Management of a nursing ward: using patient clinical data for nurse assignment

Walter Sermeus PhD, RN
Leuven, Belgium
and
Paul Epping RN
Leiden, The Netherlands

Prof. dr. W. Sermeus, RN, PhD, MS Biostatistics
Associate Professor in Nursing Management and Research
Catholic University of Leuven
Centre of Health Services & Nursing Research
Kapucijnenvoer 35/4
B-3000 Leuven
Belgium

tel. +32 16 336975
fax. +32 16 336970
e-mail: walter.sermeus@med.kuleuven.ac.be

Just as there is a nursing process by which nurses provide care, cure and comfort for patients, there is also a management process by which nurse managers work through others to achieve the nursing organisation's goals.

Those who coined the term 'nursing process' believed that nursing care should not be a hodgepodge of unrelated tasks but, instead should entail a progressive sequence of interrelated activities in which earlier events logically precede later events. The steps of

the nursing process (assessing, diagnosing, planning, implementing, evaluating) parallel the steps of the scientific method (see figure 1).
Figure 1. Similarities between the scientific method, the nursing process and the management process, based on Gillies, 1989.

If we desire the bedside nurse to use the scientific method and demonstrate professional behaviour, should we not expect as much from the nurse manager?

Nursing management can be defined as 'the process of working through nursing staff members to provide care, cure and comfort to patients'. The nurse manager's job is to plan, organise, direct and control financial, material and human resources, so as to provide the most effective care possible to groups of patients and their families. The nursing management process parallels the nursing process that it is intended to facilitate. The management process, like the nursing process, includes gathering data, identifying problems, making plans, implementing plans and evaluating results.

Because nursing management is concerned with the efforts of many workers rather than one, each step in the management process is more complex than the comparable step in the nursing process. For instance, the data-gathering step of the management process consists of accumulating information not only about patients, but also about the nurses, the institution, the community, and any legal and financial constraints. The planning step not only consists of determining the care needs of different types of patients, it also includes the determination of the number and type of staff needed, and designing an organisational structure that will maximise staff effectiveness.

The process

A process is a series of actions leading towards a goal. In the nursing process, the ends might be relief of symptoms, prevention of complications, augmentation of health knowledge and skills, or the facilitation of maximal independence. In the nursing management process, the goal is to deliver the most effective and efficient care for a group of patients.

From a management information point of view, a similar process is followed. A model published by Thomas in 1986 will be followed in this paper, it is outlined in figure 2. In the model to determine nursing management information requirement, the process starts with identifying objectives, formulating critical success factors, and
performance measures. At the same time, key decision and decision steps are identified.

**Figure 2. A model to determine nursing management information requirements, based on Thomas 1986**

All these steps lead to the formulation of information requirements and system design.

In identifying information requirements, very often a distinction is made between data and information. Data are the building blocks of information, or information without meaning.

**The nursing assignment**

Identifying the management information requirements for the nursing assignment problem provides one example of a nursing management process.

Most emphasis has been put in the characteristics and patterns of the assignment process

- are patients or tasks been assigned to a nurse?
- are patients assigned to just one nurse or to a team of nurses and health care workers?
- for which period in time, is the pattern assigned - is it just for one day or for the whole hospitalisation of the patient?

Most of these question are dealt with in the professional nursing literature.

A second aspect which gets less emphasis in the professional nursing literature, but much more in the nursing management literature, is the question of the numbers: how many patients or tasks one single nurse or a team can handle and does this ratio change if the problem/patient/task is very complex?
Patterns of nurse assignment

Three conventional patterns of nursing assignment have been described: functional nursing, team nursing, and primary nursing. Based on these three patterns a lot of mixed patterns exists in practice.

In functional nursing, the emphasis is on specialisation and division of labour. The main focus is in getting the greatest amount of task-work done at the least cost in time and training.

Team nursing puts the emphasis on integrating nursing personnel with varying skill levels into a team. Team nursing was created to improve patient care by using the diverse skills of team members, to their full potential, under the close supervision of registered nurses.

Primary nursing puts the emphasis on the responsibility for nursing care management with the direct care giver. The activities of nurses' aides are refocused: away from direct contact with patients towards equipment and supplies.

