STUDY OF THE MODIFICATION OF A WORKLOAD INDEX STAFFING TOOL

by

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We accept this thesis as conforming to the required standard

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April, 1973
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ABSTRACT

This descriptive study was designed to evaluate what modifications of an existing workload index staffing tool were necessary for practical application in an extended care hospital. Two activity studies were conducted concurrently in a 63 bed extended care unit. The Inroom Activity Study measured the amount and kind of care patients received on each shift. Patients were classified into two categories of nursing care needs - average and above average care. The Indirect Work Sampling Study identified how nursing staff spent their time during their eight hour tour of duty. A random selection of the days of the week and the shift to be observed was undertaken to select times that would be representative of the total week days.

The data for the Inroom Activity Study was collected by continuous observations of nursing care given to patients during an eight hour period, and included 10 patients from each category on each shift.

The data for the Indirect Care Study was collected by making fifteen minute spot checks on all nursing personnel throughout an eight hour tour of duty. Observations were made throughout 5 day shifts, 5 evening shifts, and 4 night shifts.

Four questions were answered in this study. Data
analysis of Question 1 revealed that there was a difference in the average amount of direct nursing care time that each category of patient received on days, and the average amount of time each category of patient received on evenings. There was no difference in the average amount of time each category of patient received on nights. Data analysis of Question 2 revealed that there was a direct ratio between the amount of care all patients received on days, the average amount of time all patients received on evenings, and the average amount of time all patients received on nights. Data analysis of Question 3 revealed that weighting factors could be established to determine the amount of care received by each category of patient on each shift. Data analysis of Question 4 showed the percentage of time nursing personnel were able to spend in giving direct patient care during an eight hour shift.

The study concludes with consideration of the implications and recommendations for use of the workload index staffing tool, and suggests further research as to refinement of the tool.
ACKNOWLEDGEMENTS

My thanks are expressed to my Committee Chairman, Professor Mary Cruise, and Committee members Professor Helen Elfert and Lillian McLean for their time and effort in providing helpful suggestions; to the nursing staff and patients who so willingly took part in this study; and to both my colleague, Eleanor Heieren, and my parents for their encouragement and inspiration.
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CHAPTER I

INTRODUCTION TO THE STUDY

I. INTRODUCTION

One of the most difficult aspects of the management role in nursing service is that of staffing to meet the needs of the patient. To be effective the nurse manager must be able to assess the staffing needs of each unit, provide flexibility in staffing by the allocation of staff according to workload, indicate trends in patient care load from month to month, compare workloads between wards, and predict future staff requirements when submitting annual operational budgets.

In the past allocation of staff has been determined, primarily, by patient census and the subjective judgement of experienced directors of nursing, supervisors, and head nurses. Far too often emphasis has been placed on patient census. Census can be misleading if it is used as the sole

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1 "Statement on Nursing Staff Requirements for In-Patient Health Care Services," prepared by the Committee on Nursing Services, American Nurses' Association, American Journal of Nursing, vol. 67, no. 5, (May, 1967), pp 1029 - 1030.

basis for judging workload, since each patient has varying degrees of nursing care requirements. The subjective judgements of nursing supervisors within the same institution may vary greatly because of their individual differences in both experience and education. To achieve consistency and to provide staffing which will meet the needs of the patients, nursing requires a method for objectively arriving at a measure of nursing care workload, and an associated staffing guide.

Since April, 1969, as Director of Medical Nursing at University Hospital, Saskatoon, Saskatchewan, the writer had been moving staff between the four medical wards for which she was responsible. The assessment of staffing requirements was a subjective assessment made by the Director, after consultation with the Head Nurse, on each of the wards.

In April, 1970, at University Hospital, an objective method for numerically assessing workloads, and for calculating the number of required nursing staff was developed out of the nursing research in progress. Use of the patient workload

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4 K. Sjoberg and P. Bicknell, Nursing Study - Phase II: A Pilot Study to Implement and Evaluate the Unit Assignment System, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1969.
index tool made these decisions much more objective. The workload index was calculated daily for each shift, on each ward. Staff were then allocated to best meet patients’ needs. The writer found that the workload index was an objective and accurate reference to use when compiling monthly and annual reports. It was also a valuable tool to use when dealing with operational budgets when requesting or reclassifying nursing staff positions.

Subsequent use of the workload index staffing tool by other directors of the clinical services in this same hospital resulted in a more consistent overall approach to staffing the total nursing service department, and in the allocation of part time personnel assigned from a central location at the beginning of each shift.

This approach to staffing appears to provide consistency in the provision of patient care, objectivity in establishing staffing priorities, increased staff satisfaction by limiting the wide fluctuations in the nurse’s daily assignment of patients, and indication of cost reduction.

5 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.

6 Communications between the Nursing Administrator and the Directors of Clinical Services, University Hospital, Saskatoon, Saskatchewan, 1970 – 1971.
in providing nursing care by using a flexible approach.

II. THE PURPOSE OF THE STUDY

The purpose of the study was to obtain data on staff utilization and the amount and type of nursing care being provided. Direct patient care activities of the nursing personnel were explored as well as the nursing personnel's indirect patient care activities. It is intended that the study will contribute to the knowledge of nursing staff utilization by providing an instrument that will assist nursing directors of extended care units to staff more effectively.

III. THE PROBLEM

Statement of the Problem

What modifications of an existing workload index staffing tool are necessary to provide an effective staffing guide for utilization in an extended care setting?

In order to solve this problem four questions must be answered. They include: (1) Is there a difference in the average amount of direct nursing care time that each category of patient receives on days, the average amount of time

Marion Jackson, *Annual Report - Medical Nursing Department*, submitted to the Nursing Administrator, University Hospital, Saskatoon, Saskatchewan, December, 1970.
each category of patient receives on evenings, and the average amount of time each category of patient receives on nights?; (2) Is there a direct ratio between the average amount of direct nursing care time that all patients receive on days, the average amount of time all patients receive on evenings, and the average amount of time all patients receive on nights?; (3) Can weighting factors be established from the relationship of direct nursing care time received by each category of patient on each shift, and the ratio between the direct care patients receive on each shift? Will these weighting factors differ from those identified in the acute care center?; and (4) Will the number of direct nursing care hours that nursing personnel provide in an extended care setting differ from the number of direct care hours that nursing personnel provide in the acute care setting?

Specific Objective of the Study

The specific objective of the study is to establish the values for calculation of the workload index which can provide practical application in an extended care setting by: (1) classification of patients into categories of care according to their needs for nursing care, (2) identification of the time nursing personnel spend giving direct care to each category of patient on each shift, and (3) identification of the time nursing personnel spend on activities away from the patient's bedside.

Significance of the Problem

That the costs of health care services are rising
yearly is indisputable. An important area to examine is the question of what proportion of available financial resources should be allotted to nursing service to maintain a safe level of patient care with maximum efficiency. The very definite need to relate staffing to workload has been well documented and recommended.

Quantitative standards developed by specific hospitals cannot, and should not, be applied directly to other institutions providing health services. This would result in a defeat of their initial purpose and a loss of their potential for effectiveness. The tools for measuring quantitative needs can only be used when they are adjusted to meet the needs of a particular nursing service department. However, the investigator believes that much time and effort can be saved by the modification of existing tools rather than the development of separate tools for each institution.

The acute care settings throughout Canada have gained through research. Virtually no research of this


kind has been conducted in extended care facilities. On January 1, 1972, in British Columbia, 27 extended care facilities were providing care to 2,104 patients. The projected number of beds available for the end of 1972 was 3000. This was only a 75 per cent estimation of required needs. Studies must be conducted in extended care facilities to identify the nursing needs of the patients, and to provide appropriate staffing to meet those needs. Because of all these factors a study, conducted to determine what modifications of an existing workload index staffing tool are necessary for application in an extended care facility, was warranted.

IV. ASSUMPTIONS

This study is based on the following assumptions: (1) the classification system used is a reliable and valid tool for assessing the patients' needs for nursing care, and (2) a quantitative measure of nursing care can be used as an estimate of the care the patients actually require.

11 Personal Communication with Mrs. Lillian McLean, Director of Nursing, Louis Brier Home and Hospital, March, 1972.

12 Ibid.
V. DEFINITIONS

Patient Classification

Patient classification is a system of organizing patients' needs for nursing care into one of four categories. The categories include minimal care, average care, above average care, and intense care.

