



This is an abridged version; the full version is on [bmj.com](http://bmj.com)

## Prospective semistructured observational study to identify risk attributable to staff deployment, training, and updating opportunities for midwives

Brenda Ashcroft, Max Elstein, Nicholas Boreham, Soren Holm

School of Health Care Professions, University of Salford, Greater Manchester M6 6PU

Brenda Ashcroft  
*lecturer*

Institute of Medicine Law and Bioethics, University of Manchester, Manchester

Max Elstein  
*emeritus professor of obstetrics and gynaecology and reproductive health care*

Soren Holm  
*professor of clinical bioethics*

Institute of Education, University of Sterling, Scotland  
Nicholas Boreham  
*professor of education and employment*

Correspondence to:  
B Ashcroft  
[B.Ashcroft@salford.ac.uk](mailto:B.Ashcroft@salford.ac.uk)

*BMJ* 2003;327:584-6

### Abstract

**Objective** To identify potential risk or mishap in the system of intrapartum care, relating to the deployment of midwives.

**Design** Prospective semistructured observational study.

**Setting** Labour wards of seven maternity units in the north west of England.

**Participants** All midwives working on the labour ward during the observation period in 2000.

**Main outcome measure** "Latent failures" within the system relating to midwifery staffing levels, deployment, and training or updating opportunities.

**Results** Despite the exemplary dedication of midwives, potential risk of mishap due to their deployment occurred within the system of care. A shortfall of midwives existed in all seven maternity units and was most acute in the largest units. Six units relied on bank midwives to maintain minimum staffing levels. High risk practices (oxytocin administration and epidural blockades) continued during midwifery shortfalls in all units. Some adverse events and "near misses" were attributable to midwifery shortages in all units, and near misses remained unreported in all units. Uptake of opportunities for training or updating in interpretation of cardiocographs and obstetric emergency management remained low owing to midwifery shortages in all units. A poor skill mix of midwives occurred at times in all units. In six units midwives spent time away from clinical areas performing clerical duties. In three units team midwifery systems were reported to erode labour ward skills and confidence.

**Conclusion** Midwives are fundamental components in the system of intrapartum care, and the system cannot operate safely and effectively when the number of midwives is inadequate, midwives are poorly deployed, and they are unable to engage in opportunities for training and updating.

### Introduction

Factors associated with adverse outcomes in maternity care have previously been identified by retrospective analyses of records.<sup>1-4</sup> We present findings from a pro-

spective study of observations made in a systematic manner, combined with information obtained from interviews with staff and examination of documents. By adopting this approach, we hoped to identify latent failures in the system or "accidents waiting to happen."

### Methods

#### Participants

We did the study in the labour wards of seven maternity units in the north west of England, geographically distributed and selected to cover a range of facilities. These included large inner city units and smaller provincial units. All had level 1 compliance for the requirements of the clinical negligence scheme for trusts.<sup>5</sup> Three units used team midwifery systems, whereby midwives worked on the labour ward on infrequent occasions. Other units allocated midwives to the labour ward for approximately three to six months. We interviewed all midwives working on the labour ward during the visit (204 team and core midwives), after informing them that the purpose of the study was to examine the organisation of care and identify risk within the system and not to question individual practice. This formed a random sample of a constantly fluctuating labour ward workforce.

#### Assessment tool

We minimised researcher bias by using a semistructured tool. This consisted of three parts: directing essential observations, guidance for interviews, and guidance for collecting documentation on work practices (see [bmj.com](http://bmj.com)).

*Observation of the organisation of care*—We used the tool to observe systematically each labour ward's organisation of care. This observation covered the 24 hour period and took place over seven days (a total of 48-52 hours' observation). Visits took place in offices, delivery rooms, and operating theatres. A follow up visit over one day took place in the next year on completion of the study; it revealed little change.

*Informal interviews*—We informally interviewed all midwives on duty on the labour ward at opportune moments. We used open and closed questions.

*Documentation of work practices*—Documentation included adverse event criteria and reports, any near miss reports, midwifery staffing rosters, work boards,

birth records, admission and discharge records, theatre lists, induction of labour lists, documentation identifying provision and uptake of training, and unit protocols.

We made our findings through a triangulation of the above three sources to ensure validity. The semistructured tool yielded comparable information across the seven units when we repeated the process.

## Results

Themes related to staff deployment and training emerged, highlighting latent failures or “accidents waiting to happen.”<sup>6</sup> Some adverse events and near misses occurred through midwifery staffing shortages. Although schemes for analysing adverse events operated in most units, reporting and inclusion criteria varied across the units. Adverse events and near misses share the same underlying causes,<sup>7</sup> and therefore provide learning opportunities, but no reporting schemes operated in any unit.

