Modeling and managing the patients’ need for clinical care: Enhancing evidence-based practice and management
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Given the current societal developments such as survival to an older age and increasing co-morbidity, the demand for medical and nursing care is expected to increase, while the available number of healthcare professionals is likely to dwindle. In addition, due to expensive technological innovations leading to more treatment options for a wider range of indications, health expenditure will continue to rise. These developments cause a shift from predictable and scheduled clinical care to, for example, outpatient care or home care, while the more complex patients, who need tertiary referral clinical care, stay in hospitals. This causes an increased demand for complex clinical medical and nursing care in these hospitals. This challenges hospitals to provide more complex, effective, and affordable services without lowering the quality. This requires and promotes more evidence-based nursing care (EBN) as well as evidence-based management (EBMgt).

Clinical challenges

Medical directors, nurse directors, policy advisors, physicians and (head) nurses on clinical wards nowadays recognize the changing demography of their patient population and increasing accountability of their hospitals. Below are some illustrative examples of challenges and questions they are facing:

Medical director, on strategic level; “Which factors are good predictors for the demand for care of my patients? Is it age, the patients‘ comorbidity or maybe (a combination of) other factors? I need information to substantiate my (top)referral patient population and to negotiate reimbursement issues with insurers…”

Nurse director, on tactic level; “The nurse staffing levels on my wards are critically low. What factors did you (a policy-advisor) use for formulating these levels? Was the patients‘ care intensity involved? What information can we use to discuss these staffing levels? How can we ensure safe personnel staffing?”

Head nurse, on tactic/operational level; “I have a few unoccupied beds and the patient care intensity per nurse is rather comfortable today. However, I have to discuss new admissions with the ward surgeon as this can have consequences for his operating schedule and our ward production. Which facts do I need to discuss with him? I might also lend some of my staff to another nursing ward with a high care intensity per nurse. However, which ward would need my nurses the most?”
Policy-advisor, on tactic level; “We have some information about safe staffing for nurses. However, this information is based on mainly American or Australian studies. For physicians, safe staffing on general wards is just a black box. What are the optimal nurse and physician staffing levels in the Netherlands?”

Nurse, on operational level; “Today we have 28 patients and 5 nurses. To whom are we going to assign our patients? Should we assign based on the patients’ care intensity? Which nurses know which patients? Do some patients need special nursing skills? Can all nurses be assigned for 100%?”

These everyday clinical scenarios expose information gaps about:
1. factors influencing or predicting the patients’ demand for care,
2. the consequences of the resulting care intensity for staffing and
3. how to organize care on clinical wards.

Medical directors, nurse directors, policy advisors, physicians and (head) nurses are in want of evidence-based parameters and tools enabling them to efficiently organize and manage their hospitals and wards, including interdisciplinary communication and negotiation.

Applying EBMgt in health care; A theoretical framework

Generally, efficient and high-quality hospital care and inherent costs are determined by three aspects. First, the number of patients treated and their disease severity; second, the size and skill mix of the medical and nursing staff; and third, the organization of care, in other words, demand for care, staffing and organization of care.

These aspects have effect on how hospital care is provided on clinical wards, on workload, and on outcomes in terms of quality and costs of care. How these aspects are interrelated is illustrated by the Patient Care Delivery Model (PCDM; Figure 1). Here, the original model was adapted by using terms identifiable in this thesis to be applicable to our research purposes.

This model was originally developed in the mid-nineties to link the nursing work environments and care processes to outcomes. The theory behind delivering patient care is that causal factors, such as the characteristics of patients, personnel and organization, are transformed by processes on the work floor into patients’ care intensity, perceived work environment, and staffing utilization level. In turn, this results in outcomes that provide feedback to the system. This transformative process from the three determining aspects of hospital care to the outcomes of care is influenced by many factors and events: leadership, social support, unanticipated disruptions, delayed events, and distractions. All factors involved in this transformative process determine the healthcare professionals’ workload.

The PCDM offers hospital managers a conceptual framework based on empirical evidence to inform decision-making and to promote systematic approaches as to the scenarios described earlier. To start with demand for care; patients enter the hospital with a certain demand for care, which is determined by the patient’s characteristics (e.g., age, gender, comorbidity, or diagnosis). These characteristics subsequently influence the outcomes of the patient, the personnel, as well as the organization. For example, increased age and severity of illness are associated with poor patient outcomes and higher hospitalization costs.

Second, the association of personnel staffing and organizational characteristics with outcomes is supported by a number of publications: patients receiving insufficient care due to high workload are at risk for higher morbidity and mortality rates; higher proportions of Registered Nurses (RNs) are associated with lower mortality rates; a higher workload has a significant impact on job satisfaction as nurses in hospitals with higher nurse-patient ratios are more likely to suffer from...
burn-out and job dissatisfaction; the larger the size of the hospital unit, the fewer nurses were satisfied; a functional nursing care model (i.e. with few highly educated nurses and little support for innovation and nursing professionalization) is, in contrast to a professional nursing care model (i.e. an organization model with a highly educated nursing staff in a supportive practice environment), associated with an increase in medication errors, patient falls, pressure ulcers, and pneumonia. Third, factors directly influencing the healthcare professionals' work and work environment, for example leadership, social support, delayed events and distractions, have an indirect effect on healthcare outcomes as they interact with patients' demand for care, personnel staffing and the organization of care. For instance, when implementing a better hand hygiene among nurses, strong leadership has significant influence on the incidence of post-operative wound infections, while interruptions during the medication administration process cause more medication errors. Both examples are common measures of hospital care quality.

AIM AND OUTLINE OF THIS THESIS

Taking the scenarios and the PCDM into account, the overall aim of this thesis is to give insight in the relation between patients' demand for care, patients' care intensity, and personnel staffing. We therefore investigated:

1. Which patient characteristics predict the demand for medical and nursing care? (part I)
2. What is the impact of the patients' care intensity on physicians and nurses? (part II)
3. How can we ensure optimal staffing levels on clinical wards? (part III)

PART I: DEMAND FOR CARE

As described in the first scenario, it is important to know trends in the demand for care and to have information on cost issues. In order to support hospital directors in their substantiation and negotiation, insight in the (sets of) factors influencing or explaining the demand for care is highly desirable. We conducted a systematic review (SR) to identify these (sets of) factors and to appreciate their capability to explain the demand for clinical hospital care (Chapter 2).

Based on the factors found in this SR we developed a set of explanatory factors for the demand for care, in the first place for the demand for care by clinical surgical patients (Chapter 3). To test the applicability of this set to other clinical specialties, we investigated the set in a wider clinical patient population; described in Chapter 4.

PART II: PATIENT CARE INTENSITY

Subsequently, knowledge about the impact of the demand for medical and nursing care (i.e. the patients' care intensity) would help managers plan the number and skill mix of healthcare professionals. Nowadays, the staffing of physicians and nurses in Dutch hospitals tends to be mainly determined by historical production data, financial arguments and process optimization (i.e. optimization rather than care intensity). Therefore the risk physicians and nurses run to experience a high workload and resource shortage is high, particularly at times when clinical patients need a complex and large amount of care. Patients’ care intensity is a well-known concept in nursing care, but is less known to physicians. To obtain insight in the factors influencing the patients’ care intensity according to physicians and nurses on the wards, and possible perception differences, we conducted a conjoint analysis (Chapter 5).

No empirical information is available about the perceptions of nurses about the current patient care intensity and the impact on providing nursing care on the wards. In Chapter 6 we describe a study exploring the current sentiments regarding the use of a patient care intensity measure for managing nursing care on operational level and tuning the demand for nursing care and nursing resources offered.

PART III: STAFFING ON CLINICAL WARDS

Physicians and nurses are the key healthcare professionals in the hospital setting. Hence, adequate physician and nurse staffing has become critical to ensure efficient and affordable high-quality care. In Chapter 7 we conducted a study to check whether an evidence-based patient classification instrument (RAFAELA; of Finnish origin) would lead to reliable and valid measures of the patients’ care intensity, and whether this measure would be valuable to achieve more adequate nurse staffing levels.

If we are able to quantify the patients’ care intensity, this measure can also lead to daily practical staffing applications on the wards, i.e. automatic patient assignment based on the patients’ care intensity (Chapter 8). Such an instrument would help efficiently organize nursing care and balance the nursing workload on the wards over a longer period of time.

Finally, Chapter 9 presents a summary and future challenges that put the findings of the studies in this thesis into a broader context.
REFERENCES