**Minimal Care**

The patient is physically capable of caring for himself, but requires minimal support plus treatments or monitoring by the nurse every four hours.

**Average Care**

The patient requires an average amount of nursing care and medical support; e.g. he is past the acute stage of his disease.

**Above Average Care**

The patient requires a greater than average amount of care, medical support and use of special equipment; e.g. after the acute phase of CVA with residual paralysis.

**Intense Care**

The patient requires continuous nursing care and

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close supervision by medical personnel with support from technical equipment, e.g. patient with multiple sclerosis on a rocking bed.

Acute Care Setting

An institution designed for patients who are seriously ill regardless of diagnosis, who require constant professional skilled nursing care and observation, daily medical attention, reassessment, and observation; and for those patients who require special diagnostic and treatment facilities only available in an acute hospital.

Extended Care Setting

This is an institution designed for persons of all ages who do not require acute hospital care and treatment, nor an intensive or comprehensive programme of activation and rehabilitation. This level is restricted to those with severe impairment and who require regular and continuing medical attention as well as skilled nursing provided under graduate nurse supervision on a 24 hour basis. These patients should be treated in the extended care unit of an acute hospital, or in an extended care hospital.

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16 K. Sjoberg and P. Bicknell, Patient Classification Study, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1968.

17 B.C.H.I.S., Definitions of Levels of Care, sent with form letter to British Columbia Hospitals, September, 1972.

18 Ibid.
Nursing Personnel

This includes all personnel giving direct care to the patients. It includes registered nurses and nursing aides.

Weighting Factors

Weighting factors represent numerical values that have significant relationships to one another.

Workload Index

A numerical value that is representative of the patient care load for the entire patient population of a unit, ward, or hospital.

Direct Nursing Care

This represents all care that is given directly to the patient by the nursing personnel such as bathing, feeding, and administering medications.

Indirect Care

This represents all indirect care performed by the nursing personnel for the benefit of the patient, and all activities which do not affect the patient directly, but fulfill the needs of the institution such as the requisitioning of supplies.

VI. LIMITATIONS OF THE STUDY

The study is subject to the following limitations:

(1) The study considered only numerical values which represented the amount of care that the patients actually received, and not the nursing care required by the patients,
and (2) the study was conducted in only one extended care facility in Vancouver, British Columbia.
CHAPTER II

REVIEW OF THE LITERATURE

Review of the literature has been divided into three sections including a conceptualization of all of the variables in the staffing of nursing units, a review of the significant studies on patient classification, and a review of significant studies that have developed indices for staffing based on patient care loads.

I. CONCEPTUAL FRAMEWORK

The attempt to staff nursing units in order to meet patient needs is a very real concern to nursing administrators. The many variables in staffing must be delineated to substantiate a quantitative approach to the study of the problem. The volumes of literature concerned with staffing problems are so numerous that a concise review of the literature is impossible. Furthermore, the amount of research that has been carried out in the area of staffing continues at a rapid pace. A review of the approaches to staffing, prepared by the Canadian Nurses' Association, gives clear evidence of this. The attempt, in this first

1 Canadian Nurses' Association, Historical Overview of Approaches to Staffing the Hospital Nursing Service Department, Canadian Nurses' Association, 50 The Driveway, Ottawa 4, 1966.
section of the literature review, will be to identify all the intervening variables by a synthesis of much of the literature concerned with staffing. Figure 1 illustrates schematic representation of the conceptual framework.

Influence of Social Factors

The rising cost of health services has a most profound affect on staffing nursing units. The largest single item of expenditure in a hospital's operational budget is allotted to the nursing service department. Although the estimates vary from hospital to hospital, some authors have stated that from one-half to one-third of all hospital salaries go to nursing personnel. This fact alone makes justification of nursing budgets essential. Nursing having had no control over the type of patients being admitted plus having no tools to identify patient workload has tended to staff for projected maximum work-

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4 Measurement of Nursing Care, no. 9, Operational Research Unit, Oxford Regional Hospital Board, Old Road, Headington, Oxford, 1967.
Figure 1 - Conceptual Framework
loads which is economically unsound.

It is recognized that as medical technology expands, and as the general public's knowledge and demand for health care increases, the number of hospitals increase. These factors lead naturally to an increased demand for nursing personnel.

The shortage of nursing personnel, real or imagined, is not difficult to understand in today's society. Women have many more alternative occupations from which to choose a career. Thus fewer women in the population are likely to enter nursing in comparison with the proportion of women in the population fifteen years ago. The shorter work day, work week, increased vacation time, and other employee benefits further decrease the likelihood of meeting the demands. However, simply increasing the number of nursing personnel may not solve the problem, as was indicated in a

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5 Eleanor Heieren, _Nursing Service Research Report - Workload Index_, prepared for the Hospital Systems Study Group Third Annual Institute, University of Saskatchewan, Saskatoon, Saskatchewan, September 29, 1971.

6 "Statement on Nursing Staff Requirements for In-Patient Health Care Services," prepared by the Committee on Nursing Services, American Nurses' Association, _American Journal of Nursing_, vol. 67, no. 5, (May, 1967), pp 1029 - 1030.

study conducted by Abdellah and Levine. A study by Aydelotte further indicated that increasing the number of personnel did not necessarily improve the care of the patients. Effective utilization of present resources would appear to be a more rational approach to deal with the shortage of nursing personnel.

Organization of Nursing Service

Sjoberg, Heieren and Jackson noted that the philosophy and objectives of the nursing service department, and the quality of the senior nursing personnel directly affect the staffing of nursing units. These factors are determinants for staffing policies, nursing procedures, method of assignment, defined functions of nursing personnel, opportunity for professional development and advancement, and consistency in the nurses' daily responsibilities. If these factors are positively directed, they are likely to


increase the nurses' job satisfaction which should decrease the rate of staff turnover. Frequent turnover of staff makes staffing inconsistent, is likely to increase costs, and most important, affect the quality of care given to patients. A five year nursing study at University Hospital in Saskatoon, Saskatchewan, which dealt with many of these factors, resulted in more efficient staffing, increased job satisfaction, and indicated a substantial saving in operational costs.

**Patient Population**

In determining how much staff is necessary, consideration of patient census, number of admissions and discharges daily, and the average length of the patients' hospital stay is essential. Census, alone, will not effectively determine staffing needs. Identification of the degree of each patient's needs is the important determinant. This dependence should be assessed daily because the patient's needs may fluctuate from day to day.

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13 Ibid.
In addition the amount and kind of care to be given to the patient should be clearly established. Abdellah and others have suggested three categories of care which include sustenal, remedial, and restorative. Both quality and quantity of staff will determine the type of care that the nurse is able to administer.

Based on the preceding discussion the investigator believes that the established staffing pattern of any hospital will determine the standard of care and the time consumed per patient. Both these factors affect, to a great extent, the patient's comfort and satisfaction.

Facilities to Meet Patient Needs

The following generalizations regarding internal and external forces affecting staffing are substantiated by the studies conducted by the Hospital Systems Study Group at the University of Saskatchewan, Saskatoon, Saskatchewan.

The physical plant and the size of each unit affect staffing needs. Generally, the smaller the unit the greater


the cost is in staffing.

The availability, quantity, and the quality of supplies and equipment will also affect the staffing of a nursing unit. If the nurse must travel varied distances, and frequently, to obtain supplies and equipment, more time is consumed resulting in the need for more staff and in the ineffective utilization of professional nurses.

Obviously, the structure of the medical staff will affect nurse staffing. The number of physicians practicing in the hospital, the scope of their activities, and their expectations for the nursing care of their patients will determine, to some extent, the number and category of nursing personnel in the institution.

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16 B. A. Holmund, Nursing Study - Phase I - University Hospital, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1967.

17 K. Sjoberg and P. Bicknell, Nursing Study - Phase II: A Pilot Study to Implement and Evaluate the Unit Assignment System, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1969.

18 K. Sjoberg, E. Heieren, and P. Bicknell, Nursing Study - Phase III: Implementation and Evaluation of Unit Assignment in a Multi-Ward Setting, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, August, 1971.
Discussion

Exploration of the many variables that affect staffing of the hospital nursing service departments indicates that much research is necessary to examine the many variables involved.

How can effective utilization of nursing staff be achieved? Objectivity and Uniformity in communication between all sources concerned with staffing to meet patient needs will result in effective utilization of available staff. To reach this optimal state, standardized methods of identifying both quantitative and qualitative measures of care are essential. The methods of communication must be such that it is logical to nurses, physicians, business administrators, and the public.

