

# The Safety of Maternity Services in England

**Alex Smith and Anna Dixon**

© King's Fund 2007

First published 2007 by the King's Fund.

Charity registration number: 207401

All rights reserved, including the right of reproduction in whole or in part in any form.

Available from:

King's Fund  
11–13 Cavendish Square  
London W1G 0AN  
Tel: 020 7307 2591  
Fax: 020 7307 2801  
Email: [publications@kingsfund.org.uk](mailto:publications@kingsfund.org.uk)  
[www.kingsfund.org.uk/publications](http://www.kingsfund.org.uk/publications)

Edited by Mary Jean Pritchard  
Typeset by Lucy Latchmore

# Contents

About the authors	ii
<b>Introduction</b>	<b>1</b>
Demographic trends	1
Settings	1
Changes in practice	2
<b>Outcomes for mothers</b>	<b>3</b>
<b>Outcomes for babies</b>	<b>5</b>
<b>Causes of the problems</b>	<b>6</b>
<b>Recommendations for making services safer</b>	<b>8</b>
Staffing levels	8
When complications occur	9
Staff training	10
Teamwork and communication	10
Data collection and audit	11
<b>Conclusions</b>	<b>12</b>
References	13

## About the authors

**Alex Smith** is a Researcher in Health Policy at the King's Fund. Alex Smith's work at the King's Fund includes a paper considering the role of the independent regulator of foundation trusts, a study of managed clinical networks in England and contributions to the Care Services Inquiry. Alex read Natural Sciences at Cambridge University. Before joining the King's Fund, she worked in the research department of Diabetes UK, project-managing a national audit.

**Anna Dixon** is Deputy Director of Health Policy at the King's Fund. Anna Dixon has conducted research and published widely on health care funding and policy. She has given lectures on a range of topics including UK health system reform and patient choice. She was previously a lecturer in European Health Policy at the London School of Economics and was awarded the Commonwealth Fund Harkness Fellowship in Health Care Policy in 2005–6.

She has also worked in the Strategy Unit at the Department of Health where she focused on a range of issues including choice, global health and public health.

# Introduction

In response to growing concerns about the safety of maternity services in England, the King's Fund has set up an independent inquiry with the aim of identifying obstacles to the delivery of improvements in the safety of maternity services and robust strategies for overcoming them. There is already a substantial body of evidence on the safety of maternity services in England, including a number of recent high-profile reports (Confidential Enquiry into Maternal and Child Health 2006; Healthcare Commission 2005). The inquiry seeks to draw on rather than replicate this body of research.

This background paper summarises what is currently known about the safety of maternity services in England. The paper begins with some background information on trends in numbers of births, place of birth and changes in maternity services. Data is then presented on the type, incidence and causes of adverse outcomes for mothers and babies. The paper concludes by reviewing existing recommendations for improving the safety of maternity services.

## Demographic trends

The number of live births in England and Wales rose from 594,634 in 2001 to 645,835 in 2005 (Office for National Statistics 2006b). Since 2000, the numbers of births in England and Wales to women born outside the UK have increased (A Macfarlane, personal communication 2007). Fertility rates in all age groups have risen from 1.63 children per woman in 2001 to 1.79 children per woman in 2005 (Office for National Statistics 2006c). However, more women are giving birth at an older age and are more likely to have multiple births.

## Settings

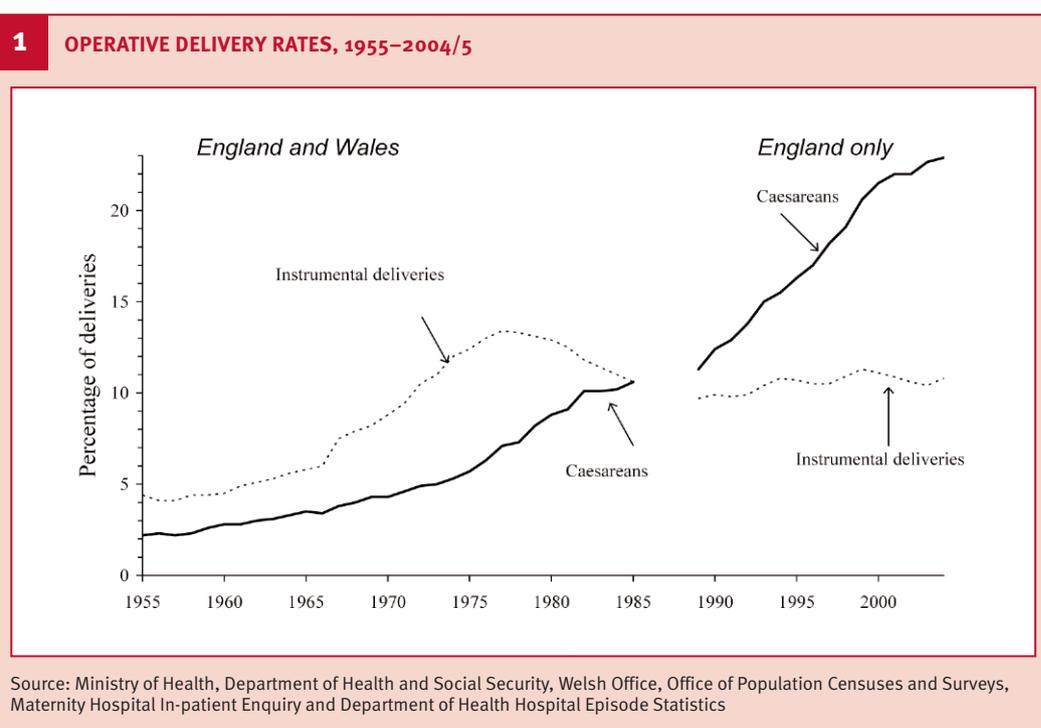
The government is committed to allowing all women a choice of place of birth by 2009 (Department of Health 2007a). Choices include consultant-led units in hospitals, birth centres within hospitals, free-standing midwife-led units in the community, or the mother's own homes. The vast majority of babies are born in NHS hospitals. In 2005, only 0.5 per cent of births in England and Wales took place in private hospitals (A Macfarlane, personal communication 2007). In 2001/2, there were 47 freestanding midwife-led units in England and 16 birth centres within hospitals out of a total of 242 maternity units (Smith and Smith 2005). A survey of more than 3000 women who gave birth in England in March 2006 found that 3 per cent of women gave birth at home and three-quarters of these were planned home births (Redshaw *et al* 2007). Some 0.4 per cent of hospital deliveries in 2004/5 were originally intended to take place at home. This means that approximately 2,500 women transferred from their homes to hospital while they were in labour; this was because of a clinical decision by a midwife or doctor in 65 per cent of these cases (Information Centre 2006c). In the same 2006 survey mentioned above, 3.5 per cent of respondents were

