52), times the average wage of registered nurses in Oregon (Oregon Association of Hospitals Survey, 1986). This results in a total cost amount. Comparing the two systems results in a dollar difference of $110,511 yearly (Table 6).

Further comparing the data in Table 6 with the fractional variation in staffing that would result between the two systems (in this study it is 43.5% of the patients) the discrepancy in staffing would result in a total cost difference between $102,046 and 154,615 for TISS and $86,185 and 130,584 for Medicus yearly (Table 7).

The remaining 14% (n=46) are considered to be outliers. This means that there is no agreement or correlation in nursing resource allocation between the systems under study for these patients. It is important at this point to conceptually examine each system to understand why a patient classified by TISS as a Type I (1:4) might be classified by Medicus as a Type V (1:1). This particular circumstance did occur once in the data collected. Part of the discrepancy lay in the time frame differences of each system. TISS is based on actual needs or hours; and, therefore looks at the past 24 hours. Medicus, based on estimated needs or hours, looks ahead to the next 24

Table 6. A Comparison of Yearly Costs for Nursing Resource Allocation as Determined by TISS and Medicus.

	Staff/ week		Hours of care		Weeks/ year		Average wage	Total yearly cost
TISS	49.41	X	24	X	52	X	$ 11.53=	$710,982
Medicus	41.73	X	24	X	52	X	$ 11.53=	$600,471
					Difference		=	$110,511

Table 7. A Comparison of Costs for Nursing Resource Allocation Based on Fractional Variation as Determined by TISS and Medicus Differences.

	Staff/ Week-43.5%		Fractional variation		Hours of care		Weeks/ year		Average wage		Total yearly cost variation	Maximum cost difference
TISS	21.49	X	.33	X	24	X	52	X	$11.53	=	$102,046	
TISS	21.49	X	.50	X	24	X	52	X	$11.53	=	$154,615	$15,861
Medicus	18.15	X	.33	X	24	X	52	X	$11.53	=	$ 86,185	
Medicus	18.15	X	.50	X	24	X	52	X	$11.53	=	$130,584	$24,031

hours. In other words, the TISS observation documented actual medical interventions, i.e. nasal oxygen, standard intake and output, EKG monitor, peripheral intravenous routes, etc. consumed by an acutely ill preoperative patient. These same care needs were observed by Medicus as immediate postoperative nursing care needs for an open heart surgery. This difference in time reference would account for the vast acuity discrepancies between the two systems.

In other outliers where a TISS Type I patient was classified as a Medicus Type IV, the differences of acuity measurement could be explained by the theoretical framework underlying each system. Referring back to Figure 1, it can be discerned that the focus of measurement for TISS is the nurse and tasks or medical interventions, while that for Medicus is the patient and assessed patient needs that the nurse must meet. For example, an unconscious but stable patient on a ventilator according to TISS would qualify for clinical indicators such as controlled ventilation with or without positive end expiratory pressure, complex intake and output, peripheral intravenous routes, EKG monitor and foley catheter. But, according to Medicus which considers functional/

emotional/educational needs, in addition to tasks, appropriate indicators for the same patient would be an assessment of mentation, immobilities, ambulatory status, wound and skin care, frequency of vital signs, non-invasive monitoring and emotional needs of the family. Viewing the patient from a more holistic perspective, one that takes into account the individual patient variables, might account for a higher nursing acuity than one which counted only weighted tasks.

By the same token even though Medicus indicators are objectively defined in order to create exhaustive and mutually exclusive categories, it is common for a nurse to anticipate that a patient's acuity will be higher than it actually may be. It is more difficult to elevate or exaggerate a TISS acuity score because a patient either does or does not require the tasks indicated.

It is noteworthy that despite conceptual differences in the two systems--individual patient variable needs versus tasks--more TISS observations fell within a higher staffing category (Figure 2). Thirty-one percent of the TISS observations compared to twelve percent of Medicus observations required a 1:1 nurse-to-patient staffing ratio. In addition, according to TISS, somewhere between five and thirty percent of patients (combining Type I and Type II observation) would be considered inappropriate admissions for an intensive care unit. The TISS system does seem to capture inappropriate admissions while Medicus might substantiate the reason for admission, as only 0.6% of the Medicus observations (Type II) were considered inappropriate admissions. These patients with lower activities are often cardiac telemetry overflows or gastrointestinal bleeds, or perhaps, head injuries admitted for observation and monitoring through the emergency department. The length of stay for these patients who do not actually need or require the resource intensity of this expensive service is normally short; and, these patients are triaged to a more appropriate and less expensive level of nursing care.

Overall, it would seem that the TISS system would be a more accurate method for measuring nursing resource allocation at this level of required resource intensity. The reasons for this are: 1) there are no budgetary requirements for purchasing TISS versus a packaged or computerized software system such as Medicus, 2) the critical indicators (medical interventions) of TISS are a universal language shared by health care professionals, 3) though TISS allocatesmore staff resulting in higher labor costs, it may eliminate the need for supplementary programs and additional ancillary personnel. A higher staffing level may prevent staff burnout and general dissatisfaction with working conditions.

CHAPTER IV

Summary

The nature of acute health care has changed rapidly during the past decade. This change has been marked by growth, competition, and complexity. In some ways the pressures of the current system present a paradox. The system concentrates on cost containment primarily through streamlined patient lengths of stay and nurse staffing while maintaining the expectation of highest quality care.

