

THE RELATIONSHIP BETWEEN TWO METHODS OF  
ACUITY STAFFING AND ABSENTEE RATES  
OF NURSING PERSONNEL

by

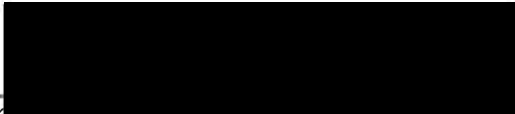
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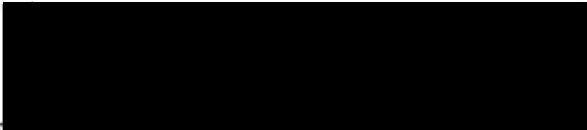
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CHAPTER I  
INTRODUCTION

One of the more difficult problems confronting nursing administrators is the determination of a staffing pattern for nursing personnel that meets patient-care needs, enhances employee satisfaction and is cost effective. Approaches to staffing and thus to distribution of workload have included case, functional, team and more recently, primary care and patient-acuity. Of these, patient-acuity based staffing appears to be a more realistic means of maximizing the achievement of patient, staff and organization goals (Simendinger & Gilbert, 1979).

The concept of staffing by patient-acuity is that the number and professional skill level of nursing personnel is determined and assigned according to the degree of patient care needs of the total number of patients on a given nursing unit. It is possible to base staffing on a calculation of the average patient-acuity needs of specific nursing units or by daily summing of individual patient-acuity needs of the specific unit's census. Presumably, patient-acuity based staffing, particularly the individualized type results in the following advantages: 1) each patient will receive a fairer share of available care time since the nursing workload will be reasonably predictable, relatively consistent and divisible;

2) there will be better utilization of staff time and their skills; 3) there will be greater continuity of assignment allowing staff to know patients as individuals; 4) more time will be available for patient and staff education and unit coordination activities.

The disadvantage however, is determining the need to attend to the inherent difficulties of individual differences of patients. Grouping patients according to level of care needs may sometimes result in minimal attention to a person with maximum emotional needs but few physical needs. Therefore, nurses must be professionally astute in their assessment of total care needs and strict criteria for classification be developed (Simendinger & Gilbert, 1979). In addition, staffing by individual patient-acuity is not a panacea for all staffing problems. The philosophy, beliefs and values of the nursing staff, their perceptions of their practice and the workload tolerated will influence the quantity of staff deemed necessary to do the job (Aydelotte, 1973; Williams & Murphy, 1979).

It is conceivable that the advantages of individual patient-acuity based staffing will outweigh the disadvantages. With a more equitable distribution of workload and clearer role definitions, personnel satisfaction with their work may be improved resulting in fewer incidences of withdrawal behaviors such as absenteeism.

One measure of the impact of staffing approaches that would serve as an indicator of cost effectiveness and is sensitive to personnel satisfaction is absenteeism. Although absenteeism of the nations' work force and absenteeism of nursing personnel has been studied by various researchers, none have documented systematically the relation between absenteeism and patient-acuity based staffing. It therefore seems important and worthwhile to determine whether this staffing approach will decrease costly absenteeism among nursing service personnel.

#### Review of the Literature

Whether one staffing approach is more cost effective by reducing absenteeism and more efficient by increasing employee satisfaction is of concern to many nursing administrators who are faced with providing an appropriate amount and type of nursing care by persons possessing requisite skills to the largest number of patients (Murphy, 1976). Because the research questions address the relationship between staffing approaches and absenteeism, the review of the literature has been organized around these variables.

#### Staffing Approaches

Staffing can be defined as a system of determining and assigning available personnel to accomplish the nursing care

work requirements of patients (Clark & Shea, 1979). Over the last 50 years, five staffing approaches have evolved: 1) case; 2) functional; 3) team; 4) primary care; and 5) patient-acuity. The relative merits of each approach can be assessed in relation to its' administrative efficiency, patient-need satisfaction and staff need satisfaction (Alexander, 1978).

Case Method Staffing. The case approach is one in which a 1:1 relationship between patient and nursing member exists. This approach is considered to be the most satisfying to both patient and nurse since more time and attention can be devoted to meeting the patients' total needs for care. This approach however, suffers from administrative inefficiency since the number of patients far out number available personnel.

Functional Staffing. The functional assignment approach is one in which available staff are assigned by specific tasks. For example, there is a medication nurse, treatment nurse or bedside nurse, etc. Because of the division of labor, each nursing staff member has a clearly defined set of duties and there is less confusion over who will do them. From an administrative standpoint, the functional approach is the most efficient since minimal time is spent in coordinating activities among staff members. While efficient for

administration, it rates low on satisfaction for both patients and nursing personnel. For patients, needs may be over-looked if such needs fail to fall within the designs of specific tasks. For example, a patient who may have a need for limited human contact will suffer under this staffing approach as will the needs of a person who may have no medications or treatments, but needs extensive human contact. Satisfaction for nursing personnel is also rated low under the functional approach. The repetitious nature of task performance often results in boredom and the employee lacks the satisfaction of seeing their individual efforts as contributing to the patients' progress (Alexander, 1978).

Team Staffing. The team approach to staffing evolved as a method to manage patient-care workload based on the premise that a small mixed nursing group working together, guided by a nurse, can give better care than these same individuals can if working alone (Kron, 1971). Other assumptions of this approach are that: 1) with responsibility for fewer patients, staff can identify their needs more readily and 2) because of increased contact, better staff-patient relationships will develop resulting in greater mutual satisfaction. Kramer (1971) and Kron (1971) report that improved personnel satisfaction is the result of a clearer sense of the individual member's contribution to patient outcomes

and a better matching of assignments with skills.

The gains of satisfaction however are at the expense of administrative efficiency. The use of each staff member's knowledge and skills is confined to a small number of patients, thus limiting staff mobility. Additionally, there is increased time spent in delegating and coordinating nursing activities since each staff is likely to be performing a greater variety of tasks thereby increasing the chance for errors (Alexander, 1978).

Primary-Nurse Staffing. The primary-nurse assignment approach is one in which each professional nurse has a selected number of patients for whom the nurse is responsible for all nursing care planning on a 24 hour basis (Marriam, 1976). The premise underlying this approach is that patient's satisfaction is enhanced because one staff member has a vested interest in the case and therefore problems are more likely identified and resolved. Greater satisfaction for professional nurses is alleged to result from greater independence in decision making, improved nurse-patient relationships and a sense of autonomy (McCarthy & Shifalacqua, 1978; Zander, 1977). Isler (1976) reports marked reduction in absenteeism rates in a St. Petersburg, Florida hospital following primary-nurse staffing. Although other staff members may benefit from the guidance of the primary nurse,

a concern for their work satisfaction under this approach is minimized. As with the team approach, administrative efficiency is lost by limiting each nurse's knowledge and mobility to the care of a few patients although the use and mobility of other staff members may not be restricted. In addition, a nurse who is insecure in nursing care planning may feel threatened by primary-nurse staffing resulting in poorer patient care than could be achieved by other staffing approaches (Alexander, 1978).

Patient Acuity Staffing. With the exception of primary nurse staffing, the most commonly used means of determining workload and assigning staff has been based on an averaged number of requirements for nursing care of the unit's census. It has long been recognized that such staff to patient ratio assignment is insensitive to extreme fluctuations in workload, variations of needs for individual patients and is ineffective and inefficient utilization of various levels of professional skills (Gionannetti, 1978). The development of patient-acuity classifications has been a response to the variable nature of nursing care demands. Patient acuity classifications can be defined as grouping of patients according to some assessment of their requirements for care over a specified period of time as well as a determination of the skill level of personnel who should provide the required care.



Numerous researchers have developed patient-acuity classifications over the past three decades. One of the early studies (Claussen, 1955) conducted at Walter Reed Army Hospital, suggested that four factors influenced patient acuity needs for care: physical restrictions, procedural requirements, instructional needs and emotional needs. Staffing requirements were established using this scale. The limitations of the study were that classification was strongly weighted to physical care needs and the patient population was not a representative sample of all patients in other hospitals.

In 1960 at Johns Hopkins, Flagle and Connor worked on the development of a classification model that has received the greatest amount of testing for reliability and validity (Jelinek & Dennis, 1976). This system classified patient-acuity into three categories of intensive, intermediate and self care and estimated the amount of nursing care time necessary for patients in each group. In further refinements, Connor (1961) used work sampling as an index to measure direct nursing to patient workload and variation in workload. He found that census failed to provide a good indication of variance; there was wide fluctuation in workload when direct nursing care activities changed, and patients classified as total care required approximately five times the amount of

nursing time than those in self-care classification.

In a five year research project at the University of Saskatchewan, Gionannetti (1973) developed a four category patient-acuity classification using five critical components in determining patient needs for nursing care. These were: personal care; feeding; ambulation; observation and other. Based on the number and combination of critical indicators, patients were placed into one of four groups ranging from minimal to intensive care. For each category of care for each 8 hour shift, the average minutes of direct care was determined. The average care-time was converted to ratios, multiplied by the number of patients in each category thus providing an index or workload. To determine the amount of time per shift each nursing member was available to provide direct care, indirect activities of nursing personnel were conducted. By combining the direct and indirect care activities, total workload was formulated as a basis for staffing prediction.

The Medicus Corporation in cooperation with Rush Presbyterian - St. Luke's Medical Center in Chicago also designed a patient-acuity classification system based on determination of patient needs rather than quantification of nursing tasks to determine workload. Thirty-two indicators were used in differentiating categories of care including patient's

physical, emotional and teaching needs. Each indicator was assigned a point value and the sum value for each patient provides a range for placement into one of the four categories. For example: a patient with 0-8 points was classified as Type 1 (minimal) care, 9-16 points Type 2 care, 17-40 points Type 3 care and more than 40 points Type 4 (maximum) care. A workload index was then calculated for the number of patients in each category and staffing allocations made to meet patient care needs (Jelinek, 1971). The most significant contribution of the Medicus Corporation system is that the workload is determined from the sum of each individual patient's needs rather than an averaged estimation of a group of patients needs.

Although other acuity classifications have been developed, they are basically modifications of those discussed but tailored to meet the needs of individual hospitals.

Murphy (1976), Strilaeff (1978) and Simendinger and Gilbert (1979) all support patient acuity-based-staffing as being cost effective by avoiding over or understaffing on nursing units; however, the impact of individual patient acuity-based-staffing related to absenteeism has not been addressed.