transferred between settings in labour, for example from home or a free-standing midwife-led unit to a consultant-led unit in hospital (Redshaw *et al* 2007).

There has been no published evaluation of care in large, consultant-led maternity units and the evidence available about care in other settings is limited. It is therefore not possible to conclude whether, for women with straightforward pregnancies, giving birth in hospital is more or less safe than giving birth in a midwife-led unit or at home in terms of outcomes for mother and baby (MIDIRS 2003). To fill this gap, a new programme of collaborative research, 'Birthplaces', based at the National Perinatal Epidemiology Unit in Oxford, is now under way to compare outcomes of births planned at home, in different types of midwifery units, and in hospital units with obstetric services ([www.npeu.ox.ac.uk](http://www.npeu.ox.ac.uk)). The study will report in 2009.

## Changes in practice

In the UK, as in most other developed countries, there have been marked changes in method of delivery since 1990, with a rise in the proportion of babies delivered by caesarean section. In England, caesarean section rates rose from 11.3 per cent of deliveries in 1989/90 to 22.9 per cent in 2004/5 (see Figure 1). It is not clear whether the rise is due to changes in practice, demography or patient choice. Increased intervention has consequences both for women's subsequent deliveries and for the way in which staff are deployed within maternity units. Caesarean sections are associated with an increased rate of post-partum hysterectomy, admission to intensive care and maternal mortality compared to vaginal births. Caesarean sections and vaginal births have similar rates of post-partum haemorrhage and infection (National Collaborating Centre for Women's and Children's Health 2004). However, comparisons are not straightforward because of differences in case mix depending on whether elective and emergency caesareans are included and whether these are being compared to uncomplicated vaginal births.



# Outcomes for mothers

Mothers in the UK during the triennium 2000–2002 had an overall risk of 1 in 7,750 of dying during pregnancy or birth. In the developing world in 2004, this risk was 1 in 16 (Lewis *et al* 2004). International comparisons of maternal mortality rates are problematic as the wide variations in the rates in different countries could be due to population differences, quality of obstetric care, under-reporting of maternal deaths or differences in classification (Salanave *et al* 1999a). The Peristat project, which aimed to develop a common set of indicators of perinatal health and perinatal care, examined maternal health outcomes in Europe (Alexander *et al* 2003). It concluded that variations in maternal mortality rates in different European countries reflected the completeness and quality of different data sources, in addition to actual differences in the number of maternal deaths. Salanave *et al* also found that the classification of pregnancy-associated deaths varies between European countries, and differences in coding contribute to variations in the mortality rate (Salanave *et al* 1999b).

Data collection in England and Wales started in 1928, and in the UK, the confidential enquiry into maternal deaths (CEMACH) has published data triennially since 1952. Maternal deaths are classified as direct deaths (pregnancy or obstetric causes), indirect deaths (diseases exacerbated but not caused by pregnancy, such as suicide resulting from puerperal mental illness) or coincidental deaths (deaths that would have occurred even if the mother had not been pregnant) (World Health Organisation 1990). Deaths that occur from 42 days to 1 year after delivery from direct or indirect causes are classified as late maternal deaths.

The maternal mortality rate declined steadily from the 1930s until the 1980s, since when it has not fallen any further. The leading cause of death in the 1950s was pre-eclampsia (high blood pressure that can cause fits if untreated). Mortality due to haemorrhage was also high in the 1950s. Mortality attributed to thrombosis (blood clots) is hard to measure as it was under-ascertained in early reports. Deaths from abortion featured heavily in the early reports but virtually disappeared after the legalisation of abortion in 1967.

During the triennium 2000–2002, the most common cause of direct death was thromboembolism, with rates similar to the previous triennium. Mortality rates from haemorrhage and anaesthesia increased slightly. The most common cause of indirect death was suicide, which is also thought to be under-reported. Cardiac disease is the second most common cause of indirect death (Lewis *et al* 2004).

Factors associated with high mortality in the last two CEMACH reports were: age (mothers aged over 34 were at greatest risk, but socially excluded teenagers were also at risk); parity (the greater the number of previous pregnancies the greater the risk); multiple births; infertility treatment; late booking or poor attendance at antenatal clinics (20 per cent of

the women who died from direct or indirect causes booked after 20 weeks' gestation); obesity; substance abuse; suboptimal clinical care; and lack of inter-professional and/or inter-agency communications. Other factors mentioned included social exclusion (for example, domestic violence) and the fact that women from some minority ethnic groups and those without partners are at increased risk. These factors are associated with maternal mortality, but are not correlated with it and should therefore be, interpreted with care. For instance, women who experience other social or medical problems are more likely to book late, so it is not necessarily the late booking itself that affects the risk of poor outcomes.