II. PATIENT CLASSIFICATION STUDIES

Since quantitative nursing care is more easily studied, the starting point has been time studies to determine how much care the patient is receiving. At first, time studies dealt with averages of time that care was given to all patients regardless of their individual needs. Recently, classification of the patient, according to his needs for nursing care, have made time studies more definitive.

19 K. Sjoberg and P. Bicknell, The Development of a Research Tool to Evaluate and Compare the Standard of Patient Care, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, April, 1971, Unpublished.
The investigator feels that more specific information on quantity of care is needed. Hopefully, further study on the quantitative measurements of patient care will assist in the identification of improved methods for the measurement of qualitative patient care.

Classification of patients, according to their needs for nursing care, was suggested as far back as 1937. The major work that was done in this area was primarily in the late 1950's and 1960's. Review of the significant studies on patient classification will include those of the past fifteen years.

In 1955, Flanagan and Herdan analyzed the nursing requirements of neurological and neurosurgical patients. The patients were grouped into four categories of care according to their degree of physical independence. Observers recorded the amount of time direct care was given. The statistical approach revealed that, on the average, patients

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received 3.7 hours of direct care per 24 hours. This average was for all patients regardless of their category. The researchers estimated the indirect care as 1 hour in a 24 hour period. This was an estimation only, not a timed factor.

One of the most significant studies originated at the John Hopkins Hospital under the direction of Flagle. A classification system was developed which divided the patients into three groups of care based on the elements of nursing care. It was further developed by Connor and others from the John Hopkins Research Center. Their studies indicated the importance of categorizing patients according to nursing care needs. The classification consisted of a checklist of 25 items, and put the patient into one of three categories of care - intensive, intermediate, and minimal.

CASH (Commission for Administrative Services in Hospitals, CASH, 1964).
Hospitals), in 1964, published a report on staff utilization and a program for control. Nursing personnel were categorized according to what procedures they performed for patients, and the patients were classified as self care, intermediate care, and intensive care.

In 1965, MacDonell and Murray at Deer Lodge Hospital, in Winnipeg, Manitoba, introduced a three level care categorization of patients. These included level I - investigative, convalescent; level II - intermediate, extended; and level III - intensive, acute. Placement of the patient involved a check-off list of 55 items to describe the patient. The program was most extensive and appeared to meet definitive criteria of patient needs. To be used daily on a unit was felt by some nursing professionals to be too time consuming to be of practical value.

In 1964 the research unit in Headington, Oxford, observed care received by patients classified into self care, intermediate care, and intensive care. Their methods of


26 K. Sjoberg and P. Bicknell, Patient Classification Study, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1968.

27 Measurement of Nursing Care, no. 9, Operational Research Unit, Oxford Regional Hospital Board, Old Road, Headington, Oxford, 1967.
research added more knowledge to the significance of patient classification, and the time consumed per patient in each category.

In 1967 the University of Saskatchewan Hospital Systems Study Group produced a four-level classification system for identifying patient nursing needs. Their analysis of nursing activity studies resulted in the development of a tool that quickly and simply classified patients into four categories of nursing care including minimal, average, above average, and intense. This resultant classification system was tested for reliability and validity in 1968. It was shown to be a satisfactory method of classifying patients in a short period of time.

Since this classification tool was used in the present study, a general summary of its elements is presented. Information was taken from the study by Sjoberg and Bicknell. This patient classification system contains six primary nursing need categories including personal care, feeding, feeding, feeding, feeding,

28 B. A. Holmund, Nursing Study - Phase I - University Hospital, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1967.

29 K. Sjoberg and P. Bicknell, Patient Classification Study, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1968.

30 Ibid.
observation, activity, fecal incontinence, and preoperative care. The determiners indicating the category to which the patients belong yield a combination of his identified needs. Minimal care determiners include independent personal care, such as requiring only basin or tub, independent in feeding, observation every four hours or less, and unrestricted activity. Average care determiners include bathing with assistance, partial help in feeding, observation every two to four hours, and restricted physical activity such as 'up with assistance' or on 'bed rest with bathroom privileges'. Above average and intense determiners include complete bathing by the nurse, fed by the nurse, or nothing by mouth, intravenous therapy, tube feeding, constant or hourly observation, positioning by the nurse in bed or chair, fecal incontinence, and preoperative preparation. One basic assumption includes psychosocial support on a continuous basis. If psychosocial or patient teaching needs are primary, they would be included in the observational determiner. It is the combination of these needs that place the patient into one of the four categories for nursing care.

In 1970 reliability and validity testing of a five level classification tool, developed at Vancouver General Hospital, Vancouver, British Columbia, was undertaken.

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The five level classification, subjective in nature, was not found to be statistically reliable or valid. It was felt that a five-level tool would be more sensitive in the identification of the patients' nursing care needs. Although the reliability and validity was not statistically significant, the tool was found to be useful as a guide for staffing.

Price's study on staffing classified patients into one of three categories - independent, partially independent, and dependent. This classification was based on the activities of daily living. In this study the researchers eventually disregarded classification of the patients' nursing needs, and appeared to rely more on the intuition of the nurse.

III. MEASUREMENTS OF PATIENT CARE WORKLOAD

The program developed by CASH for staff utilization and control suggested an interim staffing guide. This included identification of the total hours available for giving direct care to the patients in each category. The researchers identified basic care time and special care

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33 *Nursing Service: Staff Utilization and Control Program Orientation Report*, May, 1964, Commission for Administrative Services in Hospitals, CASH.
time in the activity studies conducted. The total hours available from nursing personnel were divided mathematically by the patient care requirements. Their analysis indicated that the patients, overall, received 45 per cent care time on days, 37 per cent nursing care time on evenings, and 18 per cent nursing care time on nights. Using this as a base line, determination of approximate staff requirements could be made at the start of each shift based on the number of patients and their estimated needs for nursing care. The program also suggested a more even distribution of care throughout the 24 hour day, rather than the peak periods of activity identified in their time studies.

The research group at Oxford Regional Hospital, using activity sampling and continuous patient observation, established the amount of time spent in giving nursing care to each category of patient. The ratio between the three levels of care over a 24 hour period was found to be 1 : 2 : 5. An overall index of workload could be established by multiplying the number of patients in each category by the ratio for that care group plus summation

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34 Nursing Service: Staff Utilization and Control Program Orientation Report, May, 1964, Commission for Administrative Services in Hospitals, CASH.

35 Measurement of Nursing Care, no. 9, Operational Research Unit, Oxford Regional Hospital Board, Headington, Oxford, 1967.
The direct care index associated with the classification system at the John Hopkins Hospital gave a measure of daily nurse hours of direct care. The average time per patient category included, self care - one-half hour; partial care - one hour; and complete care - one and one-half hours of direct nursing care per 24 hour day.

More specific numerical ratings were assigned to each care category in the development of the workload index at the University Hospital, Saskatoon, Saskatchewan. Because this was the tool chosen for modification in the present study, an in-depth review of its elements are presented. At the University Hospital the workload index is based on the amount of direct nursing care each category of patient receives on each shift. It is further based on how the nursing personnel spend their time on each shift including direct patient care, personal time, and other functions not related to patient care.

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36 Measurement of Nursing Care, no. 9, Operational Research Unit, Oxford Regional Hospital Board, Headington, Oxford, 1967.


38 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.
The development of a numerical weighting factor resulted during Phase II of the nursing study, when the statistician recognized a relationship between the amount of care that the patients in each of the four categories received on each shift. On the day shift, the average care patient received twice as much direct nursing care time as the minimal care patient, the above average care patient received six times as much care as the minimal care patient, and the intense care patient received twelve times as much direct nursing care time as the minimal care patient. On the evening shift, again relating each care category to the minimal care patient, the average care patient received twice as much direct nursing care, the above average care patient received seven times as much care, and the intense care patient received fourteen times as much direct nursing care time. Again, relating each category of patient to the amount of direct nursing care time received by the minimal care patient, on the night shift the average care

39 K. Sjoberg and P. Bicknell, Nursing Study - Phase II: A Pilot Study to Implement and Evaluate the Unit Assignment System, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan December, 1969.

40 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.

41 Ibid.
patient received twice as much direct care, the above average received seven times as much direct care, and the intense care patient received twenty-five times as much direct nursing care time.

