The RAFAELA system: a workforce planning tool for nurse staffing and human resource management

Lisbeth Fagerström and colleagues describe a method pioneered in Finnish hospitals that aims to uphold staffing levels in accordance with patients’ care needs.

Abstract

The RAFAELA system was developed in Finland during the 1990s to help with the systematic and daily measurement of nursing intensity (NI) and allocation of nursing staff. The system has now been rolled out across almost all hospitals in Finland, and implementation has started elsewhere in Europe and Asia. This article describes the system, which aims to uphold staffing levels in accordance with patients’ care needs, and its structure, which consists of three parts: the Oulu Patient Classification instrument; registration of available nursing resources; and the Professional Assessment of Optimal Nursing Care Intensity Level method, as an alternative to classical time studies. The article also highlights the benefits of using a systematic measurement of NI.

Keywords
Nursing intensity, staffing, care needs, leadership, nursing resources, management, human resource management

ECONOMIC PRESSURE on the European healthcare sector has increased in recent years, and changing age profiles and a surge in the number of older people will continue to affect healthcare systems perhaps more than we can imagine (Butler and Volkov 2010). Throughout Europe, politicians call for more cost-effective healthcare service systems (Finnbakk et al 2012), but at the same time laws are passed that ensure people have the right to high quality care and treatment. Additionally, there is increasing emphasis on evidence-based care, patient safety and person-centred care.

International research shows a clear association between nursing staff resources and nursing-sensitive quality indicators, patient safety issues, mortality rates, work environments and job satisfaction (Aiken et al 2002, Rafferty et al 2007, Needleman et al 2011). Nursing resources are often the largest budgetary expenditure in healthcare systems, so it is necessary to ask whether nursing staff are allocated accurately in accordance with patients’ care needs or whether resources are wasted due to ‘traditional’ allocation planning methods.

The Royal College of Nursing (RCN) guidance on safe nurse staffing levels in the UK (RCN 2010) states that the issue of what constitutes the optimal number and mix of nurses required to deliver good quality care as cost effectively as possible has become ‘a perennial question’.

Interest in developing instruments and systems for measuring nurse staffing levels began in the US in the 1940s and 1950s (Alward 1983, Fagerström 1999). The primary objective of such initiatives has been to achieve suitable staffing levels to enable nurses to meet the constant variation of patients’ care needs (Giovannetti 1979). In the 1960s, ‘time study’ methods were taken from industry and applied to hospitals, and this approach became the primary method for calculating nursing resources (Procter and Hunt 1994).

There are many instruments and systems in hospitals or primary healthcare environments that are used to measure nursing intensity (NI), nursing...
workload, patient dependency levels, nurse staffing and nurse-patient ratios (RCN 2010).

Most, however, have significant flaws: they have not been scientifically tested; they can be time consuming; the software programs do not support use of the information gathered; managers fail to use the data collected; and it is difficult to compare systems (Fagerström 1999, Rauhala 2008, RCN 2010). Further, while nurse-patient ratios are easy for politicians and the public to understand, and hopefully guarantee a minimum ratio, managers are the ones who must realise such guarantees in everyday care.

People’s unique and individual characteristics, such as gender, age, state of health and contextual factors, affect their care needs and consequently affect nurses’ workload and NI. The workload of nurses can be measured by patient classification systems, based on the measurement of NI. However, it is important to make the distinction between patient-related and ward-related workload. NI measures only the patient-related, direct and indirect, workload of nurses and does not include their ward-related work (Morris et al 2007).

Various factors influence the need for nursing resources, and a resource allocation system in which nursing staff are merely divided evenly between patients is not sufficient (Rauhala and Fagerström 2007); there must be a balance between nursing resources, NI level and patients’ actual needs.

The RAFAELA system
The RAFAELA system was developed for hospital settings in Finland in the late 1990s (Fagerström 1999, Pusa 2007, Rauhala 2008); its name is derived from the surnames of the original research group members. The validity of the RAFAELA system’s measurement tools, and its feasibility for use in human resource management in nursing, have been assessed in four doctoral dissertations (Fagerström 1999, Pusa 2007, Rauhala 2008, Frilund 2013).

