

## **2.4. The RAFAELA patient classification system**

### **2.4.1. History and definition of patient classification systems**

When patient classification systems were first developed, the classifications were based on the Taylorian idea of the division and measuring of work either by observation or self-evaluation, and on the division of nursing activities into direct care with patients, indirect care in the clinic and indirect care outside of the clinic, or non-patient-related tasks (Williams 1977, Alward 1983, Hendrickson et al. 1990, Giovannetti & Johnson 1990). Initial development of the PCS systems began before the 1970s, when the aim was to estimate annual staffing needs and labour budgets (Malloch & Conovaloff 1999), and to control the rising costs of patient care, as well as reduce the costs of staffing (Shaha & Bush 1996).

In the 1980s, the federal implementation of DRG in the United States and managed care affected the management in hospitals (Malloch & Conovaloff 1999). Nurse hours per patient (NHPP), NHPP per Day and NHPP per Night measures have also been used as indicators of productivity and the demand for resources in nursing. These measures, however, did not take patient dependency into consideration, nor did they consider patients with specific nursing needs (Reid & Melaugh 1987). In the 1990s, some criticism was directed against classification systems and the accurate measuring of time and work tasks, and there was discussion on the subject of linking PCS with patient outcomes, cost of care and quality measurement (Finnigan et al. 1993: 62). The information obtained from PCS is used to estimate patient care needs, staff allocation, budgeting, costing out nursing services, billing, cost control, quality and research (Botter 2000, Sarnecki et al. 1998, Malloch & Conovaloff 1999). Most of the patient classifications are constructed on specific philosophical assumptions about the nature of nursing and nursing care (De Groot 1989a). The demands of the care of the inpatients have increased during the last two decades. An increasing amount of traditional inpatient care has been transferred to outpatient clinics or to home care (Sarnecki et al. 1998).

According to Hoffman (1988), the only way to measure the patient-centered work done by nurses is to use patient classification systems, from which the obtained information can be utilised in human resource management and cost calculations. Information obtained through a

patient classification system provides information on the productivity of work, providing that nursing care intensity is clearly linked to the use of resources.

With the aid of patient classification, patients are assessed and classified based on their care needs within a specific time frame. A patient classification system is a method by which the patient classification is quantified, allowing the measurement of the required nursing effort. It can be defined as methods and processes through which an individual patient's care needs are defined, validated and monitored in order to inform human resource management, cost calculation, budget planning and the different functions of management in general. (Huhkabay & Skonieczny 1981:90, De Groot 1989a) The use of a patient classification system aims at the effective allocation and utilization of nursing resources (Williams et al. 1993: 538, Giovannetti 1979:8). In choosing a patient classification system, attention should be paid to ensuring reliability, validity, and acceptability, as well as ensuring that the system is simple, time-efficient, easy to use (utility) in clinical management, and objective (De Groot 1989b).

Patient groups and their level of nursing care intensity do not necessarily correspond to the levels of complexity of the medical treatment in each case. In terms of nursing, patient care needs may be much higher than can be predicted by a medical diagnosis. The nursing care intensity of a patient reveals the amount of nursing resources used to meet patient care needs. (Christ-Grundmann 1997, Van Slyck 2000, Van Slyck & Johnson 2001) Professional knowledge and skills affect the way a nurse uses a PCS. When a nurse from another unit cares for an unfamiliar patient group, he/she is likely to rate the same patients at higher patient care intensity levels (Sarnecki et al. 1998).

It can be assumed that a nurse's professional knowledge has an effect on the amount of time and resources he/she puts into caring for a familiar or unfamiliar patient group. A nurse uses more resources and time when caring for a patient group he/she has less or no professional experience of. A nurse is likely to classify an unfamiliar patient group into a higher class of nursing care intensity. This corresponds to the reality that he/she uses more resources on caring for that patient than a nurse with the relevant expertise would have done. Thus, a nurse's experience and professional skills are significant in terms of cost formation, and, it may be assumed that a skilled nurse working with a familiar patient group will lower costs and increase productivity (see Taylor 1911, Rischbieth 2006, Häkkänen et al. 2001).

