RN+RN = better care. What do we know about the association between Registered Nurse staffing levels and patient outcomes?

There is considerable evidence of an association between nurse staffing levels and patient outcomes. The evidence has been used to support calls for mandatory nurse patient ratios but the precise significance of the relationship remains unclear. This Policy+ examines the evidence in order to establish what is known, and crucially, what is not known?

What do we already know?

The evidence supporting an association between registered nurse staffing and patient outcomes is mainly derived from large observational studies conducted in North America, which focus on patient safety in hospitals. These studies, most notably the work of Linda Aiken[1] and Jack Needleman[2], show associations between nurse staffing levels and patient outcomes including mortality and failure to rescue.

A recent systematic review provided clear evidence of an association between the numbers of registered nurses and patient outcomes in acute care[3]. The meta-analysis, drawing data from 96 studies, many involving numerous hospitals and data from hundreds of thousands of patients, concludes that each additional Registered Nurse per patient per day was associated with a 4% decrease in the odds of death. The review also found consistent associations with other outcomes such as failure to rescue, reduced length of stay and hospital acquired pneumonia.

The authors estimated that an overall increase by one RN full time equivalent per patient day could save five lives per 1,000 hospitalised patients in intensive care units, five lives per 1,000 medical patients, and six per 1,000 surgical patients. However the relationship is not linear and the improvements in mortality are greater when moving up from the lowest staffing levels with diminishing benefits at higher levels of staffing.

But are such impressive benefits actually caused by higher nurse staffing levels? If they are not, the potential benefits will not be achieved by simply increasing the number of nurses.

Analysis of the results of the systematic review gives mixed evidence of a causal relationship[3]. For example, evidence for associations with outcomes such as pressure ulcers, falls and urinary tract infections, that are expected to be highly sensitive to nursing[4], is not clear.

Is the case clear?

The evidence of an association between nurse staffing and patient outcomes has been used in some countries to set mandatory nurse patient ratios but the expected benefits in terms of patient outcomes have not been realised[5]. A recent study in Belgium, found no association between nurse staffing and outcome at a hospital level[6], although significant variation in staffing levels between wards within hospitals was reported.

Other factors may also be at work. A UK study found that good human resource (HR) practices (sophisticated training policies, team-working and appraisal) reduced mortality[7]. This study controlled for medical but not nurse staffing.

The majority of studies have utilised data which are now more than 10 years old, covering a period in which there has been considerable change in both the patient population and the profile and roles of the workforce in the NHS and beyond. For nursing in particular there has been a recent upsurge in the use of tools for determining appropriate staffing[8] and managing an effective work force through the use of quality/outcome measurement[4].

What about the doctors?

Only a few studies have considered non- nursing staff alongside RN staffing. Most studies originate from North America where both medical and nurse staffing patterns are very different to those in the UK. While in the US, teaching hospital status (training undergraduate doctors) may serve as a proxy for numbers of doctors this is unlikely to be sufficient in systems such as the UK NHS, where most acute hospitals have resident medical staff.

One UK study found that mortality was higher in hospitals with fewer nurses[9] but this study did not consider medical staffing. An earlier UK study showed a significant association between nurse staffing and mortality when considered in isolation but not when other variables including medical staffing were included in the models[10]. This study found the number of doctors per bed to be the stronger predictor of mortality.

Studies in other countries confirm an association between outcomes and medical staff workload in ICU[11] and general medicine[12]. More recently, a preliminary analysis conducted by the NNRU and Dr Foster Intelligence concluded total clinical staff (predominantly doctors and nurses) was a better predictor than either the number of nurses or the number of doctors alone[13].

Conclusions and implications

- There is clear evidence of an association between low registered nurse staffing and some adverse outcomes.
- There is less evidence of benefit from increasing already high staffing levels.
- Current research does not allow for assessment of the impact of recent changes to the organisation of care and does not consider the extent to which crude relationships between staffing and outcomes are moderated by other factors.
- The observed associations between nurse staffing and outcomes may result from a 'halo effect' where hospitals with good nurse staffing are generally well resourced clinically.
- The time is ripe for further research. A major new European study, RN4CAST, will explore the relationship between nurse staffing, aspects of hospital organisation and patient outcomes across Europe. The English arm of this study, led by the NNRU, will be undertaken in 2009-10.

Key issues for policy

- Fixed nurse-patient ratios is an inflexible solution which is unlikely to lead to optimal use of resources
- Research which concurrently considers multiple factors is urgently needed
- Potential benefits of increasing registered nurse staffing are greatest where staffing levels are low
- While low registered nurse staffing levels should be considered a risk factor for poor quality care, increasing nurse staffing may not be a sufficient solution

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References and information

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