

Investigation

# Investigation into 10 maternal deaths at, or following delivery at, Northwick Park Hospital, North West London Hospitals NHS Trust, between April 2002 and April 2005

August 2006



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# Contents

The Healthcare Commission	3
Investigating serious failings in healthcare	4
Executive summary	5
1 Introduction	10
2 General overview of pregnancy, labour and medical terms referred to in this report	16
3 The women who died	21
4 Review of other incidents and complaints	96
5 Conclusions	103
Progress made by the trust since April 2005	107
Recommendations	108
Acknowledgments	109
Appendices	110
Appendix A: The Healthcare Commission's criteria for an NHS investigation	110
Appendix B: Definitions of maternal mortality	111
Appendix C: The investigation team	112
Appendix D: Summary of dates and causes of death	113
Appendix D: Common factors present across the 10 deaths	114



# The Healthcare Commission

The Healthcare Commission exists to promote improvements in the quality of healthcare and public health in England. We are committed to making a real difference to the provision of healthcare and to promoting continuous improvement for the benefit of patients and the public. The Healthcare Commission's full name is the Commission for Healthcare Audit and Inspection.

The Healthcare Commission was created under the Health and Social Care (Community Health and Standards) Act 2003. The organisation has a range of new functions and took over some responsibilities from other Commissions. It:

- replaces the Commission for Health Improvement (CHI), which ceased to exist on March 31<sup>st</sup> 2004
- takes over responsibility for the independent healthcare functions previously carried out by the National Care Standards Commission, which also ceased to exist on March 31<sup>st</sup> 2004
- carries out the elements of the Audit Commission's work relating to the efficiency, effectiveness and economy of healthcare

We have a statutory duty to assess the performance of healthcare organisations in the NHS and award annual ratings of performance, to coordinate inspections and reviews of healthcare organisations carried out by others, and register organisations providing healthcare in the independent sector on an annual basis.

We have created an entirely new approach to assessing and reporting on the performance of healthcare organisations. Our annual health check will examine a much broader range of factors than in the past assessments, enabling us to report on what really matters to those who receive and provide healthcare.

# Investigating serious failings in healthcare

The Healthcare Commission is empowered by section 52(1) of the Health and Social Care (Community Health and Standards) Act 2003 to conduct investigations into the provision of healthcare by or for an English NHS body.

We usually investigate when allegations of serious failings are raised, particularly when there are concerns that the safety of patients might be at risk. Our full criteria for deciding to conduct an investigation are set out in Appendix A.

The purpose of our investigations is to discover whether there is any foundation to allegations of serious failings and to uncover the cause of those failings. Our investigations also aim to help organisations to improve the quality of care that they provide, to build or restore public confidence in services, and to help organisations, as well as the wider NHS, to learn lessons about how best to ensure that the care provided to patients is safe.

The Healthcare Commission is responsible for this report and for ensuring that North West London Hospitals NHS Trust publishes an action plan in response to our investigation. The action plan will be available on the Healthcare Commission's website, [www.healthcarecommission.org.uk](http://www.healthcarecommission.org.uk). London Strategic Health Authority will be responsible for monitoring the implementation of agreed actions.

# Executive summary

Between April 2002 and April 2005, 10 women died during pregnancy or within 42 days of delivery at Northwick Park Hospital, North West London Hospitals NHS Trust (the trust). This number of maternal deaths over this period of time was significantly higher statistically when compared with other trusts that serve similar populations. In June 2005 the Investigation Committee of the Healthcare Commission decided to conduct an investigation into the 10 maternal deaths.

The Commission had previously conducted an investigation that focused on whether the trust was maintaining appropriate standards in the management, provision and quality of care provided in maternity services. The investigation found that the systems and processes for the management of risk in maternity services were not effective and also highlighted a number of other concerns, including a lack of clinical leadership and poor inter and intra-professional relationships between midwives and consultant obstetricians. As a result of the previous investigation and on the recommendation of the Healthcare Commission, the Secretary of State for Health imposed special measures on the trust in April 2005. More details can be found in our report, *Review of Maternity Services Provided by North West London Hospitals NHS Trust*, published in July 2005 and available on our website, [www.healthcarecommission.org.uk](http://www.healthcarecommission.org.uk).

In view of the findings of its previous investigation, the Healthcare Commission was concerned about the robustness of the action taken following the maternal deaths. It decided to carry out this further more detailed investigation, to examine the care and treatment provided to the 10 women who died, and the actions that the trust took following each death.

## Terms of reference

The terms of reference for this investigation were to examine:

- 1 the care and treatment provided to the 10 women who died between April 2002 and April 2005
- 2 the previous investigations/reviews undertaken on behalf of the trust in response to the 10 maternal deaths, which occurred between April 2002 and April 2005
- 3 the circumstances surrounding the 10 maternal deaths, including, where appropriate, a detailed examination of other incident and complaint forms to ascertain whether there were any underlying common factors not yet identified
- 4 any other matters that the Healthcare Commission considers arise out of, or are connected with, the above

The investigation into the 10 maternal deaths tells the story about 10 women who died during what should have been one of the happiest and most important events of their lives. The impact of the deaths on their families, including the children who survived them, cannot be overstated.

Although the investigation focuses on individual cases and comments on the practice and decision-making of individual clinicians, the Healthcare Commission has decided not to name staff in this report in order to ensure that the focus of attention is directed on improvement. The overarching purpose of this report is to determine the vital lessons and changes required to safeguard patients and to improve their quality of care. It is not to focus on or judge the actions of individuals.

The key findings and conclusions are summarised below and set out in full in the body of the report.

The Healthcare Commission expects all NHS trusts that provide maternity services and organisations responsible for monitoring the performance of maternity services to take account of lessons and the recommendations in this report, and where appropriate, make the necessary changes to ensure the safety of women and improve the quality of care that they provide.

## Key findings

The report finds that there were either major or minor deficiencies in the care and treatment provided to all but one of the 10 women.

### Care and treatment provided to the 10 women

- The maternity service was offering care to women whose pregnancies represented a high risk, but did not have the necessary systems or staff with the appropriate skills in place to manage such cases.
- There was a lack of input from consultants at crucial times, and there was an over reliance on junior staff to manage complex and difficult cases with little guidance or support.
- Consultant obstetricians did not routinely carry out ward rounds when they were responsible for overseeing care in the labour ward and the teamwork between midwives and obstetricians was not as effective as it should have been. Therefore, there was no adequate mechanism in place for staff to discuss concerns that they may have had about the women.
- There was an excessive reliance on the use of locum and agency staff, who did not always receive the necessary guidance or support.
- Deficiencies in the management structures also contributed to the poor quality of care the women received, for example midwives were expected to manage a busy delivery suite that was reliant on agency and locum staff, with at times, little professional or managerial support. Around the time of the first deaths the midwives received little professional support from the supervisors of midwives.
- In the majority of cases the women attended their hospital and GP antenatal appointments and sought help when they felt unwell. Yet despite this, in a number of the cases, clinical staff failed to recognise and respond to the severity of the condition of the women, thereby reducing the chances of survival of the women. In some of the cases there were minor deficiencies in care which, in isolation, may not have had such a dramatic impact, but when occurring together had serious consequences for the health of the women concerned.
- The anaesthetic staff involved in the care of the women responded well, often in difficult circumstances.
- The haematology department responded efficiently in providing the necessary, and at times large, volumes of blood and blood products.
- In two of the cases there was an absence of documentation for surgical procedures that were carried out by the obstetric staff and in one case there was an absence of contemporaneous documentation.



### **The actions taken by the trust following each death**

- Following each death the trust undertook some form of investigation and in some cases external investigations were carried out. However, the internal investigations were narrowly focused on care provided by the obstetricians rather than taking a wider approach and considering the context in which the deaths occurred.
- The trust did try to ensure that lessons were learnt from each death. However, there was limited success in this: similar failings can be found in the case of woman C as in the later case of woman H. The actions that the trust took were not comprehensive and the prevailing culture in the maternity services during this period did not facilitate learning from adverse incidents.
- The investigations had a strong medico-legal focus and a great deal of the investigative work was done in preparation for the coroner's inquest.
- There was a belief that a single member of staff could be responsible for coordinating the internal investigations carried out by the trust, the legal investigations, the preparations for the coroner's investigations and communication with the families involved. The result of this was that learning from the deaths was not as effective as it should have been.
- The trust maintained that there were no common factors between the deaths, yet our investigation has highlighted a number, including lack of input from consultants and poor clinical judgement.

### **Other factors**

- There was poor planning in relation to the refurbishment of the maternity services at Northwick Park Hospital and the transfer of obstetric deliveries of babies from the Central Middlesex Hospital.
- Members of the trust's board and the external organisations responsible for monitoring the performance of NHS trusts were aware of the 10 deaths and the other problems in the maternity services. However, they did not appreciate the seriousness of the situation, make the links between the deaths and the problems identified in the Healthcare Commission's previous investigation into the maternity services nor taken action at a sufficient early stage.

### **Conclusions**

As reported in the Commission's earlier investigation, maternity services at Northwick Park Hospital were in a state of upheaval – it was a service fraught with tensions and frustrations. There was a lack of leadership, poor communication between staff, ineffective teamwork and, perhaps most significantly, a lack of awareness of how this was affecting the safety of patients and the quality of care that was being provided.

Despite the good intentions of staff, who were working in very difficult conditions, their practice and ultimately the care that they provided were compromised by the environment and the culture in which they were working. It was an environment that allowed the quality of care to fall below proper professional standards and poor working practices to flourish.

There is no doubt that it was a difficult time for staff and, although the Healthcare Commission is critical of some of the actions of individual staff, it recognises that these were the result of wider systemic failings in the maternity services.

## Progress made by the trust since April 2005

The previous investigation made recommendations relating to the management of the maternity services, the management of risk, staffing in maternity services and outcomes from care and treatments and the experiences encountered by women.

Following the previous investigation, the trust developed an action plan to implement the recommendations contained in the report and the actions arising from the imposition of special measures. Implementation of the action plan has been driven and monitored by the trust's maternity services action plan group, which includes staff from the strategic health authority and the local primary care trusts. The trust has implemented a number of improvements, resulting in better and safer care for women. The improvements include:

- The recruitment of three additional consultant obstetricians.
- The level of cover by consultants on the labour ward has been increased from 40 hours to 60 hours between Monday and Friday.
- An additional 20 midwives have been recruited.
- Nurses trained in caring for patients recovering from an anaesthetic, and operating theatre nurses have also been employed.
- The number of supervisors of midwives has been increased and is in line with national guidance.
- An on call system for midwifery managers outside normal working hours has been introduced.
- The refurbishment of the labour ward which now includes a high dependency unit.
- More effective teamwork and improved communication in the consultant obstetric team, and between obstetric staff and midwives.
- Consultant obstetricians carry out ward rounds on the labour ward three times per day.
- Up-to-date clinical guidelines have been developed and implemented. Paper copies of the guidelines are kept in each of the rooms on the delivery suite and are also available on the trust's intranet. Individual copies have been distributed to clinical staff.
- Revised and improved clinical governance structures have been put in place in maternity services.
- The policy for reporting and managing serious untoward incidents has been revised. The Commission was told that the trust is focusing on learning from incidents and staff confirmed that there is less of a "blame culture".
- Replacement of defective equipment and implementation of a system for the maintenance of equipment.

The Commission acknowledges that the trust has made good progress in implementing the actions arising from the first investigation.

## Recommendations

As most of the actions arising from the previous report and the imposition of special measures have now been implemented or are in the process of being implemented, our recommendations are limited to the following:

### National recommendations

- The Healthcare Commission realises that, due to a shortage of suitably trained radiologists, it is not possible to provide full time cover for interventional radiology in all obstetric units. However, given the potential to save the lives of patients who have catastrophic postnatal bleeding, trusts with delivery units should, where feasible, engage with their neighbouring trusts to discuss the formation of networks. The aim should be to provide an emergency interventional radiology service that is responsive to patients' needs wherever and whenever they arise.
- All NHS trusts providing maternity services, and organisations responsible for the monitoring of the performance of NHS trusts, must ensure they have robust systems in place for monitoring the quality and performance of the maternity services.

# 1 Introduction

Between April 2002 and April 2005, 10 women died during pregnancy or within 42 days of delivery at Northwick Park Hospital. The Commission's previous investigation found that the maternal death rate at the trust for 2002-2004 was statistically higher when compared with trusts that serve similar populations. The trust told the Healthcare Commission that it had undertaken reviews of the deaths and found there were no commonalities between the deaths. However, the Commission found major concerns in the maternity services including poor systems for the management of risk and learning from clinical incidents. Prompted by a further death in March 2005, and other events described below, the Investigation Committee at the Healthcare Commission, in June 2005, decided to conduct this further more detailed investigation into the care and treatment provided to the women who died, and the actions taken by the trust following their deaths.

Information about the classification of maternal deaths is provided in Appendix B.

Northwick Park Hospital is part of North West London Hospitals NHS Trust (the trust).

## Why did the Healthcare Commission carry out this investigation?

In response to the nine maternal deaths that occurred between April 2002 and June 2004 and following a request from the trust and Brent and Harrow Primary Care Trusts we had carried out an earlier investigation into maternity services at the trust, the report of which, *Review of Maternity Services Provided by North West London Hospitals NHS Trust*, was published in July 2005 and is available on our website, [www.healthcarecommission.org.uk](http://www.healthcarecommission.org.uk).

The trust had carried out its own internal reviews of the deaths, and had commissioned external reviews of some of the deaths, but had not addressed wider issues such as the management of risk or the involvement of women in their own care and treatment.

As part of our previous investigation, we visited the maternity unit at Northwick Park Hospital in December 2004. At the end of this visit we were sufficiently concerned to ask for urgent action to be taken on a number of issues, including identifying ways to reduce demand on the service and to ensure that consultant obstetricians were available on the labour ward for 40 hours between Monday and Friday, as recommended by the Royal College of Obstetricians and Gynaecologists.