Illustration

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<tr>
<th>Shift</th>
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<td>D</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>25</td>
</tr>
</tbody>
</table>

The statistician also identified a ratio between the average amount of care received by all patients between the day shift the evening shift, and the night shift. This ratio was $4:2:1$.  

Index weighting factors were arrived at by multiplying the ratio found on each shift with the corresponding relationships of direct nursing care on the same shift.

42 P. Bicknell, **Staffing by Patient Care Workload**, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.

43 Ibid.

44 Ibid.
Illustration

<table>
<thead>
<tr>
<th>Shift</th>
<th>Minimal</th>
<th>Average</th>
<th>Above Average</th>
<th>Intense</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>4</td>
<td>8</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>4</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>25</td>
</tr>
</tbody>
</table>

To achieve the workload index for any given shift, the number of patients in each category is multiplied by the weighting factor for that patient category on that particular shift. The summation of these multiples gives the workload index.

Calculation of the Workload Index

Example: census = 40

Patient Classification: minimal = 5
average = 25
above average = 5
intense = 5

Calculation for the Day Shift:
minimal \( 5 \times 4 = 20 \)
average \( 25 \times 8 = 200 \)
above average \( 5 \times 24 = 120 \)
intense \( 5 \times 48 = 240 \)

Workload Index \( = 580 \)

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P. Bicknell, *Staffing by Patient Care Workload*, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.
In order to convert the workload index into minutes of direct care time required by each patient, the basic unit of care was established as the amount of care time that the minimal care patient received during the night shift. Time studies analysis during Phase II of the study revealed that this measurement was equal to five minutes. To convert the weighting factors to minutes of direct nursing care time, the total workload index is multiplied by 5. To indicate the average minutes of direct nursing care time for each patient, on each shift, multiplication of the weighting factors by 5, would give the total minutes consumed per patient.

Illustration

<table>
<thead>
<tr>
<th>Shift</th>
<th>Minimal</th>
<th>Average</th>
<th>Above Average</th>
<th>Intense</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>20</td>
<td>40</td>
<td>120</td>
<td>240</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>20</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>10</td>
<td>35</td>
<td>125</td>
</tr>
</tbody>
</table>

46 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.

47 Ibid.

48 Ibid.
Work Sampling studies identified the amount of time nursing personnel actually spent in providing direct nursing care. The activity analysis noted all functions of the nursing personnel including direct patient care, indirect patient care, other functions, and personal time. It was found that, on the average, nursing personnel spent 42 per cent of their time, during the day tour of duty, giving direct care to patients. By identifying this factor the workload index could be converted to indicate the number of required nursing staff at the beginning of each shift.

Conversion of Workload Index to Required Staff

Example: Index = 200 units

One unit = 5 minutes of care

Minutes of direct nursing care needed: \[200 \times 5 = 1000\] minutes

Converted to hours: \[
\frac{1000}{60} = 16.67\text{ hours}
\]

Hours of direct care provided per nurse per 8 hour shift: \[
\frac{42 \times 8}{100} = 3.36\text{ hours/nurse}
\]

Total nursing staff needed to meet all care requirements for the 8 hour shift: \[
\frac{16.67}{3.36} = 5\text{ nurses}
\]

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49 P. Bicknell, *Staffing by Patient Care Workload*, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1969.

50 Ibid.

51 'Nurse' represents any nursing staff who provides direct care to the patients.
This method of calculating staff requirements has been used since April, 1970, at University Hospital, Saskatoon, Saskatchewan, in all nursing departments with the exception of pediatrics and psychiatry. The necessity for further research on the workload index was summed up by the Director of Inservice Education at University Hospital. She had worked closely with the research group throughout the five year study, and assisted with the 52 writing of the Phase III report.

"As a result of the research at University Hospital over the past five years, many tools have been made available to us. Many staff members now recognize the need for research in nursing. This, in itself, is reason to be optimistic. The opportunity to test and experiment with the workload index has convinced us that there are solutions to staffing problems in nursing, and that eventually we will staff to meet the patients' needs, and be equipped to provide patients with care that is personalized." 53

52 K. Sjoberg, E. Heieren, and P. Bicknell, Nursing Study - Phase III: Implementation and Evaluation of Unit Assignment in a Multi-Ward Setting, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, August, 1971.

53 Eleanor Heieren, Nursing Service Research Report: Workload Index, prepared for the Hospital Systems Study Group Third Annual Institute, University of Saskatchewan, Saskatoon, Saskatchewan, September 29, 1971.
Summary of the Review of the Literature

The review of the literature has revealed the many approaches that have been taken in order to study staffing of the nursing service department and to provide safe care to patients. Classification of the patients according to their needs for nursing care has been given much attention over the past two decades. In the past few years, researchers have attempted to develop methods for numerically identifying the patient care load, and the number of staff required to meet the needs of the patient. Use of these objective tools, combined with the nurse's professional judgement have indicated good results. The writer believes that if standardized methods of identifying estimated quantitative care needs to provide safe patient care can be established, nursing research can concentrate on the measurement of qualitative nursing care.
CHAPTER III

METHOD

I. OVERVIEW

A descriptive and explanatory approach was undertaken to evaluate the adaptability of the workload index staffing tool. Prior to each data collection period the investigator classified patients into one of four categories according to their needs for nursing care. Two types of nursing activity studies were used to obtain the desired information. One focused on the direct care received by patients in each category of care. The second focused on how nursing staff spend their time during each eight hour shift.

These two studies, the Inroom Activity Study and the Indirect Care Work Sampling Study, were run concurrently, beginning on October 3, 1972 and concluding on November 13, 1972. Prior to this, orientation sessions were held for all nursing staff involved. The observations for both studies were continuous for each eight hour shift observed. The researcher was present during all observation periods.

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and did the actual observations for all but three of the shifts.

II. SAMPLE

The study was conducted in one extended care hospital with a patient population of 63. The eight hour shifts observed were selected at random. The sample, for the observation of direct patient care, included 10 patients from each of the nursing care categories on each shift. This resulted in 60 eight hour observations. Patients with private duty nurses were not included in the study. Four patients were observed simultaneously on each eight hour shift. The selection of the patients thus depended, to a large degree, on the proximity of the patients to each other. The sample, for the observation of indirect patient care, included nursing staff personnel on duty at the time of data collection. There were 14 eight hour observations of nursing staff indirect care activities. Private duty nurses were not included in the study.

To ensure reliability the first three eight hour observations were discarded. It was felt that the staff were comfortable with the presence of the researcher after the first three eight hour shifts.

The researcher acknowledges, with gratitude, the assistance of two second year nursing graduate students - Jo Ann Albers and Diane Brennan.
III. PATIENT CLASSIFICATION

The classification tool, developed by researchers at the University of Saskatchewan, was used to categorize the patients according to their needs for nursing care. This was done prior to each eight hour observation period. This tool has been used throughout University Hospital, Saskatoon, Saskatchewan, on all wards except pediatrics and psychiatry, by all head nurses, assistant head nurses, and the majority of registered nurses since 1969.

It has also been used in several other hospitals including Calgary Foothills Hospital, Calgary, Alberta, Lethbridge Municipal Hospital, Lethbridge, Alberta, Rosetown Union Hospital, Rosetown, Saskatchewan, and several other hospitals in Canada. It has shown consistency, stability, and repeatability.

A study done to test the tool's validity was conducted in 1968, at University Hospital, Saskatoon,

3 Blaine Holmund, Nursing Study - Phase I - University Hospital, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1967.

4 Personal communication and work with Mrs. K. Sjoberg, Project Leader, Nursing Research, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, 1969.- 1971.
Saskatchewan. It has face validity in that its components contain nursing care needs of patients. The review of the literature on other classification systems indicated that the tool has content validity. In the study the tool was compared with the classification system developed by MacDonell and Murray and the subjective judgement of the Head Nurse on the ward. Statistical analysis indicated significant concurrent validity.

IV. THE INROOM ACTIVITY STUDY DATA COLLECTION

This study measured the amount of service provided to each category of patient, and determined who provided this service for each category of patient.

Patients in each of the two categories, Average and Above Average, were observed during the day, evening, and night shifts. This required 7 day observations, 6 evening observations, and five night observations. During these observations, the researcher recorded the following: (1) the category of staff member who entered the room, (2) the time of entry and exit, (3) whether the activity was

5 K. Sjoberg and P. Bicknell, Patient Classification Study, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1968.

associated with the general room, or was directed toward
the patient, and (4) a narrative description of the activity.

The following is a summary of the task codes used
in the Inroom Activity Study:

01 Dependent Functions of Nursing - included all
therapeutic and diagnostic functions performed by
nursing as a result of a doctor's written order.

02 Medications - tasks associated with the preparation
and administration of medications in the patient
area.

03 Independent Functions of Nursing - included all
personal hygiene, feeding, etc.

04 Communication - patient instruction

05 Communication - general conversation with the
patient.

06 Communication - between staff members about the
patient being observed.

07 Doctor's Rounds - included nursing staff accompanying
the doctor.

08 Nursing Rounds - included checking and inquiring
into the status of the patient by the nursing staff.

09 Recording and Charting - included all paperwork and
charting completed at the patient's bedside.

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Systems Study Group, University of Saskatchewan, Saskatoon,
Saskatchewan, 1968, Unpublished material.
10 **Portering** - transferring the patient to and from other sections of the hospital or to another room on the same ward.

11 **Dietary Services** - included serving and removing trays, filling water jugs. (This does not include actual feeding of the patient)

12 **Room Housekeeping and Maintenance**

13 **Looking for People and Things**

14 **Supplies and Equipment** - included preparation and cleaning of supplies.

15 **Communication** - not with or about the patient being observed.

V. THE INDIRECT CARE ACTIVITY STUDY DATA COLLECTION

These observations determined the percentage of staff time spent on each type of activity on the ward. A work sampling technique was used. This study was carried out during each eight hour shift and included 5 day observations, 5 evening observations, and 4 night observations. A random selection of the shifts was made to select shifts on week days that were representative of the usual busyness of the unit. Random selection also allowed for days in which the staffing was neither inadequate nor overabundant for the given workload.

The researcher remained for the full shift and made one observation every fifteen minutes on each staff member working on the unit for that shift. The researcher recorded
their location and activity. The following codes were used in analysis of the data:

01 Direct Patient Care — any direct contact with the patient, included conversation. (DIR)

02 Paper Work Patient Oriented — included all reading or writing activities associated with the care of particular patients. (PPT)

03 Paper Work Staff and Supply Oriented — included all paper work which was not patient oriented. (PSS)

04 Medications — all activities associated with medications except administration to the patient (DIR) and charting (PPT).

05 Supplies and Travel — all activities associated with the handling of non-medical supplies and all types of travel. (SUP)

06 Personal, Non-Productive — included all activities which were not related to the actual performance of the person's job such as coffee and meal times. (PER)

07 Communication with Nursing Staff — included all non-personal communication among ward staff members. (CNU)

08 Communication with Other Health Team Members — included all non-personal communication with the other members of the health team; e.g. doctors, physiotherapists, occupational therapists. (CHT)

K. Sjoberg, Manual for Nurse Observers, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, 1968, Unpublished material.
09 Communication with Other Hospital Staff - included all non-personal communication with other personnel such as housekeeping, laundry, etc. (COH)

10 Communication with Visitors - included all conversation with the patients relative and friends. (CVO)

Each code has been given an abbreviation to be used in the analysis of data when presenting tables or figures.
CHAPTER IV

ANALYSIS OF THE DATA

I. ANALYSIS OF THE INROOM ACTIVITY STUDY

Table 1 represents the sample size during the inroom observations. The extended care hospital population consisted of, primarily, patients in the average care and above average care categories. There were no patients in the minimal care category, and approximately two patients per day in the intense care category. Patients moved into the intense care category from the above care category when they received their weekly tub bath or shower. The study focused only on the two major categories present.

Table 1  Number of Patients Observed

<table>
<thead>
<tr>
<th>Shift</th>
<th>Average</th>
<th>Above Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Amount of Direct Care Provided

The figures in Table 2 represent the average minutes of care provided to each category of patient on each shift in the extended care unit.
By examining the above figures, a relationship between the average amount of direct nursing care time each category of patient received on each shift can be identified. On the day shift above average care patients received approximately twice as much direct nursing care time as the average care patients. On the evening shift above average care patients received approximately twice as much care as the average care patients. During the night shift both categories of patients received, on the average, the same amount of care. Table 3 illustrates these relationships.

Table 3 Relationship Between Amount of Care Received per Patient Category per Shift

<table>
<thead>
<tr>
<th>Shift</th>
<th>Average</th>
<th>Above Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
The figures in Table 4 represent the average amount of care that all patients receive on each shift in the extended care hospital.

Table 4  Average Minutes of Direct Nursing Care per Patient per Shift

<table>
<thead>
<tr>
<th>Shift</th>
<th>Minutes of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>76.2</td>
</tr>
<tr>
<td>E</td>
<td>49.2</td>
</tr>
<tr>
<td>N</td>
<td>22.0</td>
</tr>
</tbody>
</table>

The activity study shows that, on the average, patients received three times more direct nursing care on the day shift than on the night shift, and twice as much care on the evening shift as on the night shift. Thus, the ratio between the amount of nursing care time on the day, evening, and night shifts was found to be \( 3 : 2 : 1 \).

By multiplying the day shift relationships through by 3, and the evening shift relationships through by 2, the ratios discussed above reflect not only the relationship between shifts for each category, but also the relationships between shifts for each category. Table 5 shows these relationships.

Table 5  Ratios of Direct Nursing Care Time Received

<table>
<thead>
<tr>
<th>Category</th>
<th>Average</th>
<th>Above Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
It should be emphasized that these figures represent the amount of care the patients receive, and these are to be used as an estimate of the care patients actually require. The possibility of the difference between the two cannot be determined without extensive qualitative studies.

The ratios shown in Table 5 can be used as weight factors for the corresponding categories on each shift to arrive at an index of patient care load on the ward for any shift. For example, if the ward census is made up of 30 average care patients, and 32 above average care patients, the workload index on the day shift would be calculated by multiplying the number of patients in each category by the weight factor for that category, and summation of the results. Thus, the workload index for days would be: \((30 \times 3) + (32 + 6) = 282\). The same would be done for the evening and night shifts, which would have workload indices of 188 and 62, respectively.

The workload index figures mean very little by themselves, but if they were viewed comparatively over a period of time they would become very informative. For example, if the census remained the same but the number of patients in the above average care category increased, the workload would increase. This demonstrates that census can be very misleading if it is used as the sole basis for judging workload.

Discussion

The data presented answers the first three questions
posed following the problem statement. (see pages 4 and 5)

Question (1) There is a difference between the average amount of direct nursing care time that each category of patient receives on days and the average amount of time each category of patient receives on evenings. However, there is no substantial difference between the average amount of direct nursing care time each category of patient receives on the night shift.

Question (2) There is a direct ratio between the average amount of direct nursing care time all patients receive on days, the average amount of time all patients receive on evenings, and the average amount of time all patients receive on nights.

Question (2) Weighting factors can be established from the relationship of the average amount of direct nursing care time received by each category of patient on each shift, and the ratio between the average amount of direct care all patients receive on each shift. These weighting factors differ from those identified in the original development of the workload index staffing tool.

Overall, analysis of the data collected in the Inroom Activity Study indicates the necessity of modifying the existing workload index staffing tool if it is to be of any value to the extended care setting.

1 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.
Other Findings in the Inroom Activity Study

Additional analysis of data from the Inroom Activity Study gives information regarding the type of nursing functions in the extended care facility and the level of staff who perform these functions. This information is presented to stimulate ideas regarding change in the provision of care to patients in extended care units.

The Type of Functions. Figure 2 shows the type of functions performed for each category of patient on each shift in the extended care unit. The figure demonstrates what the average direct nursing care times are comprised of in terms of three broad groups of functions.

Group A - Dependent Functions of Nursing
Group B - Independent Functions of Nursing
Group C - Miscellaneous

The dependent functions of nursing (Group A) are functions which are directly related to the medically initiated therapies. This group includes the following task codes which have been previously described: (see page 40)

01 Dependent functions of nursing
02 Medications
07 Doctor's rounds

The independent functions of nursing (Group B) include all functions which are performed by the nursing staff without a specific doctor's order. This includes the following task codes:

03 Independent functions of nursing
04 Communication - patient instruction
05 Communication - general conversation with the patient
06 Communication - between staff about patient
08 Nursing rounds
09 Recording and charting
10 Portering

The Miscellaneous group (Group C) includes the remainder of the task codes.

11 Dietary services
12 Room housekeeping and maintenance
13 Looking for equipment
14 Supplies and equipment
15 Communication - not with or about the patient

As can be seen in Figure 2, on all shifts, for each category of patient, the major components of care deal with the independent functions of nursing. The definition of an extended care unit indicates that this should be the case since it is primarily an institution existing to provide skilled nursing care. The dependent functions of nursing are primarily concerned with the giving of medications and accompanying the physician on rounds.

The miscellaneous functions are primarily concerned with tidying the patient's bedside area. The supportive services provided by the housekeeping department keep this function at a minimum for nursing staff.
Average Direct Nursing Care Time by Patient
Category and Type of Function

Figure 2

Legend

- Independent nursing functions
- Dependent nursing functions
- Miscellaneous
Levels of Staff who Provide Direct Nursing Care.

Figure 3 demonstrates the average minutes of direct nursing care time per patient provided by each level of nursing staff in the extended care unit. There are only two levels of nursing staff in the extended care hospital studies; these are the registered nurse (R.N.) and the nursing aide (N.A.).

The figure demonstrates that the nursing aide provides the majority of direct care to all patients in each category on each shift. This is understandable when one realizes that the ratio of professional staff to auxiliary staff is 1 : 5. The registered nurse's direct contact with the patient involves, primarily, the giving of medications, assessment of problems brought to her attention by the nursing aide, and supervision of the nursing aide.

Discussion

Further analysis of the data gathered during the Inroom Activity Study provided more information regarding the nursing care of patients in the extended care unit. It was not the purpose of this study to analyze all aspects of the care given to these patients. However, the investigator believes that it is beneficial to present this information to emphasize the need for encouraging further research of nursing care in extended care units.
Average Direct Nursing Care Time by Patient Category and Level of Staff

Figure 3
II. ANALYSIS OF THE INDIRECT CARE STUDY

Table 6 shows the number of staff observed per shift during the Indirect Care Activity Study.

Table 6  Number of Staff Observed

<table>
<thead>
<tr>
<th>Date</th>
<th>Shift</th>
<th>Head Nurse</th>
<th>Registered Nurse</th>
<th>Nursing Aide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 4, 1972</td>
<td>E</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Oct. 6, 1972</td>
<td>N</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Oct. 9, 1972</td>
<td>D</td>
<td>0</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Oct. 11, 1972</td>
<td>D</td>
<td>1</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Oct. 13, 1972</td>
<td>E</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Oct. 17, 1972</td>
<td>N</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Oct. 18, 1972</td>
<td>N</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Oct. 19, 1972</td>
<td>E</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Oct. 21, 1972</td>
<td>N</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Nov. 2, 1972</td>
<td>E</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Nov. 3, 1972</td>
<td>D</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Nov. 7, 1972</td>
<td>E</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Nov. 9, 1972</td>
<td>D</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov. 13, 1972</td>
<td>D</td>
<td>0</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

With observations recorded on these staff members every fifteen minutes, the number of observations shown in Table 7 were obtained.
Table 7 Total Observations Recorded

<table>
<thead>
<tr>
<th>Shift</th>
<th>Head Nurse</th>
<th>Registered Nurse</th>
<th>Nursing Aide</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>94</td>
<td>303</td>
<td>1320</td>
</tr>
<tr>
<td>E</td>
<td>0</td>
<td>223</td>
<td>913</td>
</tr>
<tr>
<td>N</td>
<td>0</td>
<td>184</td>
<td>407</td>
</tr>
</tbody>
</table>

Table 8 shows the percentage of staff time spent on each activity during the day, evening, and night shifts. (The abbreviations for the task codes have been identified on pages 42 and 43.)

Table 8 Percent of Staff Time Spent on Each Activity Per Shift

<table>
<thead>
<tr>
<th>Days</th>
<th>H.N.</th>
<th>R.N.</th>
<th>N.A.</th>
<th>Evenings</th>
<th>R.N.</th>
<th>N.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIR</td>
<td>13.9%</td>
<td>31.0%</td>
<td>61.9%</td>
<td>DIR</td>
<td>31.9%</td>
<td>59.6%</td>
</tr>
<tr>
<td>MED</td>
<td>-</td>
<td>8.9</td>
<td>-</td>
<td>MED</td>
<td>19.3</td>
<td>0.1</td>
</tr>
<tr>
<td>PPT</td>
<td>6.4</td>
<td>17.8</td>
<td>0.8</td>
<td>PPT</td>
<td>13.9</td>
<td>1.3</td>
</tr>
<tr>
<td>PSS</td>
<td>16.1</td>
<td>0.7</td>
<td>2.2</td>
<td>PSS</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>CNU</td>
<td>27.7</td>
<td>17.8</td>
<td>6.4</td>
<td>CNU</td>
<td>9.1</td>
<td>6.6</td>
</tr>
<tr>
<td>CHT</td>
<td>22.3</td>
<td>5.3</td>
<td>0.1</td>
<td>CHT</td>
<td>3.1</td>
<td>-</td>
</tr>
<tr>
<td>COH</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td>COH</td>
<td>0.5</td>
<td>-</td>
</tr>
<tr>
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Total 100.3% 100.0% 100.0%

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<td>CHT</td>
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<tr>
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<tr>
<td>SUP</td>
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</tr>
<tr>
<td>PER</td>
<td>10.3</td>
<td>12.7</td>
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</tbody>
</table>

Total 100.0% 99.9%
The amount of direct care that the registered nurse is able to provide is the same on both the day and evening shifts. However, on nights her direct involvement with the patient drops by 16 per cent. This may be explained in part by the amount of time the registered nurse spends in the preparation of medications, and in updating the Kardex. The registered nurse spends approximately twice as much time on nights communicating with other nursing personnel when compared to the amount of time spent on this activity on days and evenings.

The amount of time the nursing aide is able to spend in providing direct patient care is high on all shifts. (days: 62 per cent; evenings: 60 per cent; and nights: 49 per cent)

The Work Sampling Study was conducted primarily to determine the percentage of nursing staff time spent on activities other than direct patient care. Averaging out this percentage including only the registered nurse and the nursing aide, the following percentage on indirect care activities is identified as: days, 54 per cent; evenings, 54 per cent; and nights, 67 per cent. Thus, the values used for the percentage of time nursing staff spend giving direct patient care are 46 per cent for both days and evenings, and 33 per cent for the night shift.

The final question posed, following the problem statement, can now be answered. Nursing personnel in the acute care center were able to spend 42 per cent of their
time in giving direct patient care. It was only established for the day shift. Nursing personnel in the extended care setting were able to provide 46 per cent on both days and evenings, and 33 per cent on nights.

Since the original study provides information for the day shift, it can be stated that nursing personnel in the extended care unit are able to spend a greater percentage of their time in providing direct patient care on the day shift. This difference may be further illustrated by comparing the staffing of both units on days. In the acute care unit one 50 bed medical ward was staffed, on the average, by 12 nursing personnel. In the extended care unit used in this study, the staffing was, on the average, 12 nursing personnel for 63 patients on the day shift.

III. STAFFING GUIDE USING THE WORKLOAD INDEX

Data analysis of both activity studies have revealed

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2 P. Bicknell, *Staffing by Patient Care Workload*, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970, p. 10.

3 Personal communication with Mrs. Peggy Bicknell, Systems Analyst, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1972.

4 Marion Jackson, *Operational Budget - Department of Medical Nursing*, University Hospital, Saskatoon, Saskatchewan, January, 1971.
the modifications in the workload index staffing tool necessary for its application in the extended care unit. If the index of direct care workload is to be related to the number of nursing staff required to meet the needs of the patients in the extended care unit it requires one final step. To make the conversion from workload index to required staff it is necessary to know the number of hours of direct nursing care that the index represents.

First, refer to the weighting factors presented on page 46. All figures are expressed as multiples of the amount of care the average care patient receives on nights. The activity studies indicated that this represents ten minutes of direct nursing care. Thus, if the calculated workload index for any shift is multiplied by $\frac{10}{60}$, the result is the number of hours of direct nursing care required on that unit.

The Indirect Care Study indicates that the nurse is able to spend only a portion of her eight hour day in providing direct patient care. On the day and evening shift each staff member contributes just 46 per cent of 8 hours (3.68 hours) towards the total direct nursing care requirements of the unit. On the night shift the nursing staff member contributes 33 per cent of 8 hours (2.60 hours) towards the total direct nursing care requirements of the unit.