Each assignment pattern has had its day of popularity, and one feels that proponents of each method agree there is one best way to organise nursing, but disagree on method. Advantages have been cited for each. In general, these advantages recognise the importance of better quality, lower cost and higher patient and staff satisfaction.

A curious paradox exists in some of the literature. These various assignment patterns seem to be clear cut and clearly defined and understood. The nursing organisation differs from one nursing unit to another. Within the primary pattern, for example, the time duration in which a primary nurse plans and gives care to a patient might span hospital admission to discharge or be limited to one or some days of stay. A study by Lakiere (1993) indicates that the average number of days a nurse is assigned to the same patient is three. The main reason given is that the work schedule of the nurse is independent from the stay of patients. After a few days of assignment, the nurse has a few days off. A lot of nurses work part-time.

Within a given day, primary nurse responsibility for care management might vary from eight to 24 hours. In team nursing, the team leader might carefully match patient needs to team member skills so that each patient copes with a limited number of personnel. Or, the team leader could assign tasks within the team, with less concern for the number of personnel rendering direct care to an individual patient. The length of time any team stays together or gives care to the same group of patients is also highly variable.

For functional nursing, the picture is quite similar. When a hospital has a separate specialist for each of several therapies, for discharge planning, for family counselling, for patient education, it is engaging in functional patient care.

This leads us to the prior question: What are the distinctive characteristics of the different nursing assignments patterns? Research in that field has been done by Munson and Clinton,³ and by Thomas and Bond.⁴
Munson and Clinton model

In the Munson and Clinton model, the nursing assignment pattern is determined by patient characteristics, nursing resources and organisational support (see figure 3).

**Figure 3. Factors influencing and influenced by nursing assignment patterns based on Munson & Clinton**

As patient characteristics, the following variables are selected: age of the patients, length of stay, stability of condition, variability of care, uncertainty, predictability of care and cure at the time of admission, care complexity (one or multiple problems, need for patient feedback...), standardisation, technicality of care, interdisciplinary approach necessary, need for learning.

As nursing resources, the following variables are selected: qualification mix (by shift); percentage of qualified staff; ratio of patients and nurses; ratio full-time/part-time; stability of nursing staff (turnover, absenteeism); experience, education levels, additional training and motivation.

As organisation support, the following variables are selected: presence of physician in the nursing ward, communication between nurses and physicians (documentation process, rounds, shift reports...), supportive services (transportation, pharmacy, hotel function, unit secretary, laboratory services...), Clinical Nurse Specialist, budgets available, nursing ward design (architecture).

These factors will influence the choice of a nursing assignment pattern to obtain some nursing process quality. Four elements are indicated: comprehensiveness, accountability, continuity, co-ordination.

Munson and Clinton differentiated between two basic activities of a nurse: care giving or care management. Care management includes assessment of patient requirements for nursing care, formulation of nursing diagnoses, stating outcomes of care and nursing interventions and evaluation reassessment. Care giving refers to the implementation of the nursing intervention only.

Two organisational decisions were also recognised: whether an activity will be done by one person or shared among several (called integration) and whether an act will be performed continuously by one person or group or to be shifted from one group to
another (continuity). Table 1 shows four shaded cells using these concepts. This table
then identifies four distinct and measurable elements with which a nursing assignment
pattern can be defined. For example, in cell I, care management integration (CMI)
refers to the number of care planners for an individual patient. The lower the number
of care planners the higher the degree of integration.

Based on these kinds of combinations, 10 characteristics of nursing assignment
patterns are described.

Table 1. Four central elements of a nursing assignment pattern

<table>
<thead>
<tr>
<th>Assignment pattern</th>
<th>Care management</th>
<th>Care giving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration</td>
<td>Care Management Integration</td>
<td>Nursing Care Integration</td>
</tr>
<tr>
<td>Continuity</td>
<td>Care Management Continuity</td>
<td>Nursing Care Continuity</td>
</tr>
</tbody>
</table>