On December 16<sup>th</sup> 2004, the Commission received a letter from the trust stating that the urgent actions were complete or were in the process of being completed. We have analysed the trust board minutes between December 2004 and April 2005. There is evidence that the deputy chief executive told the trust board of the urgent actions at the December 2004 board meeting. The board was also told that it would be kept informed of progress on the urgent actions.

Between January 2005 and April 2005 there is only limited reference to the urgent actions in the trust board minutes. In January 2005, the chief executive and directors of the board were informed that the managers of maternity services were looking at ways of utilising spare capacity in the private sector. At the board meeting in March 2005 the chief executive said that the primary care trusts were not engaging with the trust to address the problems in the maternity services.

It is important that all trusts have systems and processes in place to manage risk – things that could or have gone wrong. Our previous investigation found that the systems and processes for the management of risk in maternity services were not effective. Staff were reporting clinical incidents, but there was little evidence of learning from or changes in practice following these incidents. Our previous investigation also highlighted a number of other concerns, including the levels of staffing, poor inter and intra-professional working relationships between midwives and consultant obstetricians, problems with the implementation and monitoring of guidelines in maternity services and a lack of clinical leadership. More details can be found in our July 2005 report of this investigation.

In March 2005 there was a further maternal death at Northwick Park Hospital. North West London Strategic Health Authority (the strategic health authority) informed us about the death, rather than the trust.

At the same time the Healthcare Commission also became aware that the chief executive was soon to be leaving the trust.

We were concerned that the strategic health authority, and not the trust, had informed us about the 10<sup>th</sup> maternal death and that we had not been informed earlier of the chief executive's plans to leave the trust. Two members of staff from the investigation team and a consultant obstetrician (an adviser to the Healthcare Commission) visited Northwick Park Hospital, unannounced, on April 11<sup>th</sup> 2005.

The consultant obstetrician undertook a preliminary review of the 10<sup>th</sup> woman who had died, and identified some concerns about the care she had received.

During our visit on April 11<sup>th</sup>, the trust told us that an external review of the care and treatment was underway, but that, at that stage, no concerns had been identified. The two members of staff from the investigation team visited the labour ward. Staff told them that since our site visit in December 2004 the number of babies delivered there had increased, rather than decreased.

On the same day, an action planning meeting was held to address the issues raised by our previous investigation. At this meeting, staff at the trust raised further concerns about the level of consultant obstetrician cover on the labour ward.

On April 21<sup>st</sup> 2005, the Healthcare Commission wrote to the Secretary of State for Health, reporting significant failings in relation to the provision of maternity services by the trust. We recommended that, to protect the safety of patients, certain special measures needed to be taken urgently. The Secretary of State responded immediately to all of our recommendations and agreed to provide a package of support to the trust. The report of our previous investigation has further details of these special measures.

In view of the findings of our previous investigation, and the events described above, the Healthcare Commission was concerned about the robustness of the action taken by the trust following the nine maternal deaths. We decided to carry out a further investigation into the care and treatment provided to all of the 10 women who had died. We felt it was possible that there were underlying problems that the trust's internal reviews had not identified and, in addition, where problems had been identified, we felt these may not have been adequately addressed.

## Terms of reference

The terms of reference of this further investigation aimed to establish whether the care and treatment provided to the 10 women who died had been appropriate, the extent to which lessons had been learnt from the deaths and to consider the responses which had been made by the trust to any other adverse incidents.

The investigation included an examination of:

- 1 the care and treatment provided to the 10 women who died between April 2002 and April 2005
- 2 the previous investigations/reviews undertaken on behalf of the trust in response to these 10 maternal deaths
- 3 the circumstances surrounding the deaths, including, where appropriate, a detailed examination of other incident and complaint forms to ascertain whether there were any underlying common factors not yet identified
- 4 any other matters that the Healthcare Commission considered arose out of, or were connected with, the above

## What was our approach?

Healthcare Commission staff worked with a team of clinical advisers with specialist knowledge of maternity services, anaesthetic services and the management of risk. This included a consultant obstetrician and gynaecologist, a professor of obstetrics and gynaecology, a midwifery adviser, a consultant anaesthetist and an adviser with experience in the management of risk. Additional specialist advice was sought from a consultant haematologist, a consultant cardiologist and a consultant hepatobiliary liver transplant surgeon (a specialist in medicine and surgery of the liver).

Further details of the members of the investigation team are given in Appendix C. The investigation team reviewed the case notes of the 10 women who died and the documentation from the trust's internal and external reviews of the 10 deaths. This included previous statements made by staff, inquest transcripts and other external reports. Other documents reviewed included trust board minutes, clinical incident reports and minutes from a range of meetings held in maternity services and post mortem reports. Where relevant, the Healthcare Commission took account of the absence of information and records, where we would have reasonably expected such records to exist.

We also reviewed information from other trusts that were involved in events leading up to the deaths of the 10 women. The investigation team interviewed 46 NHS staff, including past and present employees of the trust. We invited the families of the 10 women who died to meet with us, and meetings were held with five of the families, and one family responded in writing.

The Healthcare Commission is aware that it is difficult to rely on evidence gathered through interviews up to three years after the events. Therefore, we placed greater reliance on contemporaneous accounts and records. Our interviews with staff concentrated on clarifying areas of uncertainty and drawing out explanations for decisions made during the events.

During the course of the investigation concerns were raised about the content and quality of some of the post mortem reports. Details of our concerns are to be referred to the Department of Constitutional Affairs as a contribution to the Coroner's Service Reform.

Although the investigation focuses on individual cases and comments on the



practice and decision-making of clinicians, the focus of attention is on improvement. The overarching purpose of this report is to determine the lessons and changes required to safeguard patients and to improve their quality of care. It is not to focus on or judge the actions of individuals.

The Healthcare Commission expects all staff working in maternity services and organisations responsible for monitoring the performance of maternity services to read this report, and where appropriate make the necessary changes to ensure the safety of women and improve the quality of care.

## The trust

Northwick Park and St Mark's Hospitals NHS Trust merged with Central Middlesex NHS Trust in 1999 to become North West London Hospitals NHS Trust. The trust serves a population of over 500,000 people in the boroughs of Brent and Harrow. Brent and Harrow have large populations from black and minority ethnic groups, although the boroughs differ in terms of levels of poverty and employment. Unemployment levels in Brent are above the national average and it is among one of the most deprived boroughs in England and Wales. Comparatively, Harrow is a relatively affluent borough.

In 2002 some of the maternity services from the Central Middlesex Hospital site were transferred to Northwick Park Hospital. Transfer of high risk pregnancies to Northwick Park Hospital occurred in September 2002. A birthing centre was built at Central Middlesex Hospital and opened in September 2004. This is a midwife-led unit for women at low risk of pregnancy complications. Antenatal care is provided both at Northwick Park and Central Middlesex hospitals.

The number of babies delivered at the trust increased from 4,736 in 2003/2004 to 5,028 by 2004/2005.

The refurbishment of maternity services at Northwick Park Hospital began in February 2002. The refurbishment was still ongoing at the time of writing this report.

For the period covering the investigation, North West London Strategic Health Authority was responsible for the management of the performance of the trust. From July 2006 London Strategic Health Authority is now responsible.

A new chief executive was appointed to the trust in April 2005, along with a new director of operations. The trust has also recently appointed a director of nursing and midwifery, and the former director of nursing is the director of innovation and strategy. The medical director designate took up his post in July 2005.

## Reporting of serious untoward incidents

NHS trusts are required to report all serious untoward incidents to their respective strategic health authority, and it is considered good practice also to report serious untoward incidents to the primary care trust that is responsible for commissioning the service. However, there is no national guidance about the timescales for when a trust should inform its strategic health authority that a serious untoward incident has occurred or, indeed, the definition of what constitutes a serious untoward incident.

All maternal deaths should also be reported to the Confidential Enquiry into Maternal and Child Health<sup>1</sup> and to the local supervising authority midwifery officer. The local supervising authority

<sup>1</sup> The confidential enquiry is a self governing body that aims to improve the health of mothers, babies and children.

midwifery officer plays a key role in clinical governance (the steps and procedures for ensuring high quality care) by ensuring that the standard of midwifery practice and supervision of midwives meets that required by the Nursing and Midwifery Council. Serious incidents relating to midwifery practice or maternity care should be reported to the local supervising authority midwifery officer.

During the period of the 10 deaths at Northwick Park Hospital, the trust had a policy for managing serious untoward incidents. The policy outlines what action should be taken following a serious untoward incident. It was updated in September 2003 and more recently in 2005.

North West London Strategic Health Authority was established in April 2002 and developed a procedure for trusts to report serious untoward incidents in January 2003. Its policy states that all serious untoward incidents must be reported to the strategic health authority within 24 hours of them occurring. It also includes a definition of a serious untoward incident:

“An accident or incident when a patient, member of staff or the public suffers serious injury, major permanent harm or unexpected death (or the risk of death or injury) on hospital or other premises where NHS care is provided or where actions of the health service staff are likely to cause significant public concern.”

## Maternity services – the national context

Maternity services have received considerable attention in recent years. This is described in more detail in the 2005 report of our previous investigation of maternity services provided by the trust. Recent publications which set out good practice in maternity services include *The National Service Framework for Children, Young People and Maternity Services* (2004) and the *National Institute for Health and Clinical Excellence (NICE) Guidelines for Maternity Services* (2001). Information about these publications is included in our 2005 report.

In this report we will focus on the two *Confidential Enquiries into Maternal and Child Health: Why Mothers Die 1997–1999* and *Why Mothers Die 2000–2002*, and initiatives taken by the Healthcare Commission.

In *Why Mothers Die 1997–1999*, substandard care is associated with a substantial proportion of deaths and the reasons for this are described as:

“... lack of team work and communication, failure to appreciate the severity of the illness and suboptimal treatment, failure of consultants to attend and failure of junior staff or general practitioners to diagnose or refer the case to a senior colleague or hospital.”

In *Why Mothers Die 2000–2002*, it is noted that the risk of women dying from a pregnancy related cause is extremely small and has reduced over the years. During the period 2000 – 2002, 391 maternal deaths were reported, giving an incidence of 11.4 deaths per 100,000 maternities.



The report notes that the main reasons for substandard care are unchanged from the previous report (1997–1999). However, four new causes of substandard care were identified, including:

“failure of obstetric staff and midwifery staff to recognise and act on medical conditions outside their immediate experience” and  
“failure of accident and emergency staff to recognise the severity of the illness in sick pregnant women and to ask for obstetric or midwifery assessment”.

The report acknowledged that although some of the causes of substandard care arise from problems associated with the delivery of healthcare, for example, lack of intensive care beds, ultimately many of the problems “are inherent “ in the professional staff involved in providing maternity care.

Other risk factors for maternal deaths identified in the report are social exclusion, which includes women who come from a black or minority ethnic group; women who book late for maternity care, i.e. after 22 weeks gestation, women who miss over four antenatal appointments and women from poor communities.

## The role of the Healthcare Commission

This is the third investigation into maternity services undertaken by the Healthcare Commission (and an investigation into maternity services was also undertaken in March 2003 by the Commission for Health

Improvement, one of the Healthcare Commission’s predecessors). In view of the findings from these investigations and some common issues, the Healthcare Commission has decided to direct more attention to the provision of maternity services. Through its maternity programme board the Healthcare Commission is developing a range of activities to help bring about improvements in maternity services. This includes a trust level survey in 2007 and an audit of maternity services. This work is still in the early stages of development.

## 2 General overview of pregnancy, labour and medical terms referred to in this report

This section provides a brief overview of pregnancy and labour and the information is specific to the type of care these women required. It contains explanations of some of the medical tests and complications, which may be associated with pregnancy, and other terminology, which is referred to in this report. It is not intended to be a comprehensive guide to pregnancy and labour, it is merely a guide to assist readers.

Most women have their first and longest antenatal check up between the 10<sup>th</sup> and 12<sup>th</sup> week of pregnancy (some women have a pre-booking visit prior to this). This is also known as the 'booking visit'. Women who have their first antenatal check up later in pregnancy are often referred to as 'late bookers'. Women who book late may present significant risk due to social complexity, which results in difficulty accessing and maintaining access to maternity services.

At the first antenatal check up a number of tests are offered, some of which will be repeated at later visits.

- The woman's height and weight are measured. A woman's height is a rough guide to the size of her pelvis. Some small women have small pelvises and, although they may have small babies, they may need to discuss the baby's delivery with their doctor or midwife.
- A general physical examination may be carried out depending on the general health of the woman and if she has any pre-existing medical problems.
- At each visit women are asked to give a sample of urine, which is tested for a number of things, including protein or albumin levels, which can indicate an infection or be a sign of pre-eclampsia, also known as pregnancy induced hypertension.

- Blood pressure is recorded at every antenatal visit. Two measurements are taken: the systolic pressure (top number), which is the highest pressure in an artery when your heart is pumping blood to your body. The diastolic pressure (bottom number), which is the lowest pressure in an artery when your heart is at rest. Blood pressure measurement is made up of both the systolic and the diastolic pressure. It is normally written like this: 120/80, with the systolic number first. An abnormal systolic blood pressure is defined as equal to or greater than 160 and an abnormal diastolic blood pressure is defined as equal to or greater than 90.
- The mean arterial pressure (MAP) is a term used in medicine to describe average blood pressure in an individual.
- An increase in blood pressure could be a sign of pre-eclampsia.
- Women are also offered a blood test to carry out a number of checks to determine, among other things, their blood group and whether or not they are anaemic.
- Women may also be offered a date for an ultrasound scan at this first visit. This test uses ultrasound waves to build up a picture of the baby in the uterus (womb), taking its measurements and checking that it is growing and developing normally and establishing the number of babies that the woman is carrying.