In the grouping of various patient groups, and in structural changes concerning production information is obtained through a patient classification system concerning the effect the care needs of a specific patient group have on a ward's human resources. According to nursing philosophy, the intensive care of heart patients and the rehabilitation of neurological patients, for example, are incompatible. Consequently, nursing staff work with these two different patient groups in different ways. New requirements regarding patient classification focus directly on providing the opportunity to evaluate the quality and content of care (Van Slyck & Johnson 2001), thus enabling the allocation of the right nurses, e.g. expert nurses, to where they are needed, in terms of the demands of patients with higher care requirements.

Many patient classification systems or measures of patients' ability to function exist around the world and are used to receive information on the required nursing resources, as well as information used in the cost accounting and pricing conducted by the organisation. The Zebra system is used in Sweden (Levenstam & Engberg 1997) and in the Netherlands, there is a patient classification system of community care (Algera-Osinga et al. 1994). The RUG-III – Resource Utilization Groups classification system is used in long-term care in the USA and in geriatric care in Finland (Björkgren et al. 1999, Mueller 2000). The NMDS – Nursing Minimum Data Set, which includes more substantial data on nursing, has also been studied in Finland (Turtiainen 1992, Turtiainen 1999, Huber et al. 1992:38). In this study, the RAFAELA patient classification system functions as the case through which nursing management and the effect of nursing productivity on quality of care and the staff during the care process are discussed.

#### **2.4.2. Presentation of the RAFAELA patient classification system (PCS)**

The RAFAELA PCS has been actively studied in Finnish health care and is part of the electronic patient administration system. The development of RAFAELA PCS started in 1994, and it was named after the research group. The RAFAELA-system comprises three parts: the Oulu Patient Classification (OPC) system; the nurse resource registry; and the PAONCIL (Professional Assessment of Optimal Nursing Care Intensity level) measure (*i.e. the RAFAELA patient classification system = OPC + Nursing resource + PAONCIL*). Using the OPC system and the nurse resource registry, it is possible to calculate the nursing care intensity points per nurse during certain days. Using linear regression analysis, the PAONCIL

measure is used to estimate the optimal nursing care intensity level per nurse, which in turn, describes the nurse resources needed in proportion to the need of patient care. (Fagerström & Rainio 1999, Oulun yliopistollinen keskussairaala 1994, Kaustinen 1995, Fagerström et al. 1998, Rainio 1994, Rainio 1999, Fagerström 2000, Fagerström et al. 2000a,b, Fagerström & Rauhala 2001, Fagerström & Rauhala 2003)

Data received through the RAFAELA patient classification system regarding the optimal nursing care intensity per nurse levels or rates on different wards enable the existence of one strategic target of nursing, one measure on what the situation regarding the productivity of nursing should be on an annual basis, taking into consideration the optimal levels of ensuring quality (see Vaasan sairaanhoitopiirin talous- ja toimintasuunnitelma 2007 - 2011 [Vaasa Hospital District Financial and Strategic Plan 2007-2011], Kaplan & Norton 2001a,b). The data gathered generates information, with the aim of converting this into knowledge, to be used in the management of the organisation (Harno et al. 2000), and thus improving productivity and enabling a more efficient allocation of resources (Lillrank et al. 2002). In other words, through management, information becomes wisdom, and know-how, information, experience and understanding become the wisdom of management (Vuori 2005b:37).

#### **2.4.3. The Oulu Patient Classification (OPC)**

The OPC (Oulun yliopistollinen keskussairaala 1994, Kaustinen 1995) comprises six subsections of nursing care: 1) planning and co-ordination of care; 2) breathing, blood circulation and symptoms of disease; 3) nutrition and medication; 4) personal hygiene and excretion; 5) activity, movement, sleep and rest; 6) teaching, guidance in care and follow-up care, emotional support. In each of these areas, the nurse classifies the patient into one of four classes according to his/her need of care (from A=1 point to D=4 points) once a day. A 10-page classification manual is used in the classification. The OPC summary score is calculated by adding up the points in the six care areas of the system. Thus, the nursing care intensity of a patient can be scored between 6 and 24. The higher the score, the higher the nursing care intensity of the patient. The OPC measure describes how a nurse has responded to the patients' needs using the various processes and interventions of nursing work (Hoffman 1988, Rainio 1994, Rainio 1998, Kaustinen 1995).

