

# Some initial thoughts on a nurse/patient dependency index tailored to a burns unit

Md. Mizanur Rahman, Ph. D.\*

## ABSTRACT

The optimal deployment of staff is one of the most difficult problems in hospital nursing, primarily because the patient's demand for nursing care is highly probabilistic in nature. Various attempts in this respect, have since been made to determine nurse staffing levels based upon the matching of staff availabilities with patient's need. Amongst the various approaches, that of nurse/patient dependency has probably received the most attention. It has been, however, observed that this approach is mostly based on general medical or general surgical case; that, this approach may not be appropriate for a single speciality, particularly, when a disproportionate number of the patients in that speciality are likely to be in one particular dependency category. The intention of this paper is to discuss along what line a scheme tailored to needs of burns patients might be developed.

## An Empirical Approach to Predict the Amount of Nursing Care Need.

Before proceeding in the proposed direction let us examine a possible alternative based on the Discriminant Function Analysis [1]. It seems a not unreasonable assumption that the factors which produce a high discriminant index also serve to create additional nursing work. Let us suppose that the amount of nursing care,  $W$ , can be expressed as,

$$W = f(D, L) \dots \dots \dots (i)$$

where,  $D$  = Discriminant Index of the patient  
 $L$  = Length of stay, days

One possible linear function might be,

$$W_i = \begin{cases} (1-i/L). C.D + b, & \text{if the patient survives... (ii)} \\ a.D, & \text{if the patient might die ... (iii)} \end{cases}$$

where,  $i$  = day of the patient's stay  
 $b$  = amount of basic nursing needed

$a, C$  = Constant coefficients  
 $W_i$  = amount of nursing care needed by a patient on the  $i$ th day of his stay

The values of  $C$  and  $b$  could be evaluated by linear regression analysis, whereas the value of 'a' could be assigned subjectively. Unfortunately, linear regression analysis could not be used due to the lack of sufficient data. However, for nine patients, estimated values of nursing care needed during their entire stay in the unit were produced by the Ward Sister of

\*Assistant Professor, Department of Mechanical Engineering, Bangladesh University of Engineering & Technology, Dacca.

the unit. The profiles of these estimates are shown in Figs. 1 to 9. From those profiles it was revealed that considerable anomalies existed. For example, for those patients who survived, the amount of nursing care needed does not appear to be directly related to a corresponding increase in the discriminant

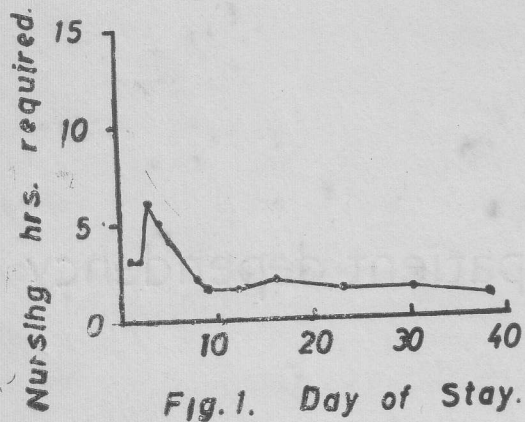


Fig. 1. Day of Stay.

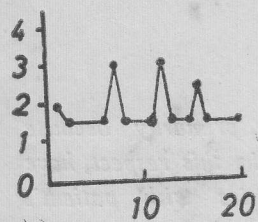


Fig. 2.

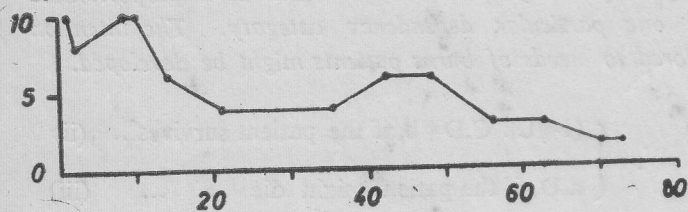


Fig. 3.

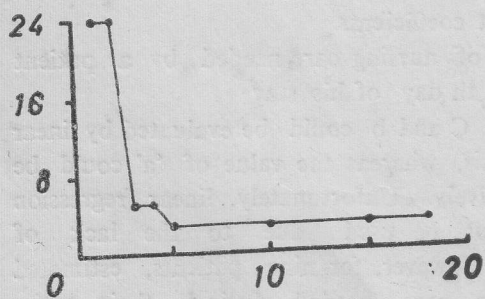


Fig. 4.

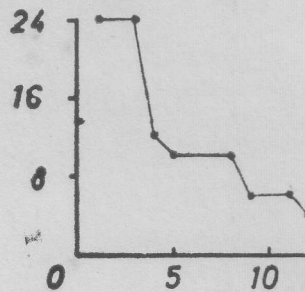


Fig. 5.