Healthy women with an uncomplicated pregnancy who are having their first baby, will have approximately 10 antenatal visits. Women having their second or subsequent baby will have approximately seven visits. Most of this care will be provided by a midwife and a GP. Women with pre-existing medical problems or

who develop problems during their pregnancy will be seen more often, and a consultant obstetrician is likely to be involved in their care.

During the antenatal visit the doctor or midwife will examine the woman's abdomen to check the baby's position and growth. They will also listen to the baby's heart rate, either using a hand-held ultrasound monitor or electronically through a monitor belted on the woman's abdomen and linked to a cardiotocograph (a machine used to monitor the baby's heart rate usually referred to as the CTG). A pinnards stethoscope may also be used.

## What happens in labour?

There are three stages to labour. In the first stage the cervix gradually opens up (dilates). In the second stage the baby is pushed down the vagina and is born. In the third stage the placenta comes away from the wall of the womb and is also pushed out of the vagina.

Prior to the first stage of labour the cervix will start to soften, this will continue and the cervix will gradually open to about 10cm. This is when it is described as being fully dilated and is wide enough for the baby to be delivered. Sometimes the process of softening can take many hours to reach what the midwives refer to as established labour. This is when the cervix has dilated to at least 3cm. In a first labour, the time from the start of established labour to full dilation is usually between six and 12 hours.

If the labour is slow the doctor may prescribe a drug, which will encourage contractions and accelerate labour.

The second stage of labour starts when the cervix is fully dilated and lasts until the baby is born.

The third stage of labour is when the placenta is delivered. The midwife will usually give the woman an injection into her thigh just as the baby is born to speed up this stage. The injection contains a drug called syntometrine or syntocinon, which makes the womb contract and so helps prevent the heavy bleeding which some women may experience without it. If the woman chooses to accept this injection this stage takes five to 10 minutes.

If the woman has a significant tear or has required an episiotomy (when the perineum is cut), this will be sewn up. Small tears and grazes are often left to heal without any stitches because they frequently heal better this way.

Epidural anaesthesia is a special application of local anaesthetic. It numbs the nerves which carry the feelings of pain from the birth canal to the brain. An epidural is given by an anaesthetist. For most women it will provide complete pain relief. It does require that contractions are monitored continuously. There are other types of pain relief available such as intramuscular injections of pain-relieving drugs.

## Fetal heart monitoring

Every baby's heart is monitored during labour. The midwife is watching for any marked change in the heart rate which could be a sign that the baby is distressed and that action should be taken in order to speed up delivery. There are different ways of monitoring the baby's heartbeat:

- using a pinnards stethoscope
- using a special kind of stethoscope or a hand-held ultrasound monitor
- through a monitor linked to a cardiotocograph

Sometimes a clip is put on the baby's head so that it can be monitored more exactly.

### **Induction of labour**

Sometimes labour must be started artificially – this is called induction. Labour may be induced if there is any sort of risk to the mother's or the baby's health, for example, if the mother develops high blood pressure or if the baby is failing to grow and thrive. Contractions can be started by inserting a pessary or gel into the vagina or by a hormone drip in the arm.

### **Caesarean section**

A caesarean section is the delivery of a baby by surgical incision through the abdominal wall into the uterus (womb). There are situations where the safest option for the mother and/or baby is to have a caesarean section. A caesarean section will only be performed where there is a clinical need for this type of delivery. It may be 'elective' (planned in advance) or 'emergency'. An emergency caesarean section may be necessary if complications develop and quick delivery is needed. This may be before or during labour.

Where possible, a caesarean section is performed under epidural anaesthesia or similar spinal anaesthetic. A general anaesthetic is sometimes used, particularly when the baby needs to be delivered very quickly.

## **Problems referred to in this report**

### **Mild itching**

Mild itching is common in pregnancy because of the increased blood supply to the skin. However, itching without a rash, particularly in the last four months of pregnancy, may be a

sign of an uncommon serious problem called obstetric cholestasis. This is a disorder of the liver and may lead to health problems for the baby and an increased risk of maternal haemorrhage after the birth.

### **Headaches**

Some pregnant women find they get a lot of headaches. Sometimes a walk or rest and relaxation will help relieve them. Frequent bad headaches should be discussed with a doctor or midwife. Severe headaches may be a sign of high blood pressure.

### **High blood pressure and pre-eclampsia**

During pregnancy the woman's blood pressure is checked at every antenatal appointment. This is because a rise in blood pressure can be the first sign of pre-eclampsia. Pre-eclampsia is defined as high blood pressure greater than 140/90mmHg on two consecutive occasions four or more hours apart or any diastolic reading of 100 or more, for example, 150/100mmHg, or a single reading of a diastolic blood pressure above 110, developed during pregnancy in a woman whose blood pressure was previously normal. Urine is also checked for protein. The signs and symptoms of pre-eclampsia include visual disturbances, swelling and abdominal pain. Most cases of pre-eclampsia are mild and cause no trouble. Although some women feel perfectly well, pre-eclampsia can still be severe, causing serious problems for both mother and baby. It can cause fits (convulsions) in the mother (eclampsia) and affect the baby's growth and may be life threatening if left untreated.

Pre-eclampsia usually occurs towards the end of the pregnancy, but may occur earlier. The earlier it starts in pregnancy the more severe it is likely to be. Treatment ranges from rest at home to drugs to lower the blood pressure and

prevent fitting, or occasionally early delivery of the baby.

HELLP syndrome is a life threatening complication of pre-eclampsia and eclampsia. HELLP is an abbreviation of the main findings: Haemolysis (the breakdown of red blood cells), elevated liver enzymes and low platelet count (a blood clotting element).

### **Vaginal bleeding**

Bleeding from the vagina at any stage of a pregnancy can be an indication of problems. In early pregnancy it can be an indication of miscarriage, although many women who bleed in the early stages go on to have a normal pregnancy. Bleeding can also be caused by vaginal infection.

Bleeding after the 24<sup>th</sup> week of pregnancy is referred to as antepartum haemorrhage. It may be a sign that the placenta is implanted in the lower part of the uterus (placenta praevia) or that it has started to separate from the uterus (placental abruption). Both of these can be dangerous and help from a midwife or doctor should be sought immediately.

### **Bleeding post childbirth**

A post partum haemorrhage is most often defined as vaginal bleeding in excess of 500ml in the first 24 hours after childbirth. The importance of a given volume of blood loss varies with the woman's haemoglobin level. A woman with a normal haemoglobin level (the part of the red blood cell that carries oxygen) will tolerate a loss of blood that would be fatal for a woman who is anaemic.

Bleeding may be caused by failure of the uterus to contract after childbirth (atonic uterus). This is the most common cause of bleeding after childbirth.

Other causes of bleeding following delivery include tears in the genital tract and retention of placental tissue and blood clots in the uterine cavity. This latter cause prevents adequate uterine contractions after childbirth and is therefore associated with post partum haemorrhage.

Blood clotting disorders are an unusual but important cause of post partum haemorrhage. In the majority of cases the clotting disorder is secondary to pre-eclampsia or massive blood loss.

Haemoglobin (often referred to as Hb) levels in the blood are measured in grammes per 100 millimetre, abbreviated to g/dl. The normal range of haemoglobin for a woman is 11.5–15.5g/dl. Anything less than this is termed as anaemia. There is a normal physiological drop during pregnancy. Some young, fit people may be able to cope with a lower haemoglobin and only develop symptoms when their haemoglobin drops to around 6g/dl.

Platelets are one of the main components of the blood that form clots, sealing up injured areas and preventing haemorrhage.

### **The supervisor of midwives and the local supervising authority midwifery officer**

The report also refers to the supervisor of midwives and the local supervising authority midwifery officer.

All practising midwives in the United Kingdom are required to have a named supervisor of midwives. A supervisor of midwives is a midwife who has been qualified for at least two years and has undertaken a preparation course in midwifery supervision. Each supervisor is responsible for approximately 15 midwives and is someone that midwives may go to for advice,

guidance and support. The supervisor of midwives will monitor care by auditing the midwives' record keeping and investigating any reports of problems in practice. They are also responsible for investigating any serious incidents and reporting them to the local supervising authority midwifery officer. The supervisor of midwives is also responsible for making sure maternity services have guidelines, policies and procedures based on the best available evidence to promote best practice.

Supervisors of midwives are appointed by the local supervising authority. The local supervising authority sits within an NHS authority, and in England the local supervising authority is the strategic health authority. The main responsibility of the local supervising authority is to protect the public by monitoring the quality of midwifery practice through the mechanism of statutory supervision for midwives. The strategic health authority will appoint a local supervising authority midwifery officer to carry out the functions of the local supervising authority.

The Nursing and Midwifery Council sets the rules and standards for the function of the local supervising authorities and the supervision of midwives.

The local supervising authority midwifery officer is professionally accountable to the Nursing and Midwifery Council. The function of the local supervising authority midwifery officer is to ensure that statutory supervision of midwives is in place to ensure that safe and high quality midwifery care is provided to women.

Source:

*The Pregnancy Book*, Department of Health, 2001

*Midwives Rules and Standards*, Nursing and Midwifery Council, 2004



## 3 The women who died

This section provides an outline of the events surrounding each of the 10 maternal deaths, the action taken by the trust after each one and our findings. To protect the identity of the 10 women, we have called them woman A, woman B, woman C and so on. A summary of the dates and causes of death and the common factors across the 10 deaths can be found in Appendix D.

### Woman A

Woman A was an African woman in her thirties with no significant medical history. She had had a female circumcision, and this was to be reversed during the pregnancy. This was her first pregnancy and her baby was due on July 22<sup>nd</sup> 2002.

Woman A did not book until she was 22 weeks pregnant to have her baby at Northwick Park Hospital. Most women book to have their babies when they are between eight and 12 weeks pregnant, so woman A was classified as a 'late booker'. This is considered to be a significant risk factor for complications during pregnancy.

### Antenatal care

Woman A was first seen at Northwick Park Hospital on March 20<sup>th</sup> 2002. It was noted that she needed an interpreter. At 22 weeks pregnant, her blood pressure was recorded as being 120/70mmHg, which is within the normal range. However, during pregnancy, blood pressure normally falls and reaches its lowest point at around the 20<sup>th</sup> week of pregnancy, so this cannot be an accurate assessment of her pre-pregnancy blood pressure.

It is documented in her notes that woman A was reviewed in the African Well Woman Clinic

on March 22<sup>nd</sup> 2002, when she was just over 22 weeks pregnant, and her blood pressure was 130/90mmHg. This was rechecked and was found to be 130/84mmHg – a diastolic (lower number) blood pressure of 90mmHg in mid-pregnancy would be classified as abnormal. Every pregnant woman should have her urine tested for protein at every antenatal visit to check for the possible development of pre-eclampsia (Pre-eclampsia is defined as high blood pressure greater than 140/90mmHg on two consecutive occasions four or more hours apart or any diastolic reading of 100 or more). A urine specimen for woman A was not obtained for testing at this appointment. However, it was noted that she did not have a headache or any visual disturbance, thus the clinicians were looking for additional factors in relation to the possibility of pre-eclampsia.

At the appointment on March 22<sup>nd</sup> arrangements were made for woman A to have a procedure to reverse her female circumcision, which was carried out on April 3<sup>rd</sup>. There is no record of the actual procedure in her clinical notes, but the record in her case notes, "Post reversal of circumcision, well ... wound healthy", suggests that the procedure took place.

At 8.43pm on April 8<sup>th</sup> woman A was admitted by ambulance to the accident and emergency (A&E) department at Northwick Park Hospital. She had begun to feel unwell that afternoon and the ambulance notes record that she was complaining of vomiting and "had developed epigastric pain at 15.00 today" (pain in the middle of the upper abdomen). The ambulance records state that she was 24 weeks pregnant and that her blood pressure had been checked and was 124/88mmHg. This information was provided both in writing and verbally to the A&E nurse who received woman A.

Woman A was put in a wheelchair and transferred to the A&E waiting room to await assessment. The A&E records do not have details of who accompanied her to the A&E department. Written statements from staff note that woman A was accompanied, but when we interviewed members of A&E staff they were unable to confirm who accompanied her.

During interviews, staff told the Healthcare Commission that the A&E department was very busy when woman A arrived and that it failed to register with them that she was pregnant.

Some time before 10.00pm, woman A collapsed and fell to the floor with a possible seizure, and was transferred on a mattress (staff told us in interviews that this was in line with guidance on how to transfer patients) to the minor injuries area of the A&E department. A senior house officer (junior doctor) examined her and noted that she had been complaining of abdominal pain. At this point her blood pressure had increased to 165/84mmHg, her heart rate was 120 beats per minute (this would be classified as an abnormally rapid heart beat) and her blood glucose level was 8.4mol/l, which indicated that the collapse was not caused by a low blood sugar level. Woman A began to regain consciousness and it was at this stage that the senior house officer was made aware, by the person with woman A, that she was pregnant. The senior house officer asked the healthcare assistant to inform the staff working in the 'majors' area of A&E that woman A was going to be transferred there. The sister who was in charge of the majors area informed the on call obstetric and gynaecology senior house officer about woman A. Woman A's blood pressure was recorded at 11.00pm and at 11.05pm and the readings were high: 210/120mmHg and 220/132mmHg respectively. Woman A was transferred to the maternity unit at 11.05pm, and on arrival on the labour ward

she was unconscious and had further seizures. Her blood pressure was 186/136mmHg and her heart rate was 51 beats per minute.