Maternal death is not the only adverse outcome that can occur during pregnancy. Women can experience morbidity or illness, and can deliver babies who are very ill or who die. According to the NHS Information Centre, of the approximately 601,000 deliveries in England in 2004/5, 6 per cent were complicated by hypertension (high blood pressure) and oedema (swelling); 8 per cent of women had a prolonged second stage of labour and 7 per cent a post-partum haemorrhage; 19 per cent of babies experienced distress during delivery and 4 per cent experienced intrauterine hypoxia (Information Centre 2006c).

As maternal mortality has become a rare event in the UK, 'near misses' can be used as a measure of the quality of care women receive (Geller *et al* 2002; Pattinson *et al* 2003). The 3rd Scottish Confidential Audit of Severe Maternal Morbidity identified 329 women who experienced selected types of severe morbidity (a rate of 6.3 per 1,000 births) (Penney *et al* 2006). The most common cause of severe morbidity in this audit was major obstetric haemorrhage. The audit found that 69 per cent of women having a major haemorrhage had a consultant obstetrician present; 50 per cent of women had a consultant anaesthetist and a haematologist involved in their care; 33 per cent of women had central venous pressure lines inserted; transfer to an intensive care unit was documented in 24 per cent of cases. The audit identified the following lessons: involve senior midwifery and medical staff and other disciplines, such as haematology, early; improve documentation; ensure awareness of and adherence to local protocols; adopt a 'managed clinical network' approach; and avoid blame-culture and inter-professional rivalry (Penney *et al* 2006).

In a study that measured the incidence of severe maternal morbidity in selected regions of nine European countries between 1995 and 1998 (the MOMS-B survey), 1,734 women were identified with at least one of the following conditions: pre-eclampsia, haemorrhage and sepsis (Zhang *et al* 2005). Severe haemorrhage and severe pre-eclampsia were much more common than sepsis. There were wide variations in incidence between countries, ranging from 6.0 per 1,000 deliveries in Austria to 14.7 per 1,000 deliveries in Belgium. The rate in England was 11.8 per 1,000 deliveries. These differences may be explained in part by the small numbers of cases, differences in ascertainment and method of data collection, and differences in clinical management between the countries. Interestingly those countries with high rates of maternal morbidity were not necessarily the same as those which have the highest mortality.

# Outcomes for babies

In England and Wales in 2005, there were 3,484 stillbirths (where the baby is born dead after 24 weeks' gestation) and 3,869 neonatal deaths (where the baby dies in the 28 days after a live birth) (Office for National Statistics 2006a). The stillbirth rate in 2005 was 5.4 per 1,000 births and the neonatal mortality rate was 3.4 per 1,000 live births. The perinatal mortality rate in the UK, defined as the number of stillbirths and early neonatal deaths of babies aged up to 7 days old per 1,000 live births and stillbirths was 7.9 per 1,000 live births.

Multiple births are at greater risk than singletons of perinatal death. In 2004, the stillbirth rate for multiple pregnancies was 3.2 times that of singletons. The cause of death in 7.3 per cent of these stillbirths was intrapartum causes; lethal congenital anomalies caused 15 per cent of stillbirths, and antepartum haemorrhage 10 per cent. Slightly less than 50 per cent of stillbirths had unexplained antepartum causes. Some 48 per cent of neonatal deaths were due to prematurity, and 11 per cent were due to intrapartum causes (CEMACH 2006).

Socio-demographic factors associated with stillbirth and neonatal death include socio-economic deprivation, maternal age and ethnicity. Mothers who are very young or older (late 30s or 40s) are at higher risk than others of losing their babies. The stillbirth rate for women under 20 is 7.59 per 1,000 live births and for women aged 40–44 it is 8.86 per 1,000 live births compared to an overall rate of 5.69 per 1,000 live births. Some ethnic minority groups, notably Pakistanis, West Africans and Caribbeans, also experience high rates of infant death. The relative risk of stillbirth for black and Asian women is 2.8 and 2.0 times higher than for white women respectively (CEMACH 2006).

Babies who survive may experience morbidity and disability, however, the attribution of disabilities to intrapartum events is problematic and few data are available on adverse outcomes. Cerebral palsy is the most common motor disability in childhood. There are various estimates of prevalence from local studies. Among babies born in 1993 in the North East of England, the rate of cerebral palsy is reported as 2.45 per 1,000 neonatal survivors (Colver *et al* 2000). A study set up to collect information about children born with cerebral palsy, sensorineural deafness or severe hearing loss in children born to residents of Berkshire, Buckinghamshire, Northamptonshire and Oxfordshire ([www.npeu.ox.ac.uk/4Child/](http://www.npeu.ox.ac.uk/4Child/)) reports a rate of cerebral palsy of 1.9 per 1,000 births between 1984 and 2000. Research indicates that a percentage of neuro-disability is the result of hypoxic–ischaemic injury to the previously normal fetal brain occurring during the course of labour and delivery, although the scale of impact is not clear due to problems of attribution (MacLennan 1999). It has been estimated that approximately 10 per cent of cerebral palsy is due to intrapartum events (Blair and Stanley 1998). The rising incidence of cerebral palsy is mainly accounted for by a rise in the number of extremely pre-term infants who survive. This is because the rate of cerebral palsy amongst children with birthweights between 1,000g and 1,499g was 50 times that of children with birthweights over 2,500g (Surman *et al* 2006).