### Adverse events and near misses

During the study, we directly observed one adverse event and 15 near misses. These were predominantly related to midwifery staffing shortages, and midwives from all units reported that such shortages were commonplace. To identify the frequency of such risks, we collected evidence from duty rosters and records of admissions, transfers, and births for the three calendar months preceding the visit. The adverse event in box 1 is an example discovered during the week preceding the visit.

The collection of near misses involved only cases in which a shortage of at least three to four midwives occurred during critical periods, such as deliveries. In total we identified 153 near misses due to midwifery shortages during each three calendar month period, and of these we had directly observed 12 during visits. This suggested that one such near miss occurred on average every 2.5 to 5 days, most often in units with the highest number of deliveries and complications. Box 2 gives an example of a near miss observed during one night shift.

### Shortfall of midwives

According to professional recommendations,<sup>8</sup> and each unit's own staffing specifications, all labour wards experienced midwifery staffing shortfalls and poor skill mix, resulting in reliance on bank midwives to maintain minimum staffing levels in six units. The shortfalls were exacerbated when midwives were inappropriately assigned away from clinical duties, duplicating information from case records on to computers.

#### Box 1: Adverse event 1 (reported by staff)

A decision was made to perform an emergency caesarean section on a woman at term, with a low lying placenta, an unreactive cardiotocograph trace, and fetal bradycardia. The procedure had to be delayed for two hours, as the five midwives on duty on the labour ward were too busy caring for other women in labour to assist in the maternity theatre. Staffing levels elsewhere on the unit precluded assistance. The infant survived in a poor condition.

#### Box 2: Near miss 1 (directly observed)

A woman with a twin pregnancy needed an emergency caesarean section, after induction of labour that morning at 38 weeks' gestation. Three midwives would normally assist. Although six midwives were on duty, three other women had entered the second stage of labour at this time, and each birth needed two midwives. No assistance was available from elsewhere. Consequently, the caesarean section was delayed for an hour until the three other women had delivered.

Shortfalls were observed and confirmed during interviews and on evidence from duty rosters, clinical workbooks, and computer printouts.

### Use of team midwifery systems

Team midwifery systems operated in three units in response to *Changing Childbirth*,<sup>9</sup> in an attempt to provide 75% of women in labour with a known midwife. Each shift had two non-team based midwives who remained on the labour ward and supported the others, but most of the midwives with substantial labour ward experience were displaced into community based teams and worked in the labour ward infrequently. We interviewed a total of 65 team midwives, and most of them (21 out of 27 in one unit) worked only two to four shifts a month on the labour ward, which they felt was insufficient to maintain their skills and confidence.

### Latent failures relating to high risk practices

Women having oxytocin infusions and epidural blockades need increased midwifery supervision,<sup>8</sup> so shortfalls increase the risk associated with these procedures. Unit statistics identified annual rates of oxytocin induction or augmentation of between 25% and 59%, which was highest in units with most deliveries, complications, and staffing deficiencies. Similarly, annual rates of epidural anaesthesia (11-33%) were highest in units with the greatest staffing shortages. Analysis of the previously identified three months' near misses revealed that 78-95% involved the use of oxytocin, epidural blockades, or both during labour.

### Uptake of opportunities for training or updating

Observations, interviews, and documentation revealed that opportunities for training or updating in interpretation of cardiotocographs and emergency obstetric management were provided only during working hours. Therefore busy periods and staffing shortages prevented uptake of scheduled training sessions.

## Discussion

Shortfalls in midwifery staffing levels seemed to be widespread across the units, and are a common finding.<sup>10 11</sup> However, the shortfalls were most acute in three units with the largest numbers of deliveries per year, with large numbers of high dependency or complicated cases, and with high annual rates of oxytocin use (25-49%) and epidural blockades (17-33%). This study has shown that midwifery shortfalls are the underlying cause of some adverse events and many more “near misses.” None of the units we visited operated a near miss reporting system, and therefore the cases identified in this study simply remain silent—that is, warnings that went unheeded.

### What is already known on this topic

Factors associated with adverse outcomes relate to recognised national shortages of midwives, inadequate fetal monitoring, and poor interpretation of cardiotocographs in birth asphyxia cases

Further problems are failure to respond to cardiotocographic abnormalities and delay in summoning medical assistance and involving senior staff

### What this study adds

All maternity units experience midwifery staffing shortages, and most units rely on bank midwives to maintain minimum staffing levels

Adverse events occur as a result of midwifery staffing shortages; "near misses" due to staffing shortages occur frequently and remain unreported

Poor skill mix of midwives exists at times, and midwifery shortages prevent uptake of opportunities for training or updating

No contingency plans existed in any of the units to cope with the unexpected surges in demand for care that occur frequently on labour wards. During intensely busy periods, when shortfalls were most acute, senior midwives in charge of the shift were unable to provide support for inexperienced midwives.