Nurse managers can use this tool to balance patients’ care needs and nursing resources, to indicate optimal nurse staffing levels. The core idea is to ensure that the workload per nurse, expressed in NI points, is at the optimal NI level, thereby assuring the quality of nursing, patient outcomes and working conditions for staff and the effective use of resources (Fagerström 1999).

The theoretical framework of the system is based on two perspectives: the nursing science perspective, which encompasses a ’holistic view’ of people, the importance of human needs and the complexity of nursing (Fagerström 1999, 2009); and the human resource management perspective, which emphasises the importance of a top-down approach, a belief in staff competence, and the importance of a strategic and engaged leadership (Rauhala 2008, Fagerström 2009). Nurses’ perspectives are crucial in assessing what nursing resources are needed for high quality care.

Structure and implementation
The RAFAELA system consists of the following components:

- Instruments for measuring NI in different contexts - daily registration of patients using the Oulu Patient Classification qualisan (OPCq) instrument, a generic instrument for all hospital specialties; the Pitkäniemi Patient Classification qualisan (PPCq) for mental health care; the Poliklinikka Hoitoisuus qualisan (POLIHOIq) for outpatient departments and emergency rooms; the Perioperatiivinen Hoitoisuus qualisan (PERIHOIq) for operating and recovery rooms, and for day surgery; and the Sädehoito Hoitoisuus qualisan (SÄDEHOIq) for radiation therapy.
- Staff resources: daily registration of actual nursing staff resources (in numbers of nurses).
- Determination of optimal NI level using the PAONCIIL instrument over a period of between four and six weeks.
- Financial information, sent in by organisations annually for calculating costs and benchmarking purposes.

The OPCq instrument, used to measure daily NI inpatient settings, consists of six needs and the nursing activities connected to the following nursing domains:

- Planning and co-ordination of nursing care.
- Breathing, blood circulation and symptoms of disease.
- Nutrition and medication.
- Personal hygiene and secretion.
- Activity, sleep and rest.
- Teaching, guidance in care and follow-up care, and emotional support (Fagerström 1999).

Nursing intensities can vary for each domain between 1 and 4, and the points are added up to give a range of between 6 and 24 NI points per patient. The total sum of NI points for a unit is calculated by adding all NI points. Thereafter, the total unit NI is divided by the total number of nurses caring for patients in the unit during that calendar day. For example, given a total unit NI of 240 points and ten nurses in the unit, the actual workload per nurse is 24 NI points.

The validity and reliability of the OPCq instrument has been tested by different methods and from various angles (Fagerström et al 2000a, Rauhala 2008, Frilund and Fagerström 2009).
The validation process started with an assessment of patients’ perceived care needs compared to the content of the OPCq manual (Fagerström et al. 1998). Using expert nurse panels, the content validity was then tested with good results in hospital (Fagerström 2000) and primary healthcare settings (Frilund and Fagerström 2009). Thereafter the construct validity of the OPCq instrument was established in two Finnish hospitals (Fagerström et al. 2000a).

Most recently the construct validity was found to be at the same good level as in a comparable study at Oslo University Hospital (Andersen et al. 2014). Reliability testing of the OPCq instrument by parallel classifications at each unit where the instrument is in daily use should occur annually (Frilund and Fagerström 2009). The implementation process of the RAFAELA system is shown in Figure 1.

After testing the reliability of the OPCq classifications, the PAONCIL instrument is applied. This is an alternative to classic-time studies (Fagerström et al. 2000b) and can be described as ‘nurses’ professional assessment of the sufficiency of resources in relation to the actual NI of patients during a shift’ (Fagerström and Rainio 1999). The content validity of the PAONCIL instrument, including its manual, was evaluated in a mixed-method design study at the beginning of 2000 in two hospitals (Fagerström et al. 2002).

Optimal NI is the intensity that every trained professional nurse working in a unit can manage without compromising the standard of care determined for the unit. The level of optimal NI that is obtained after the PAONCIL study can vary within 15% either side of the optimal point to create a ‘good reference area’ for the unit (Figure 2). The workload per nurse should fall in this optimal area, for example 70% of the time.

Using the PAONCIL instrument, an optimal NI level is determined for each unit on the basis of nurses’ professional assessments over at least three weeks. Every nurse makes an overall assessment at the end of each shift or before leaving the department, which determines whether the nursing resources have been enough in relation to patients’ needs and NI. He or she does so on a scale from -3 to +3, on which a score of 0 is considered optimal and indicates that the number of nurses is balanced with patients’ needs and NI, and that staff have had the opportunity to provide good care.