# Causes of the problems

Some systemic causes of adverse outcomes for mothers and their babies have been identified. Communication difficulties, lack of teamworking and staff shortages have been repeatedly identified as causes of poor obstetric outcomes.

Ennis and Vincent (1990) reviewed 64 obstetric accidents to either mother or baby or both in England between 1982 and 1986; this was one of the first systematic studies to determine common factors, identify their causes and develop methods of prevention. Four mothers from the sample died; 19 babies died, and the remaining 45 babies suffered some degree of neurological damage. Human error was frequently implicated. The three major areas of concern were inadequate fetal monitoring, mismanagement of forceps deliveries and inadequate supervision by senior staff.

Human error and staffing shortages were themes that were also highlighted in a root cause analysis of 37 adverse events and near misses in obstetrics in the North West of England between 1999 and 2000 (Ashcroft 2003). The human errors were linked to clinical inexperience. Staffing shortages were compounded by heavy workloads and problems with staff changeover. Lack of equipment was a problem, and training needs were overlooked. The culture of the labour ward was highlighted as unhelpful.

Issues of lack of communication and teamwork among staff were described in the CEMACH report for the 1997–1999 triennium (Lewis *et al* 2001). Assessors coded 60 per cent of direct deaths as having some form of sub-standard care including: failure to appreciate severity of illness and suboptimal treatment; wrong diagnoses; failure of junior staff to diagnose or refer a case to a more senior colleague; failure of consultants to attend; lack of policies in some units for dealing with pulmonary embolism, eclampsia or haemorrhage; and failure of lead professionals to seek advice about conditions they do not specialise in.

In the 2000–2002 triennium, 67 per cent of direct deaths were judged to be at least partly due to sub-standard care. The main causes of sub-standard care are similar to those identified in the previous report. New ones include: failure of accident and emergency staff to recognise severe illness in pregnant women and ask for obstetric or midwifery assessment; lack of active follow-up of women who did not attend antenatal appointments; and failure of GPs to pass on all relevant information in referral letters or phone calls (Lewis *et al* 2004).

The Healthcare Commission has investigated the provision of maternity services at three hospitals. Ashford and St Peter's Hospitals NHS Trust was investigated in 2002 following the death of a baby in the trust's maternity unit (Commission for Health Improvement 2003). New Cross Hospital in Wolverhampton was investigated in 2003 following four serious incidents in the maternity services at the trust where three babies died (Healthcare

Commission 2004). Northwick Park Hospital in North West London was investigated after the deaths of 10 women in the maternity unit in three years (Healthcare Commission 2005). Overarching themes that emerged from all three investigations were inadequate staffing levels, absence of effective teamworking, poor working relationships between different consultants and between consultants and midwives, a culture of bullying, poor support for staff from human resources, lack of effective data collection for audit and poor staff attendance at training sessions.

# Recommendations for making services safer

There are a number of sources of recommendations for how antenatal and maternity services should be designed and delivered in order to assure and improve safety. Best practice guidance is issued by the National Institute for Health and Clinical Excellence (NICE), the Royal Colleges, regulators (for example, the Nursing and Midwifery Council, the General Medical Council and the Healthcare Commission) and the Department of Health. The Healthcare Commission reports contain recommendations on remedying problems, including addressing the poor practice identified in the course of the investigations while the reports of the Confidential Enquiry into Maternity and Child Health (CEMACH) provide recommendations on how to improve the safety of maternity services more generally.

Recommendations and guidelines primarily address problems that arise due to staff shortages, the failure of senior clinical staff to be called or to attend in the event of complications during labour, a lack of staff training, poor teamworking and communication between staff, and the absence of data collection and audit. These recommendations are summarised below in turn.

## Staffing levels

In November 2006 several of the Royal Colleges, including the Royal College of Midwives, the Royal College of Obstetricians and Gynaecologists, the Royal College of Anaesthetists and the Royal College of Paediatrics and Child Health, published a joint set of recommendations for maternity care. The report, *Safer Childbirth*, sets out minimum staffing levels for labour wards: all consultant-led wards with more than 2,500 deliveries per year should have at least 40 hours of consultant presence during the working week, rising to 60 hours for wards with more than 6,000 deliveries a year.

Surveys by the Royal College of Obstetricians and Gynaecologists have found that only a minority of units comply with their standards for minimum staffing levels despite the fact that the number of consultants specialising in obstetrics and gynaecology has increased by more than 50 per cent between 1995 and 2005 (see Table 1). In 2005, only half of consultant-led units of the relevant size had 40 hours of consultant time during the working week and as few as 30 per cent of this group actually had 40 hours of consultant presence as opposed to cover (RCM *et al* 2006). There are potentially problems around both lack of consultants and the lack of time they spend on the labour ward. The Royal Colleges have said that their recommendations for consultant obstetrician staffing levels can only be achieved with a 'considerable expansion of consultant numbers' (RCM *et al* 2006).

The Colleges have also called for an increase in the number of midwives. Although on a headcount measure the number of midwives increased by 13 per cent between 1995 and

2005, when measured as full-time equivalents (FTE) the numbers have remained almost unchanged over the past decade (see Table 1). In the Royal College of Midwives annual staff survey in 2005, 74 per cent of heads of midwifery reported that the number of funded posts in their trust was inadequate, compared with 59 per cent giving that response in 2001 (RCM 2005). The RCM survey in July 2005 also found that 78 per cent of maternity units in England were experiencing midwife vacancies and 59 per cent of these had been unfilled for more than three months (House of Commons Health Select Committee 2007). Respondents cited increases in delivery rates, levels of maternity and sick leave among staff and the impact of the government's 'woman-centred care' policy as contributing to the inadequacy of staffing levels.