In summary, the literature demonstrates that various staffing approaches have evolved over the course of time to

meet the changes in patient care needs, changes in available manpower resources and changes in costs. Each of these staffing approaches has been considered in the light of their strengths and weaknesses in relation to cost effectiveness and personnel satisfaction.

#### Absenteeism

In a report from the Bureau of Labor Statistics by Hedges (1977), absenteeism for the nations full-time work force amounted to roughly 80 million hours per week or the equivalent of 2 million persons working a 40 hour week. The report focused on absence attributed to illness or injury and for personal or civic reasons but suggests that some reasons given for absence may have been reported as illness or personal when the actual reasons may have been related to work situations such as size of the work group, physical and mental demands of the job, work schedules or employee-employer relations (Hedges, 1977). The statistics were derived from a survey of absence records of 3.6 million workers for the calendar month of May, 1976. Absence rates were calculated using incidence and inactivity rate formulas for goods and service producing and public administration industries. Though not classified by the medical field, professional incident rate of 72% and inactivity rate of 39% was the highest reported of all service producing

industries with the range of 53% to 72% for incidence and 25% to 39% for inactivity (Hedges, 1977). This fact along with data relative to absenteeism costs indicates the importance of reducing the level as much as possible.

From the standpoint of the absent employee, the costs may include loss of pay or termination of employment in cases of poor attendance. Some factors relative to costs for employers are to consider the dollar costs per employee for sickness added to expenditures for insurance and worker compensation, other costs include overtime and overstaffing to offset absent workers as well as disruption of productivity caused by absent, untrained or fatigued employees working beyond their assigned shift. The estimated cost per year for each employee for illness and personal reasons of absenteeism alone averaged \$100.00 in 1974 (Hedges, 1977, p. 19). Based on current economic standards and salaries, the dollar cost per employee per year has increased at least three fold.

These national average absence rates provide useful data for managers who wish to compare absence rates in different groups. This phenomenon is of compelling concern to nursing administrators since it may jeopardize patient care in addition to being costly. The studies of Kirtane (1975) and Redfern (1978) indicate that absenteeism is

increasing for nurses and other health care workers. Although major studies associated with absenteeism have approached the problem under differing variables such as age, tenure, seniority and marital status, the variables of greater concern for managers are those that can be organizationally altered. These variables include the staff skill level, size of the work unit and workload.

#### Staff Skill Level

Kirtane's study (1975) related absentee rates between professional nurses, licensed practical nurses and nursing aides in a 300 bed, private metropolitan hospital during a 12 month period. Absentee rates were found to differ significantly among the three groups with the professionals having the lowest and nursing aides the greatest rate. Kirkup (1977) however, found in her four year study of absentee rates in a 450 bed Dallas hospital, that professional employees took more sick time than non-professionals by a ratio of 3:2. The author suggests this finding was due to greater job security among the professionals.

#### Size of the Work Unit

A consistently positive relationship between organizational and unit size with absenteeism has been reported by industrial researchers (Porter & Steers, 1973). In reviewing

eight studies, a positive relationship between unit size and absenteeism was found in seven studies of blue collar workers while no relationship was found between unit size and absenteeism in the one study of white collar workers. They explain the higher absentee rates associated with large groups is "the results of higher specialization of tasks, poorer communications and lower group cohesiveness, making expectations difficult to fulfill and lead to increased tendencies to withdraw" (p. 159). The lowest absentee rates were found in middle-size units.

#### Workload

In a study by Benton and White (1972) with 565 randomly chosen registered nurses from small, medium and large institutions in a southwest city, they found nurses rates the second most important dissatisfier as inadequate personnel per shift. Coburn's job incongruence study supports the notion that work is disliked and stressful when workers feel that the tasks to be accomplished exceed or are less than those of which they are capable of performing and results in increased absenteeism (Coburn, 1975). Relating absenteeism

with nurse staffing, Rushworth (1975) states,

there is an optimal level of staffing for each ward determined by workload rather than bed numbers. If staffing falls far below this level or rises above it, the level of absenteeism rises also. In the first care, the stresses imposed by attempting to meet impossible demands became intolerable, and some members of the staff respond by taking a day off. At the other extreme, when a ward is over-staffed, a nurse may feel her presence is not crucial and will more readily yield to the temptation of an extra day off (p. 123).

Similarly, Connor's workload study at Johns Hopkins found that as available nursing care hours increased, direct patient care remained constant, however, personal time of staff increased (Connor, 1961). Other more recent studies report the impact of staffing approaches on absenteeism, turnover and personnel satisfaction.

In an effort to reduce high rates of absenteeism and turnover, Isler (1976) describes the effects of primary nurse staffing by Bayfront Medical Center, Florida after one year of implementation as highly successful. "Staffing is no longer a problem, expansive nursing turnover is now minimal and absenteeism once a great problem is virtually non-existent" (p. 65). On a 34 bed medical-surgical unit at St. Michael's Hospital, Milwaukee, Wisconsin, McCarthy and Schifalacqua (1978) found that staff turnover was 50 percent lower on the unit staffed by primary nursing than on units staffed by the team approach after an eight month pilot study.



In a conceptually related study of nurse turnover, on three units in a general hospital located in a large urban area of Eastern Canada, Strilaeff (1978) found the nurse dissatisfaction and turnover "highest" on the unit staffed by a functional approach "medium" on the unit staffed by a team approach and "low" on a unit staffed by a total patient care approach (p. 30). The author suggests that the staffing method used to organize nursing work is a major intervening variable in nurses disposition to remain on the job.

In conclusion, nursing administrators charged with the responsibility to staff hospitals with an adequate number of qualified personnel to meet patient-care demands must also address the issues of employee attendance. Although personnel and external factors influence absenteeism, there is increasing evidence that intra-organization factors such as work climate, workload and distribution of workload have greater influence on absenteeism (Clark & Redfern, 1978). Since nursing administrators are in a position to alter organizational characteristics related to nursing, it seems a fundamental requirement to search for ways that enhance employee work satisfaction. Staffing based on individual patient's acuity may be one means of reducing absenteeism among nursing personnel.

### Purpose of the Study

The purpose of this investigation is to evaluate two distinct patient-acuity staffing systems in relation to absentee rates which is one measure of cost effectiveness and satisfaction of nursing personnel. More specifically, this study addresses the following questions:

1. Does individual-patient-acuity-based staffing decrease absentee rates more than does averaged-patient-acuity-based staff of nursing service personnel?
2. Is there a difference between skill level of nursing service personnel and absentee rates under each staffing system?
3. Does the size of the work unit affect absentee rates under each staffing system?

### Hypotheses

The following hypothesis will be tested:

Hypothesis 1: Nursing personnel will have a significant difference in absenteeism when staffing is based on the individual-acuity-staffing system than when based on the averaged-acuity-staffing system.

Hypothesis 2: There will be a significant difference in absenteeism between registered nurses, licensed practical

nurses and nursing aides in either staffing system.

Hypothesis 3: There will be a significant difference in absenteeism between larger nursing units and smaller nursing units when staffing is based on the individual-acuity-staffing system.

### Operational Definitions

**Nursing Service Personnel:** Full-time equivalent registered professional nurses, licensed practical nurses and nursing aides assigned to six different nursing units from May 1, 1980 to January 16, 1981.

**Averaged-Acuity Staffing:** A staffing system based on a pre-determined, fixed patient-acuity average for each nursing care unit expressed in nursing hours per patient-day for each unit and each shift.

Nursing hours/patient day/unit/  
shift =  $K + \Delta$  in census.

Average acuity is constant.

Census change is variable.

See Appendix A for complete system description.

Individual-Acuity-Staffing: A staffing system based on a daily determination of each patient's acuity expressed in nursing hours per patient-day for each unit and each shift.

$$\text{Nursing hours/patient day/unit/shift} = \Delta \text{ in acuity} + \Delta \text{ in census}$$

(variable = acuity and census)

See appendix B for complete system description.

Nursing Unit Type:

Smaller Acute-Care Units:

Two of six acute-care units with a capacity of 29 to 32 beds.

Larger Nursing Units:

Four of six acute-care units with a capacity of 35-38 beds.

Absenteeism:

The total and monthly absenteeism for full-time-equivalent nursing service personnel assigned to one of six nursing units over four consecutive months of each acuity-staffing-system.

$$\text{Absentee rate} = \frac{\text{Total days absent}}{\text{Total FTE}}$$

Influenza Rate:

The number of reported influenza cases in the greater metropolitan area each month divided by the number of days in the month.

$$\text{Influenza rate} = \frac{\text{Reported cases/month}}{\text{No of days in month}}$$

CHAPTER II  
METHODOLOGY

This retrospective study was conducted to explore the difference between an averaged-acuity-staffing system and an individual-acuity-staffing system on absentee rates among full-time-equivalent nursing personnel assigned to acute-patient care units. In the following sections, the setting and subjects will be described; the design; instruments and data collection procedure used in the study will be discussed as well as an explanation of the data analysis. Assumptions and limitations of the study are also included.

Setting and Subjects

The setting was a 483 bed, acute-care, metropolitan hospital, located in the Pacific Northwest United States. This hospital was selected because nursing service staffing had been based on an averaged-acuity system since April, 1970 (Appendix A) and was changed to an individual-acuity system in September, 1980 (Appendix B). This research was timely and convenient for the hospital and investigator. Written permission to conduct this study on absentee rates of nursing service personnel assigned to six acute-care units over an eight month period was obtained from the Directors of Nursing Service. Anonymity of the subjects as well as confidentiality of the data were assured (Appendix C).

Four criteria were used in the selection of six of sixteen possible acute-care units to include in the study.

The criteria used were:

- 1) those units that represented the broadest range of absentee rates;
- 2) those units that had the most stable average daily census;
- 3) those units that had the widest range of bed capacity and percent occupancy; and
- 4) those units with the most stable staff-mix ratio.

The bed capacity, average daily census and percent occupancy of the units during the study months is depicted in Table 1.

The mean full-time equivalent nursing personnel by skill level and percent of unit staff for the units during the study months is depicted in Table 2. It should be noted that there was a substantial increase in both full-time-equivalent Registered and Licensed Practical nurses during the individual-acuity-staffing period as well as increase in the professional skill level ratio.