The optimal staffing level of a unit can be established through linear regression analysis of the results of the OPCq points per nurse and PAONCIL scores (Rauhala and Fagerström 2004). When using the PAONCIL instrument, we recommend that the study should be repeated every second or third year, or after organisational or extensive staff changes.

The PAONCIL instrument includes 12 additional questions aimed at revealing non-patient factors that can affect nurses’ workload during a shift. These include aspects of organisation and planning of work, managerial roles, staff situations, meetings, training events or other absences, students and co-operation with doctors. By analysing these, nurse managers can determine which might be stressing nursing staff or easing the overall work situation (Rauhala and Fagerström 2007).
The credibility and usefulness of the RAFAELA system was tested in 14 Finnish hospitals between 2000 and 2002 with good results (Fagerström and Rauhala 2003). After this initial testing, the Association of Finnish Local and Regional Authorities took ownership of the system, while the Finnish Consulting Group Ltd is charged with overseeing the license system, quality assurance and staff education (Fagerström and Rauhala 2003, 2007). More than 90% of Finnish hospitals have implemented this system, and the process has been underway in Iceland since 2010, Norway since 2011, and the Netherlands, Sweden and Vietnam since last year.

Benefits
The RAFAELA system is a tool that can be integrated into an organisation’s management and patient administrative systems. The system uses data on patients’ care needs and nurses’ workload, and provides an effective platform for the management of nursing resources, operatively and strategically. It enables efficient allocation of nursing resources over time in accordance with patients’ real care needs; it also has a positive effect on nurses’ clinical practice and therefore influences patient outcomes.

Once the system is integrated into a unit – with nurses classifying every patient each calendar day and performing daily registration of available nursing resources - the system provides information in four main domains: patients’ need for individual care, nurses’ workload, nursing staff costs, and productivity of nursing staff (Fagerström and Rauhala 2007).

With the system it is possible to:

- Improve person-centred care for patients, by starting with the care needs of each individual.
- Improve workforce planning and decrease staff costs, for example through effective allocation of available resources and reducing the need for deputy, or assistant, nurses, acute replacements or permanent reserves. The system also provides information for budget planning and cost calculation.
- Improve quality and manage risks better, by taking patients’ individual care needs, not just their number and diagnoses, into account. Optimal workload per nurse reduces the incidences of mistakes and adverse events and so improves safety.
- Increase nurses’ job satisfaction and decrease the amount of sick leave taken, by allocating resources optimally to create a better balanced and more equally distributed workload.
- Enhance patient documentation, by having daily and systematic classifications based on nurses’ experiences and the nursing documentation recorded in each patient’s record. Better documentation gives a more reliable classification of NI.

The RAFAELA system provides different kinds of information, in the form of reports that can be used for various purposes by staff nurses, nurse managers at various levels and politicians. Below are examples of how nurse managers can use the information derived from the system when developing person-centred care and in evidence-based human resource management.

Figure 3 shows an example of a RAFAELA system report of patients’ need for care and the associated NI, measured using OPCq. The report shows the average NI points for two patient groups, those with cerebral infarction (Diagnosis Related Group (DRG) 14) and those with rhythmic cardiac disease (DRG 139) during one year. Figure 3 shows that patients with cerebral infarction require on average a higher NI than those with rhythmic cardiac disease. The data were measured using the OPCq instrument, which measures domains not commonly calculated by other instruments including planning and co-ordination of care, teaching, guidance in care, follow-up care, emotional support and relatives’ need for support and guidance.

The inclusion of the first domain in the OPCq instrument has proved to be a wise decision; traditionally, planning and co-ordination of care have been categorised as indirect care but are deemed prerequisites for efficient care pathways under this system. For example, the average age of patients with rhythmic cardiac disease is lower than that of patients with cerebral infarction, and these patients can usually take care of their hygiene once discharged.
from the hospital. Cerebral infarction, however, often leads to aphasia or decreased physical functioning, so patients and their relatives need guidance in self-care and follow-up care before discharge.