The age profile of the midwifery workforce has also prompted concerns; in 2004/5 almost one-third of midwives registered to practice were 50 years or over and just 8 per cent were under 30 years of age (NMC 2005).

**TABLE 1: MATERNITY STAFF IN ENGLAND, 1995–2005**

Year	Number of maternities	Midwives			Obstetrics/gynaecology consultants			Obstetrics/gynaecology registrars		
		Headcount	FTE*	FTE*/1,000 maternities	Headcount	FTE*	FTE*/1,000 maternities	Headcount	FTE*	FTE*/1,000 maternities
1995	607,793	22,022	18,034	29.7	945	879.2	1.4	857	817.2	1.3
1999	583,923	22,799	17,876	30.6	1,057	983	1.7	1,001	951.7	01.6
2000	567,297	22,572	17,662	31.1	1,146	1,048.50	1.8	939	910.2	1.6
2001	558,271	23,075	18,048	32.3	1,219	1,105.40	2.0	950	916.7	1.6
2002	560,332	23,249	18,119	32.3	1,308	1,211	2.2	1,014	901	1.6
2003	584,450	23,941	18,444	31.6	1,353	1,253	2.1	973	940	1.6
2004	601,467	24,844	18,854	31.3	1,413	1,306	2.2	1,099	1,062	1.8
2005	607,090	24,808	18,949	31.2	1,458	1,370	2.3	1,290	1,254	2.1

Sources: Data on midwives (Information Centre 2006a), consultants (Department of Health 2004a; Department of Health 2005a; Department of Health 2005b; Information Centre 2006b), registrars (Department of Health 2004a; Department of Health 2005a; Department of Health 2005b; Information Centre 2006b)

\* Full time equivalent

## When complications occur

The Confidential Enquiry into Maternal and Child Health (CEMACH) has recommended that clear clinical guidelines and protocols, which set out what staff should do in dealing with complications and emergencies, should be available in all labour wards and accident and emergency departments (Lewis *et al* 2004).

The Royal College's recommend that in the event that complications develop, a consultant should be available within 30 minutes of being contacted. They also require that a senior member of paediatric staff should be able to attend within 10 minutes of being contacted

and a consultant paediatrician who has been assessed as competent in neonatal advanced life support within 30 minutes. Improving the availability of senior clinical staff in the event of complications occurring before, during or after labour is in part addressed by the Royal Colleges' recommendation that there should be a greater consultant presence on consultant-led wards. The Colleges have also recommended that outside of the times when a consultant obstetrician is present, the consultant should conduct physical or telephone-based ward rounds every evening and at least twice a day at weekends.

Draft guidance on intrapartum care published by the National Institute for Health and Clinical Excellence (NICE) in 2006 recommended that if a woman chooses to give birth outside of hospital and has certain risk factors – such as diabetes or is expecting twins – then a supervisor of midwives should be present at the birth (National Collaborating Centre for Women's and Children's Health 2006).

## Staff training

The Department of Health's National Service Framework for maternity services states that midwives delivering babies in midwife-led units or at home should undertake 'regular, specific, ongoing, on-site training on the early identification and referral of women with obstetric or other medical complications. This includes procedures for the management of obstetric emergencies (such as cardiac arrest and haemorrhage) on site in the maternity unit' (Department of Health 2004).

The Royal Colleges recommend that as a minimum all clinicians in obstetric units should attend in-service training on the management of labour every six months and on obstetric emergencies and resuscitation every year. They also call for mandatory, regular training sessions for midwives focusing on practices associated with births outside hospitals (RCM *et al* 2006).

Both the Nursing and Midwifery Council and the General Medical Council require that professionals on their registers keep their knowledge and skills up to date throughout their professional career (NMC 2007). In future doctors wishing to continue to practise as a specialist will be required to complete a recertification process led by the Royal Colleges (Department of Health 2007b).

## Teamwork and communication

The Royal Colleges state that all labour wards should have a lead consultant obstetrician, a consultant midwife and a labour ward manager who has overall responsibility for the management and co-ordination of the ward. Wards should also have a multidisciplinary forum that meets at least once every three months to discuss practice. The forum should be attended by the three lead members of staff along with an obstetric anaesthetist, a neonatal paediatrician, a risk manager, a supervisor of midwives, representatives from junior medical and midwifery staff and from the Maternity Services Liaison Committee or Patient Advice and Liaison Services (RCM *et al* 2006).

The Department of Health recommends that PCTs and NHS trusts develop Managed Maternity and Neonatal Care Networks to create links between professionals and organisations so that they can work in a co-ordinated way. The stated aim is that, 'Knowing which path to follow, and who is responsible for providing what, will help to reduce clinical

variation, eliminate duplication of services, maintain quality of care and adherence to clinical or other guidelines and give professionals agreed control over the care of the delivery process' (Department of Health 2004).

'Maternity Clinical Risk Management Standards' have been established as part of the NHS Litigation Authority's Clinical Negligence Scheme for Trusts (CNST), which handles negligence claims against NHS trusts in return for annual contributions. The standards require that at all times there are clear arrangements for which staff member is responsible for planning and managing a woman's care. They also state that there must be personal handover of a woman's care when shifts change (NHSLA 2006).

The NMC and GMC both state that registrants should respect other team members, and the GMC requires that its registrants should ensure that everyone in the team understands who is responsible for each aspect of a patient's care (NMC 2007).