- **Nursing Care Integration** The proportion of total care given by the person
  providing the most care.
- **Care Management Integration** The number of persons managing the care
  process at a given time.
- **Plan-Do Integration** The proportion of care givers also involved in planning
  the care.
- **Nursing Care Continuity** The average number of care givers for a patient
  over a seven day period.
- **Care Management Continuity** The average number of care planners for a
  patient over a seven day period.
- **Care Management Continuity across settings** Whether a care planner is
  responsible for a patient before or after patient's stay on the unit.
- **Nursing Co-ordination** The most common pattern of on-unit co-ordination of
  nursing care activities for a patient: co-ordination by hierarchy, co-ordination
  by consultation, autonomous functioning.
- **Care-cure co-ordination** The most common pattern of nurse-direct
  involvement and the proactiveness of that involvement in co-ordinating other
  inputs to the patient's care requirement.
- **Patient Services co-ordination** Reactive by unit, reactive by nurse, proactive
  by unit, proactive by nurse.
- **Inter shift co-ordination** Method of communication by which inter shift co-
  ordination is achieved.

These ten characteristics are very useful to examine those factors which should
influence nursing assignment patterns. For example, the benefits of care continuity
care may be minor for some patients and crucial to others. Not all nurses may be able
to handle a wide range of care requirements for a patient. So the presence of Licensed
Practical Nurse have low impact on the continuity variables but a high impact on the
integration variables. When the predictability of care is very low as in the Intensive
Care Unit, a high level of plan-do integration can be required.
Thomas and Bond model

Thomas and Bond identified six main features as discriminating between various nursing assignment patterns:

1. grouping of nurses and length of allocation to specific patients;
2. allocation of nursing work;
3. organisation of the duty rota;
4. nursing accountability for patient care;
5. responsibility for writing patients' nursing notes;
6. liaison with medical/paramedical staff.

Assignment load

The second question deals with the load and the assignment problem itself. Which patient can I assign to which nurse? How many of these patients can I assign? What is the optimal and maximal workload of a nurse?

In the nursing literature, this question is seldom directly addressed. Most methods we find in patient classification literature. This domain primarily focuses on the workload of a nursing unit (all nurses together) and not one specific nurse in particular. However, the problem and the solution to the problem are similar.

It is essentially a succession of decisions which determines ultimately whether a patient receives so many minutes more or less nursing care. The average length of stay per patient is determined by the staffing of a nursing unit. The head nurse can change this relationship by allocating to one nurse less patients than to another nurse. Each nurse will in her turn determine whether she will spend the same time on all patients allocated to her or whether she will spend more time on some of her patients.

Intensity of nursing care

Measuring the intensity of nursing care was studied in the early sixties by Connor. Its purpose was to attune the number of nursing personnel of a nursing unit to the actual intensity of nursing care instead of the number of beds or the bed occupancy. The number of beds and the bed occupancy are indeed a much too rough measure and imply that nursing care is equal or constant over the years on all nursing departments.

To measure this intensity of nursing care, nursing patient classification systems have been developed.

What do we understand under 'intensity of nursing care'? Common synonyms are: work volume, quantity of care. This means concretely that we arrange nursing care on a continuum from much to little care. Three aspects play a role here. The first is whether the intensity of nursing care is evaluated on the basis of the demand for care (the diversity of the patient population) or from the offer of care (the variability of care).

The advantage of evaluating the intensity of nursing care from care offered is that the latter can be observed. The disadvantage is that the offer is strongly coloured by local circumstances such as lack or plenty of time, professional ability, staff or infrastructure. It is often argued that the patient would get more and better care in optimum circumstances. The risk is high that a kind of distortion will occur when we
use these data items for computing the nursing staffing, as it is exactly this staffing that has largely determined the offer of care. The nursing units employing many staff members do indeed carry out a lot of activities. They therefore score high and get even higher staffing by means of the extra points.

The alternative is to evaluate the intensity of nursing care from the demand for care, which offers the advantage that local circumstances do not play a role. But the disadvantage is that this demand for care cannot be observed so that this method is indeed very subjective.

A second aspect is the meaning of the notion 'intensity of nursing care'. Is this notion evaluated in one dimension or in multiple dimensions and which aspects are then taken into account? In most nursing patient classification systems the intensity of nursing care is made concrete according to the time spent or to be spent. Other factors that may influence the intensity of nursing care are for example the degree of urgency, the degree of complexity, the required professional ability and the intellectual activity. Obviously the time, and the required professional ability, will differ according to the circumstances and the existing infrastructure.