### Care during delivery

According to the case notes woman A was seen by an obstetric registrar at 11.00pm and treated with magnesium sulphate, an anti-convulsant drug, via an intravenous infusion. Blood was taken for haematological and biochemical tests. Her blood pressure was rechecked and it had decreased to 142/96mmHg, although this would still be considered high. Because of this drop in blood pressure, woman A did not receive any anti-hypertensive medication. However, it was noted that she was deeply unconscious and had a Glasgow coma scale score of three (assessment to determine level of consciousness, in which three is the worst score), and, on examination, the baby's heartbeat could not be heard.

At 11.47pm woman A had a further seizure and was given a bolus dose of magnesium sulphate, which was in adherence with the guidelines. At midnight, the consultant obstetrician, along with anaesthetists and paediatricians, were informed of woman A's condition. At 12.10am she was transferred to theatre for a caesarean section operation and the consultant obstetrician arrived in theatre at 12.20am. The obstetric registrar carried out a caesarean section under general anaesthesia, but the consultant obstetrician was present in the operating theatre. A senior anaesthetic registrar and an anaesthetic specialist registrar were involved in the care of woman A. At 12.41am a stillborn baby boy was delivered.

Prior to the caesarean section it was noted that woman A's blood tests were abnormal: her platelet count was low and that her uric acid was significantly elevated, along with her levels



of ALT (an enzyme that is normally found in the liver cells – an increase in ALT levels may indicate liver damage).

### Care after delivery

Woman A continued to have significant and severe high blood pressure (remaining around 190/120mmHg) until after delivery. At around 1.45am woman A was given labetalol (a drug used to treat high blood pressure) to reduce her high blood pressure, and control of her blood pressure was achieved. Monitoring of her blood pressure using an arterial line (catheter inserted into the artery to measure blood pressure and draw blood) was instituted.

The magnesium sulphate intravenous infusion was continued after the caesarean section operation. Medication, Fragmin 2,500iu daily, was also prescribed to prevent woman A developing blood clots.

The consultant obstetrician spoke with the relatives of woman A to inform them that the baby had been stillborn and of the serious nature of woman A's condition. Woman A's husband was not in the country.

Woman A remained ventilated by machine and was transferred to the intensive care unit at 2.30am. She developed disseminated intravascular coagulation (overstimulation of the blood clotting mechanisms in response to disease or injury). Her blood pressure began to rise and she was given hydralazine and labetalol (drugs used to treat high blood pressure) to bring it down. Woman A remained unconscious despite not receiving any sedation and continued to receive medication to control her blood pressure.

The obstetric registrar reviewed woman A at 8.55am on April 9<sup>th</sup> 2002, and again at 11.10am. The consultant obstetrician reviewed her after his morning ward round. Her blood pressure

recordings were returning to normal but she remained unresponsive. Her relatives were informed of her poor condition. A scan showed that she had had an intracerebral bleed (bleed into the brain).

The consultant anaesthetist discussed the condition of woman A with the neurosurgeons at the National Hospital for Neurology and Neurosurgery. In view of the poor outlook for woman A, it was agreed that an operation was inappropriate. Subsequent assessment of cerebral and brain stem function including an assessment of spontaneous respiration showed no evidence of brain activity. Following a discussion with her relatives, ventilation by machine was discontinued and woman A died on April 9<sup>th</sup> 2002 at 9.20pm.

### Post mortem

The post mortem report of Her Majesty's Coroner's Pathologist confirmed an intracerebral bleed as the cause of death.

### Inquest

The inquest concluded that woman A died of natural causes.

### Hospital protocols

The trust has provided two protocols, one for the administration of antihypertensive therapy and one for the management of severe pre-eclampsia. The first focuses on giving a bolus of fluids over 20 minutes before commencing antihypertensive (drugs used to treat high blood pressure) therapy. The second provides definitions for severe systolic and diastolic hypertension and focuses on hydralazine given as intravenous boluses to control hypertension. The protocols seem to be contradictory.

## **Actions taken by the trust following the death of woman A**

The trust informed the London local supervising authority midwifery officer of the death of woman A. North West London Strategic Health Authority was informed of the death but is unsure who informed them. The strategic health authority was being set up at the time of this death and there was no system in place for the reporting of serious untoward incidents. The strategic health authority has provided evidence that Harrow Primary Care Trust was informed of the death. The Healthcare Commission was told by the head of clinical risk and legal services that the trust did not report this death to the strategic health authority, but in other evidence it states that it did, and there is written evidence that the trust informed the strategic health authority at the end of April 2002. The trust board was informed of the death in May 2002. The death was also reported to the Confidential Enquiry into Maternal and Child Health.

The death was classified as a serious untoward incident and the trust conducted an investigation into the death. This was led by the head of clinical risk and legal services, who was accountable to the medical director. The consultant obstetrician who had lead responsibility for the management of obstetric clinical risk assisted the head of clinical risk and legal services.

Statements were not obtained by the trust from all of the staff involved in this incident. There is no statement from the A&E department healthcare assistant who was involved in caring for woman A and there is a statement from only one midwife. The statement indicates that two other midwives were involved in the care of woman A. There is evidence that statements were requested from four other midwives

involved in the care of woman A. Some of the statements are not dated or signed, although the name of the person writing the statement is included. The dates on the statements range from April 2002 to January 2003. The trust acknowledges that it took a long time to obtain statements from some of the staff. The Healthcare Commission was also told that dates on the statements indicate when they were finalised, not when they were first written.

Two preliminary reports were written about this incident. Here, we refer to the reports as Report 1 and Report 2 respectively.

Report 1 is dated April 24<sup>th</sup> 2002 but is not signed. It contains a summary of events. It states that the trust's serious untoward incident policy was implemented and that the director of midwifery is supporting the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk. It refers to a serious untoward incident panel comprising of the chief executive, the medical director and the clinical director for women's and children's services. It also says that statements are being obtained from staff and that there are associated investigations into the management of woman A in the A&E department. The report concludes "there are no immediate recommendations necessary [sic] arising from this preliminary investigation".

The report says that the correct next of kin has not been identified and that it is not clear "whether or not she was accompanied". It states that the body of woman A was released to "cousins".

Report 2 is not signed or dated and contains a brief description of events. It contains a summary of events that is similar to that in Report 1. It indicates that an external review has been commissioned. The preliminary conclusions are that, although there was some

concern about the delay in the A&E department and the delay in referring woman A to the obstetric team, this did not make a difference to the outcome as woman A would not have received treatment for her raised blood pressure until after her first seizure.

Report 2 states that work is in progress to improve arrangements between the A&E department and the labour ward when a pregnant woman is admitted as an emergency. A chronology of events is also attached to Report 2.

Both reports contain a section that covers communications with the relatives and GP of woman A. Through its chaplaincy, the trust offered to arrange a funeral for woman A. Report 2 states that the coroner released the body of woman A to a 'cousin' and that the coroner's team has been in touch with representatives of the family of woman A.

When asked by the Commission about the serious untoward incident panel, the head of clinical risk and legal services said she was not aware of such a formal panel being formed, and was unsure where this information came from. Meetings were held and the head of clinical risk and legal services kept the chief executive, medical director and other key staff informed about the investigation. There is evidence of a meeting held on April 24<sup>th</sup> 2002 to discuss this and the subsequent two deaths that occurred in April 2002. The meeting was attended by the chief executive, medical director, director of midwifery and the medico-legal adviser.

The head of clinical risk and legal services wrote the preliminary investigation reports with input from the consultant obstetricians involved in the case.

In the case of woman A there is a third report, called 'Risk Management Report'. This is not

signed or dated. We believe this report was written by the consultant obstetrician who cared for woman A when she was admitted to the labour ward. It provides an overview of events and concludes that, given the presenting signs and symptoms of woman A, it was reasonable for the ambulance crew to take her to the A&E department rather than the labour ward. It also concludes that the outcome would have been the same even if she had been taken directly to the labour ward.

In May 2002 the trust asked an external consultant obstetric physician to review the care of woman A. The consultant obstetric physician points out that the inpatient notes covering the reversal of circumcision performed on April 3<sup>rd</sup> 2002 had not been made available to her. The trust's letter in response to the consultant obstetric physician's report does not refer to the missing case notes from the reversal of circumcision.

We were told that the trust has searched for these missing notes but that it has been unable to locate them.

In June 2002 the trust contacted the medical director at London Ambulance Service NHS Trust to inform her of the death of woman A. The ambulance trust agreed to obtain further information from the relevant ambulance crew.

The ambulance trust protocols indicate that, where problems relating to pregnancy are identified in a patient who is 20 weeks or more pregnant, the woman should be taken straight to the labour ward. In the case of woman A, the crew did not associate her symptoms with her pregnancy.

As part of their review of the care of woman A, the ambulance trust agreed to highlight this case to staff and to remind them of the importance of taking women who are 20 weeks

or more pregnant straight to the labour ward, and that even without prior suggested history their problems may be pregnancy related.

A letter sent to the head of clinical risk and legal services from the director of midwifery in July 2002 states that a meeting took place between the director of midwifery, a senior midwife from the labour ward and staff in the A&E department to discuss this incident. The letter also states that there “had been confusion over the referral route of pregnant women from the A&E department to maternity. There appeared to be anecdotal evidence that there was a reluctance on the part of the delivery suite at times to accept referrals”. The Commission was told that following this meeting a memo was sent to all staff in maternity services confirming that all women who are 20 weeks pregnant and who have a non-traumatic presenting injury must be admitted to the labour ward and not the A&E department.

A&E staff developed a flow chart for the management of pregnant women who attend the A&E department.

We were told that discussions took place between the ambulance trust and the A&E department, but that a joint review involving maternity, A&E and the ambulance service was not carried out.

There is no final investigation report or action plan arising from the internal investigation.

The head of clinical risk and legal services was responsible for coordinating the investigation into this death, but the director of midwifery was responsible for providing feedback to the midwives. Midwives involved in caring for woman A when she was admitted to the labour ward told the Healthcare Commission that they

did not receive any feedback from the internal investigations or the external report. Nursing staff in A&E did not receive any feedback from either the internal investigations or the external review report.

The Commission was also told that senior midwives spent time with the midwives discussing the case and informing them about what was happening.

The consultant obstetrician who cared for woman A when she was admitted to the labour ward received a copy of the external review report prepared by the consultant obstetric physician.

The consultant obstetrician who had the lead responsibility for the management of obstetric clinical risk wrote to the GP of woman A, providing him with details about the events leading up to her death. The letter also asked the GP to inform the relatives that they could contact the consultant obstetrician who had cared for woman A if they would like to discuss her care.

### **Findings and conclusions on the care and treatment provided to woman A and the actions taken by the trust**

Staff did not obtain a sample of woman A's urine for testing when she was seen in the antenatal clinic on March 22<sup>nd</sup> 2002.

The case notes for the reversal of female circumcision are still missing – the trust has been unable to locate them.

We do not know what woman A's blood pressure was during her admission for reversal of female circumcision. The case notes from the reversal of female circumcision may have highlighted earlier that woman A was beginning to show signs of pre-eclampsia, but

equally could have confirmed that the onset of the condition was rapid.

Woman A was admitted to the A&E department. The ambulance staff should have taken woman A to the maternity unit. Women who are over 20 weeks pregnant and complaining of stomach pain should ideally be admitted directly to a maternity unit. It is well known that these symptoms can be features of pre-eclampsia, and they must be excluded. *The Confidential Enquiries into Maternal Deaths* highlight repeatedly the need for clinical staff to have an awareness of the implications of epigastric pain during pregnancy and of the need to highlight this to A&E physicians and GPs as well as obstetricians.

The ambulance staff did inform the A&E staff that woman A was pregnant, therefore they should have transferred her to the maternity unit rather than leaving her in the waiting room.

There was a delay in woman A being assessed in the A&E department. Staff are not clear why she was not assessed earlier or why they failed to transfer her when they were told by the ambulance staff that she was 24 weeks pregnant.

There was very little communication by the staff with woman A. It was, and still is, usual practice to ask women if they may be pregnant, but in the case of woman A this did not happen. This may have been because woman A was from Somalia and English was not her first language. As we described in our first investigation into maternity services at the trust, staff had limited access to interpreters at Northwick Park Hospital. We were told that, even now, if English is not the first language of a patient admitted to the A&E department, staff tend to assess them according to their physical signs and rely on whoever is accompanying the

patient to act as an interpreter for them.

There was a failure of the triage (assessment to determine the seriousness of the problem) process.

At the time of her admission to the A&E department, woman A was likely to have had severe pre-eclampsia complicated by HELLP (haemolysis, elevated liver enzymes and low platelets) syndrome (a severe variant of pre-eclampsia where there is liver disturbance, low platelets and the breakdown of red blood cells). The results of her blood tests indicate that this was the case.

There were no major deficiencies in the care woman A received once she was admitted to the maternity unit, however, more effort could have been made to control her blood pressure, particularly before she was anaesthetised. Although, it is noted that it can be difficult to obtain good control of blood pressure in patients with established extreme high blood pressure.

The anaesthetist had taken cognisance of the need to prevent a surge in blood pressure at tracheal intubation (insertion of a tube into the mouth or nose to maintain the airway or facilitate the administration of general anaesthetics) by administration of alfentanil (an analgesic drug) with rapid onset action.

A consultant anaesthetist was not directly involved (although informed of her condition) in the care of woman A. However, the anaesthetic care woman A received was appropriate.

The supervisor of midwives was informed of the death of woman A but she did not go into the unit to provide support and advice to the midwives who were on duty when woman A died. In the event of a maternal death, the on call supervisor of midwives would be expected to provide support and advice to the midwives.

Our findings from the investigations undertaken by the trust following the death of woman A show that not all of the reports are signed or dated. This is not in line with good practice.

Statements were not collected from all the staff involved in this incident, for example, the healthcare assistant working in A&E, and there was delay in obtaining some of the statements.