## **Data collection and audit**

Improving the collection and audit of data on where babies are delivered, the sorts of interventions that take place during the delivery, whether a woman is transferred between units, whether a consultant is present for the birth, and any ill health suffered by the baby or the mother has been recommended by the Royal Colleges and CEMACH.

The CNST's risk management standards require that trusts report adverse incidents and 'near misses'. Discounts on annual contributions are available to those trusts who audit their practice against recommendations in CEMACH reports and implement changes accordingly.

The Healthcare Commission, working with other stakeholders, has developed a set of indicators that will allow professionals and the public to compare the performance of maternity units. The data will be collected during the summer of 2007 as part of an audit of maternity services ([www.healthcarecommission.org.uk](http://www.healthcarecommission.org.uk)). The Healthcare Commission already regulates the safety of maternity services as part of its annual health check of trusts. It currently checks the performance of trusts against standards set out in the Department of Health's National Service Framework; NICE guidance; the National Screening Committee; and publications by the Royal Colleges.

For the 2007/8 annual health check, the Commission also plans to assess units against the standards set by the Clinical Negligence Scheme for Trusts. In addition to requirements mentioned above, the scheme requires that all units have a named professional who is responsible for overseeing risk management; written risk management strategies that are distributed to all staff; and evidence that the strategies are being implemented.

# Conclusions

While there is a low risk of maternal mortality in England, there has been no reduction in the maternal mortality rate since the 1980s. Today the leading cause of maternal death is suicide but there are still deaths and significant morbidity in mothers and babies due to suboptimal care. Higher mortality rates are associated with a number of factors including age, number of previous pregnancies, multiple pregnancies, infertility treatment, poor attendance at antenatal clinics, obesity, substance abuse, social exclusion, no partner, and belonging to some minority ethnic groups. Women also experience other poor outcomes, though there is at present no trend data for morbidity.

Infant mortality rates are also low but again factors such as social class, deprivation, age and ethnicity are associated with higher risk. The incidence of cerebral palsy, however, is increasing. This is a common motor disability and about 10 per cent of cases are attributed to the events during labour.

Recent investigations, following a series of maternal deaths, found numerous problems that contributed to a lack of safety in the maternity care received by women. Problems such as poor communication, inadequate training, staffing shortages, lack of teamworking and inadequate protocols have much in common with the findings of previous studies and the general patient safety literature. Considerable effort has been put into improving maternal and perinatal safety. However, there has not been a systematic audit or evaluation to assess whether these recommendations have been implemented and whether they have resulted in improvements in outcomes for mothers, their babies and families. Improving the safety of maternity services remains a challenge and one that must be met if fewer mothers and babies are to die, suffer permanent injury or other adverse outcomes in future.

# References

Alexander S, Wildman K, Zhang W, Langer M, Vutac C, Linkmark G (2003). 'Maternal health outcomes in Europe'. *European Journal of Obstetrics and Gynecology and Reproductive Biology*, vol 111: 578–87.

Ashcroft B (2003). *Report for the National Patient Safety Agency: Summary of findings from the root cause analysis of 37 adverse events and near misses in obstetrics*. From research carried out at 7 Maternity Units in the North West of England. Available at: [www.pcpoh.bham.ac.uk/publichealth/psrp/Pdf/PS014\\_final\\_report.pdf](http://www.pcpoh.bham.ac.uk/publichealth/psrp/Pdf/PS014_final_report.pdf) (accessed on 19 March 2007).

Blair E, Stanley F J (1998). 'Issues in the classification and epidemiology of cerebral palsy'. *Mental Retardation and Developmental Disabilities Research Reviews*, vol 3, issue 2, pp 184–93.

Colver A, Gibson M, Hey EN, Jarvis SN, Mackie PC, Richmond S, for the North of England Collaborative Cerebral Palsy Survey (2000). 'Increasing rates of cerebral palsy across the severity spectrum in north-east England 1964–1993', *Archives of Disease in Childhood Fetal and Neonatal Edition*, vol 83: F7–F12.

Commission for Health Improvement (2003). *Investigation into Maternity Services provided by Ashford and St Peter's Hospitals NHS Trust Report*. London: CHI. Available at: [www.healthcarecommission.org.uk/\\_db/\\_documents/04005345.pdf](http://www.healthcarecommission.org.uk/_db/_documents/04005345.pdf) (accessed on 19 March 2007).

Confidential Enquiry into Maternal and Child Health (2006). *Perinatal Mortality Surveillance, 2004: England, Wales and Northern Ireland*. London: CEMACH. Available at: [www.cemach.org.uk/publications/PMR2004\\_March2006.pdf](http://www.cemach.org.uk/publications/PMR2004_March2006.pdf) (accessed on 19 March 2007).

Department of Health (2007a). *Maternity Matters: Choice, access and continuity of care in a safe service*. London: Department of Health. Available at: [www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_073312](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_073312) (accessed on 11 April 2007).

Department of Health (2007b). *Trust, Assurance and Safety: The Regulation of Health Professionals in the 21st Century*. London: The Stationary Office. Available at: [www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_065946](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_065946) (accessed on 16th April 2007).

Department of Health (2005a). *Hospital, Public Health Medicine (PHM) and Community Health Service (CHS) Medical and Dental Workforce Statistics, England, at 30 September 2004: Detailed results* [table 1]. Leeds: Department of Health. Available at: [www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH\\_4106746](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_4106746) (accessed on 16 March 2007).