Table 1  
 Mean Daily Census by Unit  
 During the Study Period

Unit	Bed Capacity	Averaged- Acuity-Staffing 4 Months		Individual- Acuity-Staffing 4 Months	
		$\bar{x}$ Daily Census	Percent Occupancy	$\bar{x}$ Daily Census	Percent Occupancy
1	31	22.72	73.29	25.12	81.03
2	36	25.32	70.33	27.30	75.83
3	29	26.27	90.58	26.82	92.48
4	36	24.50	68.05	25.20	70.00
5	36	28.85	80.13	30.97	86.02
6	36	29.10	83.14	35.55	87.28
Grand $\bar{x}$		26.12	77.58	27.66	83.10



Table 2  
 Mean Full-Time Equivalent Skill Level and Percent of  
 Unit Staff by Unit During the Study Period

Unit	Averaged-Acuity Staffing 4 Months						Individual-Acuity Staffing 4 Months							
	RN		LPN		NA		RN		LPN		NA			
	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%	FTE	%		
1	12.7	50.9	9.2	36.7	3.3	12.7	26.2	15.5	53.0	10.2	34.3	3.7	12.7	29.3
2	12.1	46.6	9.5	36.9	4.3	16.5	25.9	14.3	48.9	11.1	37.7	4.0	13.4	29.3
3	14.5	55.3	10.1	38.5	1.6	6.2	26.1	14.7	54.4	10.8	39.9	1.6	5.7	27.9
4	14.6	51.4	11.9	41.8	2.0	6.8	28.4	16.0	53.3	11.7	39.5	2.1	7.0	29.8
5	13.9	43.4	10.2	31.9	7.9	24.7	31.9	15.6	48.6	9.3	28.7	7.3	22.7	32.1
6	13.7	48.4	12.4	43.7	2.2	7.8	28.3	15.0	51.5	11.9	40.7	2.3	7.8	29.2
Grand $\bar{x}$	13.7	49.3	10.5	38.3	3.5	12.4	27.9	15.2	51.7	10.8	36.8	3.5	11.6	29.4

### Design

The design employed in this study was an eight month retrospective time series in a 3 x 2 x 6 factorial design with repeated measures. The main factor of interest was the type of staffing with two levels, averaged-acuity and individual-acuity staffing systems. The other factors included for control were three nursing skill levels and six acute-care units of smaller or larger size. A covariate added for control was the greater metropolitan area influenza rate.

The time series design is depicted by the following notation: 0 0 0 0 X 0 0 0 0 where 0 = monthly "observations" of absentee rates and X = implementation of the individual-acuity staffing system. Four consecutive months were observed for each acuity staffing system. The 3 x 2 x 6 factorial design of the study is shown in Figure 1. The mean absentee rates per month for eight months was computed for each staffing system, unit and skill level; hence there are a total of 8 x 3 x 6 x 2 or 144 total observations or 4 cases for each of 36 cells.

Because of non-feasibility of an equivalent control group design, the time series design was chosen primarily to control for unusual fluctuations in absentee rates over time. A non-equivalent control group or single measure

pretest-posttest design would not have controlled for such fluctuations. Additionally, the time series design helps control for statistical regression toward the mean. Due to the lack of the advantages of the true experimental design, there is a risk of erroneous interpretation of the results. The effect in absentee rate due to history pose the greatest threat to internal validity.

	Averaged-Acuity-Staffing 4 Months	Individual-Acuity-Staffing 4 Months
Unit 1	RN	
	LPN	
	NA	
Unit 2	RN	
	LPN	
	NA	
Unit 3	RN	
	LPN	
	NA	
Unit 4	RN	
	LPN	
	NA	
Unit 5	RN	
	LPN	
	NA	
Unit 6	RN	
	LPN	
	NA	

Figure 1. 3 x 2 x 6 Factorial Design During the Study.

### Instruments

The absentee rates were derived from a review of unit staffing records and included measurement of three factors: unscheduled sick days, non-prescheduled authorized absent days and unauthorized absent days for full-time equivalent nursing staff per skill level for each month of the study period. The absentee rate was computed for each unit, skill level and month by the following formula:

$$\text{Absentee rate} = \frac{\text{Total Days Absent}}{\text{Total FTE}}$$

The metropolitan influenza rate was used as a covariate and was obtained from the records of the Public Health Department for each month of the study period. The influenza rates for the greater metropolitan area per month were calculated by the following formula:

$$\text{Influenza rate: } \frac{\text{Reported Cases}}{\text{No. of Days/Month}}$$

### Data Collection Procedure

Data collection was conducted by extracting absentee rates from the hospital staffing records. These records were requested, examined and immediately returned to the staffing coordinator. The records were examined in a section

of the staffing office set aside for this purpose. Code numbers were assigned to the subjects to insure anonymity and confidentiality of data.

To control for normal fluctuations in absentee rates over time, the data were collected for each of four consecutive months during each acuity-staffing system. Data of the metropolitan influenza rate was obtained via telephone from the Public Health Department.

#### Analysis of Data

In order to determine the absentee rates during each of the acuity-staffing systems, the total frequency of days absent for each month, unit and full-time equivalent skill level was divided by the total full-time equivalent for each skill level, unit and month. The absentee rates were then compared to determine if there was a difference between each acuity-staffing system.

The same method of recording and calculation was used to determine:

- 1) the difference in absentee rates between the three skill levels on all units;
- 2) the difference in absentee rates for the total full-time equivalent staff on each unit; and

- 3) the difference in absentee rates for each full-time equivalent skill level on each unit.

To determine the difference in absentee rates during each of the acuity-staffing systems between the larger (4 of 6) and smaller (2 of 6) units, the frequency of absent days of the total full-time equivalent staff on each unit type was divided by the total full-time equivalent staff of each unit type.

Due to the inability to control for the normal seasonal variations in absentee rates, the metropolitan influenza rate for each month of the study was calculated by dividing the incidence of reported cases in each month by the number of days in the specific month. This data was then included as a covariate in the analysis of absentee rates during each acuity-staffing system for all full-time equivalent skill levels and units.

In order to compute the average daily census for each unit and month, the total patient days per month was divided by the number of days in the specific month. The four month sum during each acuity-staffing system was then averaged for each unit. The percent occupancy for each unit per month during the study was calculated by the ratio of average daily census to each unit's bed capacity.

To test the main and interaction effects of the different acuity-staffing systems, units larger and smaller units and skill levels on absentee rates, an analysis of covariance with repeated measures was used with the level of significance set at  $p \leq 0.05$ . The influenza rate was used as the covariate. The same analysis of covariance was also used to test the main and interaction effects with the nursing aide skill level removed due to the extreme fluctuation of absentee rates within this group. Because daily changes in patient census could not be controlled for during this study, it was deemed appropriate to determine if there was a significant difference in the daily census for each unit between each of the acuity-staffing systems. To test this difference, a two-tailed t-test was computed with the level of significance set at  $p \leq 0.05$ .

### Assumptions and Limitations

#### Assumptions

In this research investigation, the following four assumptions are made:

- 1) it is assumed that when staffing is based on a system that is sensitive to daily rather than an average unit workload change, the workload of the individuals will change;

- 2) that workload affects the satisfaction of personnel;
- 3) that absenteeism is a measure of satisfaction; and
- 4) that the most accurate means of measuring absentee rates is over time.

#### Limitations

The three limitations of the study are:

- 1) the sample was drawn from only six acute-care units within one hospital;
- 2) only full-time equivalent nursing personnel of three skill levels were included; and
- 3) absentee rates were measured only during an eight month period.

Because of these limitations, generalizations to other unit types, nursing personnel skill levels or non-acute hospitals cannot be made.



## CHAPTER III

### RESULTS

Over eight consecutive months of the study, two distinct acuity-staffing systems were in effect. During the first four months, staffing of the units was based on a fixed patient-acuity average for each unit. In this system, the number and skill level of staff for the unit in 24 hours was determined only by changes in the unit census. During the second four months, staffing was based on the daily patient-acuity for each unit. In this system, the number and skill level of staff for the unit in 24 hours was determined by the daily change in each patient's acuity and changes in unit census. The absentee rates of full-time-equivalent nursing personnel by skill-level for each unit and month was obtained during four months for each acuity staffing system.

In the sections to follow, the hypotheses and results related to testing the main effects of the staffing systems, skill-levels, larger and smaller units on absentee rates will be presented. Additionally, the results pertaining to the interactions among the three factors are presented.

#### Main Effects of the Staffing System

It was hypothesized that there would be a significant difference in nursing personnel absentee rates when staffing

was based on the individual-acuity system.

The mean absentee rates with four observations for each cell are shown in Table 3 with a grand mean of 1.37 for averaged-acuity staffing and 1.80 for individual-acuity staffing. It appears that there was a general increase in absentee rates during the individual-acuity staffing system. Figure 2 depicts the mean absentee rates for the acuity-staffing systems, skill levels combined and unit combined. Figure 2 depicts monthly absentee rates for all units and skill levels combined and Figure 3 depicts the monthly absentee rates for all units by separate skill levels.

