

Is it cost-effective to deploy more nurses on hospital wards?

Currently the National Health Service (NHS), in common with many health systems around the world, faces shortages of registered nurses. Common sense and a huge body of evidence suggest this is far from ideal to deliver high-quality patient care. In acute general hospitals, when there are fewer registered nurses, more patient care is missed, quality is reduced and patient outcomes are worse. But fixing the problem is likely to be expensive and it is important to ask if this is the best way to spend money in a resource-limited system. Are there alternatives to using registered nurses? In this Evidence Brief, we summarise a recent systematic review answering whether investing in registered nurses represents value for money, and considers whether using support staff with lower qualification levels might provide a more cost-effective solution to nurse shortages.

Could support staff be a potential solution to nurse shortages?

In the United Kingdom, the National Health Service (NHS) has experienced a significant shortage of registered nurses (RN), with high vacancy rates, for several years. Many countries face similar shortages of registered nurses. This motivates calls for further investment in nurse training and searches for alternative ways of staffing hospital wards. These include the creation of new cadres of nursing staff with lower levels of qualifications and increased use of unregistered support staff.[1, 2]

Extensive research shows that low nurse staffing levels are associated with increased risks of patient death. Other adverse events include falls, infections, extended hospital stays, and negative experiences for both patients and staff.[3] Such evidence has been used to argue for increased investment in training and improvements in registered nurse staffing levels.

However, showing that increased registered nurse staffing levels are linked to improved outcomes is not sufficient to provide a case for increasing them. Other options, including the use of support staff, are potentially less expensive, because of lower wages and training costs. However, this might affect the quality of care. In the face of budgetary constraints and workforce shortages, the relative costs and benefits (i.e. cost-effectiveness) of different investments need to be considered.

In this Evidence Brief, we summarise the results of a recently published review of economic studies,[4] which aims to identify costs and consequences associated with different nurse staffing configurations in acute hospitals.

Searching for research

The review included economic studies exploring the effect of variation in nurse staffing, including changes in the number of staff and changes in the mix of staff in the nursing team (skill mix) caring for inpatients in acute hospitals. We searched several healthcare databases, such

as PubMed, CINAHL and Embase. We made judgements about how reliable the results of the studies were (called 'risk of bias') using a framework based on the NICE guidance for public health reviews and Henrikson's framework for economic evaluations.

Support staff are cheaper but increasing skill mix is more cost-effective

In total, we found 22 relevant studies with data from 5900 hospitals and over 41 million patients. Most studies were conducted in the United States of America but we also found evidence from Australia, Belgium, China, South Korea and the United Kingdom. Studies were undertaken with various patient groups, but most were undertaken with general medical and surgical patients in general wards.

These studies were all 'observational', in that they relied on observing the effect of change in staffing or differences between hospitals, as opposed to randomised experiments where investigators actively change the skill mix or staffing levels. A small number of studies looked at the impact of planned changes to staffing through policy implementation. Fifteen studies were judged to be at high risk of bias and none had low risk. Nevertheless, the studies reviewed did include some relatively strong designs where the effect of daily staffing variation on individual patients was observed.

We grouped results according to whether they related to changes in nurse staffing levels (primarily registered nurse staffing) or changes in skill mix (generally the proportion of registered nurses in the ward nursing team). Some studies looked at changes in staff costs only (gross cost) while others also considered other costs associated with the hospital stay or, in some cases, beyond (net costs). The patterns of results are summarised in Figures 1 and 2.

Six studies found that increased registered nurse staffing led to improved patient outcomes and reduced or unchanged net costs, and so clearly favour increased

staffing as a policy. Most results indicated that higher staffing improved outcomes, but at a cost. For example, in a UK study conducted in a large hospital, when registered nurses provide one extra hour of care per day of a patient's stay, it was associated with over 200 fewer deaths per year at a cost of £150 per admission.[5] In such cases, a judgement must be taken to determine whether a change in staffing level is to be regarded as 'cost-effective'.

We considered a range of recognised criteria for deciding whether increased staffing might be cost-effective. Studies undertaken outside the USA, including some done in England, showed that increased nurse staffing was likely to be cost-effective at most thresholds, including a threshold of £10,000 per quality-adjusted life year, a level identified by NICE as representing 'exceptional value for money' (for new drugs).[6]

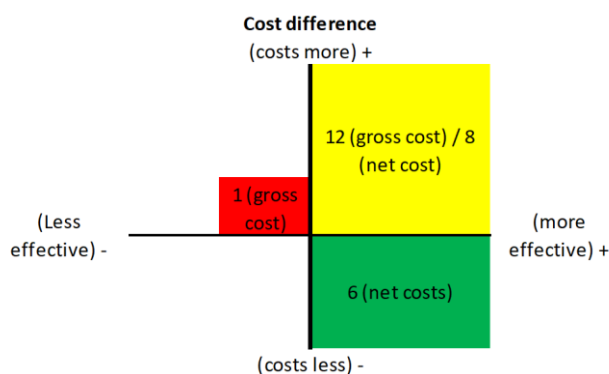


FIGURE 1 – DISTRIBUTION OF ECONOMIC STUDY RESULTS – RN INCREASES

In contrast, studies that looked at changes in skill mix provided no evidence that this was cost-effective or delivered improvement in patient outcomes (see Figure 2).