Department of Health (2005b). *Medical and Dental Workforce Statistics: Historical data from 1975 to 2002*. Leeds: Department of Health. Available at: [www.dh.gov.uk/PublicationsAndStatistics/Statistics/StatisticalWorkAreas/StatisticalWorkforce/StatisticalWorkforceArticle/fs/en?CONTENT\\_ID=4101839&chk=5Slmn4](http://www.dh.gov.uk/PublicationsAndStatistics/Statistics/StatisticalWorkAreas/StatisticalWorkforce/StatisticalWorkforceArticle/fs/en?CONTENT_ID=4101839&chk=5Slmn4) (accessed on 16 March 2007).

Department of Health (2004a). *Hospital, Public Health Medicine (PHM) and Community Health Service (CHS) Medical and Dental Workforce Statistics, England, at 30 September 2003: Detailed results* [table 1]. Leeds: Department of Health. Available at: [www.dh.gov.uk/en/Publicationsandstatistics/Statistics/StatisticalWorkAreas/Statisticalworkforce/DH\\_4000231](http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/StatisticalWorkAreas/Statisticalworkforce/DH_4000231) (accessed on 16 March 2007).

Department of Health (2004b). *National Service Framework for Children, Young People and Maternity Services: Maternity services*, p 30. London: Department of Health. Available at: [www.dh.gov.uk/assetRoot/04/09/05/23/04090523.pdf](http://www.dh.gov.uk/assetRoot/04/09/05/23/04090523.pdf) (accessed on 16 March 2007).

Ennis M, Vincent CA (1990). 'Obstetric accidents: a review of 64 cases'. *British Medical Journal*, vol 300, pp 1365–7.

Geller SE, Rosenberg D, Cox SM, Kilpatrick S (2002). 'Defining a conceptual framework for near-miss maternal morbidity'. *Journal of the American Medical Women's Association*, vol 57, no 3, pp 135–9.

General Medical Council (2006). *Good Medical Practice*. London: GMC. Available at: [www.gmc-uk.org/guidance/good\\_medical\\_practice/GMC\\_GMP.pdf](http://www.gmc-uk.org/guidance/good_medical_practice/GMC_GMP.pdf) (accessed on 9 February 2007).

Healthcare Commission (2004). *Investigation of the Maternity Service Provided by the Royal Wolverhampton Hospitals NHS Trust at New Cross Hospital*. London: Healthcare Commission. Available at: [www.healthcarecommission.org.uk/\\_db/\\_documents/04011738.pdf](http://www.healthcarecommission.org.uk/_db/_documents/04011738.pdf) (accessed on 19 March 2007).

Healthcare Commission (2005). *Review of maternity services provided by North West London Hospitals NHS Trust*. London: Healthcare Commission. Available at: [www.healthcarecommission.org.uk/\\_db/\\_documents/04018499.pdf](http://www.healthcarecommission.org.uk/_db/_documents/04018499.pdf) (accessed on 19 March 2007).

House of Commons Health Select Committee (2007). *Workforce Planning: Fourth Report of Session 2006-07*. HC 171-11 Ev 170.

Information Centre (2006a). *NHS Hospital and Community Staff (HCHS): Non-medical England: 1995–2005* [tables 2a and 2b]. Leeds: Information Centre. Available at: [www.ic.nhs.uk/pubs/nhsstaff/nonmedbulletintab/file](http://www.ic.nhs.uk/pubs/nhsstaff/nonmedbulletintab/file) (accessed on 16 March 2007).

Information Centre (2006b). *Medical and Dental Workforce Census: Medical and dental detailed results 2005* [table 1]. Leeds: The Information Centre. Available at: [www.ic.nhs.uk/pubs/nhsstaff/mddetailtab/file](http://www.ic.nhs.uk/pubs/nhsstaff/mddetailtab/file) (accessed on 16 March 2007).

Information Centre (2006c). *NHS Maternity Statistics, England: 2004–05*. Leeds: The Information Centre. Available at: [www.ic.nhs.uk/pubs/maternityeng2005/maternitystat06/file](http://www.ic.nhs.uk/pubs/maternityeng2005/maternitystat06/file) (accessed on 11 April 2007).

Lewis G (ed) (2001). *Why Mothers Die 1997–1999: Report on confidential enquiries into maternal deaths in the United Kingdom*. London: RCOG Press.

Lewis G (ed) (2004). *Why Mothers Die 2000–2002. The Sixth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom*. London: Royal College of Obstetricians and Gynaecologists. Available at: [www.cemach.org.uk/publications/WMD2000\\_2002/content.htm](http://www.cemach.org.uk/publications/WMD2000_2002/content.htm) (accessed on 16 March 2007).

MacLennan A (1999). 'A template for defining a causal relation between acute intrapartum events and cerebral palsy: international consensus statement'. *British Medical Journal*, vol 319, pp 1054–9.

Midwives Information and Research Service (2003). *Informed Choice for Professionals No 10: Place of birth*. Bristol: MIDIRS.

National Collaborating Centre for Women's and Children's Health (2004). *Caesarean Section Clinical Guideline*. London: RCOG Press. Available at: <http://guidance.nice.org.uk/CG13/guidance/pdf/English> (accessed on 3 April 2007).

National Collaborating Centre for Women's and Children's Health (2006). *Intrapartum Care Consultation: Full guideline*. London: NICE. Available at: [www.nice.org.uk/page.aspx?o=334322](http://www.nice.org.uk/page.aspx?o=334322) (accessed on 16 March 2007).

NHS Litigation Authority (2006). *Clinical Negligence Scheme for Trusts: Maternity clinical risk management standards, April 2006*, standards 3.1.4–3.1.5. London: NHS Litigation Authority. Available at: [www.nhs.uk/NR/rdonlyres/002DB3DE-F1A1-4153-AFE1-B59A3D743239/o/CNSTMaternityStandardsApril2006final.pdf](http://www.nhs.uk/NR/rdonlyres/002DB3DE-F1A1-4153-AFE1-B59A3D743239/o/CNSTMaternityStandardsApril2006final.pdf) (accessed on 19 March 2007).

