Nurse staffing and patient safety in acute hospitals: Cassandra calls again?

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The risk of adverse patient outcomes, including death, is lower in hospitals that provide more registered nurses to care for patients on inpatient wards. The association has been demonstrated in a body of evidence comprising several hundred studies, involving hundreds of hospitals and millions of patients from around the world. The association has been shown at hospital level in large cross-sectional studies and in a growing number of longitudinal studies examining the effect of variation in staffing experienced by individuals.[1–3] In the context of such an extensive body of evidence, one might ask what could possibly be left to discover?

In this issue of *BMJ Quality and Safety*, Zaranko and colleagues contributed some important new evidence.[4] Their findings highlight further the potential consequences of the nursing shortages being experienced in many countries. Using data from 53 inpatient wards from three hospitals in the English National Health Service (NHS), the study focused on team size and composition, linking daily staffing rosters to patient outcomes. Adding an additional registered nurse to the average ward team on a shift reduced the odds of a patient death on that day by 9.6%. Adding more senior nurses (as measured by pay grade) had a larger effect than adding more junior registered nurses, whereas increases in assistant staff (healthcare support workers) and agency employed registered nurses were not associated with reduced mortality.

These findings support those of other studies that have used varied designs and taken different approaches to exploring team composition. A systematic review of 63 mainly cross-sectional studies found that a nursing team with a higher proportion of registered nurses was associated with lower mortality and other adverse outcomes.[5] Others using more sophisticated longitudinal designs have found beneficial effects from higher assistant staffing,[6] while research

published by our team in *BMJ Quality and Safety* in recent years has pointed to complex non-linear relationships between assistant staffing and quality, with possible interactions between assistant staffing and registered nurse staffing levels.[7 8] In general, this research all supports the same conclusion. Support staff are important members of the team, but they are not effective substitutes for registered nurses when it comes to maintaining patient safety. Without sufficient registered nurses to supervise support staff, benefits are not realised and harm can occur. Similarly, agency staff are not effective substitutes, with other studies indicating possible harms arising from heavy reliance on temporary staff.[9] Zaranko *et al* go beyond the existing research in showing the additional benefits of more senior registered nurses.

These findings are important because they highlight the importance of skill mix. Strategies that focus exclusively on increasing numbers to address staff shortages may be harmful if they lead to a dilution of skill mix or a reduced number of highly skilled staff, although such strategies are still advocated. Zaranko *et al*'s new study is also important simply because it offers more diversity to the methods used to demonstrate associations between nurse staffing and patient outcomes. Although many regard evidence that staffing levels and skill mix influence outcomes as statements of the obvious, questions about causal inference remain for others, with some senior figures, including health policy makers, appearing to dismiss the causal connection.[10] Despite the close alignment between staffing and outcome data in Zaranko *et al*'s research, this is an observational study, as is almost all other research on this topic. This research is novel in the way that daily staffing levels are associated with daily outcomes with direct linkage between patient outcomes and team composition. The fact that similar findings come from diverse study designs

lend increasing weight to a causal interpretation and the absence of experimental studies can no longer be used to dismiss evidence such as this as '*merely showing an association*'. Much like the denials of evidence for a causal association between lung cancer and smoking, maintained by senior figures in the tobacco industry well after the epidemiological evidence was clear, the proposition that staffing levels have no causal influence on patient outcomes seems increasingly absurd.

However, acting on the evidence is more difficult. In Greek mythology, Cassandra was a Trojan priestess and prophet, whose true prophecies were fated to be ignored. Similarly, the evidence on nurse staffing and patient outcomes has, in many respects, been effectively ignored by policy makers and those in charge of planning workforce requirements. Outright denial is rare, but effective action has not been taken, with inertia seemingly fuelled by a false belief that the consequences of predicted staff shortages could be averted. In the UK, a growing shortage of registered nurses is underpinned by a persistent failure to provide enough training capacity for the projected demand, in part supported by an assumption that demand could be reduced by using more support staff.[11] Enquiries into failings in hospital care have revealed inadequate nurse staffing as a core factor,[12 13] with low registered nurse staffing 'enabled' by use of support staff as a cheaper alternative. The NHS in England uses a benchmarking approach that equates productivity with care hours per patient day from registered and assistant staff combined, compounding the impression of a degree of equivalence and seemingly oblivious to the evidence that links skill mix and registered nurse staffing levels to the quality and safety of care. As we note below, there is even some evidence indicating that reducing skill mix reduces productivity.