A third aspect is the way in which the 'intensity of nursing care', is computed. Here two approaches are possible. The first approach is the more analytical approach in which a certain points value is allocated to every activity or feature (according to the required time or other parameters). For each patient the list will be ticked as to whether this activity or this feature is applicable. If applicable, the corresponding points values will be added. The total score represents the intensity of nursing care of a patient. The advantage of this method is that it is simple. The disadvantage is that the interaction of the different activities or features is not taken into account.

The other approach is a more global one in which the total care of a patient is evaluated. The advantage is that in this approach the total care is evaluated more precisely. The whole is indeed more than the sum of its parts. The disadvantage is that insight will be lost in how these different parts contribute to global care.

On the basis of a combination of these three aspects a whole range of patient classification systems has been developed to assess the intensity of nursing care. It is estimated that more than 1000 different patient classification systems have been developed, of which a restricted number are spread on a larger scale. These patient classification systems aim to divide the continuum of the intensity of nursing care - on the basis of a restricted number of criteria as precisely and reliably as possible into a number of classes. In practice the number of classes varies from a minimum of three to a maximum of ten classes.

**An example system**

The San Joaquin patient classification system is an example of a patient classification system, it was developed in the United States in the 1970s on behalf of the Department of Health, Education and Welfare in the United States. The continuum of intensity of nursing care was divided into four classes.
Class I: minimum nursing care or self-care

The patient may possibly need supervision and encouragement by nurses for his personal care. He can take care of personal hygiene even if he has an infusion or catheter.

Class II: average nursing care

The patient needs partial assistance with one or several of the following activities: bathing, posture in bed or wheel chair, mobility, feeding. He requires restricted attending on intravenous therapy, vital functions etc.

Class III: more than average nursing care

The patient needs complete assistance in one or several activities: bathing, posture in bed or wheel chair, mobility or feeding. He requires continuous monitoring of vital signs, intravenous therapy.

Class IV: intensive nursing care

This class includes the above listed care and the patient requires constant monitoring of vital signs.

Five criteria are used to classify the patient in one of these four classes. These criteria (assistance with bathing, mobility, feeding, having an infusion or not, regular monitoring) are divided into nine indicators. A procedure has been provided to choose the right class by means of a combination of these indicators (see table 2). By placing a remark, the patient can be classified in a higher class than that initially computed on the basis of the nine indicators.

Table 2. San Joaquin Classification Instrument

<table>
<thead>
<tr>
<th>PATIENT CLASSIFICATION</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistance with bathing</td>
<td></td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Partial assistance in posture</td>
<td></td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Complete assistance in posture</td>
<td></td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Partial assistance in feeding</td>
<td></td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Complete assistance in feeding</td>
<td></td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Infusion</td>
<td></td>
<td></td>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>Monitoring every 1 to 2 hours</td>
<td></td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Constant monitoring</td>
<td></td>
<td></td>
<td></td>
<td>( )</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>.5</td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How these data can be used for patient assignments.

If the objective is that each nurse has an equal patient load, patient assignment can be based on this kind of information. Suppose that we have five nurses in the morning shift and 30 patients. Each nurse will care for six patients. This seems fair. But some patients can need a more intensive or more complex nursing care. Suppose we use the San Joaquin system for measuring nursing intensity with category I having weight 1, category II having weight 2, etc. We can have the distribution shown in table 3. So a more sensitive criterion for nursing assignment can be to assign each nurse a weight of 60/5 or 12 intensity points which can correspond with the care for four category III patients or six category I patients or six in category I and three category II patients or all other combinations.

Table 3. Calculating weighted patient dependency scores

<table>
<thead>
<tr>
<th>Category</th>
<th>Patients</th>
<th>Weights</th>
<th>Total weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat I</td>
<td>10 patients</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Cat II</td>
<td>10 patients</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Cat III</td>
<td>10 patients</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>30 patients</td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

Conclusions

Different concepts that will influence decision making about nursing assignment are discussed: continuity of care, care co-ordination, care integration, nursing intensity, patient characteristics, nursing resources and organisational support, and so on.

To determine nursing management information requirements to support the decision making in this field, these concepts should be evaluated, discussed, and prioritised.

References


