

A call to arms: The efficient use of the maternity workforce

Abstract

NHS maternity services in England must increase productivity if the NHS is to make efficiency savings by 2014. At the same time, it is expected to maintain or improve patient outcomes such as safety and quality. Given staff costs are 60% of the budget; it is likely that either the number or composition of the workforce will need to be changed to meet these targets. In this article, the authors argue that very little is known about the impact of altering the skill mix on either productivity or patient outcomes. Furthermore, it is unclear whether output and outcomes are themselves trade-offs between increased workload, increased number of deliveries and the increased complexity of demand.

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The subdivision of tasks along specialized skills can in many ways increase labour productivity within maternity services. Finding the optimal mix of these skills is central to maximizing output outcomes. Buchan (2005: 4) defined 'skill mix' as 'the mix of staff in the workforce or the demarcation of roles and activities among different categories of staff'. Maternity services is a labour-intensive discipline and identifying the 'right' mix of staff is of critical importance for managers and policymakers who are attempting to deliver high-quality maternity provision at the lowest cost (World Health Organization (WHO), 2000). There are two conceptually distinct 'outcomes' for maternity services: quality, represented primarily by patient safety and productivity. This is also embodied in the current NHS Quality, Innovation, Productivity and Prevention (QIPP) programme which seeks to improve quality and productivity simultaneously. While there is considerable evidence on the benefits of investment in improved patient safety, very little is known about the impact on a healthcare provider's efficiency and output of diverting resources to improve patient safety (Øvretveit, 2009). To date, these two 'outcomes' have been considered independently of each other and therefore there is scant evidence as to whether there is a trade-off between patient safety and productivity.

Given that the maternity service will need to make real-term cost savings while maintaining and, where possible, enhancing the quality of essential services (Appleby et al, 2010), it is necessary to understand the effect of any change from reduced

staffing, reconfigured settings or reconfigured skill mix on both the productivity and patient safety of maternity services. The key challenges are the need to improve productivity and quality of maternal health care outcomes, including safety, and understand how the maternity workforce might be organized to rise to these challenges. In this article, the authors argue that very little is known about the optimal skill mix in maternity services in the NHS nor even what it is that should be optimized.

Methodology

The methodology applied within this article was built on critical review of secondary literature. The systematic review provided an exhaustive summary of literature relevant to efficiency, safety and quality and the maternity workforce.

The first step of the review was a thorough search of the literature for relevant publications. Next, the titles and the abstracts of the identified articles were checked against pre-determined criteria for eligibility and relevance. To ensure that the searches undertaken were consistent and comparable, the method applied involved keywords and phrases derived from the research topic. These were then placed into categories and assigned keyword numbers to allow their strategic combination according to researcher impressions from a preliminary literature trawl: keyword 1 words were to be paired with every keyword 2 word once. These were 'efficiency' and 'maternity' respectively. The initial search returned a high number of references (that is, 100 or more), the second search was further refined by adding further keywords ('safety' and 'quality') to the search string (Chambers and McIntosh, 2008).

Publications were assigned an objective assessment of methodological quality using a rating system. The researchers kept a log of the search strings used and the results. Search logs were compared between researchers to ensure that the terms had been applied consistently (Saunders et al, 2007). This research was refined to 50 articles which directly addressed the topic under consideration.

The workforce

Staffing levels have been linked to improved patient outcomes in a range of healthcare organi-

zations. There is substantial international evidence showing that higher staff-to-patient ratios are associated with enhanced patient outcomes (Kane et al, 2007). Evidence has emerged of a similar relationship in the NHS (Rafferty et al, 2007; Shuldham et al, 2009; Griffiths, 2009). There is also literature on the optimal level of staffing in the US (Harris et al, 2004; Sucov et al, 2009) and some evidence of a medical staffing outcome relationship from both the US and the UK (Jarman et al, 1999; Pronovost et al, 2002). However, this literature is limited for comparison purposes, based mainly on research in acute services and academic hospitals. Recent research by team members has found associations between midwifery staffing levels and important outcomes including failure to rescue, extended hospital stay and readmissions (Gerova et al, 2010; Jones et al, 2010). In addition, better outcomes may be associated with a skill mix that is richer in medical staff) although this is not always the case (Griffiths et al, 2010).