Table 3  
Mean Absentee Rates by Staffing System  
Unit and Skill Level

		$\bar{x}$ Absentee Rates Averaged- Acuity Staffing	$\bar{x}$ Absentee Rates Individual- Acuity Staffing
Unit 1	RN	0.66	1.23
	LPN	0.94	1.82
	NA	1.50	2.13
Unit 2	RN	0.78	1.16
	LPN	1.38	1.34
	NA	1.05	1.58
Unit 3	RN	0.79	0.83
	LPN	1.40	1.46
	NA	2.81	3.25
Unit 4	RN	0.76	1.16
	LPN	1.66	1.34
	NA	1.33	0.85
Unit 5	RN	1.47	1.00
	LPN	1.82	2.01
	NA	2.39	2.37
Unit 6	RN	0.99	1.18
	LPN	1.44	1.93
	NA	1.41	5.77
Grand $\bar{x}$		1.37	1.80
m = 4 observations/cell			

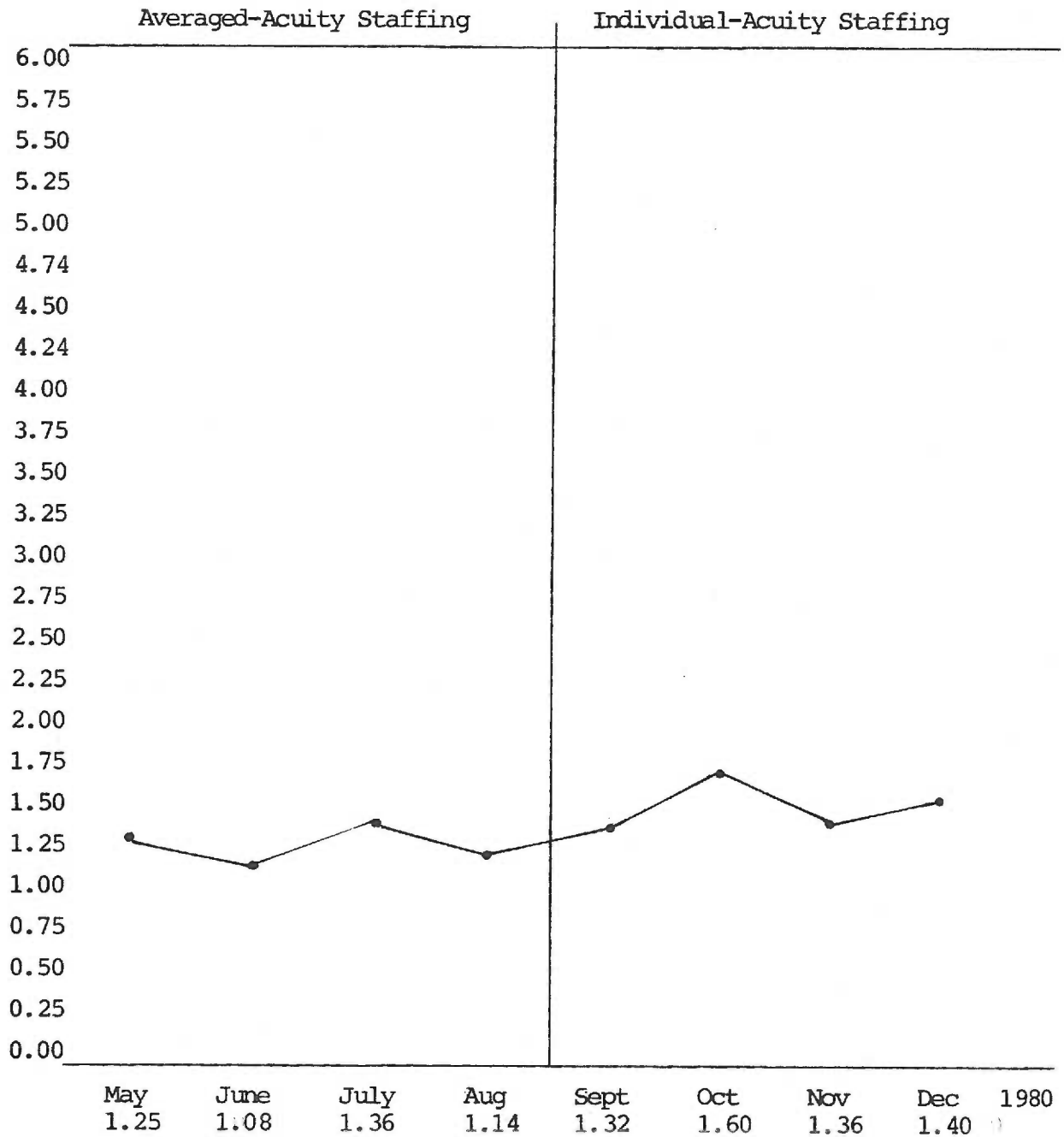


Figure 2. Monthly Absentee Rates for All Units and Skill Levels Combined (Covariate Missing).

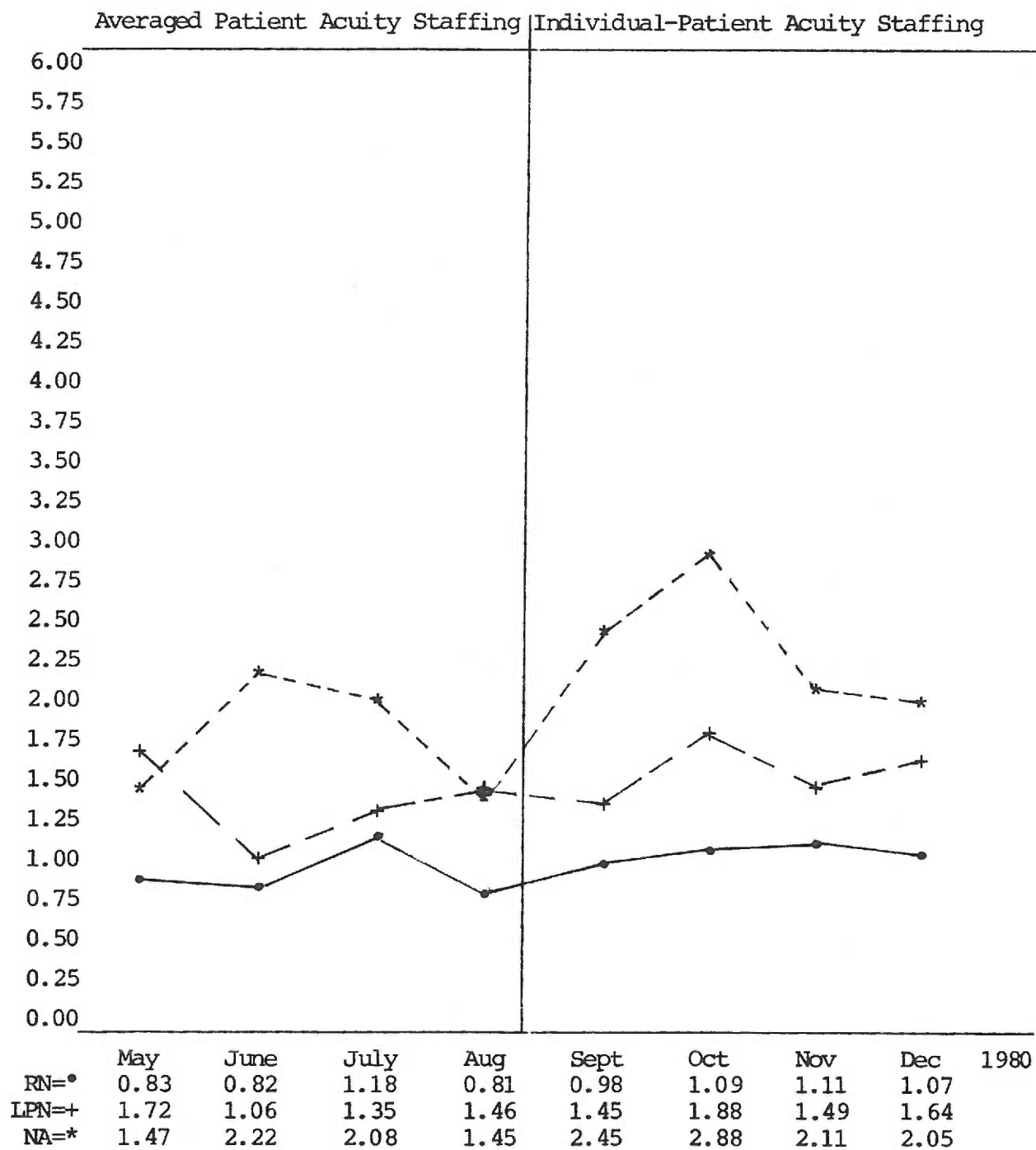


Figure 3. Monthly Absentee Rates for Combined Units by Separate Skill Levels (Covariate Missing).

An analysis of covariance was used to test the relationship between the two acuity staffing systems on absentee rates. The results of this test are shown in Table 4.

There was a significant difference in absentee rates between the averaged and individual-acuity staffing systems.

$F = 11.863, p \leq 0.001.$

Table 4  
Sources of Variation Between Acuity-Staffing  
Systems and Skill Levels and Units

Source of Variation	Sums of Squares	df	$\bar{x}^2$	F	Probability of F
<u>Covariate</u>	0.164	1	0.164	0.245	0.622
Influenza	0.164	1	0.164	0.245	0.622
<u>Main Effects</u>	60.197	8	7.525	11.205	0.
Acuity Staffing	7.966	1	7.966	11.863	0.001
Skill Level	34.792	2	17.396	25.905	0.
Units	17.439	5	3.488	5.194	0.000
<u>2-Way Interactions</u>	41.822	17	2.460	3.663	0.000
Acuity Staffing, Skill Level	4.053	2	2.026	3.018	0.053
Acuity Staffing, Units	13.893	5	2.779	4.138	0.002
Skill Level, Units	23.876	10	2.388	3.555	0.000
<u>3-Way Interactions</u>	19.604	10	1.960	2.919	0.003
Acuity Staffing, Skill Level, Units	19.604	10	1.960	2.919	0.003
Explained	121.787	36	3.383	5.038	0.000
Residual	71.855	107	0.672		
Total	193.642	143	1.354		

Because of the extreme fluctuation in absentee rates of the nursing aide skill level, they were removed from the

analysis to determine if there was a significant difference in absentee rates between the acuity-staffing systems for the remaining skill levels by units. The results of this analysis of covariance are shown in Table 5. There was no significant difference in the main effect of the acuity staffing systems on absentee rates for the Registered and Licensed Practical nurse skill levels.

$$F = 2.090, p \leq 0.153.$$

Table 5

Sources of Variation Between Acuity Staffing Systems, Units and Registered and Licensed Practical Nurses

Source of Variation	Sums of Squares	df	$\bar{x}^2$	F	Probability of F
<u>Covariate</u>	0.485	1	0.485	2.061	0.155
Influenza	0.485	1	0.485	2.061	0.155
<u>Main Effects</u>	9.983	7	1.426	6.062	0.000
Acuity Staffing	0.492	1	0.492	2.090	0.153
Skill Level	7.047	1	7.047	29.954	0.000
Units	2.444	5	0.489	2.078	0.078
<u>2-Way Interactions</u>	2.093	11	0.190	0.809	0.631
Acuity Staffing, Skill Level	0.003	1	0.003	0.014	0.905
Acuity Staffing, Units	1.838	5	0.368	1.563	0.182
Skill Level, Unit	0.252	5	0.050	0.214	0.955
<u>3-Way Interactions</u>	1.312	5	0.262	1.116	0.360
Acuity Staffing, Skill Level, Units	1.312	5	0.262	1.116	0.360
Explained	13.874	24	0.578	2.457	0.002
Residual	16.704	71	0.235		
Total	30.577	95	0.322		

Main Effects of Nursing Skill Level

It was hypothesized that there would be a significant difference in absentee rates between the three skill levels of nursing personnel regardless of the acuity staffing system. The mean absentee rates by skill level and unit with eight observations for each cell is shown in Table 6 with a grand mean of 1.00 for Registered nurses; 1.54 for Licensed Practical nurses and 2.20 for Nursing aides. Figure 3 depicts the monthly absentee rates by separate skill level for units combined.