So, why has the substantive body of research on nurse staffing led to so little action? In part, it might be due to national and local decision makers being affected by the normalcy bias, a cognitive bias that leads people to simply ignore warnings of imminent threat.[14] Perceptions about limitations of the evidence base have clearly inhibited decisive action in some circumstances. In developing guidance on safe staffing for England in 2014, the National Institute for Health and Care Excellence noted that evidence was of insufficient quality to inform decision-making. Yet many system changes are implemented in health services with far weaker evidence. For example, while electronic medical records seem an obvious necessity in modern healthcare, evidence of clinical or economic benefits from their implementation is sparse and often contradictory.[15]

The assumption that future changes in care delivery will dramatically alter the demand for staff has often underpinned optimistic appraisals that demand for staff can be reduced. Technology is often offered as the solution to workforce shortages but evidence to support such claims is scant and, in many cases, it appears that workload is increased.[16] Healthcare is labour intensive and likely to remain so for the foreseeable future. Extraordinary advances in health technology in the modern era have created opportunities to improve care outcomes but rarely do they remove the need for people to support the delivery of care. Improved modes of treatment alongside better housing conditions and a growing awareness of the adverse effects of simply being in hospital for a period of recovery have enabled hospitals to operate with fewer beds relative to activity but increased acuity of patients means that more nurses are required to safely staff each bed.

In many countries, a shortage in supply of registered nurses provides a seemingly compelling case to search for alternatives and innovation should not be ruled out, provided it is supported by evidence. What is less clear, as in the case of perennial failures of workforce planning in the UK, is whether those who control the policy levers, be they government departments commissioning training or those setting wages and working conditions, have ever fully committed to solving the registered nursing shortage with the one evidence-based solution we already know of—more registered nurses. It is unclear why this is the case. In part, local decision makers may feel powerless in the face of system supply issues or the pressure of finance directors to control costs. Certainly, any significant increase in the number of registered nurses appears to be potentially expensive for the simple reason that registered nurses are such a large proportion of the hospital workforce, and hence, the pay bill.

If the costs of expanding the registered nurse workforce could be a major factor inhibiting action, close attention has to be paid to the economics of nurse staffing and the relevant evidence. Generically, there is evidence that spending on healthcare gives a positive return on investment through increased population health, keeping more people economically active, in addition to the immediate contribution of the spending power of workers in this labour-intensive sector of the economy.[17] Government spend on healthcare can therefore make a significant contribution to economic growth. A position of principle that society simply cannot afford the additional expense of investing in nurse staffing must therefore be questioned and should never be taken as a given. Is nurse staffing the best investment to make in healthcare? In truth, that is a hard question to answer, although evidence indicates a possibility that increases in registered nurse staffing in acute hospitals may be cost-effective at a level that makes it a strong candidate for investment, and there is more evidence that a shift towards a more skilled nursing workforce could be cost neutral because of improved patient outcomes and more efficient use of beds.[8 18–20] More research into the economics of nurse staffing and approaches to determining staffing requirements (a field distinguished by a staggering volume of outputs but remarkably little progress[21]) is certainly needed, but that should not obscure the fact

that the current evidence provides some clear priorities for action.

In the 1990s, a compelling case was made by the evidence-based practice movement that implementing interventions that were already known to be effective was likely to provide a better return on investment than the discovery of novel treatments. Zaranko *et al*'s study contributes to a body of evidence that reinforces the same point about staffing health services. Investment in training registered nurses, including continuing professional education and developing a cadre of experienced and skilled senior clinical nurses, is an evidence-based solution that is likely to provide good returns. Perhaps it is time to stop looking for alternatives. It is certainly time to stop implementing solutions that are likely to be ineffective.

Cassandra prophesised the fall of Troy. With many now fearing the collapse of the publicly funded NHS in the UK in the face of staffing shortages that have been predicted for some time, the message of this research is that you cannot deliver safe modern healthcare without enough registered nurses, including senior experienced clinical nurses, on hospital wards. It is time that those able to make decisions at a local and national level listened and acted.

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