An estimate of the number of staff needed to provide the total direct and indirect requirements of care
in the unit can be calculated by dividing the total direct care time required on the unit by the amount of direct care provided by each nursing staff member.

The derivation of the method of conversion of the workload index to required nursing staff is presented in Table 9.

In Table 9:

M - represents the average number of minutes of direct nursing care received by an average care patient on the night shift. (e.g. M = 10 minutes)

P - is the percentage of nursing staff time spent on direct nursing care per shift. (e.g. P = 46% = .46)

Index - is the workload index for one shift. (e.g. Index = 300)

Table 9 Conversion of Workload Index to Required Staff

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<tr>
<th>Derivation of Conversion Method</th>
<th>Example</th>
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<tr>
<td>Minutes of direct nursing care required on the ward: INDEX x M</td>
<td>300 x 10 = 3000 minutes</td>
</tr>
<tr>
<td>Hours of direct nursing care required on the ward: INDEX x M</td>
<td>300 x 10 = 50.0 hours</td>
</tr>
<tr>
<td>Hours of direct nursing care provided per nurse per 8 hour shift: P X 8 HOURS</td>
<td>.46 x 8 = 3.68 hours/nurse</td>
</tr>
<tr>
<td>Total nursing staff needed to meet all care requirements for the 8 hour shift: INDEX x M</td>
<td>50 hours req'd = 13.7</td>
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<td></td>
<td>3.68 hours/nurse nurses</td>
</tr>
</tbody>
</table>
Summary

The calculation of the number of staff required to meet the estimated nursing care needs of the patients can be determined by use of the workload index staffing tool. If a flexible staffing policy like this were adopted the variability in workload could be identified and staffing could be adjusted accordingly. This would tend to promote consistency in staffing which is closely matched to the patients' estimated needs for nursing care.
SUMMARY, CONCLUSIONS, RESEARCH IMPLICATIONS AND RECOMMENDATIONS

I. SUMMARY

This descriptive study was designed to evaluate what modifications of an existing workload index staffing tool were necessary to provide for its practical application in an extended care setting. Two types of activity studies were conducted in one extended care hospital in Vancouver, British Columbia, Canada. The first was an inroom activity study conducted to determine the average amount of nursing care time patients, in one of two nursing care categories, received on each shift. Patients were assigned to categories by the use of an existing patient classification tool. The second study was an indirect care work sampling study used to define how nursing personnel spend their time during their eight hour shift. Observations were made on each nursing staff member every fifteen minutes throughout each shift.

For the Inroom Study the total sample consisted

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1 K. Sjoberg and P. Bicknell, Patient Classification Study, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1968.
of 10 patients in each of the two categories on each shift. This resulted in 60 eight hour observations.

The sample for the Indirect Care Study included 58 nursing staff members on days yielding 1,717 observations, 36 nursing staff members on evenings yielding 1,136 observations, and 12 nursing staff members on nights yielding 591 observations.

Data for the Inroom Study was collected by continuous eight hour observations of the nursing care given to each category of patient on each shift. The researcher recorded the activity, the length of time it took to perform the activity, and the level of staff who performed the activity.

Data for the Indirect Care Work Sampling Study was collected by observing all staff members on duty, every fifteen minutes throughout the eight hour shift. This was done on five day shifts, five evening shifts, and four night shifts.

For both studies the days and the shifts to be observed were selected at random to ensure an unbiased selection of days of the week and obtain a cross section of shifts and days of the week.

The results indicated that modification of the workload index was necessary if it was to be of practical value in the extended care setting. On the average, patients in both categories received fewer minutes of direct nursing care time than those figures presented by
the original workload index staffing tool. The weighting factors established for the extended care unit differed markedly from those in the original tool. Furthermore, the nursing personnel appeared to be able to spend more time in giving direct patient care in the extended care setting.

II. CONCLUSIONS

The results of the Inroom Activity Study in the extended care setting have demonstrated the significant differences in the amount and type of direct nursing care provided in this type of unit, compared with more acute general wards.

The average minutes of direct nursing time per patient category observed during the extended care Inroom Study may be used to determine new weight factors for the workload index.

The Indirect Care Study showed that nursing staff spend a greater percentage of their time giving direct patient care in the extended care unit than the 42 per

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2 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.

3 Ibid.
cent being used in the conversion of the workload index to required number of staff. A more accurate figure would be 46 per cent or 3.68 hours of direct nursing care on the day and evening shifts, and 33 per cent or 2.6 hours of direct nursing care time on the night shift.

Any direct comparison between the two institutions regarding the workload index would be hazardous for several reasons. Each institution has its own special nature of nursing care requirements of patients. The hospitals are in different provinces in Canada, and in all likelihood have differing amounts of money for the nursing departments operational budgets. Furthermore, the ratio of professional staff to auxiliary staff is vastly different. The acute care has a ratio of 1 : 1 while the extended care has a ratio of 1 : 5.

The workload index gives estimates of the number of nursing staff required each shift but does not indicate the level of staff best suited to meet the needs of the patients. It was observed during the activity studies, in the extended care setting, that nursing aides assume more

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4 Marion Jackson, Operational Budget - Department of Medical Nursing, University Hospital, Saskatoon, Saskatchewan, January, 1971.

5 Personal communication with Mrs. Lillian McLean, Director of Nursing, Louis Brier Home and Hospital, Vancouver, British Columbia, November, 1972.
responsibility in the actual provision of direct patient care than the registered nurses, particularly in performing functions classified as independent nursing functions. It seems unlikely, to the investigator, that one registered nurse can capably monitor the psychological and physiological behaviors of approximately 32 patients plus supervise the activities of 5 or 6 nursing aides. These responsibilities are further limited by the amount of time registered nurses spend in the preparation and administration of medications, and the amount of time spent in recording in the Kardex and patients' charts.

The activity studies indicated that there tends to be a steady pace of activity directed at patient care throughout the 24 hour day with no peak periods of busyness. This is particularly true of the day and evening shifts. While the tempo slows down on the night shift for the patients, the nursing personnel continue to work steadily throughout this shift. Nursing aides particularly appear to have a steady flow of direct nursing care activities. Many of the indirect care services are supplied by the housekeeping, kitchen, and laundry staffs allowing the nursing aides to concentrate on direct patient care. The portable supply cart used by the nursing aides is particularly impressive as it saves much time spent 'in flight' obtaining equipment necessary for patient care.

The registered nurses are unable to spend as much time in direct contact with the patient because of med-
ication duties, paperwork, and frequent interruptions by incoming telephone calls. It would appear that the elimination of the Kardex, some investigation as to the necessity of numerous medications given to the patients, and the placement of a ward clerk to answer telephone calls and take messages would allow the registered nurse to perform the function she is most capable of - that of giving patient care.

Even if the above recommendations were considered further study should be conducted to determine what the preferred ratio of professional to auxiliary staff should be to best meet the needs of the patient.

Figure 4 represents the calculation of the workload index, and the estimation of required number of staff for the days observed during October, 1972. The present staffing includes, on the average, 12 nursing personnel on days, 7 nursing personnel on evenings, and 3 nursing personnel on nights. The calculations in Figure 4 estimate an increase of 1 staff member on days, 2 staff members on evenings and 1 staff member on nights if the patients are to receive the estimated number of minutes of care established in this study.

Figure 5 represents a graph of the workload index calculations for the days observed during October, 1972.

Personal communication with Mrs. Lillian McLean, Director of Nursing, Louis Brier Home and Hospital, Vancouver, British Columbia, November, 1972.
### Calculation of Workload Index and Estimation of Required Staff Numbers for October, 1972

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*Figure 4*
Graphical Representation of Workload
Index Calculation for October, 1972

--- Days in consecutive order
---- Days not in consecutive order
One Unit = 10 minutes

Date

Figure 5
III. RESEARCH IMPLICATIONS

This study was a modified replication of a study conducted in an acute care center. It would be of value to replicate the study again in another extended care setting in the city of Vancouver, British Columbia. More meaningful knowledge might be obtained by replicating the study in an extended care unit attached to an acute care hospital, and running activity studies concurrently in both units of comparable size.

The workload index and staffing guide as described are only rough estimates at best. Refinement of the tool might be achieved by more exact measures of the determiners comprising the classification system described in the review of the literature. If weight factors could be established for each component of the classification system it might result in a staffing tool that would be applicable in any institution providing nursing care services.