The OPCq instrument has been regarded as rather broad with six needs’ domains (Fagerström 1999); however, when the classification of each patient’s needs and NI requirements occurs daily, a sensitive picture of patients’ constantly changing acuity is revealed. The value and importance of person-centred health information, mentoring, trust and support cannot be overestimated, and the structure of the OPCq reminds nurses of the most central dimensions in nursing.

A head nurse can also refer to RAFAELA system reports during discussions about aspects of care quality such as the use of working time and the prioritisation of nursing activities. At the Oslo University Hospital, head nurses hold monthly meetings with their staff and on the clinical level with the management team to discuss patients’ NI profiles.

Figure 2 shows a RAFAELA system report that encompasses the main characteristics of the system; that is, nurses’ workload compared to a unit’s optimal NI level. When the system is used every day, a unit’s head nurse can plan and allocate staff proactively on the basis of the data collected the previous day or over the most recent period, and adjust staffing so that an optimal workload is achieved.

The data in Figure 2 was measured using the PAONCIL instrument. On this unit, nurses’ workload was at an optimal level 58% of the time (18 days), while for 23% of the time (seven days) patients’ NI requirements were higher than staff resources. Nurses also experienced six ‘lighter’ days (19% of the time) with low workload. Such reports can be generated monthly or from several years’ worth of data and can show how the average workload per nurse has increased, decreased or remained the same during a five-year period, for example, or seasonally. Senior managers can compare the workload per nurse between units, clinics or even hospitals.

After three years of using the RAFAELA system at the Oslo University Hospital, it has been found that the reports generated are particularly useful when discussing allocation of nurses or planning staff resources. It can help establish, for example, whether the reorganisation of a unit’s activities is likely to result in a more stable workload per nurse, in line with the optimal NI level.

The RAFAELA system reports are easy to comprehend, and patients and their relatives can also use them to understand the care provided on a unit. Would patients, for example, elect to be cared for on a unit in which nurses are working more than optimally most of the time? Would patients choose this unit or hospital?

These questions are pertinent to countries in which patients have the right to choose where they receive care.

Figure 4 is an example of a RAFAELA system benchmarking report that shows in percentages the number of days over the optimal NI level (red areas), at the optimal NI level (green), and under the optimal NI level (yellow). The information is displayed as a traffic-light rating system, where one bar can represent a single unit, clinic or division, hospital, region or country.

The example in Figure 4 is a benchmarking report from Finland and shows the workload situation of nurses at one 16-unit hospital in 2011. Such reports give nurse executives, nursing directors or nursing staff co-ordinators an overview of staff workload, and the data can be used easily to compile other kinds of reports about job satisfaction, sick leave, adverse events or nurse-patient ratios.

According to nurse managers’ experiences in Oslo, combinations of different reports give a comprehensive and rich overview of nurses’ work situations, and can highlight problems in a new way so that innovative solutions can be found, for example to improve patient outcomes or nurses’ work situations by allocating more staff.

Where the RAFAELA system is in use in Finland, data on areas such as staff costs, staff structure and the organisational model of nursing are collected from units (Fagerström and Rauhala 2007) for an annual national comparative report, covering more than 1,000 care providers. These comparative data are combined with NI data and compiled in a benchmarking report that is delivered to RAFAELA system users once a year.

The report delineates, for example, the mean annual level of patients’ NI, available human resources, actual skill mix, NI per nurse, and staff costs per organisation and specialist field, among other variables.

Discussion

Leaders and nurse managers can use RAFAELA system reports with other reports regarding patients’ and organisational characteristics when considering nursing resources in daily staff planning and in more strategic planning. At Helsinki University Hospital, the RAFAELA system is used to allocate working hours, network with different units, plan patient flows and define costs per length of stay (Aschan et al 2009).

It also provides evidence for ‘difficult’ decisions, for example about decreasing or increasing unit resources or cutting staff costs. The reorganisation
of units or hospitals is common and usually involves reallocation of nursing resources, so it is an advantage during such processes to have the data produced by the RAFAELA system.

The system is also used for productivity analyses, cost calculations and pricing hospital services (Rainio 1996, Pusa 2007). If nurse managers are to improve their evidence-based human resource management, they need reliable and easy-to-use systems that are not too time consuming, yet yield practical and reliable data.

Implementation of the RAFAELA system should be supported by organisational leaders; if it is not, nurses may not be motivated to classify each patient every day (Rainio and Ohinmaa 2005) as the process requires commitment. Experiences from Finland, Iceland, Norway and other countries indicate that nurses need to know that their managers support the system and use the data. This is a central motivating factor for staff nurses to continue with daily classifications.