There is no uniform definition of skill mix, and previous definitions used in reviews of this topic will be drawn on. In a report by the WHO 'skill mix' is defined as 'the mix of posts, grades or occupations in an organization ...' (Buchan and Dal Poz, 2002: 575). In addition, task shifting, delegation and substitution are also terms used (Laurant et al, 2005). Findings are compounded by problems of definition of skill mix and the fact that most studies tend to be of poor methodological design, largely reflecting descriptive accounts of single sites using small sample size, such as Dubois and Singh (2009). The majority of studies which focus on the effect of skill mix changes on patient outcomes are systematic reviews of the evidence base of substituting midwives and other health professionals with support workers and/or healthcare assistants on patient safety and quality outcomes. However, in general, there is limited and inconclusive evidence that changing workforce skill mix or substitution of roles in maternity care and other acute or primary care settings is associated with improved health outcomes or a reduction in costs.

A scoping review of the relationship between maternity workforce staffing numbers, skill mix, substitution and delegation, models of care, cost implications and safety found some evidence suggesting that consultant obstetrician and midwife staffing levels are linked to reductions in poor outcomes, and potential for support workers to be deployed more creatively in maternity services in terms of improving quality of care and freeing up midwife and medical time. However, the evidence for associated impacts on safety and quality outcomes is largely absent (Sandall et al, in press).

Quality

Quality in maternity care has been defined as comprising a number of different aspects. Dimensions of quality of care as defined by the Office of National Statistics (2010) as consisting of safe, effective, patient-centred, timely, efficient, and equitable care. Three of these dimensions have been taken up in the Next Stage Review (safe, effective, patient-centred care) (Appleby et al, 2009) and the Government White Paper, *Liberating the NHS* (Department of Health, 2010b), and all have been suggested by Midwifery 2020 (Chief Nursing Officers of England, Northern Ireland, Scotland and Wales, 2010). *Safe Births: Everybody's Business* defines safety at its simplest as 'the avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of health care' (King's Fund, 2008: 2). Maternal and perinatal outcomes can either be clinical (e.g. morbidity or mortality) or 'patient'-derived (e.g. quality of life or experience of care) (NHS Employers and Care Services Improvement Partnership, 2006).

While there is ample evidence on the benefits of improved patient safety, very little is known about the impact of diverting resources to this cause on a healthcare provider's efficiency and output (Øvretveit, 2009). The limited evidence points toward complex relationships between workload, efficiency and quality (Judge et al, 2006; Kc and Terwiesch, 2009; Masnick and McDonnell, 2010). While reduced complications and higher staffing may lead to reduced length of stay (improved productivity) this finding is not universally supported. Cost effectiveness and effective use of fixed resources involving alteration in the composition of the workforce is clearly dependent on wage differentials, and so replication and extension of these findings in other health economies is clearly warranted. It also seems clear from the existing evidence that there is unlikely to be a general relationship between skill mix and quality/productivity that is generalizable across care settings.

“ Few, if any, studies have considered the potential trade-offs between staff groups to optimize quality and efficiency nor have they attempted to explore differential effects on different outcomes simultaneously. ”



Quality maternity care involves safe, effective, patient-centred, timely, efficient, and equitable care.

Furthermore, all the above cited economic models are limited because the staffing variation observed in cross-sectional observational studies is assumed to cause the differences that are observed, and the effect of variation associated with staffing is assumed to be accurately estimated, even though for most studies there is little consideration of the staff deployed in relation to the particular group of patient outcomes examined. Deployment and allocation of staff within organizations needs to be considered as a potential confounding variable as well as a potential alternative approach to increasing the effectiveness and productivity of the workforce. Human resource management factors at an organizational level have been associated with improved outcomes, while organizational culture and aspects of the work environment have also been associated with enhanced outcomes. While calls for mandated staffing ratios remain, there is also renewed interest in using tools to match workload to staffing at a hospital/community level as a bottom-up approach (Smith et al, 2009). This, in theory, could maximize efficiency by matching staffing to patient need most closely but generally lacks full validation (Buchan and Calman, 2005). For example, midwife-led care which involves continuity and matching midwife input to the needs of women, is associated with several significant clinical benefits for mothers and babies, and increased satisfaction and had no identified adverse effects and reduced costs (Hatem et al, 2008).