There is no contextual information included in the reports, for example, whether or not the A&E department or labour ward were busy when woman A was admitted. A&E staff told the Healthcare Commission that the A&E department was very busy that night and that it failed to register with them that woman A was pregnant.

The trust sought the expert opinion of a consultant obstetric physician who did not work at the trust. This was good practice.

The trust did not inform the consultant obstetric physician the reason why they were unable to forward her the notes from the reversal of the female circumcision.

The trust did not commission a review of the midwifery or anaesthetic care that woman A received.

There is no reference to the missing notes from the reversal of circumcision in either Report 1 or Report 2.

The Commission has been given conflicting information about what feedback staff received from the external review of the care provided to woman A.

There is no final investigation report arising from the internal investigation, however, it was included in the external review of the three deaths carried out by the professor of obstetrics.

There is conflicting information about how the learning from this incident was shared with midwifery staff, although there is evidence that the consultant obstetrician involved in the care of woman A received feedback.

There was no system in place between the trust and the strategic health authority for the reporting of serious untoward incidents.

The trust did inform the strategic health authority of the death of woman A.



## Woman B

Woman B was European and in her twenties. She had had four previous pregnancies, resulting in one live child born in 1996. Woman B had a history of cervical incompetence and the other pregnancies had ended in a miscarriage when she was eight weeks pregnant and two babies born at 25 weeks and 22 weeks gestation respectively, both of whom had later died. This was her fifth pregnancy and her baby was due on May 3<sup>rd</sup> 2002.

It was recorded in her clinical notes that English was woman B's first language.

### Antenatal care

When she was 16 weeks pregnant woman B had a cervical suture (stitch) inserted into her cervix to reduce the risk of miscarriage. This was appropriate, given her obstetric history of cervical incompetence (weakness of the neck of the womb).

Woman B was seen regularly during her pregnancy and she had a series of scans to monitor the growth of the baby. On March 13<sup>th</sup> and 25<sup>th</sup> 2002 woman B had some minor antepartum bleeding (bleeding occurring after the 24<sup>th</sup> week of pregnancy). On March 28<sup>th</sup> 2002 the consultant obstetrician responsible for her care instructed that woman B should stay in hospital until the cervical stitch was removed. This was removed on April 8<sup>th</sup> 2002 by the obstetric specialist registrar.

### Care during delivery

Woman B's labour was induced when she was 37 weeks pregnant, on April 16<sup>th</sup>. The reason for this is unclear but it may have been because of the recurrent small antepartum haemorrhages. Induction of labour was commenced at 3.10pm,

with 1 milligram of prostin gel being applied to the vagina. This induction technique was appropriate for a woman who had had previous pregnancies.

At 9.20pm it was noted that the cardiotocography (recording of the baby's heart beat) was showing variable decelerations (transient decrease in the heart rate). Woman B was given antibiotics while in labour because she had tested positive for Group B beta-haemolytic streptococcus, an organism carried in the vagina that babies can be infected with during delivery. It is not unusual for women to carry this organism. The labour was allowed to continue.

After being induced, woman B progressed rapidly to a spontaneous delivery of a live baby girl at 10.08pm. Woman B was given syntometrine (a drug used to treat bleeding from the uterus following delivery) and the placenta (afterbirth) was delivered and appeared complete. At 10.15pm she had profuse bleeding from the vagina, causing her to lose approximately 1,500ml of blood. The obstetric registrar was called and queried whether or not she had had a cervical tear. Her uterus was well contracted and the two main causes of bleeding are trauma to the genital tract or failure of the uterus to contract following delivery. The anaesthetic specialist registrar was present in the delivery suite at 10.15pm and he secured intravenous access and together with the obstetric registrar transferred woman B to the operating theatre for exploratory surgery, to be carried out under general anaesthesia.

Woman B arrived in theatre at 10.18pm and the staff grade obstetrician was called. A blood transfusion was commenced at 10.30pm and the staff grade obstetrician arrived in theatre. The alert to indicate a major obstetric bleed was initiated at 10.33pm. The second

anaesthetist, a senior specialist registrar, arrived in theatre at 10.45pm. Woman B was given a general anaesthetic and both anaesthetists proceeded to resuscitate her with blood and blood products. The consultant obstetrician on call was also summoned and arrived in theatre at 11.37pm. During this time the staff grade obstetrician checked the genital tract for trauma and attempted to stitch the cervix. The staff grade obstetrician did not document any of the actions he took prior to the arrival of the consultant obstetrician. The Commission was told that, because he had provided a statement for the subsequent internal investigation, it was not apparent to the trust that he needed to document the surgical procedure in the case notes.

Although woman B was bleeding from her vagina the consultant obstetrician could find no obvious trauma to the genital tract. Woman B continued to bleed from her vagina and her uterus was atonic (floppy). Her partner was informed that she would need surgery and that a hysterectomy would be required to stop the bleeding. The consultant obstetrician performed a laparotomy (an exploratory operation of the abdomen) and proceeded to carry out a total abdominal hysterectomy.

During the procedure it was difficult to control the bleeding and an additional consultant obstetrician was called in along with a consultant vascular surgeon. The consultant anaesthetist was also called in, and arrived at approximately 12.30am. The bleeding continued and woman B's fallopian tubes and ovaries were removed. Her vagina and pelvis were 'packed' with gauze swabs in an attempt to stop the bleeding. The haemorrhage was only partially controlled. Woman B had a severe coagulopathy (a condition affecting the blood's ability to form a clot) secondary to the massive blood loss.

Between 1.35am and 2.45am attempts to control the bleeding were stopped so that woman B could be resuscitated, and she received more blood and blood products.

Woman B continued to bleed and bleeding was found to be coming from her right internal iliac vein (a vein that drains to the common iliac vein). An iliac vein is one of the veins that drains the pelvic organs. This was stitched. However, at 3.00am she was still bleeding and no obvious source could be found. It was queried whether the bleeding could be coming from a vein in the pelvis. Bleeding from a vein on the left side was controlled with clips, but the blood continued to ooze. At this point the medical staff agreed that the best option was to 'pack' the abdomen with surgical swabs and transfer woman B to the intensive care unit. The procedure was completed at 5.47am and woman B was transferred to the intensive care unit at 6.25am. It is noteworthy that despite the massive blood loss, the anaesthetists managed resuscitation well enough to maintain a reasonable heart rate and blood pressure throughout most of the procedure.

Woman B continued to bleed and suffered a cardiac arrest (when the heart stops beating). She subsequently died at 10.20am on April 17<sup>th</sup> 2002.

Woman B's midwifery notes record that carboprost (a drug used to stimulate the uterus to contract and to control bleeding from the uterus) was given at 11.28pm on April 16<sup>th</sup>. The midwives also estimated that woman B lost 48 litres of blood.

The anaesthetic notes show that woman B received a total of 75 units of blood and a total of 40 units of other blood products, including fresh frozen plasma (contains clotting factors and is used to treat patients who develop problems with their clotting factors). This is a



significant amount of blood and blood products.

The trust provided us with a copy of its protocol for treating women with atonic post partum haemorrhage (bleeding post delivery caused by the muscles of the uterus becoming floppy). It is not dated. It includes information about how to manage such a haemorrhage, including the use of interventional radiology.

At the time of the death of woman B there was no manager on call for the maternity unit, and the midwives were reliant on the support and advice of the supervisor of midwives. In the event of a maternal death, the on call supervisor would be expected to come into the hospital to provide support to the midwives. In this instance the midwives paged the on call supervisor of midwives three times during the night before she responded, and her response was that “it could wait until the morning”.

### **Post mortem**

The post mortem report of Her Majesty’s Coroner’s Pathologist concludes that death was due to bleeding following vaginal delivery and surgical removal of the uterus. The pathology report on the uterine specimen showed a small residual portion of placenta remaining in the uterus.

### **Actions taken by the trust following the death of woman B**

The trust informed the London local supervising authority midwifery officer of the death of woman B. The trust board was informed of the death in May 2002. As with the death of woman A, the strategic health authority is unclear about the route by which it was informed of the death but there is evidence that the trust informed the strategic health authority at the end of April 2002. Harrow Primary Care Trust was also

informed of the death.

The death was classified as a serious untoward incident and the trust conducted an investigation. The investigation was coordinated by the head of clinical risk and legal services, with assistance from the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk. He was also the consultant obstetrician involved in the care of woman B, although he was not involved in her care on April 16<sup>th</sup> 2002, when she actually gave birth. The investigation was supported by the director of midwifery.

Discussion of this death was also included in the meeting held on April 24<sup>th</sup> 2002 to discuss the three deaths that occurred in April 2002.

Statements were obtained from the staff grade obstetrician, the consultant anaesthetist, the consultant surgeon and one of the consultant obstetricians involved in the care of woman B on April 16<sup>th</sup> and 17<sup>th</sup> 2002. The statements are all addressed to HM Coroner’s Court. There are no statements from the second consultant obstetrician who was called in on April 16<sup>th</sup> 2002, or the midwives who were on duty on the night of April 16<sup>th</sup> 2002.

A report was also prepared for the coroner by the lead consultant obstetrician who had lead responsibility for the management of obstetric clinical risk.

There is a preliminary, unsigned, serious untoward incident investigation report, dated April 24<sup>th</sup> 2002 (Report 1), which provides an overview of the events on April 16<sup>th</sup> and 17<sup>th</sup> 2002. It also refers to a serious untoward incident panel being convened.

The preliminary conclusions in Report 1 are that there were no immediate concerns about the obstetric management or “any other

clinical governance issues". It states that the situation was managed appropriately, with appropriate input by consultants and that there were no immediate recommendations arising from the preliminary investigation. A chronology of events is attached to the report.

There is another preliminary report (Report 2), which, again, is not dated or signed. It also contains a chronology of events. The preliminary findings in this report differ from those in Report 1. The findings include that a review of the serious incident policy is to be undertaken and that an external review of the care of woman B is to be undertaken. The report also states that there are questions about the timing of the arrival of the consultant obstetrician and when the hysterectomy was performed.

Reports 1 and 2 both state that a consultant obstetrician has met with the relatives of woman B.

There is no final investigation report, but the case was included in the final external report on women A, B and C. We were told that the head of risk and clinical risk wrote the preliminary investigation reports, with input from the consultants involved in the case.

There is no written information about what feedback was provided to either obstetric or midwifery staff from the trust investigation into the death of woman B. Midwives have told us that they did not receive any specific feedback. However, there was a debriefing session for the doctors, although not all those who had been involved on the night of April 16<sup>th</sup> and 17<sup>th</sup> attended or were offered support. Midwives told the Healthcare Commission that, although unsure whether they were invited, they attended this debriefing session.

Maternity services staff told the Healthcare Commission that when they were told about the death of woman B some of the midwives

started to write statements, but they were told their statements were not required.

Midwifery staff told the Commission they were not aware of any external review of the care provided to woman B being undertaken.

### **Findings and conclusions on the care and treatment provided to woman B and the actions taken by the trust**

Woman B had a cervical stitch inserted to reduce the risk of her having a miscarriage between week 14 and week 24 of her pregnancy. This was appropriate management as woman B had a complex past obstetric history and there was a high risk that she would suffer another pregnancy loss.

The reason for induction of her labour was not recorded in the case notes of woman B. It may have been because of the recurrent small bleeds from the genital tract that had occurred after she was 24 weeks pregnant.

There was early recognition of the massive bleeding and action was taken in response to this. The initial response by the obstetric registrar to consider trauma in the genital tract was appropriate.

The massive obstetric haemorrhage alert was declared. This was done within a reasonable time.

The staff grade obstetrician did not record any of the actions he took before the consultant obstetrician arrived in theatre. This is not acceptable practice. We appreciate that this was a very difficult situation and that it was not possible to maintain contemporaneous notes (notes written as care is provided or immediately afterwards). However, to ensure the health records were complete, the staff grade obstetrician should have documented in

the clinical notes what he did before the consultant obstetrician arrived. This could have been done retrospectively. Statements for an internal investigation are kept separate to the case notes and the trust should be aware of the need to maintain accurate case notes.

It is documented in a report undertaken by an external consultancy agency that the pathology report on the specimen of uterus showed a small 5 x 1 x 1 cm residual portion of placenta. It is known that residual tissue such as this can cause bleeding following giving birth and it is usually identified during the course of an examination under anaesthetic. This tissue was not identified by the obstetricians who cared for woman B.

There were two experienced anaesthetic specialist registrars in attendance, and the consultant anaesthetist arrived within 30 minutes of being contacted. Nevertheless, the value of early input by consultants is emphasised. However, the anaesthetists who were on site responded appropriately, and the overall standard of anaesthetic management for woman B was good.

The anaesthetists and the obstetricians worked well as a team.

Woman B received three drugs, carboprost, syntometrine and ergometrine, to bring about intense uterine contraction. These drugs can also stop bleeding from the womb if such bleeding is due to the womb not contracting well after delivery. However, it would have been appropriate to administer further doses of carboprost, ergometrine and syntometrine.

The consultant obstetrician's notes are descriptive but do not explain all the surgical procedures that he undertook. In particular, there is no account of why it was necessary to

remove the fallopian tubes and ovaries, and of how a tear in the internal iliac vein (a vein that drains to the common iliac vein) occurred.

The supervisor of midwives did not offer to go in to the hospital to provide support to the midwives. This response from the supervisor of midwives, was less than satisfactory, as the role of the on call supervisor of midwives is to provide support and guidance to midwives in difficult situations such as this.

In the case of woman B there was, understandably, some reluctance by one of the midwives to work in theatre because she was unfamiliar with the procedures and operating instruments. It is not unknown for midwives to work in theatre during caesarean section operations. However, once woman B began to bleed, this should have been dealt with as emergency surgery that required the skills and expertise of an experienced theatre practitioner. Maternity staff eventually received help from a theatre nurse from the general theatres.