Nursing resource allocation continues to be one of the most important and demanding problems facing nursing administrators today. The challenge of this problem is twofold: containing cost and maintaining quality. Nurse staffing represents the single most costly component of hospital operations; however, the level of nurse staffing has a direct bearing on the quality of care.

During this time of scarce resources and economic accountability patient classification systems have gained acceptance as a primary manpower planning and management information tool. This acceptance has occurred because the information generated by a patient classification system enables nurse administrators to match perceived patient needs with available nursing resources.

Though patient classification systems provide baseline information which facilitates established standards for nurse-to-patient staffing ratios, it is not a cut and dried issue. There are many patient classification systems from which to choose. While each system attempts to measure patient care requirements, each methodology varies theoretically as well as technically in its focus of measurement. It becomes a perplexing problem to select a patient classification system. Many hospitals opt to develop their own; others purchase a proprietary generic patient classification system from a consulting firm which is to be used in all patient care areas in order to measure patient care requirements and centrally allocate staffing based on those requirements. Either way, the development and testing of an in-house system or the purchasing of a generic system is very costly in both time and money.

In this study, two patient classification tools, Medicus, a proprietary generic tool, and TISS, a tool developed specifically to measure the nursing care needs of critically ill patient populations, were compared in an intensive care unit setting to determine the nursing resource allocation of each system for the same group of patients. While each system suggests specific nurse-to-patient ratios, TISS categorizes patient needs according to consumed services or actual nursing hours; whereas, Medicus is based on assessed patient needs and estimated nursing hours of care. However, both systems are credited with the efficacy of predicting staffing ratios for critically ill patient populations despite theoretical or philosophical differences.

Based on the statistical findings of this study, the sample of 329 patient observations using both TISS and Medicus did demonstrate a positive linear and highly significant relationship. However, the application of Chi Square technique revealed there was a significant difference in nurse staffing allocated by each system for the same group of patients. While there was a 100% correlation in 42.5% of the observations, there were fractional variations found in 43.5% of the cases; in 14% of the cases there was no correspondence.

The extent of fractional variation amounted to .33 to .50 of a nurse per patient per shift. While this discrepancy has a definite impact when projected for a twenty-four hour period, it is important to recognize the value of nursing judgment in providing safe, quality patient care. This factor can't be replaced, but only complemented by a patient classification system.

An important consideration in selecting a patient classification system is an economic one. Aside from the high cost of developing or purchasing, implementing and maintaining a patient classification system, it is important to consider what economic difference each system might make for each hospital. As demonstrated in this study, there could be as much as $110,000 per year in labor cost differences at the facility of study in only the intensive care unit. This raises the issue, however, that whereas a particular patient classification system may provide support for a staffing level that nurses feel is required, the question must be addressed, of whether it is an affordable level of care.

The results of this study also gave insight into the appropriate utilization of an intensive care unit. Based on the TISS observations, approximately 30% of the patients were considered inappropriate admissions, as compared to 0.6% of the Medicus observations. In the current economic climate which necessitates keeping costs to a minimum, each institution must set standards for criteria indicating appropriate levels of care for intensive care unit patient populations. Implementation of a valid, reliable patient classification system enhances the feasibility for nursing and hospital administrators to monitor, justify and project needs, productivity levels and manpower expenses.

While this study provides certain insights, there are certain limitations of which to be aware. First, the focus of this study has been restricted to a critically ill patient population in one setting; therefore, these findings can't be generalized to other patient populations within and across institutions. Second, only two tools out of the plethora of patient classification systems were compared while many are available and currently in use. Third, attempts to measure nursing care requirements are a political and economically sensitive topic which limits ready accessibility to the staff and patients. Inherent costs include gaining acceptance for a project of this nature, implementation of an additional classification tool and maintenance of the process, i.e. interrater reliability. Finally, it is difficult and perhaps not accurate to compare the categories of different patient classification systems. One can't readily draw conclusions about which system more accurately captures the nuances of patient care needs because of the theoretical differences in each system.

Replication of this study would be recommended in other acute care settings and with other specialized critical care areas. The study could be expanded to address such nursing issues as utilization of an intensive care unit, appropriately assigning staff per shift, and measuring needs of a patient in a highly technical, specialized area such as an intensive care unit.

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APPENDIX A

The Medicus Patient Classification System

Appendix A

Good Samaritan Hospital & Medical Center

Department of Nursing

Patient Classification Indicator Definitions-Type 5

The intent of the classification tool is to capture a picture of the patient's needs to the moment of classification. For patients who have not left the unit for their test or procedure at the time of classification, mark only the indicators which apply now. For patients who have left the unit for their test or procedure at the time of classification, mark the indicators which reflect their needs the moment of their return. If they are in surgery and will not return to the unit before 5:00 p.m. do not mark any indicators.

<u>Admission or Transfer in</u>: Mark if the patient has arrived on the unit during the day shift or if the patient is expected to arrive before 5:00 p.m. Mark any other indicators which are known as well.

<u>Discharge or Transfer out</u>: Mark if the patient is still on the unit, but certain to be discharged or transferred by 5:00 p.m. Also, mark any other appropriate indicators.

<u>Less than 2 years old</u>: Refers to chronological age.

