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Health Policy Matters

HELPING DECISION MAKERS PUT HEALTH POLICY INTO PRACTICE

This issue

Nursing Challenges: are changes in the nursing role and skill mix improving patient care?

Policy background

Policy makers throughout the world are striving to increase access to care and improve its quality within tight budget constraints. Pressures created by these policies are leading to radical changes in the role of health care professionals. As the nursing budget is a major element of NHS spending, particular attention is focused on the nurse's role.

The last decade has seen a significant change in the range of tasks undertaken by nurses. This was originally prompted by the reduction in junior doctors' hours, the publication by the UKCC of the *Scope of Professional Practice* and the skill mix review necessitated by the cost-consequences of the Project 2000 training proposals; but more recent drivers have included stringent government targets, doctor shortages and the requirements of the European Working Time Directive. In primary care, the number of practice nurses began to grow after the introduction of the 1990 GMS contract, when nurses began to run clinics, make preliminary diagnoses of disease and prescribe treatment for minor illnesses. More recently, nurse prescribing has been extended and policy statements have suggested further development of the roles of nurses and others in carrying out anaesthetics, endoscopy and surgery.[1]

Although the idea of nurses working in new ways and at an advanced level of practice is not entirely new, there is a lack of both clarity and control in relation to nursing roles and titles. Policy makers, practitioners, professional organisations, educationalists, administrators and the regulatory bodies have been unable or unwilling to define standards of nursing practice and determine the most appropriate and cost effective ways of delivering patient care. Clear definition of the roles, functions, levels of experience and expertise of specialist and advanced practitioners are absent in the UK, with the consequence that uncontrolled role developments and a large increase in nursing titles has occurred without systematic review or regulation, so creating confusion both within and outside the nursing profession. Furthermore, the lack of clarity regarding specialist and advanced nursing means there is no agreement about educational preparation for higher levels of practice.

Changes to nursing practice may involve either substitution or complementarity, ie. nurses may replace those undertaking other types of labour, or their activity may complement and enhance the work of others. Many express concerns about the capacity of the workforce to embrace new substitution roles whilst maintaining their traditional responsibilities.[2] In his report considering the future of the NHS, Wanless[3] stated that whilst staffing projections were sound, full exploitation of the potential for a transfer of work from doctors to nurse practitioners would have implications for capacity:

> "If 20 per cent of GP and junior doctors' work were shifted to Nurse Practitioners, this would eliminate any potential capacity constraint in doctor numbers. However, it would then introduce a potential shortfall in the supply of nurses."[3]

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Herein lies a major dilemma of any workforce study: it is not possible to evaluate changes in a profession's impact on service delivery and patient outcomes without taking into account its relationship with other groups.

These extra demands on the nursing profession are occurring at a time of nursing shortage. In some parts of the country, where particular problems have been experienced, agency nurses are widely used and delegation of nursing tasks to healthcare assistants has taken place. For instance, in Greater Manchester, the dearth of applications for registered nursing posts coupled with over-subscription to advertised healthcare assistant posts led to the development of a new role of assistant practitioner. Although a study has been commissioned to evaluate the acceptability and suitability of this new role, there are no plans to assess its impact on patient outcomes.

In the policy context of radical change, this paper addresses two questions: Firstly, what evidence exists concerning the safe and efficient transfer of work from doctors to nurses? Secondly, what is the evidence of the impact of change in the nursing workforce on patient outcomes?

What evidence exists concerning the transfer of work from doctors to nurses?

Most of the studies focusing on nurses substituting for doctors show that equivalent outcomes are achieved and that patients are at least as satisfied with the outcome.

In the UK the impact on patients in primary care settings has been considered in a number of systematic reviews.[4-6] These suggest that patients were more satisfied with nurse practitioners, who achieved greater patient compliance with treatment recommendations than did physicians. In most other respects, outcomes were equivalent although the nurses offered longer consultation times and ordered more investigations than GPs.

