

### In this article...

- Findings of a large study on the link between staffing levels and risk of death in an acute hospital
- How real-time bedside data and electronic records benefit researchers
- Why nurses and healthcare assistants should not be mixed in an overall measure of staffing

# Registered nurse and HCA staffing levels: the effects on mortality

## Key points

**In a recent study, lower-than-average staffing levels of registered nurses and healthcare assistants were associated with increased mortality**

**Higher-than-average registered nurse staffing levels were associated with decreased mortality**

**Higher-than-average healthcare assistant staffing levels were linked to increased mortality**

**Registered nurses and healthcare assistants are in no way equivalent**

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**Abstract** Findings of a new study by researchers from UK universities and a hospital trust confirm the large body of existing research showing that low nurse staffing levels are associated with a range of adverse outcomes, notably mortality. For each day of registered nurse (RN) staffing below the mean, the risk of death increased by 3%. The results were very different for healthcare assistants (HCAs), which shows that HCAs cannot make up for deficits in patient safety arising from shortages of RNs.

**Citation** Griffiths P, Missed Care Study Group (2019) Registered nurse and HCA staffing levels: the effects on mortality. *Nursing Times* [online]; 115: 1, 48-49.

There is a large body of research showing that low nurse staffing levels are associated with a range of adverse outcomes, notably mortality. Other research suggests that a richer skill mix in the nursing team is associated with better outcomes. Some studies suggest that adding healthcare assistants (HCAs) to the team may have a negative effect, even when the total team size is increased. The extent to which these studies demonstrate a causal relationship, however, is disputed (Griffiths et al, 2016).

Most studies estimate relationships at hospital level, making no direct link between staffing levels or the care experienced by individual patients and those patients' outcomes. Attention has now turned toward mechanisms that might explain these relationships.

Research has demonstrated that nurses report missing more care when staffing levels are low and suggests that, when this happens, outcomes are worse (Griffiths et al, 2018; Recio-Saucedo et al, 2018). However, these studies relied on nurses self-reporting and outcomes are associated with general reports of missed care, rather than specific care relevant to the outcomes.

Clinical and workforce data collected in real time at the bedside means analyses no longer need to use hospital-level averages; in addition, electronic care records give more objective measures of missed care. Using these two new types of data, our latest study considered staffing levels, as experienced by individual patients and care delivered to those patients.

## Aims and methods

We aimed to determine:

- Whether adverse outcomes occurred after hospital patients had been exposed to low nurse staffing levels;
- The effects of low staffing on more objective measures of 'missed care';
- The impact on mortality of higher than normal patient admissions.

Our study took place in 32 adult wards in a large NHS general hospital. Data was drawn from the patient administration system, cardiac arrest database, e-roster system, temporary staff booking records and an electronic system used for recording vital signs and other observations. It included 138,133 patients spending at least one day on one of the 32 wards between 1 April 2012 and 31 March 2015 inclusive.



## Clinical Practice Research

We used statistical models to explore the association between staffing levels and outcomes, controlling for patient and ward-level risk factors. As staffing requirements differ from ward to ward, we based our analysis on staffing relative to the mean for each ward; this means results show the effect of variation within, rather than between, wards.

### Results

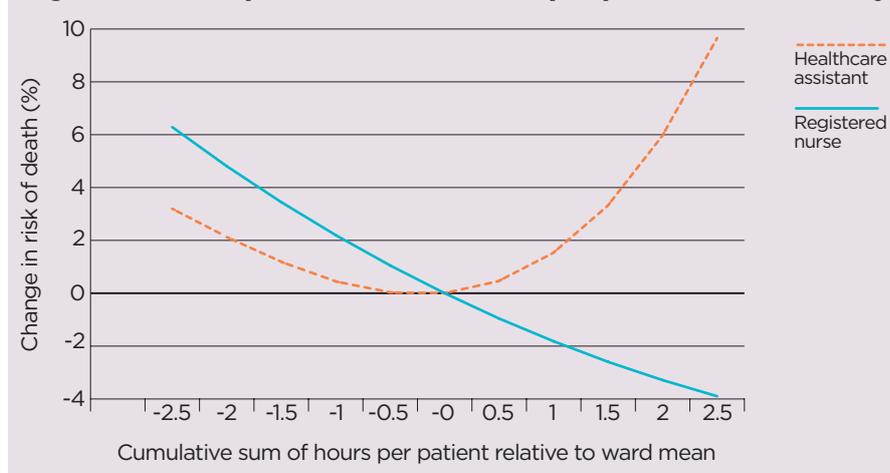
The data revealed that 4.1% of patients died, 16% of all observations were missed and 44% of observations for patients in high-acuity categories (National Early Warning Score 6+) were missed. The mean staffing level across wards was 4.75 registered nurse (RN) and 2.99 HCA hours per patient day, with an average skill mix of 60% RNs. Staffing was planned using the Safer Nursing Care Tool. While average staffing closely matched the plan, that for RNs was slightly less than planned and that for HCAs slightly more.