2-6 years old: Refers to chronological age.

Unconscious: Applies to patients who are unconscious. Excludes the lethargic or stuporous patient. If this condition is checked, none of the following may be checked: confused, sensory deficit, up with assistance, special teaching or special emotional needs, unless directed towards family, and the needs and interventions are documented.

Confused/disoriented: Applies to patients who are confused or have decreased sensorium. Example: patients who are unable to follow commands, care for self, are unaware of time and/or place, or are retarded (mental age significantly below chronological age). Includes pediatric patients who exhibit a definite lack of alertness for their age. This indicator does not apply to the unconscious patient. Special teaching needs would also be inappropriate for the patient who is unable to follow commands unless the teaching is directed toward the family and the need is documented.

Sensory deficits: Mark if a patient currently relies on nursing measures to compensate for sensory deficits of vision, hearing, and speech only. Applies to patients with both eyes patched (exception is infants) and patients who have language barriers which increase nursing care needs (deaf, aphasic, foreign language, respirator). This indicator cannot be checked if Unconscious indicator is marked. Special emotional needs would also be inappropriate if it applies only to the existence of sensory deficits as described here. Does not apply to neurologic deficits which impair tactile sensation or mobility only.

Partial immobility: Refers to the patient's ability to perform activities of daily living. Applies to 2 categories of patients requiring assistance because of obvious slowing in ability: 1) restricted movement of 1-3 extremities or joints, 2) restricted movement of chest wall to the extent of causing cardiopulmonary risk. Patients requiring moderate to maximum assistance to turn. "Restricted Movement" may be due to physical or mental disability.

Complete immobility: Mark for the patient with 90-100% immobility. These are patients who due to their physical or mental condition are incapable of participating in most or all activities, such as turning or moving. Do not routinely mark for infants (age indicator accounts for dependency) or for post-op patients. Examples: quadraplegic patient, unconscious patient, patient in four point restraints. Use of the next three indicators must be marked for each patient classified and should reflect the patient's actual status, not activity orders.

Up ad lib: Patient gets up on his own without nursing assistance. Up with assistance or bedrest cannot be checked if Up ad Lib is checked. Applies to ambulatory patients who transfer into or out of bed independently.

Up with Assistance: Mark for patient who is able to bear weight on arms or legs, but due to physical or mental condition requires nursing assistance to transfer into or out of bed. This indicator also includes patients on modified bedrest orders. Bedrest or Up ad Lib can't be checked if Up with Assistance is checked.

Bedrest: Mark if patient is on strict bedrest without bathroom priviledges or unable to bear weight. This includes all infants and patients needing bodily or hoyer lift. Up ad Lib or Up with Assistance can't be checked if Bedrest is checked.

Bath with assistance: Check for patients who currently need assistance with setting up bath equipment and washing small areas of body, e.g., back. Also includes patients needing supervision during bath, e.g., patient in tub or shower (needs less than 50% assistance).

Bath total: Includes patients who currently need an entire bath or patients that are only able to bathe small areas of the body, e.g., face, hands, and genitals (more than 50% assistance required).

Assistance with oral/tube feed: Mark if the patient (because of physical or mental condition) requires tray or tube feeding to be set up by nursing personnel. Patient is then able to feed self or administer own tube feeding, with minimal supervision.

Total oral/tube feed: Mark if the patient is unable to feed self or requires constant supervision during the meal. Example: aspiration precautions, severely confused patient.

I & O simple: Mark for patient currently on intake or output, including calorie counts, to be recorded less frequently than every two hours.

I & O Complex: Mark for patient currently on intake or output to be recorded every two hours or more often.

IV's and site care: Mark if the patient currently has an IV or AV shunt in place, including heparin locks, arterial lines, access ports for chemotherapy. Does not include epidural lines.

Specimen collection-simple: Mark for patient requiring specimen to be collected by nursing less frequently than every 2 hours, e.g., blood, urine, sputum, chemstrip, stool.

Specimen collection-complex: Mark for patient requiring specimen to be collected by nursing every 2 hours or more often, e.g. blood, urine, chemstrip, stool.

Isolation: Mark if patient currently requires isolation beyond gloving and/or good handwashing when the nurse enters the room. Do not mark for isolette unless infant is in isolation.

Incontinent/diaphoretic: Mark if patient currently has uncontrolled discharges (bowel, bladder, wound, gastric), extreme diaphoresis, or is in a high humidity tent, and requires frequent linen changes (at least 2 times per shift). Cannot be routinely marked for infants. Does not include patients with control measures in place, e.g., condom catheters, incontinence briefs, etc.

Simple wound and/or skin care: Mark for patient currently requiring: 1) observation/assessment of a wound or dressing, 2) intervention to prevent skin breakdown (beyond turning and inspection), 3) simple/uncomplicated wound care and dressing changes, 4) perineal care, excluding catheter care,

5) isolation which requires only gloving and/or good handwashing, 6) sitz baths, heat lamps, hot packs, ice bags, which are used for treatment of the skin. Do not mark for routine AM and HS care.

Extensive wound and/or skin care: Mark for patients with complex, multiple dressings or packs, patients with extensive burns or other extreme dermatological problems requiring extensive care. Example: draining fistulas, multiple decubiti, new ostomies, etc.