Table 6  
Mean Absentee Rates by Skill Level and Unit

Unit	$\bar{x}$ Absentee Rate		
	RN	LPN	NA
1	0.94	1.38	1.82
2	0.97	1.36	1.31
3	0.81	1.43	3.03
4	0.96	1.50	1.09
5	1.24	1.91	2.38
6	1.09	1.68	3.59
Grand $\bar{x}$	1.00	1.54	2.20

n = 8 observations per cell

An analysis of covariance was used to test this hypothesis with alpha = 0.05. The results are depicted in Table 4. There was a significant difference between absentee rates

with Registered nurses having the lowest and Nursing aides the highest,  $F = 25.905$ ,  $p \leq 0.000$ .

Because of the extreme fluctuation in absentee rates of the Nursing aide skill level, (See Figure 3), they were removed from the analysis to determine if there was a significant difference between the absentee rates of the two remaining skill levels. The results of this analysis of covariance is shown in Table 5. There was a significant difference in absentee rates for Registered and Licensed Practical nurses,  $F = 29.954$ ,  $p \leq 0.000$ .

#### Main Effects of Unit Size

It was hypothesized that there would be a significant difference in absentee rates between the smaller and the larger acute-care units during the individual-acuity staffing system. The mean absentee rates with 24 observations for each cell in the smaller units and 48 for each cell in the larger units is shown in Table 7. The grand mean for the smaller units was 1.57 and 1.59 for the larger units. Figure 4 depicts the monthly absentee rates for smaller units combined, larger units combined and skill levels combined.



Table 7  
 Mean Absentee Rates by Smaller and  
 Larger Units on Staffing System

	N	Averaged-Acuity Staffing	$\bar{x}$	Individual- Acuity Staffing	$\bar{x}$	Grand $\bar{x}$
Smaller Units	24		1.35		1.37	1.57
1		1.03		1.73		
2		1.67		1.85		
Larger Units	48		1.79		1.81	1.59
1		1.07		1.36		
2		1.25		1.11		
3		1.89		1.79		
4		1.28		2.96		

n = observations per cell

An analysis of covariance was used to test this hypothesis. The results of this test are depicted in Table 8. There was no significant difference in the main effects of acuity-staffing systems on absentee rates between smaller units and larger units,  $F = 0.014$ ,  $p \leq 0.907$ .

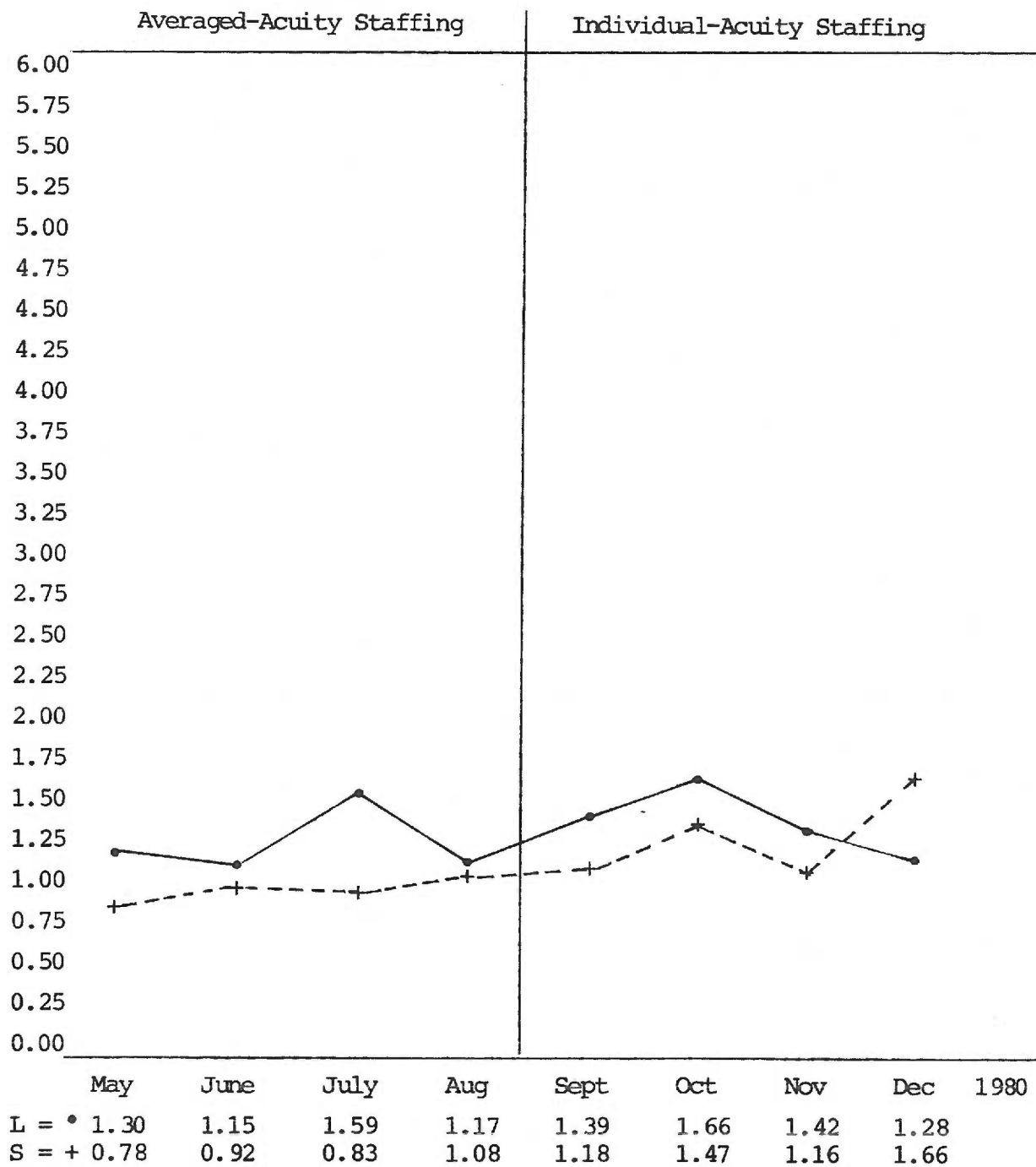


Figure 4. Monthly Absentee Rates for Smaller Units Combined, Larger Units Combined, and Skill Level Combined.

L = Large  
S = Small

Table 8  
Sources of Variation Comparing Smaller and  
Larger Units Staffing Systems

Source of Variation	Sums of Squares	df	$\bar{x}^2$	F	Probability of F
<u>Covariate</u>	0.164	1	0.164	0.150	0.699
Influenza	0.164	1	0.164	0.150	0.699
<u>Main Effects</u>	42.773	4	10.693	9.773	0.000
Acuity Staffing	7.966	1	7.966	7.280	0.008
Skill Level	34.792	2	17.396	15.899	0.000
Units	0.015	1	0.015	0.014	0.907
<u>2-Way Interactions</u>	6.024	5	1.205	1.101	0.363
Acuity Staffing, Skill Level	4.053	2	2.026	1.852	0.161
Acuity Staffing, Units	0.000	1	0.000	0.000	0.998
Skill Level, Units	1.971	2	0.986	0.901	0.409
<u>3-Way Interactions</u>	1.343	2	0.672	0.641	0.543
Acuity Staffing, Skill Level, Units	1.343	2	0.672	0.641	0.543
Explained	50.305	12	4.192	3.831	0.000
Residual	143.337	131	1.094		
Total	193.642	143	1.354		

#### Interaction Effects

In the analysis of covariance with repeated measures that was used in testing the two-way interactions between the acuity-staffing systems and combined skill levels, a significant interaction effect was found,  $F = 3.018$ ,  $p \leq 0.05$ .

However, when the Nursing aide skill level was removed, there was no significant interaction,  $F = 0.014$ ,  $p \leq 0.905$ .

(See Table 5 and Figure 3). The mean absentee rates by acuity-staffing systems and separate skill levels is depicted in Table 9 with a grand mean of 1.00 for RN, 1.54 for LPN and 2.21 for NA. Figure 5 depicts the two-way interaction between acuity-staffing systems and skill level.

Table 9  
Mean Absentee Rates by Acuity Staffing  
Systems Separate Skill Levels

	$\bar{x}$ Absentee Rates Averaged- Acuity Staffing	$\bar{x}$ Absentee Rates Individual- Acuity Staffing	Grand $\bar{x}$
RN	0.91	1.09	1.00
LPN	1.44	1.65	1.54
NA	1.75	2.66	2.21

A significant two-way interaction between the acuity-staffing systems and units was found when all skill levels were included in the analysis,  $F = 4.134$ ,  $p \leq 0.002$  (See Table 4), but no significant interaction effect was found when the Nursing aide skill level was removed.

$F = 1.563$ ,  $p \leq 0.182$  (See Table 5). Figure 6 depicts the interaction between acuity-staffing system by unit for Nursing aide.

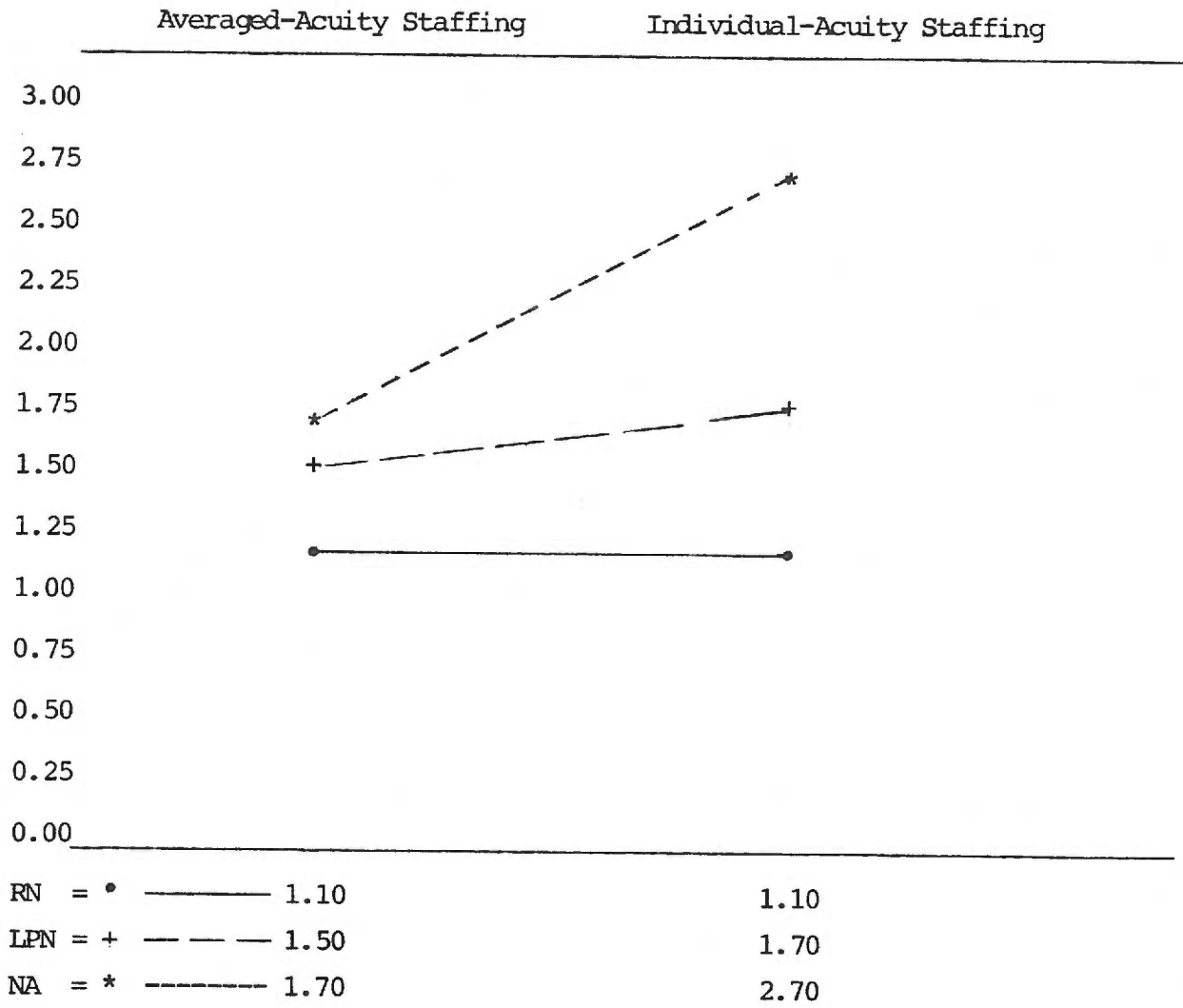


Figure 5. Interaction Between Skill Level and Staffing System.

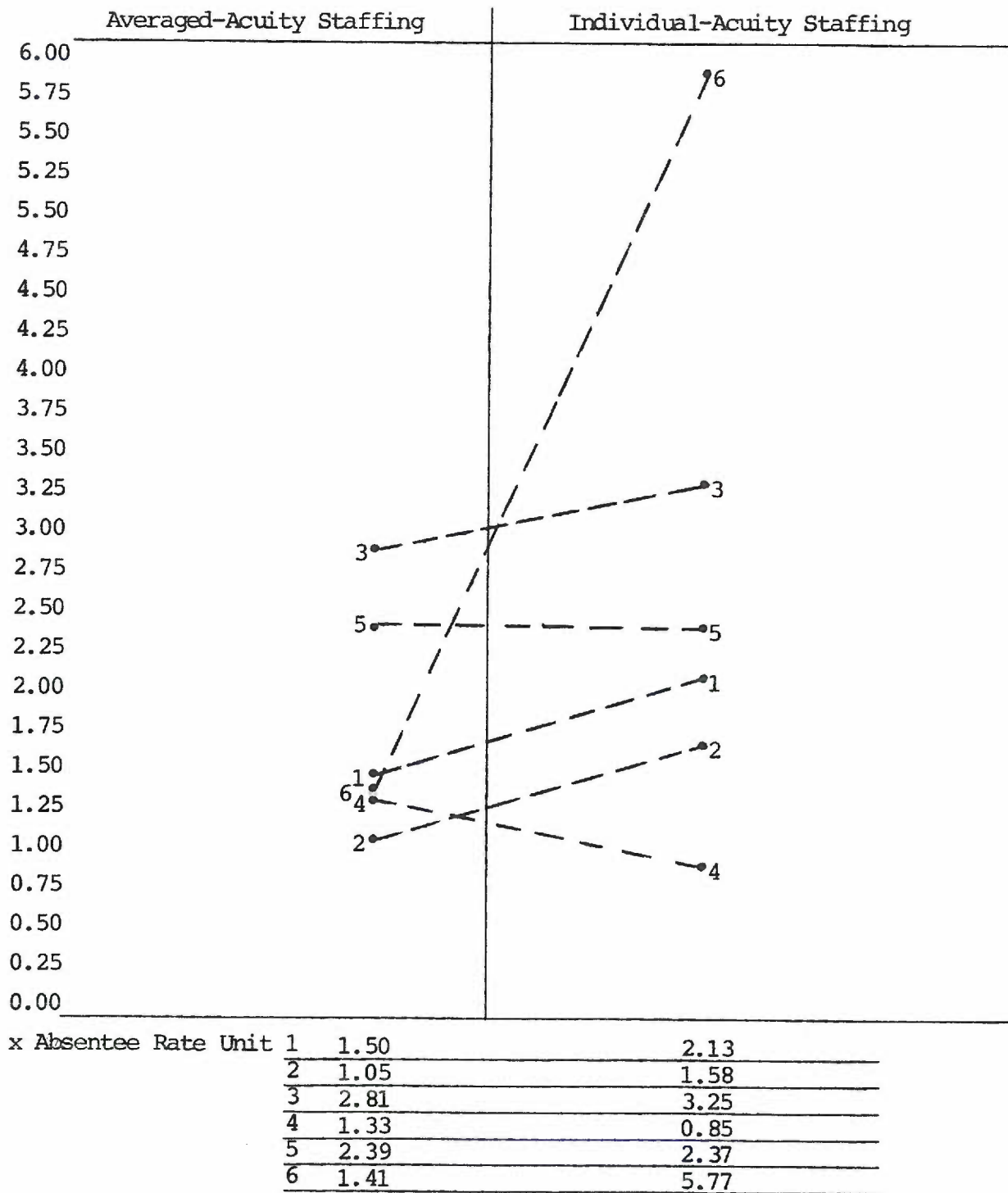


Figure 6. Interaction Between Acuity-Staffing System by Unit for Nursing Aides.

The test for the three-way interactions between the acuity-staffing systems, skill levels and larger and smaller units revealed significant interactions when all skill levels were included in the analysis,  $F = 2.919$ ,  $p \leq 0.003$  (See Table 4). No significant interaction was found when Nursing aides were removed,  $F = 1.116$ ,  $p \leq 0.360$  (See Table 5).

#### Tests for Extraneous Variables

Because it was thought that a difference in the mean daily census for each unit during each acuity-staffing system may have influenced the absentee rates, the mean daily census for each unit and month was calculated and tested for significance by means of a two-tailed-t-test with  $t = 2.447$ ,  $df = 5$ ,  $p \leq 0.05$ . There was no significant difference in the mean daily census for each unit each month during either of the acuity-staffing systems. The results of this test are depicted in Table 10.

Table 10  
Two-Tailed T-Test for Difference Between Acuity-  
Staffing Systems and Mean Daily Unit Census

Unit	Standard Deviation	Averaged-Acuity Staffing		Individual-Acuity Staffing		t
		$\bar{x}$ Daily Census	Sums of Squares	$\bar{x}$ Daily Census	Sums of Squares	
1	2.3258	22.7	3.5875	25.1	28.8675	1.4593
2	3.4935	25.3	17.1675	27.3	56.0600	0.7995
3	4.0779	26.3	1.8475	26.8	97.9275	0.1907
4	2.7148	24.5	5.6400	25.2	38.5800	0.3546
5	4.0228	28.9	2.9700	30.9	94.1275	0.7470
6	4.9529	29.1	5.2800	30.6	140.9100	0.4140

$\underline{t} = 2.447, df 5, p \leq 0.05$



## CHAPTER IV

### DISCUSSION

Before full discussion of the findings of this study, several factors must be considered. First, this type of research lacks the advantages of randomization and in some instances, control of the independent variables. In this investigation, it was possible to control only the two discrete staffing systems, the number of nursing units and nursing unit size. One major threat to the study's validity was a change in the sample composition. As the study evolved, it became apparent that the original groups of full-time-equivalent nursing personnel changed within the sample units. These changes were the result of addition to or attrition of the original members. Secondly, time constraint of the researcher limited the data collection to an eight month period rather than twelve months, due to the delay in implementing the individual-acuity-staffing system in the hospital in which the study was conducted. This did not allow for analysis of trends that appeared in the data. The changes in sample composition may have been partially controlled for by increasing the length of the study.

It should be noted also that the sample nursing staff in this study was selected from acute-care nursing units and may not represent absentee characteristics of nursing staff

on intermediate or long-term care nursing units. Because of these factors, there is a risk of erroneous interpretation of the results and generalizations of the findings is limited to full-time-equivalent nursing staff assigned to acute-care units.

#### Work-Load and Absenteeism

The outcomes of this study can be compared with previous studies of absenteeism by Hedges, 1977; Porter and Steers, 1973; Kirtane, 1975; job factors though related to absenteeism among nurses by Benton and White, 1972; charge nurses' perceived staffing adequacy by Williams and Murphy, 1979; and job demands related to perceived worker health by Coburn, 1975.

In comparing absentee rates of 3.6 million full-time equivalent workers studied by Hedges, 1977 for the month of May during 1973-1976 with those in this study from May-December, 1980, the absentee rate of this sample was significantly lower. The mean absentee rate for each full-time equivalent worker per month in the Hedges study was 6.3 days while the mean absentee rate for the same month in the present study was 1.3 days. Although there is a great disparity between the sample size and but one congruent month within the two studies, the absentee rate of the full-time-equivalent-workers

in the present study is approximately five to six times less than that of the nation's work force. In Hedges' further breakdown of absentee rates by occupation, a mean of 7.2 days per month was found for medical occupation workers. Thus, the ratio of absentee rates by an occupational classification between these two studies remains unchanged from the overall average of the nation's work force.