The authors of the recent Cochrane review[7] focusing on the substitution agenda within primary care analysed 25 papers describing a total of 16 studies examining first and subsequent contact (7 studies); urgent first contact consultations only (5 studies) and management of patients with chronic conditions (4 studies). It was found that there were no discernible differences between the performance of doctors and that of appropriately trained nurses as measured by a range of outcomes. In the case of urgent consultations, patient satisfaction was higher with nurse as opposed to doctor consultations. This may be the result of longer consultations in which nurses gave more information. The length of consultation did, however, result in the finding that the substitution was cost-neutral, with only one study achieving savings as a result of the replacement.

Hewitt et al[8] reported on several relatively poor quality studies that examined nurse-doctor substitution in hospital settings. They cite some evidence that nurses can manage people with arthritis and diabetes, and found that Parkinson's disease nurse specialists achieved outcomes similar to specialists. Other included papers examined the outcomes of nurses undertaking endoscopic or surgical procedures. Several of these studies evaluated the work of just one nurse specialist and few have attempted to explore the degree to which this model could be extended. The nurse practitioners appear to perform as well as junior doctors in treating minor injuries in accident and emergency departments, including the suturing of lacerations, and with similar costs of treatment and investigations.

In maternity care the research suggests that the substitution of midwives for doctors in low/average risk pregnancies is at least as safe, effective and acceptable to women as traditional medical care models. Midwifery care tends to result in fewer technological assessments, fewer interventions in labour and delivery, more natural births, and fewer instrumental vaginal deliveries. Outcomes such as morbidity, complications, caesarean section and satisfaction were comparable. There is also evidence of a higher incidence of breastfeeding and lower rates of admission to special care when midwives manage care.[8] This indicates that alternatives to hospital-based labour wards, such as midwife-led birth centres and similar initiatives may produce better outcomes at the same or lower costs.

With the exception of midwifery, the quality of the primary research is weak, and the substitution agenda itself is broad. Many of the roles, particularly in secondary care, have grown from one particular physician-nurse

relationship and have built on the skills developed by an individual. The fact that few studies report negative findings may imply that unsuccessful attempts at substitution have been abandoned early and/or are not thought to be worth publishing, which may render the available evidence somewhat over-optimistic.

In conclusion, there is evidence that nurses can substitute effectively for doctors in some areas. From a policy perspective it is necessary to consider not only whether substitution can result in a less differentiated workforce with at least similar patient outcomes, but also whether the substitution is cost-effective when training costs and the apparent lower productivity of nurses is taken into account.

What is the evidence of the impact of change in the nursing workforce on patient outcomes?

There is a substantial literature examining the impact of the nursing workforce on patient outcomes. Outcomes have been measured in a number of ways (table 1) and all have their limitations. We present the findings of the most recent well-conducted systematic reviews below.

1. US Agency for Healthcare Research and Quality

In a review designed to establish the impact of nurse staffing levels on patient outcomes, the US Agency for Healthcare Research and Quality (AHRQ),[9] concluded that, in both hospital and nursing home settings, rates of a number of complications and adverse events are inversely related to staffing levels. The authors concluded that increasing overall staffing levels would lower rates of medication errors and some non-fatal adverse outcomes, including pneumonia, shock, cardiac arrest, and urinary tract infections. The authors concluded that there was some evidence that the proportion of registered nurses (RN) to total care staff was a key variable, a finding echoed in two UK reviews.[11,12]

Table 1: Patient outcome measures used in nursing workforce level studies

Proposed outcome measure	Rationale	Drawbacks
Complication rate	Potential measure of hospital quality. Studies have measured infections (particularly urinary tract infections, wound infections and pneumonia), pressure sores, falls.	Difficult to differentiate between secondary diseases present on admission (co-morbidities) and complications developing during hospital stay. In UK, there is poor recording of complications.
In-hospital mortality rate	Unequivocal event.	Infrequent event. Misses deaths after discharge. Reveals nothing about the functional quality of life of "survivors", who are the vast majority of patients.
30 day mortality rate	Assumed to be a more accurate picture of outcome of healthcare.	Involves combining hospital and societal statistics.
Failure to rescue rate*	Takes into account the underlying complication rate	In the UK insufficiently complete data on complications.
Patient satisfaction	Easy to ascertain by questionnaire.	It is known to be significantly associated with patient factors such as age and gender and with a number of other factors including the mortality rate of the hospital and crucially, to patient expectation.