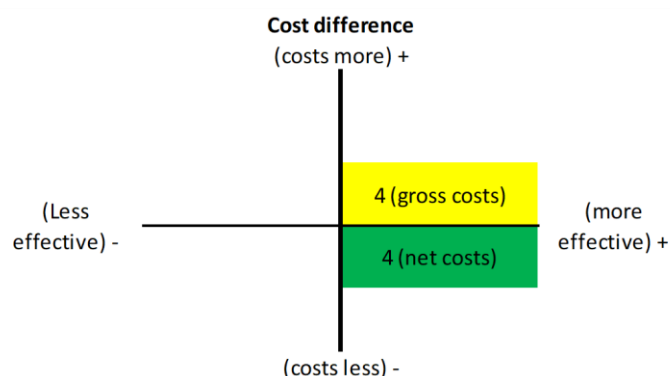


FIGURE 2 – DISTRIBUTION OF ECONOMIC STUDY RESULTS – SKILL MIX INCREASES

Even though support staff are generally cheaper to employ, all four studies that considered net costs found that a higher skill mix was, overall, less costly or cost the same while delivering improved outcomes. This was because of

reduced costs to treat complications or shorter hospital stays when the skill mix was higher. Studies that considered only staff costs found that a higher skill mix improved outcomes at higher costs, but increased skill mix still seemed cost-effective.

Conclusions

Because the evidence is observational, there remains uncertainty around the cost-effectiveness of registered nurse staffing increases, although existing evidence is generally favourable. The evidence of this review lends no support to policies that maintain or increase the size of the nursing workforce through skill mix dilution. In absolute terms, the evidence is limited but the conclusions are clear. Increasing the proportion of registered nurses is associated with improved outcomes and reduced net costs. Conversely reducing skill mix increases costs and makes outcomes worse.

- Evidence supports future investment in registered nurses as a cost-effective approach to staffing wards.
- Strategies to address nursing shortages that lead to a dilution of the skill mix are likely to lead to worse patient outcomes and potentially higher overall costs of care.

How to cite: Griffiths, P. & Ejebu, O (Ed). Is it cost-effective to deploy more nurses in hospital wards? Evidence Brief, University of Southampton. March, 2024.

References

1. Van den Heede, K., et al., *Safe nurse staffing policies for hospitals in England, Ireland, California, Victoria and Queensland: A discussion paper*. Health Policy, 2020. **124**(10): p. 1064-1073. [10.1016/j.healthpol.2020.08.003](https://doi.org/10.1016/j.healthpol.2020.08.003)
2. Twigg, D.E., et al., *The impact of adding assistants in nursing to acute care hospital ward nurse staffing on adverse patient outcomes: An analysis of administrative health data*. Int J Nurs Stud, 2016. **63**: p. 189-200. [10.1016/j.ijnurstu.2016.09.008](https://doi.org/10.1016/j.ijnurstu.2016.09.008)
3. Dall'Ora, C., et al., *Nurse staffing levels and patient outcomes: A systematic review of longitudinal studies*. International Journal of Nursing Studies, 2022. **134**: p. 104311. [10.1016/j.ijnurstu.2022.104311](https://doi.org/10.1016/j.ijnurstu.2022.104311)
4. Griffiths, P., et al., *Costs and cost-effectiveness of improved nurse staffing levels and skill mix in acute hospitals: A systematic review*. International Journal of Nursing Studies, 2023: p. 104601. [10.1016/j.ijnurstu.2023.104601](https://doi.org/10.1016/j.ijnurstu.2023.104601)
5. Griffiths, P., et al., *Nurse staffing levels, missed vital signs and mortality in hospitals: retrospective longitudinal observational study*. Health Services and Delivery Research Journal, 2018. **6**(38). [10.3310/hsdr06380](https://doi.org/10.3310/hsdr06380)
6. National Institute for Health and Care Excellence (NICE). *Changes to NICE drug appraisals: what you need to know*. 2017 [cited 2021 August 26th]; 04 April 2017]. Available from: <https://www.nice.org.uk/news>