Unless protected time is provided for midwives for training in interpretation of cardiotocographs and emergency obstetric management,<sup>1-3 5 8</sup> training during working hours will remain low owing to staffing shortages. Implementation of information technology has also increased the midwifery workload, and we suggest that clerical aspects of midwives' work could be delegated.

Although team midwifery systems may meet the challenges of *Changing Childbirth*,<sup>9</sup> relatively inexperienced midwives occasionally have to work in an intensive care situation on the labour ward with high risk cases. When such work is sporadic, the development of necessary skills becomes very difficult, creating stress for the midwife and risk for the client. Skill mix within the labour ward also depends on cover provided from other teams, but independent planning of duty rosters means that overall labour ward skill mix becomes less predictable. Consideration should be given to whether the risks generated by team midwifery systems outweigh the benefits of attempting to provide continuity of care.

### Conclusion

We observed many latent failures ("accidents waiting to happen") in this study. Inadequate midwifery staffing levels and ineffective deployment of midwives remain essential failings in the system of care and are the foundation of many adverse events and "near misses."

We thank the staff of the seven anonymous maternity units that took part in this study and the midwives, whose dedication and commitment to work was commendable.

Contributors: See [bmj.com](http://bmj.com)

**Funding:** The research received funding from the NHS Executive North West R&D, whose encouragement and advice has been appreciated. Additional funding was from the North West Lancashire Health Authority and the University of Salford. The guarantor accepts full responsibility for the conduct of the study, had access to the data, and controlled the decision to publish.

**Competing interests:** None declared.

**Ethical approval:** The North West multicentre research ethics committee approved the study, as did each of the seven trusts' local research ethics committees.

- 1 Maternal and Child Health Research Consortium. *Confidential enquiry into stillbirths and deaths in infancy*. (Fourth Annual Report.) London: Department of Health, 1997.
- 2 Vincent M, Ennis CA. Obstetrical accidents: a review of 64 cases. *BMJ* 1990;300:1365-7.
- 3 Wilson J. Protecting clients—protecting yourself: the legal and risk management issues of midwifery. Presentation to Application of Clinical Risk Management to Midwifery Conference, Nottingham Trent University, Nottingham, 9 September 1996.
- 4 Department of Health. *Why mothers die: report on confidential enquiries into maternal deaths in the United Kingdom 1994-1996*. London: Stationery Office, 1998.
- 5 National Health Service Litigation Authority. *Clinical negligence scheme for trusts: clinical risk management standards*. Bristol: Willis, 2000.
- 6 Reason J. *Managing the risks of organizational accidents*. Oxford: Oxford University Press, 1997:126.
- 7 Van der Shaff TW. Development of a near miss developmental system at a chemical process plant. In: Van der Shaff TW, Hale AR, Lucas DA, eds. *Near miss reporting as a safety tool*. Oxford: Butterworth-Heinemann, 1991.
- 8 Royal College of Obstetricians and Gynaecologists, Royal College of Midwives. *Towards safer childbirth: minimum standards for the organisation of labour wards*. London: RCOG Press, 1999.
- 9 Department of Health. *Changing childbirth: report of the Expert Maternity Group*. London: HMSO, 1993.
- 10 United Kingdom Central Council for Nursing, Midwifery and Health Visiting. *Statistical analysis of the UKCC's professional register 1 April 1997 to 31 March 1998*. London: UKCC, 1998:9-14.
- 11 Dimond B. Crisis in midwifery staffing: the legal aspects. *Br J Midwifery* 1998;6:755-7.

(Accepted 15 July 2003)

### Corrections and clarifications

#### *Improving compliance with requirements on junior doctors' hours*

Confusion at the editing stage about material submitted for the web and for the paper journal resulted in figure A being omitted from the web and another being labelled incorrectly in this Quality Improvement Report by Hilary D Cass and colleagues (2 August, pp 270-3). Figure A is now available on the web (<http://bmj.com/cgi/content/full/327/7409/270/DC2>). The figures labelled Figure 2a phase 1 and Figure 2b phase B should have been labelled figures Ba and Bb. The remaining figures (1a, b, c, and d; 2a, b, c, and d; and 3a and b) all belong to the web supplement and should have been posted after the text.

#### *Antidepressant prescribing and suicide*

We wrongly spelt out DDD in two of the letters on this subject in the 2 August issue (by Joanna Moncrieff and by Wayne D Hall and colleagues (p 288 and p 289 respectively)). DDD stands for defined daily dose (not daily dependent dose, as we wrote).

#### *A strategy to reduce cardiovascular disease by more than 80%*

Some data in the "Efficacy" section of the Results did not accurately reflect the data in table 1 in this paper by N J Wald and M R Law (28 June, p 1419-23). In the fifth paragraph of that section, the fourth sentence should cite the relative risks of an IHD (ischaemic heart disease) event for the four interventions as "0.39, 0.54, 0.84, and 0.68 [not 0.66]." Later in that same sentence, 34% should read 32%.