*defined as "the probability that the hospital failed to rescue the patient after the adverse occurrence" (Silber:[10] p616). Calculated by dividing the number of deaths by the number of patients with complications.

2. Centre for Reviews and Dissemination

In 2003, the UK Centre for Reviews and Dissemination (CRD) undertook an extensive review of the literature on patient safety,[11] drawing heavily on the AHRQ review in addition to other studies. Their review found evidence that an increase in registered nurse hours was related to a predicted reduction in

medication errors, patient falls, respiratory and urinary tract infections, skin breakdown and patient complaints.

3. NHS R&D Policy Programme

In a review undertaken for the English NHS R&D Policy Programme, Lankshear et al[12] examined the findings of 30 multi-hospital studies of acute care (large acute) conducted in the US, UK and Canada and 9 single-hospital studies (small acute) conducted in the US, France, Thailand and Taiwan. Their literature search also found 13 studies set in ICUs in the UK, US and Switzerland: 10 adult and 3 neonatal or paediatric. The majority of the primary studies included in the review are American and are based on the analysis of large databases that were created primarily for billing or administrative purposes. Any cross-sectional study of this type should adjust for patient case mix and hospital characteristics, and the studies included in the review met these criteria.

Whilst the majority of the evidence comes from cross-sectional analysis of large databases, recent longitudinal studies confirm the findings, lending strength to the argument that increasing RN numbers may generally improve outcomes of healthcare up to a certain level. These latter studies are of a more robust design than the cross sectional studies that preceded them, as they examine changes over time and compare hospitals with themselves. As a consequence, findings are less likely to be due to institutional differences.

Mark *et al* (2004)[13] undertook a longitudinal study of data provided by 422 hospitals (in 11 US states) to the Healthcare Cost and Utilisation Project National Inpatient Sample. The authors found that increasing the RN staffing levels had the effect of reducing pneumonia, urinary tract infections, decubitus ulcers and mortality. The size of the effect, however, was dependent on the base level of staffing – an increase in staffing in the poorest-staffed 25 per cent of hospitals showing the greatest quality improvement. Kovner *et al's* [14] analysis of post-operative data in 6 states in the US (numbers of participating hospitals changed year by year) for 1990 to 1996 revealed that RN hours per patient day reached the level of statistical significance for pneumonia. Finally, Unruh (2003)[15] found that in hospitals with higher RN and LPN (licensed practical nurse) staffing, lower incidences of atelectasis, decubitus ulcers, falls and urinary tract infections were found.

The review authors concluded that in acute settings, higher RN nurse staffing levels have been shown to be related to lower rates of a number of outcomes including healthcare associated infection; urinary tract infections; pneumonia; blood-stream infections; wound infections; pressure sores; medication errors and falls and to higher rates of patient satisfaction.

Since the completion of this review the Healthcare Commission's 2005 report[16] has offered further evidence, this time from 6000 wards in the UK, of a link between patient satisfaction and higher levels of RNs (but not total staffing). Higher RN numbers also correlate with fewer adverse events and accidents.

In intensive care units, the review notes that increased RN staffing has been associated with reductions in time needed to wean patients from ventilators, re-intubation rates and cardiac and other complications.[17,18]

In nursing homes, higher staffing has also been found to correlate with improved activity of living scores, better mental health status and lower numbers of deficiencies as assessed by certification authorities, but the link with