A standardised RAFAELA reporting system for different management levels is recommended, so that, for example, weekly and monthly reports can be discussed on units and at clinic level, while annual reports can be addressed to senior management. The RAFAELA system provides reliable information about NI and the need for nursing resources, and is a feasible tool for knowledge management; in other words, that decision making is based on valid data (Aschan et al 2009).

The RAFAELA system is based on research and is usually considered by nurses and managers as easy to use, while remaining complex in terms of all the possible uses of the data. Project leaders in Oslo found the implementation process to be more time consuming than expected (Andersen et al 2014). A longer implementation process can improve learning among nurses and leaders on different levels, however, in that the question ‘What is good nursing care?’ is discussed continuously.

The research results from Oslo show that the RAFAELA system is reliable (Andersen et al 2014), but continuous quality assurance and training in use of the system are necessary for staff nurses and new leaders. Research from Finland, meanwhile, shows that a usually part-time co-ordinator is needed to manage the system in the long term (Fagerström and Rauhala 2003). Co-ordinators can take responsibility for quality assurance in relation to the use of the system, availability of and accessibility to reliable data, arrangement of annual reliability tests, organising training sessions or internal seminars for nurses and leaders, and ensuring that the benefits of the RAFAELA system database are realised.

Co-ordinator positions have been established in many Finnish hospitals to support nurses with making daily and reliable classifications, to take responsibility for training new staff in using the system, and to arrange seminars and workshops to maintain staff motivation.

A systematic review and meta-analysis of staffing levels and patient outcomes by Kane et al (2007) found an association between high nurse-patient ratios and low hospital-related mortality and fewer adverse patient events. The authors note that the strength of the association between nurse staffing and patient outcomes can be affected by the method used to calculate staff resources. Patients’ care needs and NI, not nurse-patient ratios, are the foundations of the RAFAELA system.

According to Lang et al (2004), the literature offers minimal support for specific minimum nurse-patient ratios for units in acute care hospitals, and shows that the use of minimum nurse-patient ratios alone seems to be inadequate in ensuring good quality care. Lang et al (2004) recommend that patient acuity, nursing skill mix and nurse competence are among the variables that should be considered when delineating staffing requirements.

One weakness of the RAFAELA system is that the nurse competence variable that can be included in the PAONCIL instrument has not been used to its full potential, and this should be considered in further development of the system.

There are many uses for the data produced by the RAFAELA system; it can be used to determine cost calculations per hospital day and length of stay, for example (Rainio 1996). A multicentre study using the RAFAELA system suggested that, if NI per nurse
Art & science | staff allocation

is above the optimal level, sick leave lasting more than three days increases (Rauhala et al 2007), which suggests that the optimal NI level has a positive effect on nurses’ health.

Conclusion

The successful implementation and use of the system depend to a great extent on nurse managers’ interest and competence in using the different reports and data. After 15 years of systematic use of the RAFAELA system in Finland, and based on experiences elsewhere, the authors believe that nurses, managers and organisations can benefit from the data the system produces (Rainio 1996, Rainio and Ohinmaa 2005, Pusa 2007, Aschan et al 2009).

The most important factor is nurses’ commitment to the system and their daily and reliable classification of patient’s needs and NI. Nurse staffing, quantitatively in terms of people and qualitatively in terms of competence, is an important issue for healthcare research. It should be analysed in relation to work conditions, organisational structure and leadership support, and an overview of nurses’ work situation should be undertaken so that patient outcomes can be improved (Aiken et al 2002).

Data from the RAFAELA system can be related easily to data from patient safety systems. A new research project has started in Finland, the aim of which is to show the association between patients’ needs, NI and mistakes in nursing. Preliminary analyses indicate that more mistakes occur when workload per nurse, as measured in NI points, is above the optimal NI level. Nonetheless, further analyses of more comprehensive data are needed.

References


Fagerström L (1999) The Patient’s Caring Needs to Understand and Measure the Unmeasurable. Åbo Akademi University, Turku, Finland.


Frilund M (2013) A Synthesizer of Caritative Ethics and Nursing Intensity. Åbo Akademi University, Turku, Finland.