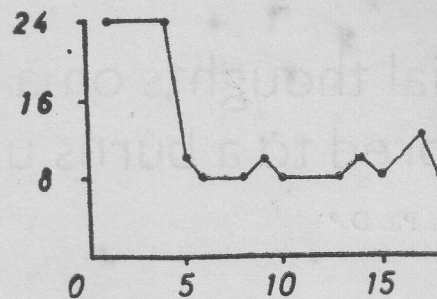


Fig. 6.

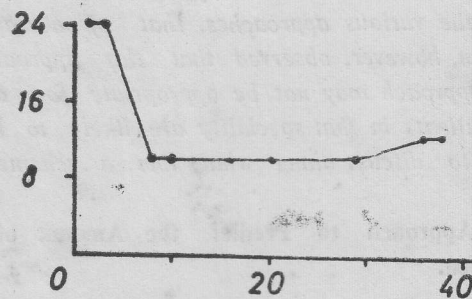


Fig. 7.

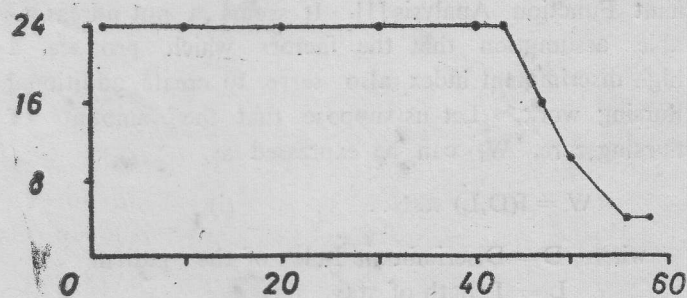


Fig. 8.



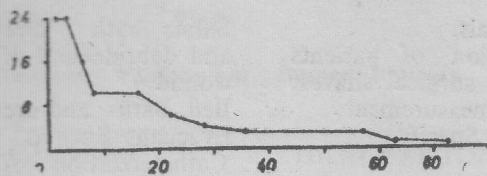


Fig. 9.

ESTIMATED NURSING HOURS REQUIRED BY A PATIENT DURING HIS DURATION OF STAY IN THE WARD.

index. In other words, as the severity of illness of the patient increased, his nursing needs did not increase correspondingly.

Let us concentrate our attention on a few individual cases. Fig. 8 represents a profile for a five year old child with 40% burn injury. She needed almost round the clock nursing care, whereas a girl of 13 represented by Fig. 3 with 45% burn needed on average, six hours of nursing care. Thus, although the second patient was more severely ill and had a far higher discriminant index, she needed much less nursing care than the former patient. A further detailed examination of these patients would, of course, reveal the reasons behind the anomalies. For example, Fig. 2 is the profile for a 42 years old man with 7% total burn. He needed only basic care for about 1½ hours daily, but when he required occasional bathing and dressing the amount of nursing care rose to three hours a day. Likewise, for the same young patient represented by Fig. 8 it is found that her burn injury has taken place in the head and neck. She required 'tracheotomy' up to the seventh week of her stay, and hence had required special nursing care which amounted to 24 hours a day. The patient represented by Fig. 3 is a girl of 13 with 35% full thickness burn and 10% partial thickness burn. Her mental state was very low and she was emotionally disturbed. Hence she needed additional nursing care over and above what would be considered routine. All these individual characteristics do suggest that the postulated linear function is unlikely to be a particularly effective estimator. From the present analysis it does appear that the discriminant index is not a sufficiently sensitive indicator of how much nursing care a patient needs; it is unconsidered characteristics

of the patient and the frequency with which various procedures have to be performed, which have to be considered.

The above observations lead, to the conclusion that a nurse patient dependency index tailored to a burns unit could, in fact, be developed along the lines of Rhys-Hearn's approach [ 3 ].

### Rhys-Hearn's Approach To Predict Nursing Requirement

The nursing requirements of the patients are assessed under two broad headings, namely, direct care and indirect care. Direct care is defined as nursing care given individually to patients, according to his 'needs' as dictated by current medical and nursing policies. This includes, taking a specimen, checking a monitoring device, changing a dressing. Indirect care on the other hand, is associated with the management of complete patient-care area. It includes those activities essential for running a ward but not directly to any individual patient (for example, paper work, ward administration, supervision and assignment of tasks, dealing with visitors and relatives of the patients etc.). It is assumed that indirect care may be assessed for the unit/ward as a whole, whereas direct care must be measured for each individual patient. The nursing dependency of a patient could be defined as an index measuring his direct care needs in terms of the 'nurse time' needed to provide the care. However, if we wish to distinguish between different categories of nurses, we must express the patient's needs in terms of these different units and also define the conditions of conversion from one to the other (for example, any grade of nurse can, in most cases, cut up food and assist a patient with feeding, but it requires a skilled nurse with specialised training to remove a chest drainage tube). It, therefore, seems reasonable to sub-divide direct care into 'basic' and 'technical'. The items of care can be categorised under the line heads:

- (a) Support of normal living function
- (b) Procedures, treatments, observations
- (c) Professional surveillance

These areas of activity are explained with reference to a maternity unit by Rhys-Hearn but are examined below in terms of the burns unit.