The reasons for this wide difference in absentee rates may be attributable to the classification of workers in the Hedges study in which all full-time equivalent medical workers were grouped together. The comparability of the results is thus inherently risky and can therefore only state that the absentee rate for the full-time equivalent staff in the present study fell well below the national norm. In addition, the comparison can only suggest that one of many possible factors in the different absentee rates was a sufficient number of full-time equivalent staff to accomplish the workload during both acuity staffing systems. It might also suggest that the comparatively low absentee rates in the present study was not a sensitive indicator of the effects of the staffing systems change since these rates may have reached their lowest possible level.

In two studies reviewed by Porter and Steers (1973), that related job satisfaction to absenteeism among department

and clinical workers, a negative relationship was found. In the present study, the results indicate that absenteeism, as one indicator of job satisfaction, was significantly different during the individual-acuity staffing period when the total sample was included but not significantly different when the nursing aides were excluded.

Assuming that absentee rate is an indicator of job satisfaction, these findings suggest that job satisfaction for the Registered and Licensed Practical nurses remained constant during both acuity-staffing systems for Nursing aides. While all implications of this discrepancy are unclear, one may be that because of an increase in Registered and Licensed Practical nurses during the individual-acuity staffing system, there was a redefinition of workload division and distribution which in turn modified the tasks to be completed by the nursing aides. An increase in absentee rates by nursing aides may have resulted from the impact of such workload modification.

Kirtane (1975) employed the same methods in studying absentee rates among nursing personnel as those in the present study. The mean absentee rates for the same three skill levels assigned on 11 acute-care units in a 300 bed hospital was 3.7 days per month for each full-time equivalent person. In the present study, the mean absentee rate for each full-

time equivalent person per month was 3.2 days. There does not appear to be a difference. These findings indicate that the average absentee rate of nursing personnel assigned to acute-care units differs very little despite the difference in the organization size. While this finding conflicts with those of Porter and Steers (1973) that there is a positive relationship between organization size and absenteeism, it is suggested that further research of these variables among nursing personnel be conducted.

In two conceptually related studies by Benton and White (1972) and Williams and Murphy (1979), inadequate nursing staff per shift was judged as the second most important reason for job dissatisfaction in the former and insufficient time to perform patient-care activities in the latter study. Benton and White (1972) surveyed 565 nurses to rank 16 job factors in order of importance. Williams and Murphy (1979) surveyed charge nurses' perception of adequate staffing on acute-care units for 18 shifts and found 14 of the shifts judged as having inadequate staffing. In the present study, the average available staff per unit increased during the individual-acuity staffing period. There was a significant increase in absentee rates when all full-time equivalent staff were included but no significant difference in absentee rates when nursing aides were excluded.

Assuming job satisfaction is improved through increased workload distribution among nursing staff and absenteeism is one measure of job dissatisfaction, the results of this study therefore reflect those of Porter and Steers (1973); Benton and White (1972); and Williams and Murphy (1979). There are several plausible explanations to be offered. First, the measurement tools employed in the latter two studies were subjective in nature while objective in the present study. Secondly, it appears that staffing was adequate during the averaged-acuity staffing system and the increase in staffing during the individual-acuity staffing system may have been in excess of that judged as adequate. The present study findings however, support the contentions of Rushworth (1975) and Coburn (1975). Rushworth believes each nursing unit has an optimal level of staff and absenteeism increases when staffing exceeds or falls below this level. Coburn (1975) contends that work becomes stressful, perceived health decreases and withdrawal behaviors increase when tasks to be accomplished are more or less than workers feel they are capable of performing. His premise may be a possible explanation for the significant increase in absentee rates among nursing aides during the individual-acuity staffing system since their task assignments may be fewer or less challenging than during the averaged-acuity staffing system.

A third plausible explanation is that the underlying assumptions of the present study are faulty. Absenteeism may not be related to job satisfaction or job satisfaction powerfully related to workload distribution. A final possibility is that the absentee rates of nursing personnel in the present study may have reached the lowest level that could be expected regardless of the staffing system in effect.

#### Skill Level and Absenteeism

The difference in absentee rates between skill levels of nursing staff in the present study can be compared with those of Kirtane (1975); Rushworth (1975); and Kirkup (1977). Kirtane's study of RN, LPN and Nursing aide absentee rates on 11 acute-care units over 12 months found the mean absentee rate per month to be 2.7 days for the RN group; 3.7 days per month for the LPN group; and 4.7 days per month for the nursing aide group respectively. Similarly, Rushworth's study of only Registered nurses and Nursing aides on 13 acute-care units over three months found a mean absentee rate of 3.8 days per month for the RN's and 10 days per month for the Nursing aides. Kirkup's study of absentee rates between nursing staff/other professionals and general/administrative services in an acute-care hospital over 48 months, found the mean absentee rate for Nursing and other professionals to

be 4.0 days per month while 2.6 days for the general and administrative services group. The findings of the present study of nursing personnel on six acute-care units over eight months were a mean absentee rate of 1 day per month for RN's; 1.5 days per months for LPN's; and 2.20 days per month for Nursing aides, thus supporting the second hypothesis and the findings of Kirtane, (1975) and Rushworth (1975). The opposite findings relating absenteeism to nursing skill level in Kirkup's research may be due to her non-specific classification within the nursing staff and between other professional and non-professional groups.

#### Size of the Work Unit and Absenteeism

Because no research relating nursing unit size with absentee rates could be found in the literature, the results of this study could only be compared with work unit size and absenteeism of blue and white collar workers reported by Porter and Steers (1973). In their summary of eight studies of blue collar workers absenteeism, a positive relationship was found while in one study of white collar workers, no relationship was found. The present study found no significant difference in absentee rates between the smaller and larger nursing units, thus supporting the study of white collar workers in the Porter and Steers report. Generalizations



however carry great risk due to differences in occupational characteristics, possible disparity of measurement tools used in the studies and wide time span between the studies. Further, the results in the present study may have been significantly different if the unit size difference had been greater than eight beds.

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

An effort has been made in this study to add to current knowledge of the absentee phenomenon; to identify acuity-based staffing as an organizational variable that may impact on absenteeism among nursing service staff and to determine if manipulation of these acuity-staffing organizational variables makes a significant difference in reducing the absentee rates of this group. A review of the literature revealed that absenteeism is increasing among nursing service personnel; that the second highest reason for worker dissatisfaction was inadequate staffing to accomplish the workload; and that absenteeism may be related to job dissatisfaction. Thus, it was conceivable that a staffing system that increased the numbers of staff and distribution of the workload would therefore reduce the absentee rates.

A four month pre and a four month post-intervention study of three full-time equivalent nursing staff skill levels assigned to two smaller and four larger acute-care units was done. Pre-post intervention absentee rates were computed for all the full-time equivalent nursing staff, for each skill level of staff and unit size nursing staff. The data were then analyzed using the analysis of covariance statistic. The covariate used during the study was the influenza rate of the metropolitan area.

It was found that the absentee rates increased during the individual-acuity staffing period when all nursing skill levels were included despite the increase in the quantity of staff. When nursing aides were excluded, there was no difference in the absentee rates between the averaged or individual-acuity staffing periods.

There was a significant difference and inverse relationship in absentee rates between skill-levels of nursing personnel during both acuity-staffing periods.

The absentee rates between larger and smaller units was not found to differ during either of the acuity-staffing periods.

### Conclusions

A summary of the findings of this and other studies pertaining to absenteeism in relation to each of the hypotheses will be discussed. Because of the limitations of the study explained in Chapter IV, the conclusions reached are provisional and each require further research.

The first hypothesis that nursing personnel will have a significant difference in absentee rates when staffing is individual-acuity based than when averaged-acuity based was supported in this study but not in the direction expected, thus, refuting the findings of the Porter and Steers (1973)

report; Benton and White (1972) and Williams and Murphy (1979), but corroborating the results reported by Rushworth (1975); Coburn (1975); and Aydelotte (1973).

The second hypothesis that there will be a significant difference in absenteeism between Registered nurses, Licensed Practical nurses and Nursing aides regardless of the acuity-staffing systems used was supported in this study adding to similar findings of Kirtane (1975); Hedges (1977); and Rushworth (1975) while refuting the findings of Kirkup (1977).

The third hypothesis that there will be a significant difference in absenteeism between smaller and larger nursing units when staffing is individual-acuity based, was not supported in this study, lending support to the Porter and Steers (1973) report of white collar workers.

#### Recommendations

It is recommended that further research be undertaken as a result of this study. A number of investigations addressing the concept of absenteeism have been conducted primarily in business and industry but few have treated absenteeism as a discrete phenomenon. Still, fewer of these studies have used rigorous measurement techniques. This is due to a failure to establish a standard definition or to develop a valid instrument to measure absenteeism, making

comparison between and among different groups difficult. Establishing these parameters needs to be a priority in future studies. Until such standards are determined, absentee measurements remain valid only in specific organizations, units or groups and monitored over time. These intra-organization longitudinal assessments could be used to determine what level of absenteeism is excessive and where to implement corrective actions.

While there is considerable literature associating absenteeism to worker dissatisfaction with organizational attributes, there is a paucity of nursing literature associating absenteeism with organizational attributes. This lack of information could be remedied by further nursing research. Further studies need to explore the nature and interactions of those variables that nursing administrators can change to minimize costly absenteeism among nursing service personnel. Such information would benefit the staff and more importantly the patients.

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APPENDIX A  
AVERAGED ACUITY STAFFING

The averaged-patient-acuity staffing system is one that was developed from a management engineering model. A three-week time-motion study was done for each eight hour shift on each nursing unit in May, 1976. Four patient-acuity categories were established by determining the average amount of time required for an average mix of nursing personnel to accomplish patient-care activities and unit functions. The patient-acuity categories are:

#### Averaged Patient Acuity

- Category I - A patient requiring a moderate amount of direct nursing care whose condition is characterized by:
1. Moderate symptoms, usually in stages of convalescence but only somewhat dependent on others for activities for daily living.
  2. A need for general control of activities.
  3. A need for periodic observations, treatments or supervised practice in self-care measures.
  4. Intermittent deviation from acceptable behavior patterns.
- Category II - A patient requiring substantial direct nursing care whose condition is characterized by:
1. Symptoms that may be subsiding or impending, or symptoms of a chronic condition that make the patient heavily dependent on nursing personnel.

