Feasibility of using payroll data to estimate hospital nurse staffing

Louise Winton Schreuders (BSc(Nursing), Grad Dip PH, PhD) a, *, Elizabeth Geelhoed (BSc, MPH, PhD) (Professor of Health Economics) a, Alexandra Bremner (BScHons, Grad Dip App Stats, PhD) (Associate Professor) a, Judith Finn (DipAppSc, BSc, Grad Dip PH, Med St, PhD, RN, RM, FACN, FAHA) (Director) b, Di Twigg (MBA MHlthSc, PhD, RN, FACN, FACHSM) (Professor of Nursing) c

a School of Population Health, The University of Western Australia, Australia
b Prehospital, Resuscitation and Emergency Care Research Unit (PRECRU), School of Nursing, Midwifery and Paramedicine, Curtin University, Australia
c Head of School of Nursing and Midwifery, Edith Cowan University, Australia

Article history:
Received 18 July 2015
Received in revised form 3 July 2016
Accepted 18 July 2016
Available online xxx

Abstract

Introduction: The capacity for a hospital inpatient unit to provide high quality nursing care depends on a complex range of factors. Accurately identifying and measuring these factors is one of the challenges of nursing care quality research. Nursing hours per patient day and skill mix are two quantifiable indicators of capacity to provide nursing care.

Aims: The aims of the study are to measure fortnightly, unit-level nurse staffing and compare them to target nurse staffing levels.

Method: Nurse staffing and inpatient unit movement data were sourced for the administrative records of three Western Australian tertiary metropolitan hospitals (2004–2008). The impact of data source on nurse staffing estimates was tested with linear mixed models, adjusting for financial year. Counts, proportions, means, and standard deviations were used to describe nurse staffing data. Bar graphs depict proportion of nursing hours provided by nurses of different skill levels.

Results: Data source did not significantly affect estimate of nursing hours per patient day (p = 0.788). Fortnights during which nurse staffing targets were not reached were recorded for all units. Skill mix varied between units with different staffing targets.

Conclusion: It is feasible to calculate fortnightly nursing hours and skill mix per hospital unit from raw nursing payroll and inpatient unit movement records. Fortnightly, unit-level measurement highlights nursing staffing fluctuations that are masked by annually aggregated data and are relevant for studies which investigate the association between nurse staffing levels and inpatient complication rates. Staffing shortfalls may affect nurses’ experiences of working or patients’ care experiences.

© 2016 Australian College of Nursing Ltd. Published by Elsevier Ltd.

1. Introduction

Nurses provide 24 h care to inpatients of hospital units as part of the health care team. There is evidence that patient health outcomes are directly influenced by the quality and quantity of nursing care provided on inpatient units (Kane, Shamiyian, Mueller, Duval, & Wilt, 2007; Subirana, Long, Greenhalgh, & Firth, 2014). Nursing hours per patient day and skill mix are two quantifiable indicators of capacity to provide nursing human resources. Currently these factors are not considered when providing and reflecting upon staffing requirements. Complex factors, both within and outside nurses’ control, interact to either enable or hinder their capacity to provide high quality care to patients (Griffiths, Jones, Maben, & Murrells, 2008; Needleman et al., 2011; Van den Heede, Clarke, Sermeus, Vleugels, & Aiken, 2007). Such factors include: appropriate numbers of skilled nurses with adequate experience and expertise; work environment; hospital commitment to inpatient safety; collaboration and communication between health professionals; and nurse burnout (Aiken & Patrician, 2000; Kane et al., 2007; Lake, 2007; O’Brien Pallas & Hayes, 2008).

* Correspondence: School of Healthcare, Baines Wing, University of Leeds, Leeds LS2 9JT, United Kingdom.
E-mail address: l.w.schreuders@leeds.ac.uk (L.W. Schreuders).

http://dx.doi.org/10.1016/j.colegn.2016.07.004
1322-7696 © 2016 Australian College of Nursing Ltd. Published by Elsevier Ltd.
Table 1
Nursing hours per patient day guiding principles (Twigg & Duffield, 2009).

<table>
<thead>
<tr>
<th>Unit category</th>
<th>NHpPD</th>
<th>Criteria for measuring diversity, complexity and nursing tasks required</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7.5</td>
<td>High complexity; High dependency unit (6 beds within a unit); Tertiary step down Intensive Care Unit; High intervention level; Specialist unit, tertiary level; 1:2 staffing</td>
</tr>
<tr>
<td>B</td>
<td>6.0</td>
<td>High complexity; No high dependency unit; Tertiary step down Coronary or Intensive Care Unit; Moderate to high intervention level; Special unit including Mental Health Unit; High patient turnover* &gt;50%</td>
</tr>
<tr>
<td>C</td>
<td>5.75</td>
<td>High complexity; Acute care unit; Moderate patient turnover &gt;35% OR Emergency patient admissions &gt;50%</td>
</tr>
<tr>
<td>D</td>
<td>5.0</td>
<td>Moderate complexity; Acute rehabilitation secondary level; Acute care unit; Moderate patient turnover &gt;35% OR Emergency patients admissions &gt;40%</td>
</tr>
</tbody>
</table>

* Turnover is defined as the number of admissions, transfers and discharges divided by bed number.