#### **2.4.4. Nursing resources**

The number of nurses who have worked with the patients in a ward is registered every day in the nurse resource registry. The OPC score is divided by the number of nurses on the ward each day. The nursing care intensity points per nurse ratio describes the productivity of nursing care in the ward. (Rainio 1999, Fagerström & Rainio 1999, Fagerström et al. 2000b)

#### **2.4.5. The Professional Assessment of Nursing Care Intensity Level ( PAONCIL)**

The third part of the RAFAELA PCS is PAONCIL. Nurses assess how they have experienced their shift's workload using a 7-class measure: 0 is the optimal situation, 1-3 is a situation in which nurses have too much work, and the greater the figure, the more nurses have to prioritize tasks. A score of between -3 and -1 describes a situation in which nurses feel that they have time for less important tasks; the closer to -3 the score, the more nurses feel they have time for such tasks. Classification guidelines have been developed for each of the whole numbers in the scale. The material includes an estimate of several hundred shifts, depending on the ward size and number of nurses.

Using regression analysis, it is possible to analyse how nursing care intensity explains the workload experienced by the nurses (PAONCIL score). Optimal nursing intensity is produced by simple linear regression analysis. The linear association between the values of the OPC (daily nursing care intensity points per nurse) and the PAONCIL (daily mean) instruments can be quantified as follows: what value does the OPC give when the average PAONCIL for the same day is optimal (i.e. zero), and how strong is the association (i.e. the explanatory power) between the OPC and PAONCIL? The explanatory power - or the determination coefficient ( $R^2$ ) - determines by how many percent the variation in values of the OPC explains the variation in values of the PAONCIL. This can, in principle, vary between 0% and 100%.

Following an administrative decision, the measurements per ward were used so that when the nursing care intensity points per nurse were 27, for example, the optimal nursing care intensity level in the ward could vary +/- 3.5 points, indicating that the optimal range would be between 23.5 – 30.5 nursing care intensity points per nurse per day. There will always be variation between days in terms of nursing care intensity points per nurse, and how much variation is acceptable is decided democratically by nursing managers. The decision is based

on practical management, since no scientific method by researchers has been found to do that. This nursing work assessment method was developed in Vaasa Central Hospital. Weighting coefficients were used at the beginning of the development work to place patients into different categories of nursing care intensity. At present, nursing care intensity points without coefficients are in use. (Rainio 1996, Rainio 1999, Fagerström et al.1999, Fagerström et al. 2000b) In the RAFAELA system, each ward has its own optimal level of nursing care, which is estimated using the PAONCIL measure. This indicates a situation in which nurses assess that they have given the patients good quality care. Moreover, the significance of factors other than nursing care intensity for the workload experienced by nurses have been studied. Such other factors include, for example, conflicts in collaboration between employees. (Fagerström & Rainio 1999, Rainio 1999, Fagerström et al. 2000b).

Details of the first development stage of the PAONCIL method are presented in Articles 2 and 3. Nurses perform many tasks at the same time, and these activities cannot be measured with engineered time and motion studies; the timing of individual tasks does not adequately measure professional nursing care. Rougher measurements are more suited to the multidimensional nature of nursing. (Flarey 1990:43) The significance of assessing the sufficiency of nursing staff by nurses in patient care should not be underestimated (De Groot 1989a:33). The PAONCIL method is based on the assessment of nursing staff evaluations, and the utilisation of these with sufficiently wide statistical data.

#### **2.4.6. The validity and reliability of RAFAELA**

The validity of the OPC instrument has been tested several times, and with good results. Already at the outset of the development work, the realisation was made that the OPC could adjust to the age, gender, number and turnover of patients. Variation between days of the week did not affect the connection between OPC and PAONCIL, nor did the total experience or the educational background of the nurses. Furthermore, the validity was later confirmed statistically. (Rauhala 1997, Rauhala 1998) The content validity of the Oulu Patient Classification (OPC) was tested by 122 expert nurses during the year 1998 (Fagerström 2000). The content validity was also tested by 75 patients (Fagerström et al. 1999). Those studies showed that the OPC instrument should be supplemented by a caring perspective and some details made more precise.

