



## Discussion

## Nurse staffing and patient outcomes: Strengths and limitations of the evidence to inform policy and practice. A review and discussion paper based on evidence reviewed for the National Institute for Health and Care Excellence Safe Staffing guideline development



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## ABSTRACT

A large and increasing number of studies have reported a relationship between low nurse staffing levels and adverse outcomes, including higher mortality rates. Despite the evidence being extensive in size, and having been sometimes described as “compelling” and “overwhelming”, there are limitations that existing studies have not yet been able to address. One result of these weaknesses can be observed in the guidelines on safe staffing in acute hospital wards issued by the influential body that sets standards for the National Health Service in England, the National Institute for Health and Care Excellence, which concluded there is insufficient good quality evidence available to fully inform practice.

In this paper we explore this apparent contradiction. After summarising the evidence review that informed the National Institute for Health and Care Excellence guideline on safe staffing and related evidence, we move on to discussing the complex challenges that arise when attempting to apply this evidence to practice. Among these, we introduce the concept of endogeneity, a form of bias in the estimation of causal effects. Although current evidence is broadly consistent with a cause and effect relationship, endogeneity means that estimates of the size of effect, essential for building an economic case, may be biased and in some cases qualitatively wrong. We expand on three limitations that are likely to lead to endogeneity in many previous studies: omitted variables, which refers to the absence of control for variables such as medical staffing and patient case mix; simultaneity, which occurs when the outcome can influence the level of staffing just as staffing influences outcome; and common-method variance, which may be present when both outcomes and staffing levels variables are derived from the same survey.

Thus while current evidence is important and has influenced policy because it illustrates the potential risks and benefits associated with changes in nurse staffing, it may

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not provide operational solutions. We conclude by posing a series of questions about design and methods for future researchers who intend to further explore this complex relationship between nurse staffing levels and outcomes. These questions are intended to reflect on the potential added value of new research given what is already known, and to encourage those conducting research to take opportunities to produce research that fills gaps in the existing knowledge for practice. By doing this we hope that future studies can better quantify both the benefits and costs of changes in nurse staffing levels and, therefore, serve as a more useful tool for those delivering services.

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### What is already known about the topic?

- A number of high quality reviews establish an association between lower registered nurse staffing levels, increased mortality rates and other adverse outcomes.
- Careful analysis of this evidence suggests that it is consistent with a causal relationship.
- Translation of this evidence into practice is disputed.

### What this paper adds

- This paper summarises and extends a recent systematic review on nurse staffing and outcomes undertaken for England's National Institute for Health and Care Excellence.
- Methodological limitations mean that existing studies may not give unbiased estimates of the benefits from increased nurse staffing, with over and underestimation of benefit both possible, which makes it difficult to directly translate evidence into guidance for practice.
- We identify avenues for progressing this important research so that future studies might be better able to provide the evidence needed to inform policy and practice, and provide a checklist to aid future study development.

## 1. Introduction

Ensuring safe and effective levels of nurse staffing in hospitals is a major concern in many countries. A large and widely cited international body of evidence has linked low nurse staffing levels to higher hospital mortality rates. One of the seminal studies in the field, Aiken's study of 10,184 staff nurses and 232,342 surgical patients in 168 general hospitals in Pennsylvania, USA (Aiken et al., 2002), is among the most highly cited pieces of research about nursing, with 2022 citations on the Scopus research database (August 12, 2015). A systematic review of research confirming the relationship between low nurse staffing levels and adverse patient outcomes found 101 studies published up to 2006, mainly from the USA (Kane et al., 2007). Major studies have continued to be undertaken in countries around the world including Australia (Twigg et al., 2011), China (You et al., 2013), England (Rafferty et al., 2007), Thailand (Sasichay-Akka-dechanunt et al., 2003) and across 12 European countries (Aiken et al., 2012, 2014).

In England, the Francis Inquiry and the Keogh review into care provided by hospital trusts with high death rates identified inadequate nurse staffing as a significant factor associated with poor patient outcomes (Keogh, 2013; The Mid Staffordshire NHS Foundation Trust Inquiry chaired by Robert Francis QC, 2010). As a result of these inquiries, the Department of Health commissioned the National Institute for Health and Social Care Excellence (NICE), an independent body responsible for producing evidence based recommendations to the National Health Service in England, to develop guidance on safe staffing.

NICE applies the principles of evidence based practice to its guideline development process, considering evidence for both the effects and cost effectiveness of its recommendations (National Institute for Health and Care Excellence, 2014a). At the start of the guideline development process NICE commissioned a series of evidence reviews on safe staffing from independent researchers. In this paper we consider the evidence that we reviewed for NICE to support its guidance on safe nurse staffing on adult inpatient wards, in order to understand how NICE could have concluded that:

*"There is a lack of high-quality studies exploring and quantifying the relationship between registered nurse and healthcare assistant staffing levels and skill mix and any outcomes" (National Institute for Health and Care Excellence (NICE), 2014b, p. 27),*

...while others describe the extensive evidence concerning the association between nurse staffing levels and patient outcomes as "...compelling" (Royal College of Nursing, 2010, p. 39) and "...overwhelming..." (Joint Commission, 2005, p. 105).

In this paper we consider this evidence in order to understand its strengths and limitations and how these apparently contradictory assessments could be made. We begin by summarising the NICE evidence review and related studies before discussing challenges that arise in interpreting and using the evidence in practice and, in particular, applying it to quantify the benefits and costs of changes in nurse staffing. For brevity we do not cite every included study. Rather we describe overall patterns in the evidence and cite specific examples. We conclude by identifying strategies to increase the usefulness of future research studies for those charged with developing policies and guidance on safe nurse staffing levels.

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