The midwives took on the role of theatre nurse. In 2002, there were no theatre staff deployed to specifically work in the maternity unit, meaning that midwives had to act as theatre nurses. In an emergency such as this, midwives were expected to taken on this role until theatre staff were available to attend. This resulted in fewer midwives providing cover on the labour ward.

Staff did not maintain contemporaneous notes of the events on April 16<sup>th</sup> and 17<sup>th</sup>. However, there was a detailed account of the events written retrospectively.

The haematology department provided blood and blood products. This was done in a timely and efficient manner.

There is no doubt that the staff worked long and

hard to save the life of woman B, but their efforts were hampered by lack of available resources such as interventional radiology. However, it is also true that woman B may not have withstood transfer to the radiology department.

Statements made by staff and reports were not signed or dated.

The death of woman B was reported to the trust board and the strategic health authority.

Before any review had taken place, the trust excluded any potential evidence from the midwives and assumed that there were no concerns about midwifery practice.

Some of the key staff, including consultant obstetricians, involved in the case of woman B did not receive any feedback after her death.

## Woman C

Woman C was a 24 year old from Asia with no significant past medical or family history. This was her first pregnancy and her baby was due on May 25<sup>th</sup> 2002.

### Antenatal care

At her initial assessment when she was 17 weeks pregnant, her blood pressure was 100/50mmHg (within the normal range) and her urine test showed no abnormalities. Her ethnicity was noted, and that an interpreter was not required.

Woman C's GP reviewed her at 21, 26, 30 and 34 weeks of her pregnancy. When she was 34 weeks pregnant, her blood pressure was 119/85mmHg. This increase in her blood pressure was an indication of a possible underlying hypertensive (high blood pressure) problem. There is no documentary evidence that an analysis of her urine for protein was carried out at the 26 and 34 week visits, nor is any reason documented why it was not tested. There is no written information about what measures were undertaken to ensure a sample of woman C's urine was tested. A sample of her urine was checked on the other visits and showed no abnormalities.

On March 19<sup>th</sup> 2002, woman C was admitted to the maternity unit at Northwick Park Hospital with a history of stomach pain and vomiting. Her blood pressure recorded during this admission was 110/70mmHg. There was no specific diagnosis and she was reassured and sent home.

Woman C's GP noted she was oedematous (swelling due to the retention of fluid in the tissues) at week 34 of the pregnancy, but this was within normal limits for this stage of the pregnancy.

### Care during delivery

On April 21<sup>st</sup> 2002 at approximately 7.35pm woman C suffered a seizure at home and was taken by ambulance to the maternity unit at Northwick Park Hospital, arriving at 8.20pm. The ambulance staff correctly considered a diagnosis of pre-eclampsia (pre-eclampsia is defined as high blood pressure greater than 140/90mmHg on two consecutive occasions four or more hours apart or any diastolic reading of 100 or more) and her blood pressure was 168/117mmHg, which was very high. When the systolic (top reading) blood pressure is greater than 160mmHg and the diastolic (lower reading) blood pressure is greater than 110mmHg, the patient is at risk of having an intracerebral bleed (a bleed into the brain).

On admission to the maternity unit woman C's blood pressure was 150/70mmHg and protein was detected in her urine. She was also noted to be oedematous (swelling due to the retention of fluid in the tissues). The obstetric registrar who saw her noted that her blood pressure had increased during the third trimester of the pregnancy (last three months of her pregnancy).

Woman C was given atenolol 50mg (a drug used to treat high blood pressure) and magnesium sulphate to prevent further seizures. Her blood pressure settled at 139/70mmHg. The obstetric registrar discussed her care with a consultant obstetrician and it was agreed that, once her condition was stable, the baby should be delivered. Subsequently, her blood pressure increased to 150/107mmHg and she was given a bolus dose of 5mg of hydralazine intravenously. A cardiotocograph (recording of the baby's heart rate) was performed and showed unprovoked decelerations. A caesarean section was performed by the obstetric registrar and woman C was delivered of a live baby girl at

9.02pm. The caesarean section was carried out using spinal anaesthesia and was uncomplicated. Woman C's blood pressure remained satisfactory throughout the procedure. The anaesthetic records, however, highlight a low platelet count of  $89 \times 10^9/l$ , an increased level of uric acid of  $439\mu\text{mol}/l$ , and an increased level of ALT (an enzyme normally found in the liver cells; an increase in ALT levels may indicate liver damage) of  $364\text{iu}/l$ , as well as an increased level of bilirubin (substance that results from the breakdown of red blood cells) of  $43\text{mmol}/l$ . These features are consistent with severe pre-eclampsia with liver involvement, similar to HELLP (haemolysis, elevated liver enzymes and low platelets) syndrome.

### Care after delivery

Following delivery, the intravenous infusion of magnesium sulphate was continued and woman C was fitted with thromboembolic deterrent stockings to prevent deep vein thrombosis. At 10.00pm, woman C was given atenolol 50mg orally. Her blood pressure at this time was  $144/81\text{mmHg}$ . She complained of a generalised itch and, following a discussion with the obstetric registrar, the senior house officer prescribed an antihistamine for her, which she received. It is likely that the itch reflected the liver disorder that accompanies pre-eclampsia. Her urine output was 30ml per hour and it was noted that if it went below 30ml she was to receive an infusion of 250ml of colloid.

At 12.05am woman C was reviewed by the senior house officer who noted that she was "asymptomatic for PE". Her blood pressure was  $141/78\text{mmHg}$  and her urine output for the previous hour was 22ml. Following a discussion with the on call obstetric registrar, woman C

received 250ml of gelofusine (a plasma expander used to replace blood loss) intravenously. He also advised that blood should be taken for further haematological and biochemical tests.

At 1.20am the senior house officer reviewed woman C again and noted that her urine output had increased to 40ml per hour and her blood pressure was  $155/94\text{mmHg}$ .

During this period the senior house officer reviewed woman C, and although he discussed his findings with the obstetric registrar, the obstetric registrar did not personally review woman C.

At 2.40am woman C's blood pressure increased to  $170/116\text{mmHg}$ . The senior house officer contacted the obstetric registrar who advised him to give 5mg of hydralazine (a drug used to treat high blood pressure) intravenously over five minutes. Woman C was given 5mg of hydralazine over five minutes.

The repeat blood investigations at 2.45am showed an increase in her bilirubin levels from  $43\text{mmol}/l$  to  $56\text{mmol}/l$  and a decrease in her platelet count from 98 to  $57 \times 10^9/l$ .

Woman C's blood pressure continued to rise and at 3.00am on April 23<sup>rd</sup> it was  $180/118\text{mmHg}$ , and she suddenly became less responsive, was drowsy and began to 'twitch'. The senior house officer summoned the obstetric registrar. On arrival the obstetric registrar gave woman C a further 5mg of hydralazine intravenously.

The midwifery notes suggest that the obstetric registrar arrived 10 minutes after he had been called by the senior house officer.



The obstetric registrar noted the increase in woman C's blood pressure, the deterioration in her level of consciousness and that she had not responded to the anti-hypertensive medication. He queried that she had possibly had an intracerebral bleed and discussed with the consultant anaesthetist whether or not to transfer her to the intensive care unit. An intravenous infusion of hydalazine, 100mg in 500ml of normal saline, was commenced at a rate of 50ml per hour.

Woman C's blood pressure remained high, 160/103mmHg at 3.25am and 164/111mmHg at 3.28am. The relatives of woman C were informed of the situation at 3.30am.

At 4.00am a computerised tomography (CT) scan of woman C's head was carried out, which showed that she had had a large right parietal haemorrhage extending to the ventricles, causing a hydrocephalus with a midline shift of the brain to the left. This means she had bleeding on the right side of the brain causing too much fluid or pressure in the brain, pushing one side of the brain to the left.

At 4.10am woman C was transferred to the intensive care unit at Northwick Park Hospital. At 5.00am she was transferred to Royal Free Hampstead NHS Trust, which has neurological facilities. A CT scan was performed which showed that woman C had had a large bleed into the parietal lobe (one of the four lobes of the brain).

Woman C subsequently died at 10.33am on April 23<sup>rd</sup> 2002 from cerebral (brain) complications caused by pre-eclampsia/eclampsia.

## **Post mortem**

The Coroner's Pathologist determined that death was due to natural causes and a post mortem was not carried out.

## **Actions taken by the trust following the death of woman C**

Following the death of woman C the London local supervising authority midwifery officer was informed of the death. The strategic health authority was unsure by which route it was informed, although there is evidence that the trust informed it via an email at the end of April 2002. There is evidence that the trust also informed Harrow Primary Care Trust.

The death was classified as a serious untoward incident and the trust conducted an investigation. As with the previous deaths, this was led by the head of clinical risk and legal services with support from the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk.

Discussion of this death was also included in the meeting held on April 24<sup>th</sup> 2002 to discuss the three deaths that occurred in April 2002.

There is evidence of a report that was presented to the confidential part of the trust board in May 2002. The report presents an overview of the events leading up to the death of woman C. It states that the coroner concluded that the death was due to natural causes and therefore there would be no inquest. The report is not signed.

The report contains a section entitled 'Preliminary findings' and states that there were "no obvious missed indicators while the patient was under the care of the GP". It also states that the case was going to be reviewed by a consultant obstetric physician and that,

depending on the outcome of this, a GP might be asked to review the care provided to woman C by her GP.

The report also contains information about the communication with the family of woman C following her death. The director of midwifery wrote to the husband of woman C and the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk wrote to the GP of woman C.

There is an additional report, *Preliminary Report Following Serious Clinical Incident Investigation*, dated April 24<sup>th</sup> 2002. This is not signed, but we were told that it was written by the head of clinical risk and legal services, with input from the consultant obstetrician involved in the care of woman C. The report provides an overview of the care of woman C and includes the findings of the coroner.

The report includes information about who is leading the investigation (the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk) and states that a serious untoward incident panel is being convened.

The report states that the GP noted that woman C was becoming slightly oedematous (swelling due to the retention of fluid in the tissues) but that he did not test a sample of her urine. These are early indicators of pre-eclampsia.

The trust's preliminary findings are that there were no immediate concerns about the care of woman C. There are no immediate recommendations arising from the report. It states that the care of woman C will be reviewed by a consultant obstetrician from outside the trust. A chronology of events is attached to the report.

The obstetric specialist registrar wrote a clinical risk management report. This is dated April 22<sup>nd</sup> 2002 and is signed.

There is a statement from the senior house officer who was on duty on April 21<sup>st</sup> 2002, but it is not signed.

There are statements from two of the midwives involved in the care of woman C on April 21<sup>st</sup> 2002, but neither is signed. One statement is dated April 26<sup>th</sup> 2002 and the other May 13<sup>th</sup> 2002.

There is correspondence between the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk and the GP of woman C. This informs the GP of the events leading up to the death of woman C.

The director of midwifery also wrote to the family of woman C, offering them the opportunity to meet with the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk.

### **Findings on the care and treatment provided to woman C and the actions taken by the trust**

The GP did not test a sample of woman C's urine, for the presence of protein, at her antenatal check when she was 26 and 34 weeks pregnant. This is an essential test that should be carried out at each antenatal assessment, particularly where there is evidence of an increase in blood pressure, even if it is not at the diagnostic level that would indicate pre-eclampsia. If urine tests had been carried out at weeks 26 and 34 and protein had been identified, it is likely that the care of woman C would have been managed differently.



Although the increase in blood pressure (to 119/85mmHg) was not at the diagnostic level for pre-eclampsia, this coupled with the mild odema strengthened the need to test woman C's urine at 34 weeks.

A consultant obstetrician was involved in the care of woman C when she was first admitted to the maternity unit.

When woman C was first admitted to the maternity unit, she was treated quickly and appropriately.

A consultant obstetrician was not involved in the care of woman C once her baby was born.

After the baby was born, the care of woman C was left to a junior doctor and a midwife, despite the diagnosis of severe pre-eclampsia. This is contrary to good practice.

The possible complications of high blood pressure after the baby was born were underestimated. Once the systolic (higher number) blood pressure exceeds 160mmHg there is a significant risk of intracerebral bleeding.

The anaesthetic care of woman C was appropriate. However, more consideration should have been given to her care after the baby was born, and the likelihood that her care would be complex. For example, an arterial line (catheter inserted into the artery to measure blood pressure) and central venous pressure line (catheter inserted into the right side of the heart, used to measure pressure, can be a guide to fluid replacement) could have been inserted in theatre to enable more efficient and accurate monitoring of woman C's blood pressure and blood volume.

The midwifery staff used an automatic blood pressure measuring device. These can underestimate blood pressure when it is

significantly raised and the use of such devices must be supplemented with manual blood pressure monitoring.

The events that occurred after the baby was born were clearly documented by the midwife and the senior house officer.

There is no reference to the supervisor of midwives being involved. The supervisor of midwives should have been called in to provide support to the midwives.

There is evidence that the death of woman C was reported to the trust board.

There is evidence that some consideration has been given to the care provided by midwives.

The trust's preliminary report does not raise concerns about the fact that woman C's GP did not test a sample of her urine when she was 26 and 34 weeks pregnant or that he did not take any action in response to the increase in her blood pressure when she was 34 weeks pregnant.

There is no written evidence about any feedback being given to the individual GP. However, the Healthcare Commission was told that, following an external review of the first three deaths, feedback was provided to GPs through Harrow Primary Care Trust. The Commission was also given a copy of a circular that was sent to all GPs. The circular contained information about the importance of carrying out blood pressure and urine analysis checks on women who are pregnant.

## External reviews

On April 24<sup>th</sup> 2002, the North West London Strategic Health Authority received a copy of the minutes from the North West London Hospitals NHS Trust executive planning meeting. The minutes state that there are "no

immediate recommendations necessary arising from the preliminary investigations". There is also no evidence of any similarities in the three deaths. This was reported at the North West London Strategic Health Authority board meeting in June 2002.

Following the deaths of women A, B and C, the trust commissioned an external review of the obstetric care and treatment provided to the three women, by a professor of obstetrics. This commenced in August 2002 and reported in October 2002. The trust did not commission a review of midwifery care or any of the other specialists involved, for example, anaesthetists.

When asked why the care provided by midwives was not reviewed, we were told that there were no concerns about the midwifery care and that most of the cases were complex and were managed by the obstetricians.

The external review resulted in a number of recommendations, which the trust formulated into an action plan. The action plan was discussed and agreed with the senior midwife with responsibility for clinical governance in maternity services, the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk and the director of midwifery. Staff told us that some of the recommendations had been implemented, including training for staff in how to deal with obstetric emergencies, guidelines on measuring blood pressure during pregnancy and guidance for staff working in A&E on the management of pregnant women.

The external review was reported to the trust board and to the strategic health authority in October 2002. There is conflicting information about whether or not the strategic health authority received a copy of the action plan. According to the strategic health authority, they

did not receive a copy of the action plan arising from this review, but they did receive an update on implementation of the action plan in February 2003. However, there is evidence that the trust did send a copy of the report and the action plan to the strategic health authority.

Some of the midwifery staff that we spoke to were aware that an external review of the three deaths had been carried out by a professor of obstetrics, but they told the Commission they had not been informed of the findings of the review. A copy of the report was sent to senior midwives and the director of midwifery.

In July 2002 the head of clinical risk and legal services reported the three maternal deaths that had occurred in April 2002 to the clinical risk, complaints and claims subgroup of the trust clinical governance committee. The minutes state that each case had been reviewed internally in detail.

The London local supervising authority midwifery officer undertook a review of the deaths of women A, B and C. The report does not make any recommendations. The report is not dated but it has the names of the two supervisors of midwives who commissioned the review.

This report was submitted to the director of midwifery. We asked staff (including those still working at the trust and those who had left) about the report and the majority of them said they were unaware of it. The consultant obstetrician who was responsible for the management of obstetric clinical risk was aware of the report, however, we have found no documentary evidence of where this report was discussed in the trust or of how it was communicated to staff.

In February 2003 the three maternal deaths were further reviewed by an external consultancy agency. The review was part of a study reviewing the cluster of maternal deaths within the London area. Northwick Park Hospital was selected as a site that required an analysis of the root cause (method used to establish underlying causes of incidents) because the three deaths had occurred within a short period of time. The local supervising authority midwifery officer provided us with a copy of the report. We were told this report was submitted to the director of midwifery. However, again, we asked both current and past members of staff about this report and they were unaware of it. The report was also submitted to the regional nurse and North West London Strategic Health Authority.

There is evidence that the reports from some of the external reviews were sent to senior staff in maternity services.

There is evidence that the actions arising from the external review carried out by the professor of obstetrics were implemented.

### **Our findings from the external reviews**

The trust commissioned external reviews, of the obstetric care, following the death of woman A and again after the three deaths had occurred in April 2002. This would be considered good practice.

The trust did not commission reviews of the care provided by all the clinical staff groups involved in the care of women A, B and C. Perhaps this was a failure of the trust to recognise that maternity care is a team activity.

The trust did not review the context in which the deaths happened. This would have helped identify any systemic problems.

There is evidence that a copy of the report, from the external review, carried out by the professor of obstetrics was sent to Harrow PCT and the strategic health authority. A copy of the action plan and progress report was sent to the strategic health authority.

## Woman D

Woman D was in her thirties and was from Asia. She had had three previous pregnancies resulting in two live births and one miscarriage. Her ethnicity was recorded in her case notes, and it was noted that an interpreter was not required.

She had a history of an under active thyroid gland which resulted in decreased levels of thyroxine being produced and was taking a thyroxine replacement for this. Woman D had multiple sclerosis, which had been diagnosed in 1994 and was currently in remission. Her previous pregnancies had been uncomplicated, although her last baby had been slightly smaller than expected at that stage of her pregnancy. Her baby was due on May 30<sup>th</sup> 2003.

### Antenatal care

Because of her underactive thyroid, woman D was seen at the combined endocrine and obstetric clinic. She was first seen in the antenatal clinic on October 30<sup>th</sup> 2002 and was assessed regularly during her pregnancy. There was no indication of any complications.

The baby's growth was considered normal until woman D reached 40 weeks and five days of the pregnancy on June 4<sup>th</sup> 2003. At this time the fundal height (assessment used to indicate the growth of the baby) was noted to be 32cm, which is significantly small for the stage of the pregnancy. This could have been an indication that the baby had stopped growing because the placenta was not functioning adequately. An ultrasound scan was performed and showed reduced liquor (fluid surrounding the baby) volume, a feature of a placenta that is not functioning well, and that she had reduced abdominal circumference. Because of this it was agreed by the obstetric registrar that

woman D's labour should be induced. The labour ward was too busy for this to happen on June 4<sup>th</sup> and it was arranged for woman D to have her labour induced on June 5<sup>th</sup> 2003.

### Care during delivery

Woman D was admitted to the labour ward on June 5<sup>th</sup> 2003 to have her labour induced. She was assessed and had a Bishops score (assessment of the readiness of cervix for labour) of three. At 11.00am her labour was induced with prostin gel and she progressed to a normal vaginal delivery of a live baby boy at 5.03am on June 6<sup>th</sup> 2003. It was noted that the placenta was complete when it was delivered.

### Care after delivery

Woman D was discharged home on June 7<sup>th</sup> 2003. The community midwife visited her on June 8<sup>th</sup> and 10<sup>th</sup> 2003 and no maternal abnormalities were detected.

On June 11<sup>th</sup> 2003, woman D collapsed at home and was taken by ambulance to the A&E department at Northwick Park Hospital. The ambulance notes record that her heart had gone into ventricular fibrillation (a cardiac arrhythmia) at home.

Woman D arrived at the A&E department at 6.45am. The A&E notes record that it had been a difficult vaginal delivery and that there had been problems with the removal of the placenta. This is not consistent with the obstetric records, which record that there was no delay in the delivery of the placenta. The placenta was delivered 12 minutes after delivery of the baby.

When woman D was examined in the A&E department, her pupils were fixed and dilated and she was deeply unconscious. Her Glasgow

coma scale was three, (assessment used to qualify the level of consciousness) indicating the deepest level of unconsciousness. Her abdomen was enlarged. The gynaecology registrar performed a vaginal examination which showed no significant bleeding. Artificial heart massage was commenced, but the team was unable to revive woman D. Treatment was discontinued and woman D was pronounced dead at 7.40am.

The community midwife was informed of the death of woman D and visited the family on the morning of June 11<sup>th</sup> 2003. The community midwife and health visitor continued to visit the family to provide support.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist concluded that the cause of death was viral encephalitis and an inquest was not held.

### **Actions taken by the trust following the death of woman D**

Following the death of woman D the trust reported the death to the London local supervising authority midwifery officer.

This death was reported to North West London Strategic Health Authority in March 2004.

The internal review was managed by the senior midwife with responsibility for clinical governance in maternity services.

Statements were obtained from the community midwife who provided postnatal care for woman D when she was discharged from the hospital. The statement is addressed to "HM Coroner" and is signed but not dated.

The staff grade doctor in obstetrics who was called to the A&E department when woman D was admitted on June 11<sup>th</sup> 2003 also provided a statement. The statement is addressed to "HM Coroner's Office" and is signed and dated.

The specialist registrar for medicine who attended woman D when she was admitted to the A&E department provided a statement for "HM Coroner". The statement is signed and dated.

The senior house officer in the A&E department also provided a statement addressed to "HM Coroner". The statement is signed and dated and provides an overview of the care woman D received in the A&E department.

The consultant obstetrician who had lead responsibility for the management of obstetric clinical risk also provided a statement for "HM Coroner". This includes information about woman D's previous medical history and information about her antenatal and postnatal care. It concludes that there was no indication during the antenatal care, delivery or postnatal care that woman D was at risk of sudden death after delivery.

The consultant obstetrician who had lead responsibility for the management of obstetric clinical risk wrote a risk management report, dated June 16<sup>th</sup> 2003. This report also provides an overview of woman D's past medical history and the care she received during the antenatal, delivery and post delivery period. It describes what happened when woman D was admitted to the A&E department on June 11<sup>th</sup> 2003. It also contains information about meetings with the family of woman D, which is described below.

It is documented that the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk, in a phone conversation

on June 11<sup>th</sup> with the pathologist, asked him to tell the family that he would be able to meet with the family on June 13<sup>th</sup>.

On June 16<sup>th</sup> the senior midwife for community care contacted the trust's obstetric lead for clinical risk to inform him that the family were angry that he had not contacted them immediately after woman D had died. In response to this he met with the family that afternoon and talked the family through the care woman D received in the maternity unit.

The trust reported the death of woman D to the strategic health authority nine months after she died. There was a delay in the trust reporting the death of woman D to the strategic health authority.

### **Findings on the care and treatment provided to woman D and the actions taken by the trust**

Woman D attended her appointments for her antenatal care. The antenatal care she received was appropriate.

Woman D's labour was induced. This was appropriate management. Induction of labour is appropriate management if it is suspected that a baby is small for dates at a stage in pregnancy beyond the estimated date of delivery.

The decision to induce the labour of woman D was made without advice from a consultant obstetrician. Although a consultant obstetrician may be involved in, or make such a key decision, there is no evidence that this had any bearing on subsequent events.

Woman D had a normal uncomplicated vaginal delivery. The care provided to woman D was of an acceptable standard during and after delivery.



## Woman E

Woman E was in her thirties and arrived in the UK from Africa on April 22<sup>nd</sup> 2003. She had travelled to London to accompany her daughter to a clinic appointment. Woman E was pregnant when she arrived in England and her baby was due on June 12<sup>th</sup> 2003. She was unable to return to Africa because her airline considered that she was too far on in her pregnancy to fly.

Woman E had had five previous pregnancies resulting in five spontaneous vaginal deliveries. She had no significant medical history, but there was a family history of diabetes and learning disabilities.

On arriving in London woman E registered with a GP and was referred to Northwick Park Hospital for the remainder of her antenatal care.

### Antenatal care

Woman E had been receiving antenatal care in Africa. She attended the antenatal clinic at Northwick Park when she was 38 and 39 weeks pregnant. Her blood pressure was normal and no abnormalities were detected in her urine. At 39 weeks it was noted that she was having sporadic contractions and she was advised to contact the labour ward if they continued. Later that day, June 6<sup>th</sup>, woman E was seen on the labour ward in suspected labour. However, there were no clinical signs of her pregnancy progressing to labour and after she was assessed she was discharged home and asked to return to the antenatal clinic in one week.

Woman E was seen again on June 13<sup>th</sup> 2003 when she was just over 40 weeks pregnant. Her blood pressure was normal at this stage and she could feel the baby move. She was not having contractions and was advised to return in one week if she had not gone into labour.

### Care during delivery

On June 16<sup>th</sup> woman E went into spontaneous labour and was admitted to the labour ward at 11.30am. There were no complications during her labour and she gave birth to a live baby boy at 2.31pm. The placenta was delivered by controlled contraction and her estimated blood loss was 100ml.

### Care after delivery

The next day woman E was given anti-D immunoglobulin because she was Rhesus negative. Her observations following delivery were all satisfactory and she was discharged to the care of the community midwives at the Barnet and Chase Farm Hospitals NHS Trust.

On June 22<sup>nd</sup> 2003 woman E contacted the labour ward at Northwick Park Hospital at 6.30pm complaining of pain in her pelvic area and a headache. It became apparent during this conversation that she had not been reviewed by a community midwife. Because woman E was staying in the catchment area for the Royal Free Hampstead NHS Trust, the midwife at Northwick Park Hospital contacted the community midwives there to ask them to visit woman E. This was the first contact made with the Royal Free Hampstead NHS Trust community midwives, and the request made was for routine postnatal care. There was no mention of the complaints of pelvic pain and headaches made by woman E. The community midwives at Royal Free Hampstead NHS Trust said they would visit woman E the following day. The midwife at Northwick Park Hospital relayed this information to woman E and advised her that in the meantime she should attend her nearest A&E department which was at Royal Free Hampstead NHS Trust.



On June 22<sup>nd</sup> woman E attended the A&E department at Royal Free Hampstead NHS Trust and was seen by the A&E senior house officer, but not by anyone from the medical gynaecology team. Her blood pressure was raised at 156/96mmHg and she had a relatively slow heart rate of 44–50 beats per minute. There was a telephone discussion between the gynaecology registrar and senior house officer and the A&E medical staff about the cause of her pelvic pain and it was concluded that she may have retained products of conception (sometimes not all of the placenta is delivered after women have given birth). No one from the obstetric team reviewed woman E in person, however, the senior house officer took the relevant blood tests. They considered admitting her but, in view of the fact that she had a young daughter, she was told to go home and to return for a scan the following day.

On June 23<sup>rd</sup> a routine postnatal visit was carried out by one of the community midwives from the Royal Free Hampstead NHS Trust. When the midwife went to visit there was no response. The next evening woman E's cousin was concerned that she could not make contact with woman E. She called the police who broke into the premises and found woman E collapsed at home. They called for an ambulance. At 11.30pm woman E was readmitted to the A&E department at the Royal Free Hampstead NHS Trust. On admission she was found to be deeply unconscious and had a Glasgow coma scale of three (assessment used to qualify the level of consciousness) indicating the deepest level of unconsciousness. A scan confirmed that she had had an intracerebral bleed (bleed in the brain). She was reviewed by the neurosurgeons but it was considered inappropriate to perform neurosurgery.