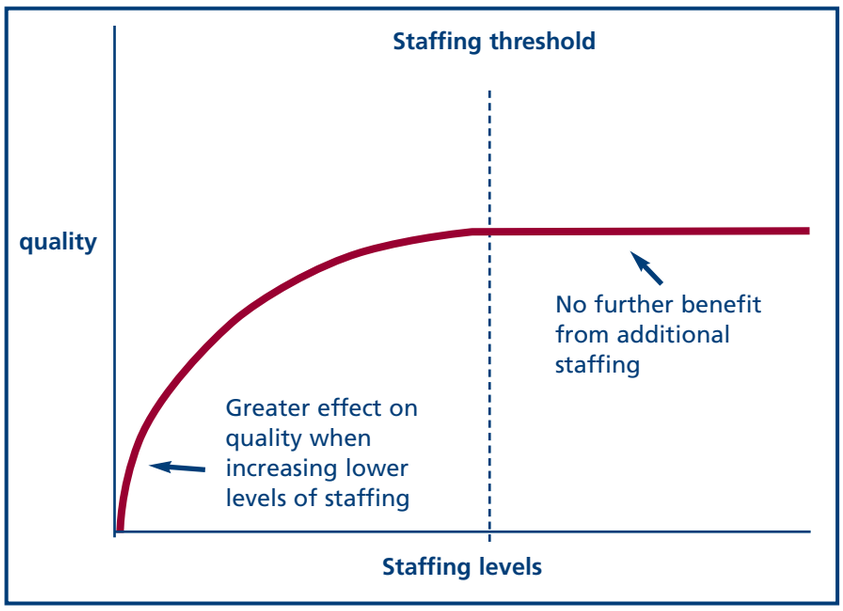

Fig. 1: Illustration of relationship between staffing and quality

RNs as opposed to other types of nursing staff is weaker. Schnelle *et al*[19] compared 21 Californian nursing homes and found that the most dramatic differences were reported for nursing assistant hours, and that the best staffed homes demonstrated significant differences on 13 of 16 care measures.

The review authors found a number of studies, in both surgical and medical patients, which have found an association between RN staffing levels and mortality.[20] One study[21] found that mortality and other complications increased as RN numbers fell, even if the total staff numbers rose. Other studies quoted, notably that by Needleman *et al*,[22] have found no correlation with mortality, although these authors did find a link between both the proportion of RNs and total nursing staff levels and failure-to-rescue. Jarman,[23] in work based on English data and well-known for describing a link between doctor numbers and mortality, also found a correlation between increased mortality and higher numbers of non-registered A grade staff, but none with total nurses per bed.

Lankshear *et al*[24] concluded that there is evidence from studies using different methods that RN staffing levels are associated with higher failure-to-rescue and complication rates. There is some weaker evidence suggesting an association between RN staffing levels and mortality. In Intensive Care Units and in acute hospitals the level and proportion of RNs appears to be of particular importance.

There are indications from some acute studies that the benefits are not simply a result of numbers of personnel, but are related also to level of training.[25] A number of studies have indicated a link between higher number of second-level nurses (State Enrolled Nurses, Licensed Practical/Vocational Nurses) and increased incidence of complications and mortality.[26,27]

The policy and research challenge is the identification of the nature of the functional relationship between staffing and patient outcomes at the level of the hospital and the specialism. If it is curvilinear (as Mark *et al*[13] suggest – see Figure 1) rather than linear (as Aiken[20] found) at what point do diminishing returns set in and is this level similar between hospitals in any one country, let alone internationally? Evidence about this relationship is essential, so that the investment level at which returns diminish is understood and staffing resources used cost-effectively. This obviously involves acceptance of some level of "optimality" where the costs of further nurse investment are not merited because the savings in adverse patient outcomes are less than the opportunity cost of such spending.

Future challenges

Policy challenges

With the exception of midwifery, the evidence on substitution, though consistent, is weak and only indicative, being derived from small and largely non-transferable studies. The unconvincing nature of the evidence has not slowed the march of substitution within the NHS. In many of the published studies, the individuals have 'grown into' their new roles over a lengthy period of time and there is a need to ascertain whether similar results can be maintained as the numbers expand.

There is little consideration in the literature of whether nurses are complements to or substitutes for doctors in the evaluation. Do the 'freed up' doctors shift their activity to other tasks, increase their activity, spend longer doing the same type of things as before or focus their attention on a smaller group of patients? These changes have not been evaluated. Consequently, because of shorter working hours and the observed increase in nurses' consultation time, substitution may not create cost savings. Furthermore, little is known about the long-term outcomes, such as nurses failing to diagnose serious illness. Are nurses competent to diagnose these and can they manage more complex cases efficiently?