Few, if any, studies have considered the potential trade-offs between staff groups to optimize quality and efficiency nor have they attempted to explore differential effects on different outcomes simultaneously. The range of staff groups considered in most existing research has been limited and of particular relevance, most studies in acute care have omitted consideration of medical staffing altogether. The use of observational data limits the ability to draw causal inferences and so the implications of observed associations remain unclear. Potential changes in the deployment and composition of the maternity workforce (including the emergence of enhanced assistant practitioner roles) raise significant questions regarding the most efficient use of scarce workforce resources and the extent to which clinical work can be safely and efficiently supported or delivered by other (currently unregistered) practitioners and/or support workers. There is a need to explore maternity staffing and outcome relationships and to incorporate economic modelling in order to clearly and rationally consider cost and operational efficiency implications.

The evidence base: Do more staff equal better outcomes?

Kane et al (2007) indicate that better quality care, improved outcomes or fewer adverse events are associated with higher levels of maternity staffing, although there are significant concerns about the ability to draw causal inference. This evidence has been used in support of policies of minimum staffing ratios for practitioners in acute care facilities (for example in California, USA and Victoria, Australia). While such policies have been identified as expensive (Buchan, 2005), economic arguments in favour of increasing staffing toward higher threshold levels have been developed (Dall et al, 2009; Van den Heede et al, 2009). This economic research generally supports the cost-effectiveness of increased staffing. These studies considered only a single staffing solution—increasing the number of qualified midwives. They also looked at only a limited range of provider costs, with Van den Heede et al (2010) referring to only qualified midwives. An earlier US study (Needleman et al, 2006) showed how consideration of skill mix (represented by different grades of licensed nurses) might lead to dramatically different conclusions. Using techniques from production economics, Newbold (2008) suggested that for a given cost, employing fewer but better qualified midwives may be the optimal approach to delivering safe care in terms of mortality.

The literature examined so far points to a relatively simple gradient of improving outcomes with more qualified midwives, and improvements in both outcomes and cost-effectiveness with a richer skill mix. However, when other staff groups are considered the results are ambiguous. Moving beyond this the economic evaluations of substituting doctors with midwives (which could be construed, in part, as involving a dilution of skill mix) also suggest that such substitution can be cost-effective or lead to a net cost reduction. While midwives-for-doctor substitution is broadly supported by an evidence base from clinical trials (Goryakin et al, 2011), this does not give immediate cause for optimism that significant cost savings could be achieved from altering the skill mix of the workforce without adversely affecting quality. Previously, associations between midwifery staffing levels and important outcomes including extended hospital stay and readmissions (Gerova et al, 2010; Jones et al, 2010) have been demonstrated but when other staff groups are considered, ambiguity and complexity is revealed. There is ample evidence that increasing single staffing inputs is associated with improved patient outcomes, and very little is known about the effect of changes in skill mix on patient outcomes or efficiency.

Limitations in the current research base

According to Goryakin et al (2011), there is limited literature on the effects of overall staff levels on outcomes. Jones et al (2010) note that while there are some hospitals that have relatively low staffing levels but appear to produce good outcomes, there are also hospitals with high staffing levels that appear to produce poor outcomes. This suggests that high staffing levels may be merely indicative of aspects of care. Similarly, it is unknown if reductions in overall staffing levels would produce a deleterious effect on outcomes.

The range of staff groups considered in most existing research has been limited (generally to nursing) and most studies in acute care have omitted consideration of medical staffing altogether, with Jarman's (1999) study being one of the few to consider both groups concurrently prior to Jones et al (2010). Other work suggests that, in some cases, better outcomes may be associated with a skill mix that is richer in medical staff (Gerova et al, 2010; Jones et al, 2010) although this is not always the case (Griffiths et al, 2010). There is a growing literature on the optimal level of staffing for doctors from the US (Harris et al, 2004; Sucof et al, 2009) and some evidence of a

medical staffing outcome relationship from both the US and the UK (Jarman et al, 1999; Pronovost et al, 2002). Other evidence that considers medical staffing suggests complex inter-relationships between workload, efficiency and quality (Judge et al, 2006; Kc and Terwiesch, 2009; Masnick and McDonnell, 2010).