2. Background

Skill mix and nursing hours per patient day (NHpPD) are two quantifiable nurse staffing indicators used as measures of capacity to provide nursing care (Griffiths et al., 2008; Van den Heede et al., 2007). The term ‘skill mix’ refers to the proportions of hours of nursing care that are delivered by nurses with different skill levels; for example, university educated Registered Nurses (RNs), or vocationally trained Enrolled Nurses (ENs, similar to Licensed Practical Nurses in North America). NHpPD is the number of hours of nursing care required to meet each patient’s care needs in a 24 h period. The term NHpPD is used in two ways: by researchers to refer to a measure of nursing care (Van den Heede et al., 2007), and by nurse managers to describe a method of planning appropriate future staffing levels (Twigg & Duffield, 2009).

Planning appropriate staffing levels for units is challenging and requires a flexible approach in order to respond to changeable patient care needs. Using usual patient profiles for each unit, the NHpPD method takes into account multiple factors that impact on nurse workload to allocate units to categories which are then used to guide nurse staffing requirements (described in Table 1).

NHpPD are calculated by dividing productive hours worked by all nurses in a day by the number of patients on a unit in the same day. ‘Productive hours’ are those worked by nurses on specific inpatient units in direct patient care roles, and exclude hours during which education or leave occur. Specialist nurses (i.e. infection control nurse specialist) are not included here, though their productive hours contribute to patient care. Productive hours by nurses delivering patient care are the recommended nurse staffing predictor of inpatient complications in statistical modelling (Park, Blegen, Spetz, Chapman, & De Groot, 2015).

2.1. Data sources for measuring nurse staffing

Accessing suitable data sources for measuring nursing care indicators like NHpPD and skill mix can be difficult when conducting nursing care quality research (Clarke & Donaldson, 2008, Chp. 25). Nursing care quality research can require large datasets for statistical analysis and during the study period records of nursing hours per patient day and skill mix were not routinely collected at the fortnightly level and made widely available for research. Hospital nurse staffing levels are commonly measured using data sourced from two broad categories: firstly, prospective surveys of nurses about staffing levels and/or workload (Aiken, Clarke, Sloane, Lake, & Cheney, 2008; Duffield et al., 2011) and secondly, retrospective access to nurse staffing records (Blegen, Goode, & Reed, 1998; Needleman et al., 2011; Twigg, Duffield, Bremner, Rapley, & Finn, 2011). Nurse staffing records include hospital data submitted to regulatory bodies (e.g. numbers and educational attainment of nurses employed at a particular facility), operational records obtained specifically for the purpose of a research project (e.g. nurse staffing rosters), or data used for other functions necessary for the running of the hospital (e.g. nursing payroll records). Data may be reported for individual units or may be aggregated and reported at the departmental or hospital level. Records do not always distinguish between nursing staff with direct patient care roles and those caring for outpatients, and may be recorded over varying time periods (e.g. daily, fortnightly, quarterly or annually) (Blegen, 2006). Researchers can find that the calculation of the nurse staffing measure is dictated by data source access limitations, rather than the research question (Harless & Mark, 2006). Careful consideration of the limitations of different nurse staffing data sources is warranted since the measure of nurse staffing used has been found to affect the association between nurse staffing and inpatient complication rates (Brennan, Daly, & Jones, 2013; Jiang, Stocks, & Wong, 2006; Kane et al., 2007; Spetz, Donaldson, Aydin, & Brown, 2008). For example, payroll data are a record of nurses who must be paid for turning up to work which may or may not match the hours of care that were required by inpatients during the same period. Though systems such as NHpPD aim to ensure the nurses who turn up to work do match changeable patient care needs.

2.2. Using payroll data: outline and challenges

Hospital nursing staff payroll records have been used in the international literature to construct measures of nurse staffing (Blegen et al., 1998; Twigg et al., 2011). Nurse staffing payroll records for public hospital employees in Western Australia (WA) are centrally housed at the Health Corporate Network, part of the Western Australian Department of Health (WADOH). However, because nursing payroll data are collected for fiscal rather than research purposes, potential limitations include: not capturing nurses who ‘float’ (i.e. are moved from their usual unit to work somewhere different for a shift) to different units without cost-recovery; not accounting for non-direct patient care activities such as nurses being off the unit for short education sessions; and payroll data may not be as carefully updated when changes do not affect payment (i.e. if a nurse moves unit but does not change pay rate, payroll data may not be updated in a timely manner).

2.3. Western Australian context

In 2002 the WA government applied the NHpPD staffing method to plan the amount of nursing time required to meet patient care needs, and this effectively mandated minimum staffing levels on units in all public hospitals (Twigg & Duffield, 2009). Specific hospital units were observed and allocated to specific NHpPD target categories using the method. Guiding characteristics considered before a unit is allocated to a category include care complexity, turnover, and intervention levels (Twigg & Duffield, 2009). There are also specific NHpPD targets for units designated as tertiary, namely: Intensive Care Units (ICU, 31.5 h), Coronary Care Units (CCU, 14.16 h) or High Dependency Areas (HDA, 14.16 h). Patients in category A units (Table 1), for example, typically have highly com-
دریافت فوری
متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات