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Development and validation of nursing resource weights for the Belgian Nursing Minimum Dataset in general hospitals: A Delphi questionnaire survey approach

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Abstract

Background: Internationally, nursing is not well represented in hospital financing systems. In Belgium a nursing weight system exists to adjust budget allocation for differences in nurse staffing requirements, but there is a need for revision. Arguments include the availability of a nursing minimum dataset and the adverse consequences of the current historically based nursing weight system.
Objectives: The development and validation of nursing resource weights for the revised Belgium nursing minimum dataset (NMDS).
Design: Two independent cross sectional Delphi—surveys.
Setting and participants: A convenience sample of 222 head nurses from 69 Belgian hospitals participated in the cross sectional survey methods. To assess validity 112 patient case records from 61 nursing wards of 35 Belgian general hospitals representing general, surgical, pediatric, geriatric and intensive care were selected.
Methods: Nursing resource weights were constructed based on Delphi survey results by NMDSII intervention. The patient case Delphi survey results were used as the primary source for validation. A series of additional validation measures were calculated, based on the different patient classification systems. Finally, three validated nursing resource weighting systems were compared to the constructed NMDSII weighting system: the use of 'Closon', 'Ghent' and WIN weights.
Results: A coherent set of nursing resource weights was developed. The comparison of nurse resource weights, based on the survey per NMDS intervention versus the survey on patient cases, yielded high correlations: $r = 0.74$ to $r = 0.97$ ($p < 0.01$) between three case rating questions, as an indication of reliability in terms of internal consistency, and $r = 0.90$ ($p < 0.01$) between summed intervention weights and patient case weights, as an indication of criterion validity in terms of concurrent validity. Other concurrent validity measures based on summed intervention weights versus patient classification dependency weights showed a correlation ranging from $r = 0.14$ to $r = 0.74$. The correlation of summed intervention weights with the

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Closon, Ghent and WIN weights ranged from $r = 0.93$ to $r = 0.96$ ($p < 0.01$), as a third indication of concurrent validity. *Conclusions:* A system of valid nursing resource weights has been developed. The system should be further validated within an international context.

Keywords: Budgets; Diagnosis-related groups; Economics; Hospitals; Nursing; Personnel staffing and scheduling

What is already known about the topic?

- In a limited number of countries hospital reimbursement is adjusted for nursing care, often lacking transparency and not taking into account appropriate nursing care needs at the patient level.
- General hospitals make local use of a diverse array of patient classification systems and nursing care workload measures to reallocate nursing staff. This requires a high amount of additional data collection efforts and investments.
- The lack of standardization obscures comparison and impedes national applications.

What this paper adds?

- This study provides a set of validated nursing resource weights as an input for nursing care adjustment of hospital reimbursement.
- The system is standardized, allowing for comparison between hospitals and nursing wards.

1. Introduction

Nursing is not well represented in hospital reimbursement, despite of being the biggest healthcare profession involved and despite of driving the most substantial cost component of the hospital budget. What is more, recently the impact of nurse staffing on patient safety has been highlighted in several studies (Aiken et al., 2002; Kane et al., 2007; Needleman et al., 2002). General staffing levels and reallocation of nursing personnel are likely to be influenced by a hospital's financial resources and how nursing is addressed in the reimbursement system.

In most countries there is no adjustment for a nursing care case mix in the hospital financing system, although there is a significant variability in nursing intensity and direct nursing costs between and within similar adult medical/surgical units (Welton et al., 2006a). Nursing intensity is the amount of direct and indirect patient care activity required to carry out the nursing function and the factors that have an impact on the level of work required to perform that activity (Morris et al., 2007). Under the umbrella of intensity of nursing care fall the concepts of nursing workload, patient acuity and time taken to administer patient care.

A recent literature review by Laport et al. (2008) found that countries like Denmark, Italy, the Netherlands, Portugal, Spain, and the US reimburse nursing as a part of a general 'room and board' fee, without going further into specific nursing care characteristics. This means that differences in nursing hours delivered are not addressed. Welton et al. (2006b,c) found that the use of a fixed daily room rate in the US led to an underestimation of nursing costs by 32.2%.

Most countries that do adjust for nursing care, do this by applying an average nursing resource weight per Diagnosis Related Group (DRG). The system clusters patient stays into groups that are homogeneous in terms of clinical characteristics and resource use. A relative weight represents differences in hours and minutes of care on a pre specified level such as a patient level, DRG level, or nursing ward level. It summarizes resource consumption as a function of nursing time needs. For example, on a DRG level, a DRG with a relative weight of 4.0 is four times more nursing resource intensive than a DRG with a relative weight of 1.0. Examples of an average nursing resource weight per DRG can be found in the systems used in Australia, Canada, New Zealand and Switzerland (Laport et al., 2008). Nursing cost allocation studies provide the necessary information to develop such average nursing resource weights in most of these countries. The averaging method however does not take the variability of nursing intensity within DRG's into account. Including additional nursing care data, combined with DRG use, can improve the overall explanation of variance in length-of-stay, use of intensive care, hospital charges, hospital death and discharge to nursing home by respectively 29.3%, 28.3%, 27.5%, 146.4% and 92.4% (Welton and Halloran, 2005).

In Belgium a mixed system is used (Sermeus, 2006). All Patient Refined Diagnosis Related Groups (APR-DRG's v. 15.0) are only used in the volume component, by specifying length of stay, and are not related with nursing care characteristics. Nursing care adjustment takes place as a part of the hospital budget price calculation. The main price calculation system allocates relative parts of the national hospital operating budget to hospitals, independent of nursing costs. An average price per patient day is calculated, comparable to the 'room and board' approach, based on minimal nurse staffing ratios per type of nursing unit.

However, about 6.5% of the national budget is reserved for supplementing the average price with an additional budget allocation, partly based on nursing intervention data. The Nursing Minimum Data Set (NMDS) is used to classify inpatient days into 28 zones. Each zone is weighted based on actual staffing level (number and qualification level). The