From an economic perspective, there is a very limited evidence base on the effect of skill mix on output and hence productivity. Studies by Thurston and Libby (2002) and Jensen and Morrisey (1986) are limited in that they are both US-based studies which investigate primary care physicians and hospital physicians respectively. The question as to whether (and to what extent) staff roles are substitutes or complements has practical relevance for understanding the effect of workforce changes on hospital output and productivity. Yet the authors have not found any relevant research from the UK, or any research that looks at both maternity services and medical skill groups simultaneously. Further, there is no research investigating the role skill mix plays in explaining observed differences in productivity. Significant gaps have been identified in the existing evidence base. Decision-makers need evidence that demonstrates the effect of reconfiguring the workforce on both patient outcomes and service output simultaneously.

There is no concrete scientific 'evidence' to justify what the optimum level of labour supply should be, the issue is politicized; however, in 'high reliability organizations' there is an emphasis on the importance of flexibility of working. It could be argued that more staff is conducive to producing better outcomes, but only as long as this 'overlap' and 'role-sharing' between different professional groups is well thought through and crafted. The use of observational data limits the ability to understand these processes and there is scope for 'task analysis' or 'work domain analysis', combining observational data with more statistical outcome data, to evaluate the efficiency of quality and safety of a work unit. However, it is crucial to create an environment where safety is ensured and built-in, so that the politicization process will not get in the way of redesigning the workforce.

Conclusions

The midwifery workforce (including both registered and unregistered practitioners engaged in delivering or supporting midwifery care) represents a significant resource in enabling change but also a significant proportion of NHS staff expense. The Department of Health (2009) has stated that workforce planning should flow explicitly from agreed service strategy and that the future work-

Key points

- Potential changes in the deployment and composition of the maternity workforce raise significant questions regarding the most efficient use of resources
- The extent to which clinical work can be safely supported and delivered by other currently unregistered practitioners and/or support workers remains inconclusive
- Productivity has increased but the potential trade-offs between staff groups to optimize quality and efficiency remains unclear
- The use of observational data limits the ability to draw causal inferences and the implications of observed associations remains opaque

force should be characterized by having the right people, with the right skills, in the right places, at the right time. This will require fundamental changes in the way that staff are deployed and services are delivered to improve productivity and quality outcomes. There will be substantial pressures to improve productivity by developing new ways of working, creating new assistant and advanced practice roles and increasing the flexibility and adaptability of the maternity workforce.

The Department of Health's *National Service Framework for Children, Young People and Maternity Services* (Department of Health, 2004), with a 10-year timeframe for implementation, and *Maternity Matters* (Department of Health and Partnerships for Children Families and Maternity, 2007), are consistent in the commitment to deliver a choice of safe, accessible, high-quality maternity care, which is women-focused and family-centred. Underpinning principles include the view that pregnancy and birth are normal life events, maximizing the opportunity for all women, regardless of risk profile, to have as physiological and positive a birth experience as possible. In 2008, the report of the independent inquiry commissioned by the King's Fund (2008), *Safe Births: Everybody's Business*, and the Healthcare Commission's review of maternity services, *Towards Better Births* (Commission for Healthcare Audit and Inspection, 2010), identified similar areas in need of improvement, including staffing, training and communication. Together with a number of other reports, guidance documents and reviews over the past few years, they identified the challenges for maternity services and set out recommendations.

Strategic approaches to maternity support worker development are underway at a national level in Scotland, Wales and Northern Ireland and at a more local level in England (NHS Employers and Care Services Improvement Partnership, 2006) although within a national initiative. Support workers are perceived to play a key role

in the future maternity workforce and although the role has been established for some time, there has been little overview of who makes up the support workforce, what they do, and what competencies they possess. However, no research has been done in relation to operational efficiency of maternity provision in relation to workforce skills mix. Areas identified requiring further research included exploring the impact of the support worker role on outcomes for mothers and babies, the cost-effectiveness of the support worker role at different levels of training and scope of practice, and exploration of the views and experience of women receiving care from support workers (Sandall et al, 2011). As the NHS moves into a time of constrained public resources which may require efficiency savings, very little is known on the optimal combination of labour inputs to achieve efficient production of safe and high-quality maternity care. and this is essential. The authors call for further research in the light of the anticipated reforms of maternity services. **BJM**

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