2. Frequent deviation from acceptable behavior patterns.
3. A need for modifying limiting or restricting activities.
4. A need for frequent treatment or observation.
5. Interaction for patient teaching needs.

Category III - A patient requiring an acute degree of direct nursing care whose condition is characterized by:

1. Acute symptoms that make complete dependency on nursing personnel for activities of daily living.
2. On going deviation from normal behavior patterns.
3. A need for closely supervised control of activities.
4. A need for frequent observations or treatments.
5. Interaction for patient teaching needs.

Category IV - A patient requiring a critical or life saving degree of direct nursing care whose condition is characterized by:

1. Completely dependent on nursing care for life sustaining measures.
2. Terminally III requiring complete supportive nursing care.
3. Isolated or security risk patient requiring frequent nursing interactions.

The averaged acuity per unit per eight hour shift was computed by summing the number of patients in each acuity category, multiplying by the category value and dividing by the average shift census.

Example:

Category I	10 patients	$10 \times 1 = 10$
Category II	17 patients	$17 \times 2 = 34$
Category III	5 patients	$5 \times 3 = 15$
Category IV	1 patient	$1 \times 4 = 4$
TOTAL	33 patients	63

$$\begin{aligned}
 \text{Average acuity/eight hour shift} &= \frac{63}{33} = 1.91/\text{day shift} \\
 &= \frac{48}{33} = 1.45/\text{eve shift} \\
 &= \frac{28}{33} = .85/\text{night shift} \\
 \text{Average acuity/patient day/unit} &= \frac{\quad}{\quad} = 4.21
 \end{aligned}$$

Nursing hours per patient per shift was computed by:

1. Converting actual nursing hours to average hours.  

$$\text{Average hours} = \text{actual hours} \times \% \text{ staff pace} + 20\% \text{ non-productive time}$$

$$\text{Ex: } 64 \times 1.00 + 1.02 = 65.02 \text{ hours}$$

2. Dividing average nursing care hours by the average shift census.

$$\text{Nursing hours/patient/shift} = \frac{65.02}{33} = 1.97$$

Nursing hours per patient day per unit was computed by:

1. Summing the average nursing hours per patient per shift per unit.

Days	1.97 average hours/patient/shift/unit
Evenings	1.50 average hours/patient/shift/unit
Nights	0.82 average hours/patient/shift/unit

Nursing hours/patient day/unit - 4.29 at the average unit acuity of 4.21 and census of 33.

The work load per shift ratio per unit was measured and the staff/shift ratio determined as follows:

Unit #	Days	Evenings	Nights
1	48	33	19
2	48	32	20
3	48	35	17
4	49	33	18
5	49	33	18
6	46	36	18

The staff mix ratio per unit was determined by:

1. Size and type of unit
2. Financial resources
3. Availability of nursing personnel

Unit #	RN %	LPN %	NA %
1	45	29	26
2	44	39	17
3	47	36	17
4	45	30	25
5	40	20	40
6	40	34	26

The individual acuity staffing system is one that was developed by the Medicus Systems Corporation. Four patient-acuity categories were established by application of 205 patient-specific and 52 unit specific indicators. The indicators applicable to each patient are determined daily by the professional nurse staff. The weights of each indicator are summed and determines each patient's category. The patient-acuity categories are:

- Category I     A patient requiring 0-2 hours of nursing care per day
- Category II    A patient requiring 2-4 hours of nursing care per day
- Category III   A patient requiring 4-10 hours of nursing care per day
- Category IV    A patient requiring 10 or greater hours of nursing care per day.

Once the category of each patient is determined, a weighted sum of all categories represents the amount of nursing workload/unit/day and is expressed as workload index. The average contribution per patient to this sum is calculated and it expressed as the average acuity. The range of points and acuity values per patient category are as follows:

APPENDIX B  
INDIVIDUAL-ACUITY STAFFING



Category	Hours/24	Point Range	Acuity Value
I	0 - 2	0 - 24	0.5
II	2 - 4	25 - 48	1.0
III	4 - 10	49 - 120	2.5
IV	10+	121+	5.0

Example:

Daily workload index/unit = # of patients/category x acuity factor.

	Number of Patients		Acuity Factor		Workload Index
Category I	4	x	0.5	=	2
Category II	5	x	1.0	=	5
Category III	4	x	2.5	=	10
Category IV	2	x	5.0	=	10
Census	15		9.0		27

$$\text{Average acuity} = \frac{\text{workload index}}{\text{census}} = \frac{27}{15} = 1.8$$

An organizational standard of 3.8 nursing care hours/patient day was established as the norm in determining the daily nursing care hours/24 hours/unit.

Nursing care hours/24 hours = workload index x 3.8 nursing care hours/patient day - 27 x 3.8 = 102.6.

Staffing/shift is calculated by multiplying nursing care hours/24 hours by a designated % of total nursing care hours.

Ex:  $102.6 \times 47\% = 48.2$  nursing care hours - day shift  
 $102.6 \times 33\% = 33.8$  nursing care hours - evening shift  
 $102.6 \times 20\% = 20.5$  nursing care hours - night shift

APPENDIX C  
OFFICIAL CORRESPONDENCE

10650 S.W. 121st  
Apt. 15  
Tigard, Oregon  
16 April, 1980

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Miss Roberta Sample R.N.  
Director of Nursing Service  
Providence Medical Center  
700 N.E. 47th Avenue  
Portland, Oregon

Dear Miss Sample:


I am presently a graduate student enrolled in the Nursing Administration and Management program at the University of Oregon Health Sciences Center in Portland. This program requires a Master's thesis and I have chosen to research the relationship between staffing of Nursing service personnel (Registered Nurses, Licensed Practical Nurses and Nursing Aides) by a patient-acuity classification and short-term absenteeism rates.

The data collection method will require that records reflecting absenteeism be assessed over a period of approximately 8-9 months on those units that are staffed by a patient acuity classification. Confidentiality and anonymity of the subjects will be assured.

Since I wish to cause the least amount of disruption as possible, I am willing to personally collect the data required and will be most happy to share with you the findings of this study.

I very respectfully request your permission to conduct this research project at Providence Medical Center.

Sincerely,

  
Lillian B. Snyder  
CDR, NC, USN

PROVIDENCE  
MEDICAL CENTER

700 N.E. 47TH AVENUE  
PORTLAND, OREGON 97213  
PHONE: (503) 234-8211



SERVING IN THE WEST SINCE 1856

3 July 1980

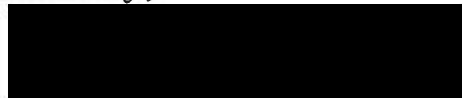
CDR Eilleen E. Snyder, USN  
10650 SW 121st, Apt. 15  
Tigard, OR 97223

Dear Commander Snyder:

This is to confirm our understanding of the approach you will take in collecting data for your thesis. The data on absenteeism among nursing service personnel will be obtained through a summation methodology, and no individual employee records will be used at any time. This will assure confidentiality and anonymity for Providence employees while providing you with the data you need.

I am pleased with the opportunity to work with you on this project.

Sincerely,



Arlene Austinson, RN  
Director  
Department of Nursing

AA/ja

cc: Lillian Millican  
Betty Sayler

PROVIDENCE  
MEDICAL CENTER

700 N. E. 47TH AVENUE  
PORTLAND, OREGON 97213  
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SERVING IN THE WEST SINCE 1856

23 April 1980

CDR Eilleen E. Snyder, USN  
10650 SW 121st  
Apt. 15  
Tigard, OR 97223

Dear Commander Snyder:

I did enjoy the time we spent discussing your proposed thesis. I believe your research into the relationship between staffing of nursing service personnel (RN, LPN and Nursing Assistants) by a patient acuity classification and short-term absenteeism rates will be very helpful to Providence Medical Center. Mrs. Lillian Millican has expressed her desire to work with you in this project. She feels the information will be of great assistance in determining some outcomes of our new program.

We will be happy to cooperate with you in this project. Please plan to use Mrs. Millican as your resource person.

Sincerely,

Roberta E. Sample, RN  
Director  
Department of Nursing

RES/ja

cc: Mr. John Lee, Administrator  
Mrs. Betty Sayler, Assistant Administrator  
Mrs. Lillian Millican, Staffing Coordinator

## ABSTRACT

AN ABSTRACT OF THE THESIS OF  
EILLEEN E. SNYDER

For the MASTER OF NURSING

Date of Receiving this Degree: June 12, 1981

Title: THE RELATIONSHIP BETWEEN TWO METHODS OF ACUITY  
STAFFING AND ABSENTEE RATES OF NURSING PERSONNEL:  
A RETROSPECTIVE STUDY

Approved:

Christine A. Tanner, Ph.D., Thesis Advisor

The purpose of this study was three-fold: 1) to identify the relationships between absentee rates of nursing service personnel during two distinctive acuity-staffing systems; 2) to determine the relationships between absentee rates and three skill levels of nursing personnel; and 3) to identify the relationships between absentee rates of smaller and larger acute-care nursing units.

An eight month time series design was employed and four months of data were collected for each acuity-staffing system. Absentee rates for full-time equivalent Registered nurses, Licensed Practical nurses and Nursing aides from six separate units were extracted from the records and placed in contingency tables. The data were then analyzed by an analysis of covariance.



The covariate used during the study was the influenza rate of the metropolitan area.

It was found that the absentee rate increased during the individual-acuity staffing period when all nursing skill levels were included despite the increase in quantity of full-time equivalent staff. When Nursing aides were excluded, there was no significant difference in the absentee rate between the averaged or individual-acuity staffing systems.

There was a significant difference and inverse relationship in absentee rates between the skill levels of nursing personnel during both acuity-staffing systems.

The absentee rates between larger and smaller units was not found to differ during either acuity-staffing periods.

The limitations of the study include:

- 1) an inability to control for history and changes in the composition of the sample;
- 2) the duration of the study was insufficient to encompass possible yearly variations in absentee rates; and
- 3) the sample nursing staff was not randomly selected and were only from acute-nursing care units.