The relationship between levels of RNs and patient outcomes is stronger, and suggests that diluting the RN mix may frustrate efforts to tackle infections and other adverse occurrences in hospitals. Although the mechanism is not entirely clear, it can be postulated that the early detection of complications and initiation of treatment is related to three factors: the number of opportunities for RNs to assess patients during a shift, sufficient capacity to respond proactively and the ability to persuade medical staff that urgent action needs to be taken. This last skill may assume greater importance with the further decline in the presence of junior medical staff in hospitals as a result of

the European Working Time Directive. The review[24] suggests that delegation of tasks from RNs to lesser-trained staff may, in acute settings, have a deleterious impact on outcomes, which suggests that the introduction of assistant practitioners should proceed cautiously and with careful measurement of the impact.

As a result of some of the high-profile studies, the US state of California and the Australian state of Victoria have both instituted minimum staffing ratios for qualified staff, set at one licensed nurse on duty for every six patients on medical and surgical wards, although California's intention to change this ration to 1:5 in January 2005 has been delayed for three years. These staffing levels are considerably higher than those in the NHS, where ratios of 1:10 or 1:12 have been quoted.

Training and education challenges

The implications for education and for its commissioning are significant, given the locally driven nature of the nursing role developments. It can be argued that nurses who prescribe and diagnose need a robust general education in the sciences, yet this is more difficult to achieve as the need to expand nursing numbers has led to a widening of the entry gate to include significant numbers with no formal academic qualifications.

Expenditure challenges

It is generally assumed that the costs of increases in staffing levels will be prohibitive, although if increasing RN staffing levels reduces complications and adverse events, then the net additional cost may be lower, even zero. For example, McCue *et al*[27] concluded that although hospitals experienced increased operating costs when they raised RN staffing levels, there was no significant impact on profit margins. Sovie and Jawad[26] found that when the percentage of RNs rose from a range of 40-50 per cent to 60-70 per cent, costs per discharge actually fell by 3 per cent. Other authors have argued that costs can be offset against the treatment costs of complications such as nosocomial infections, the cost of complaint management, the legal costs of medication errors[28] and negligent deaths.[29,30]

It is estimated that in the UK, 'adverse events' affect 10 per cent of admissions to hospital, some 850,000 people a year. The costs to the NHS alone are estimated to be in the region of £2 billion.[31] Medication errors are believed to account for around one quarter of all adverse incidents and Leape[32] attributes 38 per cent of them to nurses.

The House of Commons Public Accounts Committee estimated the annual incidence of hospital acquired infection to be 100,000 cases in England and Wales, costing as much as £1,000 million.[33] One UK estimate for treating decubitus ulcers puts the annual cost at £1.4–£2.1 billion (4 per cent of total NHS expenditure).[34]

Investment to reduce errors, including those attributable to nurse staff levels has to be carefully targeted. Unfortunately, the current evidence base is of limited use for resource allocation.

Conclusions

Large increases in the numbers of nurses and the expansion of their roles are taking place because of the Government's attempts to 'modernise' the NHS, funded by large increases in expenditure. The efficient use of this expenditure requires the NHS labour force, in the Prime Minister's phrase, to "act smarter". The resultant changes in skill mix and roles of nurses is considerable. However, in the context of the evidence base it is a large social experiment with significant risks for the patient and the taxpayer and poor evaluation of its costs and benefits.

Systematic evaluation of the costs and benefits (particularly their effects on patient outcomes) of these changes is essential if the NHS is to ensure adequate consumer protection and efficient use of society's scarce resources. Without large-scale evaluations of the effectiveness and cost-effectiveness of nurse substitution, this will be impossible to design and implement. The regulators responsible for performance might follow the lead of their US counterparts in developing a nursing report card for completion by institutions,[35,36] that gives access to information about staffing levels and the nurse-sensitive outcomes detailed in this *Health Policy Matters*. The Government is seeking to increase the flexibility of NHS institutions and its workforce by generating competition and an altered public-private mix for health care provision. The advantages of such policies may be considerable, but so may be the costs if the evidence base is ignored and if this limited knowledge is not augmented by increased research investment in the UK.

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