The construct and criterion validity has been analyzed using statistical methods, and the PAONCIL method has been used as a 'golden standard' (Fagerström et al. 2000a,b). The validity of the PAONCIL method was tested using methodological triangulation, and its content validity (+3 to -3 scale with the guidelines) was tested by panels of 124 expert nurses using a questionnaire, and seven focus groups consisting of 29 nurses in total. The nurses assessed the extent to which the seven levels of nursing workload corresponded to their experience of nursing care intensity levels. The PAONCIL method handbook was judged to be generally applicable. (Fagerström et al. 2002)

Rauhala & Fagerström (2004) conducted further research into the credibility and feasibility of the PAONCIL method. The study design was based on the results of analyses of optimal nursing care intensity from 61 wards in eight Finnish hospitals over the period 1997-2001. The minimum requirements for determining reliable optimal nursing care intensity were when the PAONCIL response rate was above 70%, the period of examination at least 3-4 weeks, the mean PAONCIL value below 0.65 and the explanatory power above 25 percent.

The RAFAELA system was tested nationally using material from seven hospitals during the years 2000-2001. The study examined the state of Finnish nursing and benchmarking data using the RAFAELA system. In the study, it was noted that several wards had a nursing care intensity ratio above the optimal area during approximately 40-50% of days, and below the lowest limit during 10-20% of days. There were differences between specialities. The nursing care intensity in the paediatric wards, for example, was above the optimal area during 25% of days and below the optimal area during 50% of days. (Fagerström & Rauhala 2001, Fagerström & Rauhala 2003) The benchmarking of nursing has remained a practice.

The Association of Finnish Local and Regional Authorities (Kuntaliitto) administers the use of the RAFAELA system, as well as its use in national nursing care intensity benchmarking. There are certain criteria which wards must fulfil in order to participate in this benchmarking analysis every year. In formal training for personnel, for example, the system has to be in use for at least six months and the inter-rater reliability of OPC must be at least seventy per cent. (Rauhala & Fagerström 2007) Enough attention should be paid to measuring and ensuring the reliability of classification systems so that the measures can function as objectively as possible and that the measurements generate information to solve the issues they were introduced to solve (Procter 1992). Data regarding nursing care intensity and optimal nursing

care intensity, staff costs, the structure of human resources, and the organisation of nursing are gathered into a comparison data bi-annually and received by hospitals using RAFAELA.

## **2.5. Productivity and management of hospitals**

### **2.5.1. Productivity in a Taylorian framework**

In the rhetoric of health management science, the relationship between productivity and the patient classification system can be examined from the viewpoint of Taylor's Scientific Management Principles. This viewpoint has been selected as the frame of reference of this study, to represent classic, industrial thinking on how to study the productivity of work. This viewpoint has not typically been used in the study of nursing in a hospital environment. In his book, Taylor (1911:66-82, 106-132) discusses measuring and organising work in relation to staff resources and considers the types of analyses and measurements that are required to reach an optimal situation. Taylor (1911:66-79) also highlights the allocation of staff: there should be an optimal number of workers, not too few and not too many, in relation to the amount of work. He emphasizes, for example, the allocation of the right person for a certain task (expertise, special skills), in other words, considering the content-related, non-material aspects of work in addition to measured information (Taylor 1911:43, 48). When examining this aspect, it must be noted that data received from a patient classification system does not describe the right allocation of experts, but quantifies the ratio between inputs and outputs in nursing, in other words, information on productivity and the amount of work accordant with the need for patient care. The right allocation of nursing expertise is a quality factor that must be determined by the manager.

Taylor (1911:30-31, 108-112, 66-83, 1903) emphasized that inputs, or resources, should be used economically and sensibly. It is in the interest of both the employer and employee that work is allocated and organised properly; thus productivity can be increased. According to his principles, the development of work included a pay rise as an incentive if productivity and efficiency were increased. According to Taylorian ideas, however, staff should not be exhausted and unreasonably burdened, rather an optimal situation should be aimed at.

An incentive can be the offer of a bonus after good performance (Taylor 1903:175). Taylor (1903:186,189) felt that every worker's motivation should be stimulated by paying him/her according to his/her individual worth. An employee should have space for individual, internal