Tube care: Mark if patient needs assistance with tubes, e.g., urinary catheter care, suctioning, cleaning trach tubes, irrigation/aspiration of tubes, chest tube, intermittent catheterization program, peritoneal tube for dialysis. Excludes: enema's, rectal tubes, or one time post-void residual urines.

Oxygen therapy: Mark if patient requires any oxygen therapy, heated mist, nasal oxygen, suctioning, percussion or postural drainage. This applies if nurse is directly responsible for therapy and/or respiratory assessment follow-up. Includes incentive spirometers for a documented respiratory problem if nursing assistance required beyond verbal reminders and simple instruction.

Respirator: Mark for patients requiring mechanical ventilation for support of life systems. If this is checked then tube care, oxygen therapy, and tracheostomy/ET tube should also be marked.

Trach/ET tube: Mark for any patient who has a tracheostomy or an endotrach tube. Also mark tube care if patient relies on nursing for care of tube.

Vital signs Q1 1/2-2 hours: Mark for vital signs, neuro checks, and CVP readings being currently taken at this frequency by a nurse for more than 4 hours duration.

Vital signs Q 1 hour or more often: Mark for vital signs, neuro checks, and CVP readings being currently taken at this frequency by a nurse for more than 4 hours duration.

Monitoring-non-invasive: Mark for patient currently requiring visual observation and assessment every 15 minutes for more than four hours duration, or for patients requiring external cardiac monitoring, EEG telemetry, or monitoring of IV chemotherapy. This indicator does not include adults or children requiring periodic supervision of activities.

Invasive monitoring: Mark for patients with invasive lines or equipment for the purpose of monitoring. Includes Swan-Ganz, intra-cranial pressure monitoring, arterial pressure line, intra-aortic balloon pump, membrane oxygenator, peritoneal dialysis, hemodialysis, etc. Do not mark for CVP lines (use IV and site care for this) or if need is met by other personnel (example: hemodialysis department staff). If this indicator is marked, do not mark non-invasive monitoring.

<u>Prep for test/procedure</u>: Mark if patient requires preparation by nursing before 5:00 p.m. for a test or procedure that has not yet occurred, e.g., bowel preps, special scrubs, use of checklists, pre-op meds, signing of permits, etc. Also applies to patients requiring nursing assistance or participation during a test/procedure, e.g., proctoscopy, lumbar puncture, or minor surgical procedure done on the unit. This indicator includes assisting with a physical examination and pre-op teaching/orientation.

<u>Special teaching needs</u>: Mark if patient and/or family has a specific need today for special instruction such as diabetic teaching, hygiene, medications, etc. There must be documentation in the care plan of the teaching plan and learning activities of the patient if this indicator is marked. This does not include routine admission instruction, environmental orientation, instruction for lab test unless patient/family exhibit difficulties in understanding. Do not mark for reinforcement of previously taught

information. This indicator can't be marked for patients who can't follow commands unless teaching is directed toward the family (see confused). Do not routinely mark for patients who have been admitted/assessed.

Special emotional needs: Mark if patient or family need additional support today because they are experiencing stress beyond the usual stress of hospitalization, are having difficulty coping, or are exhibiting inappropriate behavior. This indicator is to be used only for psychosocial disturbances which require specific nursing actions to meet the patient/family needs. There must be documentation in the care plan of the patient's or family's behavior and nursing interventions if this indicator is marked. This indicator doesn't include normal amounts of comfort and support by unit standards given by nursing personnel. Don't routinely mark for patients who have not been admitted/assessed. Examples: withdrawn-clearly avoiding interaction, aggressive-physically or verbally, anxious/demanding/manipulative-requiring additional contact, expressing suicidal ideations.

Multiple system instability: Mark for patients who require intense ongoing assessment of multiple body systems (e.g., respiratory, circulatory, and neurological) for purpose of adjusting aggressive therapeutic interventions to maintain physiological stability.

Medicus Indicators

Admission or Transfer In- 3 points

Discharge or Transfer Out- 2 points

Less than 2 Years- 9 points

Age 2-6 Years- 15 points

Unconscious- 24 points

Confused/Disoriented- 15 points

Sensory Deficit- 12 points

Partial Immobility- 9 points

Complete Immobility- 24 points

Up Ad Lib- 0 points

Up with Assistance- 5 points

Bed Rest- 10 points

Bath with Assistance- 3 points

Bath Total- 4 points

Assistance with Oral/Tube Feed- 3 points

Total Oral/Tube Feed- 10 points

I & O Simple- 2 points

I & O Complex- 8 points

IV's & Site Care- 12 points

Specimen Collection-Simple- 2 points

Specimen Collection-Complex- 9 points

Isolation- 9 points

Incontinent/Diaphoretic- 18 points

Simple Wound and/or Skin Care- 8 points

Extensive Wound and/or Skin Care - 24 points

Tube Care- 8 points

Oxygen Therapy- 6 points

Respirator- 10 points

Trach/ET Tube- 6 points

Vital Signs, Q1 1/2-2 Hr.- 12 points

Vital Signs, Q1 Hr. or More Often- 18 points

Monitoring-Non-Invasive- 12 points

Invasive Monitoring- 36 points

Prep. for Test/Procedure- 3 points

Special Teaching Needs- 12 points

Special Emotional Needs- 12 points

Multi-System Instability- 26 points

APPENDIX B

The Therapeutic Intervention Scoring System

General Guidelines for Use of TISS

1. Data should be collected at the same time each day, preferably in the morning and by the same observer.
2. A TISS item should be checked if it was performed at any time during the previous 24 hours.
3. When the patient is discharged from the intensive care unit, a discharge TISS should reflect the previous shift or eight hour period.
4. Total TISS points should decrease as the patient improves. Conversely, one can safely assume that if TISS points increase, more interventions or more intensive care is being delivered to the patient indicating deterioration in the patient's condition.
5. Many interventions are interrelated and can be automatically eliminated from consideration. For example, if the patient was extubated for the 24 hours, any intervention related to an intubated patient such as controlled ventilation will not apply.
6. When several related interventions are applied within the same 24 hours, only award one set of points for the maximum intervention. For example, if a patient was on controlled

ventilation (4 points), then placed on IMV (3 points), to CPAP (3 points), to a t-piece (2 points), and then extubated all within the same 24 hours, assign only four points (for controlled ventilation), the maximum intervention offered.

TISS Indicators

Four points

Cardiac arrest/countershock within past 48 hours

Controlled ventilation with or without peep

Conrolled ventilation with intermittent or continuous muscle relaxants

Balloon tamponade of varices

Continuous arterial infusion

Pulmonary artery catheter

Atrial and/or ventricular pacing

Hemodialysis in unstable patient

Peritoneal dialysis

Induced hypothermia

Pressure-activated blood infusion

G-suit

Intracranial pressure monitoring

Platelet transfusion

IABA (Intra-aortic balloon assist)

Emergency operative procedure (within past 24 hours)

Lavage of acute GI bleeding

Emergency endoscopy or bronchoscopy

Vasoactive drug infusion (more than 1 drug)

Three points

Central IV hyperalimentation (includes renal, cardiac, hepatic failure fluid)

Pacemaker on standby

Chest tubes

Intermittent mandatory ventilation (IMV) or assisted ventilation

Continuous positive airway pressure (CPAP)

Concentrated K+ infusion via central catheter

Nasotracheal or orotracheal intubation

Blind intratracheal suctioning

Complex metabolic balance (frequent intake and output)

Multiple ABG, bleeding, and/or STAT studies (greater than four per shift)

Frequent infusions of blood products (greater than 5 units/24 hours)

Bolus IV medication (nonscheduled)

Vasoactive drug infusion (1 drug)

Continuous antiarrhythmia infusions

Cardioversion for arrhythmia (Not defibrillation)

Hypothermia blanket

Arterial line

Acute digitalization-within 48 hours

Measurement of cardiac output by any method

Active diuresis for fluid overload or cerebral edema

Active Rx. for metabolic alkalosis

Active Rx. for metabolic acidosis

Emergency thora-, para-, and peri-cardiocenteses

Active anticoagulation (initial 48 hours)

Phlebotomy for volume overload

Coverage with more than 2 IV antibiotics

Rx. of seizures or metabolic encephalopathy (within 48 hours of onset)

Complicated orthopedic traction

Two points

CVP (central venous pressure)

2 peripheral IV catheters

Hemodialysis-stable patient

Fresh tracheostomy (less than 48 hours)

Spontaneous respiration via endotracheal tube or tracheostomy (t-piece or trach mask)

GI feedings

Replacement of excess fluid loss

Parenteral chemotherapy

Hourly neuro vital signs

Multiple dressing changes

Pitressin infusion IV

One point

ECG monitoring

Hourly vital signs

1 peripheral IV catheter

Chronic anticoagulation

Standard intake and output (q 24 hour)

STAT blood tests

Intermittent scheduled IV medications

Routine dressing changes

Standard orthopedic traction

Tracheostomy care

Decubitus ulcer

Urinary catheter

Supplemental oxygen (nasal or mask)

Antibiotics IV (2 or less)

Chest physiotherapy

Extensive irrigations, packings or debridement of wound, fistula, or colostomy

GI decompression

Peripheral hyperalimentation/Intralipid therapy

Therapeutic Intervention Scoring System Explanation Code

Four point interventions:

1. Cardiac arrest and/or countershock within past 48 hours-point score for two days after most recent cardiac arrest.

2. Controlled ventilation with or without PEEP- this doesn't mean intermittent mandatory ventilation which is a three point intervention. It does mean that regardless of the internal plumbing of the ventilator, the patient's full ventilatory needs are being supplied by the machine. Whether or not the patient is ineffectively breathing around the ventilator is irrelevant as long as the ventilator is providing all the patient's needed minute ventilation.

3. Controlled ventilation with intermittent or continuous muscle relaxants- for example, D-tubocurarine chloride, pancuronium (pavulon), metocurine (metubine).

4. Balloon tamponade of varices-use Sengtaken-Blakemore or Linton tube for esophageal bleeding.

5. Continuous arterial infusion-Pitressin infusion via IMA, SMA, gastric artery catheters for control of gastrointestinal bleeding, or other intra-arterial infusion. This doesn't include standard

three ml./h. heparin flush to maintain catheter patency.

6. Atrial and/or ventricular pacing-active pacing even if a chronic pacemaker.

7. Hemodialysis in an unstable patient-include first two runs of an acute dialysis. Include chronic dialysis in patient whose medical situation now renders dialysis unstable.