It is of prime importance to recognize that the

7 P. Bicknell, Staffing by Patient Care Workload, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, December, 1970.

8 K. Sjoberg and P. Bicknell, Patient Classification Study, Hospital Systems Study Group, University of Saskatchewan, Saskatoon, Saskatchewan, September, 1968.
figures presented in this study represent an estimate of the care patients receive and not the care patients require. However, if standardization in the amount of care given is achieved nursing researchers can concentrate on the question of what care the patient actually requires.

IV. RECOMMENDATIONS

The following recommendations are made for further investigation:

1. Replication of this study in other extended care units in British Columbia in order to identify inconsistencies in the amount of nursing care time patients receive or to substantiate the findings of the present study.

2. Activity studies should be carried out to determine the average amount of nursing care time involved in each of the determiners or components outlined in the patient classification system used in this study.

3. Activity studies conducted concurrently in acute care and extended care units of comparable size and with comparable staffing.

4. A study conducted to assess the quality of care patients receive in the extended care unit used in this study.
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BIBLIOGRAPHY

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APPENDIX A

PATIENT CLASSIFICATION TOOL
# Patient Classification Form

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<tr>
<td>In Bed or Chair With Position &amp; Support</td>
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<tr>
<td>Up With Asst. Or Bed Rest BRP</td>
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<td>Up and About</td>
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<tr>
<td>Incontinence</td>
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</tbody>
</table>

# Comments

\#2 = 17
\#3 = ?

# Category

\[24\]
GUIDELINE FOR INTERPRETING CATEGORIES

T O T A L S

A  B  C

D O E S  T H E  A. B. C.  T O T A L  Y I E L D  T H I S  C O M B I N A T I O N ?

3  0  0

Y e s  1  M I N I M A L  C A R E

N o

I S  "A"  G R E A T E R  T H A N  O R  E Q U A L  T O  "C" ?

3  1  1

I S  "B"  G R E A T E R  T H A N  "C" ?

2  1  0

N o

1  1  1

Y e s  2  A V E R A G E  C A R E

1  4  0

E t c.

I S  "C"  G R E A T E R  T H A N  O R  E Q U A L  T O  "B" ?

0  2  3

I S  "C"  G R E A T E R  T H A N  "A" ?

2  2  2

N o

1  3  1

Y e s  3  A B O V E  A V E R A G E  C A R E

0  1  0

E t c.


0  0  6

Y e s  4  I N T E N S E  C A R E

0  0  5

0  1  4

In-Service Education,
University Hosp., Saskatoon.
APPENDIX B
DIRECT OBSERVATION OF PATIENT DATA FORM
<table>
<thead>
<tr>
<th>STAFF</th>
<th>NUMBER</th>
<th>ENTRY TIME</th>
<th>BED</th>
<th>TIME</th>
<th>TASK</th>
<th>DESCRIPTION OF ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.N.</td>
<td>3</td>
<td>8:00</td>
<td></td>
<td>5:00</td>
<td>3, 4</td>
<td>feeding patient, conversation re appetite, food likes</td>
</tr>
<tr>
<td>R.N.</td>
<td>3</td>
<td>9:30</td>
<td></td>
<td>0:05</td>
<td>2</td>
<td>brought medication to patient</td>
</tr>
<tr>
<td>R.N.</td>
<td>3</td>
<td>9:30:30</td>
<td></td>
<td>1:45</td>
<td>3</td>
<td>prepared pt. for treatment to open areas on buttacks &amp; heel. Heat lamp applied. Conversation included health teaching, general conversation.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>10:15:50</td>
<td></td>
<td>6:00</td>
<td>3, 5</td>
<td>assisting patient from bed to chair. General conversation with patient</td>
</tr>
<tr>
<td>N.A.</td>
<td>7</td>
<td>10:22:10</td>
<td></td>
<td>10:10</td>
<td>3</td>
<td>assisting patient with bathing, general concerns.</td>
</tr>
<tr>
<td>N.A.</td>
<td>8</td>
<td>10:30:10</td>
<td></td>
<td>4:00</td>
<td>12</td>
<td>making bed, cleaning bedside area.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>11:45:20</td>
<td></td>
<td>10:05</td>
<td>3</td>
<td>feeding patient, general conversation.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>12:12:00</td>
<td></td>
<td>2:00</td>
<td>3</td>
<td>transfer patient from bed to commode.</td>
</tr>
<tr>
<td>N.A.</td>
<td>8</td>
<td>12:12:05</td>
<td></td>
<td>2:10</td>
<td>3</td>
<td>assisting other n.a. conversation general.</td>
</tr>
<tr>
<td>N.A.</td>
<td>8</td>
<td>12:41:10</td>
<td></td>
<td>10:30</td>
<td>12</td>
<td>transfer patients bed and belongings to another room.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>13:41:15</td>
<td></td>
<td>10:30</td>
<td>12</td>
<td>assisting with the transfer.</td>
</tr>
<tr>
<td>N.A.</td>
<td>8</td>
<td>12:50:00</td>
<td></td>
<td>4:10</td>
<td>3</td>
<td>transfer patient from commode to bed.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>12:50:10</td>
<td></td>
<td>4:10</td>
<td>3</td>
<td>assisting with patient transfer. health teaching.</td>
</tr>
<tr>
<td>N.A.</td>
<td>7</td>
<td>1:20:00</td>
<td></td>
<td>0:30</td>
<td>14</td>
<td>restocking linen at bedside.</td>
</tr>
<tr>
<td>N.A.</td>
<td>8</td>
<td>2:00:00</td>
<td></td>
<td>0:05</td>
<td>8</td>
<td>checking patient's condition.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>2:11:10</td>
<td></td>
<td>2:15</td>
<td>3</td>
<td>giving patient drink of milk.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>2:14:00</td>
<td></td>
<td>1:50</td>
<td>14</td>
<td>cleaning equipment in room - commode.</td>
</tr>
<tr>
<td>N.A.</td>
<td>10</td>
<td>2:15:20</td>
<td></td>
<td>3:30</td>
<td>3, 4</td>
<td>giving patient drink, health teaching.</td>
</tr>
<tr>
<td>N.A.</td>
<td>3</td>
<td>2:45:00</td>
<td></td>
<td>13:05</td>
<td>3</td>
<td>turning and positioning patient, general conversation, health teaching.</td>
</tr>
<tr>
<td>R.N.</td>
<td>2</td>
<td>2:50:00</td>
<td></td>
<td>5:10</td>
<td>7</td>
<td>talking to n.a. about patient regarding positioning and forcing fluids.</td>
</tr>
</tbody>
</table>
APPENDIX C

WORK SAMPLING DATA COLLECTION FORM
<table>
<thead>
<tr>
<th>TIME</th>
<th>STAFF</th>
<th>NUMBER</th>
<th>LOCATION</th>
<th>TASK</th>
<th>DESCRIPTION OF ACTIVITY AND COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>R.N.</td>
<td>2</td>
<td>Hall</td>
<td>5</td>
<td>going for salt for patient's tray</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>5</td>
<td>Hall</td>
<td>5</td>
<td>removing breakfast tray</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>4</td>
<td>Pt. room</td>
<td>1</td>
<td>feeding patient</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>1</td>
<td>Pt. room</td>
<td>1</td>
<td>feeding patient</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>6</td>
<td>Pt. room</td>
<td>1</td>
<td>rolling up head of patient's bed</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>7</td>
<td>Hall</td>
<td>5</td>
<td>removing breakfast tray and putting it in food cart</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>10</td>
<td>Pt. room</td>
<td>1</td>
<td>feeding patient</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>2</td>
<td>Pt. room</td>
<td>1</td>
<td>feeding patient</td>
</tr>
<tr>
<td></td>
<td>R.N.</td>
<td>1</td>
<td>Hall</td>
<td>5</td>
<td>travelling from North wing towards nursing station</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>9</td>
<td>Pt. room</td>
<td>5</td>
<td>cleaning equipment</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>3</td>
<td>Pt. room</td>
<td>1</td>
<td>assisting and supervising patient's eating</td>
</tr>
<tr>
<td></td>
<td>N.A.</td>
<td>8</td>
<td>Hall</td>
<td>5</td>
<td>taking meal tray from patient room to meal cart</td>
</tr>
<tr>
<td></td>
<td>H.N.</td>
<td>1</td>
<td>office</td>
<td>3</td>
<td>doing staffing hours</td>
</tr>
</tbody>
</table>

Aug.'72.