Nursing and Midwifery Council (2007). *New Draft Code of Conduct*. Available at: [www.nmc-uk.org/aArticle.aspx?ArticleID=2368](http://www.nmc-uk.org/aArticle.aspx?ArticleID=2368) (accessed on 16 March 2007).

Nursing and Midwifery Council (2005). *Statistical Analysis of the Register 1 April 2004 to 31 March 2005*. London: Nursing and Midwifery Council. Available at: [www.nmc-uk.org/aFrameDisplay.aspx?DocumentID=856](http://www.nmc-uk.org/aFrameDisplay.aspx?DocumentID=856) (accessed on 16 March 2007).

Office for National Statistics (2006a). 'Infant and perinatal mortality by social and biological factors, 2005'. *Health Statistics Quarterly*, no 32, pp 82–6. Available at: [www.statistics.gov.uk/downloads/theme\\_health/HSQ32.pdf](http://www.statistics.gov.uk/downloads/theme_health/HSQ32.pdf) (accessed on 19 March 2007).

Office for National Statistics (2006b). *Birth Statistics: Review of the Registrar General on births and patterns of family building in England and Wales, 2005*. London: HMSO. Available at: [www.statistics.gov.uk/downloads/theme\\_population/FM1\\_34/FM1\\_n034\\_2005.pdf](http://www.statistics.gov.uk/downloads/theme_population/FM1_34/FM1_n034_2005.pdf) (accessed on 19 March 2007).

Office for National Statistics (2006c). 'Fertility: Continued Rise in 2005' [online]. Available at: [www.statistics.gov.uk/CCI/nugget.asp?ID=951&Pos=2&ColRank=2&Rank=672](http://www.statistics.gov.uk/CCI/nugget.asp?ID=951&Pos=2&ColRank=2&Rank=672) (accessed on 11 April 2007).

Pattinson RC, Buchmann E, Mantel G, Schoon M, Rees H (2003). 'Can enquiries into severe acute maternal morbidity act as a surrogate for maternal death enquiries?' *British Journal of Obstetrics and Gynaecology*, vol 110, no 10, pp 889–93.

Penney G, Kernaghan D, Adamson L (2006). *Scottish Confidential Audit of Severe Maternal Morbidity. 3rd Annual Report, 2005*. Aberdeen; Scottish Programme for Clinical Effectiveness in Reproductive Health. Available at: [www.abdn.ac.uk/spcerh/publications/SCASMM%202006%20M&I.pdf](http://www.abdn.ac.uk/spcerh/publications/SCASMM%202006%20M&I.pdf) (accessed on 16 April 2007).

Redshaw M, Rowe R, Hockley C, Brocklehurst P (2007). *Recorded Delivery: A national survey of women's experiences of maternity care 2006*. Oxford: National Perinatal Epidemiology Unit. Available at: [www.npeu.ox.ac.uk/maternitysveys/report.php](http://www.npeu.ox.ac.uk/maternitysveys/report.php) (accessed on 29 March 2007).

Royal College of Midwives (2005). *Submission of Evidence to the Nursing and Other Health Professionals Pay Review Body*, p 13. London: Royal College of Midwives. Available at: [www.rcm.org.uk/info/docs/051005141621-378-1.doc](http://www.rcm.org.uk/info/docs/051005141621-378-1.doc) (accessed on 16 March 2007).

Royal Colleges of Midwives, Obstetricians and Gynaecologists, Anaesthetists and Paediatrics and Child Health (2006). *Safer Childbirth: Minimum standards for service provision and care in labour*. London: RCOG. Available at: [www.rcog.org.uk/resources/public/pdf/safer\\_childbirth\\_draft\\_report\\_301006.pdf](http://www.rcog.org.uk/resources/public/pdf/safer_childbirth_draft_report_301006.pdf) (accessed on 16 March 2007).

Salanave B, Bouvier-Colle MH, Varnoux N, Alexander S, Macfarlane A (1999). 'Classification differences and maternal mortality: a European study. MOMS group. Mothers' mortality and severe morbidity'. *International Journal of Epidemiology*, vol 28, pp 64–9.

Smith L, Smith C (2005). 'UK childbirth delivery options in 2001–2002: alternatives to consultant unit booking and delivery'. *British Journal of General Practice*, vol 55, pp 292–7.

Surman G, Newdick H, King A, Gallagher M, Kurinczuk JJ (2006). *4Child: Four Counties Database of Cerebral Palsy, Vision Loss and Hearing Loss in Children. Annual Report 2006*, including data for births 1984–2000. Oxford: National Perinatal Epidemiology Unit. Available at: [www.npeu.ox.ac.uk/4Child/4Child\\_downloads/aro6\\_p1-94.pdf](http://www.npeu.ox.ac.uk/4Child/4Child_downloads/aro6_p1-94.pdf) (accessed on 13 April 2007).

World Health Organisation (1990). *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision*. Geneva: WHO. Available at: [www.who.int/whosis/icd10/](http://www.who.int/whosis/icd10/) (accessed on 19 March 2007).

Zhang, W-H, Alexander S, Bouvier-Colle M-H, Macfarlane A (2005). 'Incidence of severe pre-eclampsia, postpartum haemorrhage and sepsis as a surrogate marker for severe maternal morbidity in a European population-based study: the MOMS-B survey'. *British Journal of Obstetrics and Gynaecology*, vol 112, no 1, pp 89–96.