We focused on the first five days of each individual stay as this covered the majority of the hospital stay for most patients. For each day of RN staffing below the mean, the risk of death increased by 3%. Each additional RN hour per patient was associated with a 3% reduction in the risk of death. The absolute risk of death is low, so a 3% change is not large but many people are affected. We estimated that an increase of one RN hour per patient per day across the hospital would be associated with over 200 fewer deaths each year.

Exposure to days with below-mean HCA staffing was also associated with increased risk of death but the relationship was not simple, as reductions and increases in HCA hours were associated with increased risk of death (Fig 1). Days with a high number of admissions per RN were also associated with increased risk of death, as were days with high temporary staffing. We also saw small but significant reductions in the length of stay with higher RN staffing levels. HCA staffing per admission was not related to risk of death, but length of stay increased slightly with more HCA hours.

We estimated that matching average skill mix and staffing levels with that planned by the trust (on the average ward this equates to an increase of 0.32 RN hours per patient per day and a similar decrease in HCA hours) would be associated with a reduction in the mortality rate of about 2%, avoiding 50 deaths per year and releasing 4,464 bed days from shorter stays. Although staff costs would increase

Fig 1. Relationship between staff hours per patient and mortality



by £28 per patient, shorter hospital stays would mean there could be net savings.

### Discussion

Higher RN staffing levels were associated with lower mortality. Other results from the study confirmed a causal mechanism involving missed vital signs observations, reducing doubt that there is a cause-and-effect relationship.

We also confirmed that mortality rates increased when patient admissions per RN were higher than normal. Admissions are a significant source of work that are often not considered in approaches used to plan staff numbers – including the Care Hours Per Patient Day approach, which is used to judge the relative efficiency of nursing in hospitals (Carter, 2016).

Our findings about HCA staffing are complex. Previous research tended to be pervasively negative about the impact of unregistered nursing staff. We found that low HCA staffing levels were associated with increased mortality. However, any substantial variation above the average was also linked to increased mortality. It may be that lower HCA staffing adversely affects mortality because it reduces overall capacity, while higher HCA staffing generates additional demand for delegation and supervision from RNs. Recent research shows that newly qualified RNs, in particular, may struggle to manage delegation and supervision (Allan et al, 2016).

The very different results between RNs and HCAs confirm that these roles are in no way equivalent and any overall measure combining them potentially gives false results and reassurances about the adequacy of staffing levels. HCAs, while important, cannot make up for deficits in patient safety arising from RN shortages.

Although variation in staffing preceded the outcomes observed, this is an observational study and cannot prove cause and effect in itself but adds to a body of evidence that is increasingly hard to dismiss. **NT**

● This article summarises findings from: Griffiths P et al (2018) Nurse staffing, nursing assistants and hospital mortality: retrospective longitudinal cohort study. *BMJ Quality and Safety*; doi: 10.1136/bmjqs-2018-008043 (Bit.ly/BMJQSNurseStaffing) and Griffiths P et al (2018) Nurse staffing levels, missed vital signs and mortality in hospitals: retrospective longitudinal observational study. *Health Services and Delivery Research Journal*; 6: 38 (eprints.soton.ac.uk/419217). The study was funded by the National Institute for Health Research (NIHR) (Health Services Delivery and Research Programme grant 13/114/17). The views expressed are those of the author and not necessarily those of the NHS, NIHR or Department of Health and Social Care.

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