8. Induced hypothermia-continuous or intermittent cooling to achieve body temperature less than 33 degrees centigrade.

9. Pressure-activated blood infusion-use of a blood pump or manual pumping of blood in the patient who requires rapid blood replacement.

10. Emergency operative procedures (within past 24 hours)-may even be the initial emergency operative procedure-precludes diagnostic tests, i.e., angiography, CT scan.

Three point intervention:

1. Intermittent mandatory ventilation (IMV) or assisted ventilation-the patient is supplying some of his own ventilatory needs.

2. Nasotracheal or orotracheal intubation-not a daily point score. Patient must have been intubated in the intensive care unit (elective or emergency)

within previous 24 hours.

3. Complex metabolic balance (frequent intake and output)-measurement of intake/output above and beyond the normal 24 hour routine. Frequent adjustment of intake according to total output.

4. Active anticoagulation (initial 48 hours)-includes rheomacrodex.

5. Complicated orthopedic traction-for example, stryker frame, circoelectric bed.

Two point interventions:

1. Replacement of excess fluid loss-replacement of clear fluids over and above the ordered maintenance level.

One point intervention:

1. Decubitus ulcer-must have a decubitus ulcer. Does not include preventive therapy.

APPENDIX C

Interrater Reliability Test for Patient Classification Systems: Medicus and TISS

Interrater Reliability Test for Patient Classification Systems: Medicus and TISS

Instructions: Classify the following patients according to both Medicus and TISS patient classification systems based on the descriptions provided for each of the patients.

1. Mr. N., a 51 year old male with a bilateral frontal intracranial hemorrhage, was admitted to the intensive care unit three days ago. He is stuporous and responds only to deep external stimulation. Attached to a cardiac monitor, his vital signs and neurochecks are monitored every thirty minutes. He is on a Nipride drip to keep his systolic blood pressure below 180 and the diastolic blood pressure below 100. He has a peripheral intravenous route through which he receives the Nipride. In addition, he receives intravenous fluids with 40 meq. potassium chloride at 75cc/hr and scheduled intravenous medications of Decadron and Tagamet. He has a foley catheter; and, intake and output is measured hourly. He receives oxygen per nasal prongs at 4 liters/min. and IPPB with Bronkosol every four hours. No suctioning has been required. He is on nothing by mouth, on bedrest requiring every two hour turns and requires complete assistance with his care.

2. Mrs. T., a 59 year old female, is two days post-operative after a coronary artery bypass graft X2 grafts. She is attached to a cardiac monitor and vital signs are monitored hourly. She has a peripheral intravenous route, an arterial line and a triple lumen central venous pressure line for intravenous fluids which contain potassium chloride and scheduled intravenous medications (one antibiotic and Inderal). Intubated, she has a t-piece with 35% oxygen and does require suctioning occasionally. Lab work is routinely drawn at least daily. She has received a unit of packed red cells this morning. On hourly intake and output, she has a foley catheter, a nasogastric tube to low intermittent suction and chest tubes. She requires simple dressing changes as needed. Alert and oriented, she is able to assist in turning and moving herself in bed. She does require total assistance with bathing. She may be out of bed and in the chair at the bedside for the first time today. Pacemaker is on standby.

3. Mrs. E., a 73 year old female, had a coronary revascularization with mitral and aortic valve replacements. She is attached to a cardiac monitor and has a pulmonary artery catheter in addition to arterial and ventricular pacers, an arterial line and

a central venous pressure line. Vital signs are monitored hourly and cardiac output, every eight hours. Nothing per mouth, she receives continuous intravenous fluids with 80 meq. potassium chloride in addition to scheduled intravenous medications (one antibiotic and Dipyridomole). She receives oxygen 40% by mask. On hourly intake and output, she has a foley catheter, nasogastric tube to low intermittent suction and chest tubes. Her intake is adjusted to her output according to physician's orders. She will be dangled for the first time today. She requires turning every two hours and total assistance with her bath. One arterial blood gas has been drawn from the arterial line this morning. Pacemaker is on standby.

4. Mr. M., a 67 year old male, was admitted with coronary artery disease which necessitated quadruple coronary bypass surgery nine days ago. He has a triple lumen central venous pressure line with three intravenous fluids continuously running (a central intravenous fluid with potassium chloride, an aminophylline drip and a titrated insulin drip). He had a tracheostomy today and currently is on a ventilator with intermittent mandatory ventilation at a rate of eight and a tidal volume of of 900 cc.

He also requires ear oximetry reading to adjust the oxygen level. Attached to a cardiac monitor, vital signs are done hourly. He has a foley and intake and output are measured hourly. He has a gastric feeding tube with a continuous Osmolyte drip at 50cc/hr. Chemstrips are done every four hours. Blood work is drawn at least daily. Alert and oriented, he is on complete bedrest, but is able to assist in turning himself from side to side. He is totally dependent on the nursing staff to meet his hygienic needs.

5. Mrs. G., a 51 year old female, was admitted with a pericardial effusion and large tumor mass on the right side of the pericardium. She had surgery yesterday. Today she was extubated and is receiving oxygen at 60% by mask. She receives continuous intravenous fluids containing potassium chloride 80 meq. through a central venous pressure line and a jelco through which she receives scheduled intravenous medications (one antibiotic and Lanoxin) and as needed analgesia. Attached to a cardiac monitor, vital signs are taken hourly. She also has an arterial line. She has been started on sips of water. She has a foley catheter and her output is measured hourly. She has chest tubes. Routine daily laboratory work is drawn.

Alert and oriented, she is on bedrest, needs assistance to turn and requires total assistance with her bath and oral care.

6. Mr. T., a 39 year old male, was admitted with an esophageal bleed. Intravenous fluids containing potassium chloride 60 meq. are administered through a jelco. He also receives scheduled intravenous medications (one antibiotic and Zantac). He may have oral fluids as tolerated. He has a foley and is on hourly intake and output. Attached to a cardiac monitor, vital signs are taken hourly. He is confused but able to respond to commands. He is able to turn himself with assistance, but requires total assistance with bathing. He requires maximum assistance to sit in the chair at the bedside. He has routine daily laboratory work. His family requires emotional support and reassurance.

7. Mr. S., a 71 year old male, was admitted three days ago for a nonemergency evacuation of a subdural hematoma. Because of deteriorating mental status, last night (second day post-operative) he returned for exploratory surgery which revealed a bilateral collection of air. Today he is comatose and oliguric. He has received a mannitol and intravenous fluid challenge in addition to Lasix 40 milligrams

intravenously with only marginal response. He has a foley with hourly outputs. He has one peripheral intravenous line through which intravenous fluids with potassium chloride 10 meq. is running continuously and also intermittent intravenous medications of Cephadyl, Decadron and Dilantin are administered. He has a large craniotomy dressing with Jackson-Pratt drains attached. The Jackson-Pratt bulbs are to be emptied only when full and specific sterile technique is to be used. He is on a cardiac monitor with hourly vital signs and half hourly neurochecks. He is receiving oxygen at eight liters/minute by mask. He has not required suctioning. He is turned every two hours, requires a total bed bath and full attention to oral hygiene. His family is very apprehensive and requires much assistance.

8. Mr. Y., a 69 year old male, was admitted to the intensive care unit four days ago postoperatively following an elective coronary artery bypass graft X5. Twenty-four hours ago his right extremeties were noted to be flaccid with a left deviation, and pupils midline. Today after six doses of intravenous Decadron, he remains sleepy but arousable. He has been diagnosed as having a severe left cerebral vascular accident. He has nothing by mouth. He has a

peripheral intravenous line kept open with fluids with 40 meq. potassium chloride, and through this line he receives Decadron, two antibiotics and analgesia. He has a foley catheter to straight drainage, hourly outputs and specific gravity once a shift. He is intubated and is ventilated with an intermittent mandatory ventilation of eight at 50% oxygen without PEEP. His vital signs are taken hourly and include blood pressure monitoring, cardiac monitoring with pacer set for 80-100 beats per minute, central venous pressure readings, radial artery line and neurochecks. He also has a nasogastric tube to intermittent suction. He is on bedrest and requires turning every two hours. He is a total bedbath and is provided oral hygiene every two hours. Daily laboratory work is drawn.

9. Mrs. M., a 58 year old female, was air transported from Bend yesterday for arteriography and an emergency coronary artery bypass graft. She is scheduled for surgery tomorrow. She experiences angina with activity, but has not complained of angina since admission. During the night she was nauseated and was medicated effectively with a Compazine suppository. She has also been medicated with intravenous morphine sulfate for back pain from a

motor vehicle accident injury. She was medicated three times in the past twelve hours. She is on oxygen at 3 liters per minute via nasal prongs. She is on a cardiac monitor in sinus rhythm with occasional premature ventricular contractions. Blood pressure and heart rate is monitored every one to two hours. She has a right femoral arterial line in place. Through a peripheral line runs a continuous Heparin drip of 1000 units per hour. She is on intake and output every four to eight hours (no foley at this time). For the present she is on diet of choice and may have fluids ad lib. She requires assistance with meals, ambulation and bathing. Alert and oriented, she has not required additional medication for anxiety. She has received instruction in using the incentive spirometer and is to receive further preoperative instruction later today.

10. Mr. R., a 43 year old obese male with a history of hypertension, insidious onset diabetes mellitus, congestive heart failure, cardiomegaly and chronic left extremety venous stasis all confounded by poor dietary and medication compliance, was admitted yesterday with an elevated blood urea nitrogen, creatinine and potassium (7), anasarca and pulmonary edema. When he did not respond significantly to

diuretics, cannulas for hemodialysis were surgically inserted and dialysis started. Today he is awake, alert, and oriented without neuro deficits. He is being dialyzed for the second time. He is afebrile, in atrial flutter with blood pressure 100/60. He is on a cardiac monitor and vital signs, including neurochecks, are done hourly. He has a foley catheter to straight drainage which is measured hourly. He is on a strict fluid restriction of 1000cc/day. He has a peripheral intravenous route but is not receiving intravenous fluids at this time. He is short of breath and on oxygen at 2 liters per minute per a nasal prong. He requires chemstrips every six hours, stools for hemoccult times three, and cultures from the venous stasis ulcers on both legs, Laboratory work is drawn before, during and after dialysis. The leg ulcers are to have Betadine scrubs followed with Kerlix dressings twice a day. He is on strict bedrest with his legs elevated. He is to be turned every two hours and requires maximal assistance because of obesity, edema and dyspnea upon exertion. He is a total bed bath and requires assistance with his meal tray.

11. Mr. P., a 48 year old male, was admitted to the intensive care unit six days ago in pulmonary edema

after receiving fluid volume prior to chemotherapy. He was intubated upon admission and placed on assisted ventilation on 100% oxygen. He is kept sedated with intravenous morphine sulfate. Arterial blood gases are drawn routinely and as needed. He is arousable and follows commands appropriately this morning. His vital signs, assessed hourly or more often, include blood pressure, heart rate (cardiac monitor), central venous pressure readings and temperature every four hours for elevation. He is febrile (101-103) rectally. Earlier this morning blood, sputum and urine cultures were sent to the laboratory. He has a right chest tube and a foley catheter; and both are measured hourly. He has no peripheral intravenous lines. The central venous pressure line is kept open with intravenous fluids at 50cc/hour; and, through this line, is administered one intravenous antibiotic, Zantac and analgesia. He receives mini-Heparin 5000 units subcutaneously twice a day. He is on tube feedings per nasogastric tube at 50cc/hour with additional boluses of water at 200cc. four times a day. He is on complete bedrest, turned every two hours, and requires a total bedbath and oral hygiene. He is frequently diaphoretic and needs a total linen change several times a shift.

12. Mrs. C., a 64 year old female with a history of cirrhossis, hypertension, chronic obstructive pulmonary disease and an insulin dependent diabetic was admitted five days ago to the intensive care unit with a gastrointestinal bleed. She had no sign of active bleeding for 48 hours and the Linton tube has been discontinued. Her mental status is lighter though she remains encephalopathic-lethargic and non-combative. Daily, her abdominal girth and blood ammonia levels are monitored. Hematocrit is 29; hemoglobin, 9.5; platelets, 63; and therefore, she is receiving two units of packed red blood cells this morning. She has two peripheral intravenous routes. Through one she receives an aminophylline drip; and the other intravenous fluids with 40 meq. potassium chloride. She also received an additional 40 meq. of potassium this morning in hourly increments of 10 meq. for four doses. Intravenous medications also include daily Lanoxin and Solumedrol. Lactulose enemas every six hours have been ordered for the next 24 hours. She has difficulty retaining these enemas and requires a linen change after each one. Her foley catheter is measured every one to two hours for output. Hourly vital signs include cardiac monitor and blood pressure. Her respiratory status is maintained on a

ventimist at 40%. She receives Alupent per nebulizer and Terbutaline subcutaneous as needed for wheezing. She is on bedrest, must be turned every two hours with maximum assist, requires a total bed bath and granulex spray to her buttocks, and assistance with her diet.

AN ABSTRACT OF THE THESIS OF

CYNTHIA S. EVANS

DEBORAH L. GASPAR

For the MASTER OF SCIENCE IN NURSING

Date of Receiving this Degree: June 12, 1987

Title: NURSING RESOURCE ALLOCATION IN AN INTENSIVE CARE UNIT

APPROVED: [redacted]

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Thesis Advisor

A descriptive correlational study of two nursing patient classification systems, Medicus and the Therapeutic Intervention Scoring System (TISS) was undertaken to compare the amount of nursing resource allocated by each system for 329 intensive care patients. Each patient in the research setting was observed daily for one month using both patient classification systems. Though both patient classification systems are currently used in acute care settings, each quantifies a patient's need for hours of nursing care through the measurement of different parameters. The intent of this project was to determine whether a generic system like Medicus which measures patient nursing care needs (estimated hours of nursing care) allocates the same staffing as

TISS, developed specifically to assess the needs of critical care patients according to technical tasks or services administered to the patient by the nurse (actual nursing hours).

The independent variable in this study is the observed patient. The dependent variables are the patient classification systems, Medicus and TISS, through which the patient's need for nursing hours of care is assessed.

The data were analyzed descriptively. The strength of the relationship or correlation between the two systems is demonstrated through Pearson's R and Chi Square statistic. Though the correlations appear strong there are discernible differences in the allocation of nursing resource.

Though there was one hundred per cent correlation found in 42.5% (n = 140) of the observations, another 43.5% (n = 143) of the sample correlated within a fraction of a variation. In each case the discrepancy was found to be .33 to .5 of a nurse per patient per shift across all patient classification categories. The remaining 14% of the sample were considered outliers because there was no correlation found.

The fractional variations were examined to consider the labor cost difference between the amount of staff allocated by each system for an average week in the research setting. A difference of $110,000 per year in labor costs in the intensive care setting alone of the research facility was demonstrated in this study. The economic difference raises the issue of whether the support prescribed by a patient classification system for a staffing level that nurses feel is required is indeed an affordable level of care.

Limitations of this study include the following. First, the focus was restricted to a critically ill patient population in one setting which precludes generalizing the findings to other patient populations within and across institutions. Second, only two tools out of many patient classification systems were compared. Third, attempts to measure nursing care requirements are a politically and economically sensitive topic which limits ready accessibility to the staff and patients. Finally, it is difficult and, perhaps, not accurate to compare the categories of different patient classification systems.

Replication of this study would be recommended in other acute care settings and with other specialized critical care areas. The study could be expanded to address such nursing issues as utilization of an intensive care unit, appropriate assignment of staff per shift and measuring needs of a patient in a highly specialized and complex technical area such as an intensive care unit.