The first of these areas of activity involves such basic items of care as washing, bathing, lifting, feeding, etc. In this case one may either list the main activities determining the patient's degree of self care (e.g. walks alone, is bedfast, up for toilet only, needs feeding etc.) or classify the patient according to his degree of self care immediately (e.g. 'total self care', 'partial self care', 'bedfast,' and 'totally dependent'). The latter needs a clear definition of the categories of care groups. A sufficient study seems to have been done in this area of nursing care to enable a general assessment to be made immediately.

The second area of activity considered is connected with the patient's medical requirements. They are well defined care items. Table. 1 lists some of the activities which may be included in this area of activity. In this case the nursing staff associated with the unit would be asked to list the items which occur most frequently.

The third area of activity is professional surveillance. This includes reassuring patients, teaching patients, 'specialling' patients, keeping them under observation, supervision and assisting with rehabilitative procedures, assisting medical staff with technical procedures, and just talking to patients. These are items of care which take varying lengths of time because they are so dependent upon the individual needs of the patients. So it is suggested that the Sister (who, after all decides the amount of surveillance a patient needs) indicates, within broad limits, the actual time spent at the bedside of each patient by the nurses fulfilling this function. The categories chosen may be as follows:

TABLE—1

List of Activities in Procedures & Treatments Area of Activity in a Burns Unit

BASIC	FREQ	Technical	FREQ
T.P.R.		Eye care	
B.P.		Recording fluid intake and output	
Feeding		Specimens : Special urine, wound swabs	
Specimens : urine, stool, sputum, Washing of hair.		Preparation of saline tanks	
Assisting patients to toilet, giving of bed pans			

& urinals.  
Preparation of patients pre-op : surgical shaves, w.ig'it measurement  
Other : Specify

Saline bath : Dressings and debridement of burn wound  
Bed baths and dressings  
Evacuant Enemas  
Catheterization of bladder  
Urinalysis  
Preparation for erection of I.V. fluids.  
Changing I.V. bottles  
Monitoring rate of absorption and control of I.V. fluid.  
Cleaning of burn wounds and application of stored skin.  
Turning of patients, treatment of pressure areas  
Removal of sutures and wound drainage systems  
Cleaning and decontamination following dressings  
Taking of bacteriological swabs  
Care of tracheotomy  
Oxygen administration  
Suction  
Cardiac Resuscitation  
Drugs—oral  
Drugs—I.M.I.  
Other : Specify.

Surveillance : Observ- Time Basic Technical  
ation : Inter-  
val,  
hrs.

Routine only  
Special Care 1  
Significant 1—3  
Extensive 3—6  
Constant 6—8  
Constant (specify time) 7—8  
Specilised Specify time.

In addition to the above mentioned three areas of activity, a list of additional dependency factors may be identified. A dependency factor is a personal characteristic of patient which makes the provision of this care more time-consuming. The possible items are listed in Table—2.



TABLE—2  
Dependency Factors For Burned Patients

LOW FACTORS	HIGH FACTORS
Unusually emotionally dependent	
Confused	Needing isolation nursing
Obese, heavy, immobile	
Unconscious	Severely mentally handicapped
Very frail	Severely physically handicapped
Unco-operative	Extremely aggressive
Unable to communicate properly	Shocked
Incontinent	Violent
Other :	Other :

For each of the activities listed in Table. 1 estimates need to be secured of how long they take. These estimates would be based on time studies. If these are properly performed and codified they should provide some insight into the effect produced by the dependency factors set out in Table 2. The emergent material could then be analysed to determine whether or not this set of dependency factors can be incorporated as in Rhys-Hearn's maternity study in which an overall percentage weighting is produced based on the number of high and low factors. For example, if one low factor and one high factor are recorded this percentage has been adjudged to be 35%. This is then used to increase the total time allowance for a patient with

these characteristics. In the burns unit, it is more likely to be the case that obesity, for example, will impinge directly on the activity of giving a saline bath and the time for that activity will need to reflect the dependency factor.

#### CONCLUSION :

Two important findings have been evolved from the study, namely, (i) that severity of illness has little influence on the nursing care requirement, and (ii) that as certain procedures will constitute a large proportion of the care, the idea of developing care groups is unlikely to be a profitable avenue of enquiry. The Rhys-Hearn's approach is, rather, reflected to be a sufficiently interesting area for a research to be worthwhile. Funds have, in fact, recently been made available which will allow the Ward Sister to devote some of her time to such a project.

#### REFERENCES :

- [1] ANDERSON, T.W. "An Introduction to Multivariate Statistical Analysis", John Wiley, London, 1958.
- [2] RAHMAN, M.M. "A Preliminary Investigation of Management Information Needs in a Burns Unit", M.Sc. Dissertation, England, 1974, pp72.
- [3] RHYS-HEARN, C. "Evaluation of Patient's Nursing Needs : Prediction of Staffing", Nuffield Provincial Hospitals Trust, England, 1973.