Woman E was admitted to the intensive care unit and a blood sample was taken for

haematological and biochemical investigation. The results of the test showed that she had high levels of uric acid, and aspartate amino transferase (substances found in the blood) were consistent with severe pre-eclampsia (pre-eclampsia is defined as high blood pressure greater than 140/90mmHg on two consecutive occasions four or more hours apart or any diastolic reading of 100 or more).

Her relatives were informed that her outlook was poor and woman E died at 10.30pm on June 26<sup>th</sup> 2003.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist concluded that the cause of death was a "spontaneous post partum intracerebral bleed".

### **Inquest**

The coroner's report concluded that the cause of death of woman E was an intracerebral bleed, recent pregnancy and probable high blood pressure.

The inquest into woman E's death was held in December 2004 and in April 2005 the report of the inquest was sent to the head of clinical risk and legal services. The report contained the following information:

- The referral of woman E to the community midwives at Barnet and Chase Farm Hospitals NHS Trust was based on a *Directory of Community Nursing* dated 2000. In the directory it states that the temporary postcode of woman E was within the catchment area for the Barnet Community midwives. However, this was incorrect and has been repeated in subsequent editions of the directory. The referral should have been

made to the community midwives at Royal Free Hospitals NHS Trust.

- The Head of Midwifery at Barnet and Chase Farm Hospitals NHS Trust stated that no referral was received for woman E. Barnet and Chase Farm Hospitals NHS Trust has a system by which incorrect referrals are returned to the referring trust. If the midwives at Northwick Park Hospital had made a referral for woman E, there would have been evidence of a response that informed them that the correct community midwifery service for her was the service provided by Royal Free Hampstead NHS Trust.
- The midwives at Northwick Park Hospital are unable to state categorically that a telephone referral was made to the community midwives at Barnet and Chase Farm Hospitals NHS Trust. However, it is documented in woman E's case notes that such a referral was made to the community midwives at Barnet and Chase Farm Hospitals NHS Trust.
- It is also standard midwifery practice to remind women to contact the maternity unit if they do not receive a visit from a community midwife. There was no evidence that woman E contacted the maternity unit at Northwick Park Hospital on June 22<sup>nd</sup> 2003 because she had not received a visit from a community midwife. Woman E contacted the maternity unit at Northwick Park Hospital to complain of her symptoms.

The coroner concluded that woman E had "not been referred to the appropriate community midwifery team for her temporary residence or any community midwifery team at all".

### **Actions taken by the trust following the death of woman E**

Following the death of woman E in June 2003 the trust reported her death to the London local supervising authority for midwives. It was not reported to North West London Strategic Health Authority until March 2004.

The head of clinical risk and legal services was not involved in this case. The investigation was led by the senior midwife with responsibility for clinical governance in maternity services, who informed the head of clinical risk and legal services of the death and sought advice. The senior midwife with responsibility for clinical governance in maternity services prepared a report for "HM Coroner". The report provides a summary and chronology of events and is signed but not dated. Following receipt of the report, the coroner's officer wrote to the senior midwife with responsibility for clinical governance in maternity services asking for further information about who telephoned Barnet Community midwives and for any documentary evidence of the telephone conversation. The senior midwife with responsibility for clinical governance in maternity services responded to this letter on September 2<sup>nd</sup> 2003.

There is evidence of a letter to the Coroner's Court from the head of midwifery at Barnet and Chase Farm Hospitals NHS Trust. The letter states they have no record of receiving a referral for woman E.

There is a copy of the letter from the GP with whom woman E registered when she first arrived in the UK. In the letter the GP states that he referred her to the maternity services at Northwick Park Hospital.

Other documentation includes the following:

- A letter from the Consultant in A&E Medicine at Royal Free Hampstead NHS Trust to the coroner's officer outlining the care woman E received during her two admissions to the A&E department.
- A statement from the ambulance technician who transferred woman E to the A&E department at Royal Free Hampstead NHS Trust on June 22<sup>nd</sup> 2003. The statement is signed and dated.
- A statement from the senior house officer in obstetrics and gynaecology who was consulted by the A&E senior house officer, but who never saw woman E in the A&E department at Royal Free Hampstead NHS Trust.
- A statement from the clinical research fellow/specialist registrar in obstetrics and gynaecology who was on call when woman E was admitted to the A&E department at Royal Free Hampstead NHS Trust. The senior house officer contacted the on call specialist registrar to discuss woman E.

There is also a copy of the report by HM Coroner for Inner North London under rule 43 of the Coroner's Rules 1984. This is dated April 2005. Following the inquest into the death of woman E, the coroner concluded that woman E "was not referred to the appropriate community midwifery team for her temporary residence or any community midwifery team at all".

There is no written evidence of what action the trust took immediately after this death. During interviews, staff told us that a memo had been circulated reminding them to check the geographical boundaries when discharging women from the unit. However, written information provided to us by the trust states that the problem of the discharge address of

woman E did not become apparent until her inquest in 2005.

There is a letter dated June 2005 from the head of midwifery to the head of clinical risk and legal services informing her about the actions taken following the coroner's report. This includes a meeting with the heads of midwifery at Barnet and Chase Farm NHS Trust and Royal Free Hampstead NHS Trust where it was agreed that they would produce street maps for their respective areas. It also states that the *Directory of Community Nursing* is produced each year and the publishers write to each trust to check the information is up-to-date. At the time of the death of woman E, the trust had not received the latest version of the directory (2005/2006) and therefore was unable to confirm if the necessary changes had been made to it by Barnet and Chase Farm NHS Trust.

The manager for clinical risk at Royal Free Hampstead NHS Trust had been in contact with the senior midwife with responsibility for clinical governance in maternity services at Northwick Park Hospital about this death. There is a brief email from Northwick Park Hospital which confirms that the referral made on June 22<sup>nd</sup> to the Royal Free Hampstead NHS Trust for postnatal care did not specify any problems or concerns.

The Royal Free Hampstead NHS Trust carried out its own review of this case and made a number of recommendations, including that when a review is sought for any women who have given birth within 28 days of the review being sought, a member of the obstetric team should perform this in person.

### **Findings and conclusions on the care and treatment provided to woman E and the actions taken by the trust**

There were no complications during the labour of woman E, and she received appropriate care during her labour.

Woman E did not receive any postnatal care once she was discharged on June 17<sup>th</sup> 2003. This was the result of a failure in the referral system. This was woman E's first experience of using maternity services in England and she may have been unfamiliar with the healthcare system. The midwives at Northwick Park Hospital should have ensured that she understood that if she did not receive a visit from the community midwives she should contact the hospital.

During the telephone conversation, on June 22<sup>nd</sup>, with midwives at the Royal Free Hampstead NHS Trust, the midwives at Northwick Park Maternity Services did not pass on information about why woman E contacted them.

The midwife at Northwick Park Hospital advised woman E that the community midwives would visit her the next day, and in the meantime she should attend her nearest A&E department which was at The Royal Free Hampstead NHS Trust. This was appropriate advice.

When woman E attended the Royal Free Hampstead NHS Trust, she was not seen by anyone from the obstetric team

The trust was not using the most up-to-date *Directory of Community Nursing*.

The head of midwifery at the trust met with the heads of midwifery at Barnet and Chase Farm NHS Trust and Royal Free Hampstead NHS

Trust following the report in 2005 by HM Coroner for Inner North London under rule 43 of the Coroner's Rules 1984. However, this meeting should have taken place sooner.

## Woman F

Woman F was in her thirties and was of Afro-Caribbean descent. She had a past medical history of asthma and also sickle cell trait (a person who has sickle cell trait is a carrier of the sickle gene, they do not have the disease, and are generally not affected by the sickle haemoglobin). She also had multiple sclerosis and was taking medication (gabapentin) to control the pain associated with it. This was her second pregnancy, and her first pregnancy in 1992 had been complicated by pre-eclampsia (pre-eclampsia is defined as high blood pressure greater than 140/90mmHg on two consecutive occasions four or more hours apart or any diastolic reading of 100 or more) or pre-eclampsic toxemia. Both complications are referred to in her case notes. Her first baby had been delivered at 36 weeks and weighed 1.76kg, which would be considered small. In addition, woman F was a Jehovah's Witness with a clearly stated wish to not to be given blood or blood products. Her baby was due on September 24<sup>th</sup> 2003. Therefore, there were a number of significant risk factors associated with this pregnancy.

### Antenatal care

Woman F first saw a consultant obstetrician when she was 21 weeks pregnant. Using guidance from the Royal College of Obstetricians and Gynaecologists, a care plan was produced for woman F on how to treat her by means other than blood transfusion, should this become necessary. The care plan was put in her case notes. It was documented that she did not want to receive any blood or blood products and that she should have active management of the third stage of her labour with an intravenous infusion of oxytocin (a drug used to minimise blood loss). The plan

contained a list of viable alternatives to blood transfusion. Woman F wrote in her permanent maternity record: "I have a Health Care Advance Directive which details my refusal of blood and blood derived [illegible word, probably products]."

Woman F was seen regularly in the antenatal clinic, and at 32 weeks pregnant she had a Bartholin's cyst removed. A Bartholin's cyst is a cyst on the vulva. This procedure was uneventful.

On August 5<sup>th</sup> 2003 her GP referred her to Northwick Park Hospital because she had "ankle swelling due to the retention of fluid in the tissues" and protein in her urine. Her blood pressure was normal, 120/78mmHg, and there were no problems with the baby's heartbeat. By this time woman F's consultant obstetrician was on annual leave, but the consultant had ensured that the other consultant obstetricians were aware of woman F and the care she needed.

On arrival at the hospital woman F was assessed by an obstetric senior house officer. Her blood pressure was 95/60mmHg and the amount of protein in her urine had increased from two pluses to three pluses. The possibility of a diagnosis of pre-eclampsia was queried and tests for pre-eclampsia were carried out. The senior house officer discussed the situation with the staff grade obstetrician and it was agreed that woman F should be admitted for further tests, and to give her steroid treatment to help mature the lungs of the baby in case early delivery was necessary.

The next day, August 6<sup>th</sup>, woman F's blood pressure was high, 157/95mmHg. She was prescribed methyldopa 250mg (medication used to control blood pressure) three times per day. The results of her blood tests for pre-eclampsia were normal.

On August 7<sup>th</sup> woman F's blood pressure was 120/80mmHg.

However, at 2.30am on August 8<sup>th</sup> woman F complained of stomach pain and her blood pressure had increased to 143/99mmHg. At 4.00am the obstetric registrar was called to review woman F, and she was reviewed by the obstetric registrar at 4.25am. Her blood pressure had increased and she was complaining of "constant abdominal pain". She was transferred to the labour ward for observation of her blood pressure with the instructions that the consultant obstetrician (who had taken over her care) was to be notified if her blood pressure was not controlled. Woman F was advised that urgent delivery of her baby may be necessary. Woman F was given analgesia for her stomach pain, which subsided. She was also given nifedipine 10mg slow release (a drug used to reduce blood pressure). Her blood pressure remained high, ranging between 150–160/93–94mmHg.

At 5.40am it was noted that woman F's uterus was more tense and it was queried whether or not she had had an abruption of the placenta (separation of the placenta from the uterus). The consultant obstetrician who had taken over the care of woman F was informed and the monitoring continued.

Woman F's blood pressure was high and she remained distressed. The cardiotocograph recording was not very satisfactory – it was showing signs that the baby's heart rate was decreasing. At 8.05am on August 8<sup>th</sup>, the consultant obstetrician who had taken over the care of woman F was informed and she carried out an ultrasound scan on woman F. The ultrasound scan appeared to show evidence of a possible abruption of the placenta. At 8.30am it was agreed that a caesarean section needed to be carried out as soon as possible.

### **Care during delivery**

Woman F was transferred to the operating theatre at 8.40am and a live baby boy was delivered at 9.44am. The baby was transferred to the neonatal unit.

The caesarean section was carried out by the consultant obstetrician, with a combined spinal and epidural anaesthetic being given. As planned, woman F was given the drug syntocinon intravenously after the caesarean section to minimise the risk of a haemorrhage following delivery of her baby. Woman F's blood loss during surgery was 350ml, but there is also a reference to "+500mls clots". It is also recorded that woman F did not wish to receive any blood or blood products.

### **Care after delivery**

Woman F returned to the labour ward at 10.15am. In view of her sickle cell trait, oxygen was given to woman F. Observations of her blood pressure and heart rate were recorded half hourly.

At 1.40pm on the same day, woman F passed a large clot of blood from her vagina, approximately 500ml, and the consultant obstetrician was informed. There was also concern that her urine output was low and the rate of administration of the intravenous fluids was increased. The consultant obstetrician advised that staff should continue to observe woman F and that she should stay on the labour ward overnight.

At 5.35pm woman F was reviewed by a staff grade obstetrician and a senior house officer, and blood tests were carried out. At 8.10pm her blood test results showed that her haemoglobin had dropped from 11.8g/dl at 6.36am to 6.1g/dl at 6.57pm. There was also a drop in her platelet count and an increase in her urea and urate



(substances formed in the kidneys and removed from the blood by the kidneys) levels. This increase in levels of urates is consistent with pre-eclampsia. The obstetric registrar was informed, and he ordered repeat blood tests, including clotting studies.

Although there was an advance healthcare directive in her notes, blood was cross matched (this is the procedure used to determine if blood is compatible with blood of the recipient, usually carried out in preparation for a blood transfusion). This was probably in case woman F changed her mind about whether or not to accept blood or blood products.

At 9.00pm woman F was reviewed by the obstetric registrar. He noted that she had no signs of pre-eclampsia and that her urine output over the last hour had increased to 75ml. He also noted that her platelets had decreased and that there had been an increase in her levels of urea and urate, the latter being consistent with pre-eclampsia. Woman F's blood pressure was 131/83mmHg and her heart rate was 73. He ordered for blood to be cross matched in case she changed her mind about receiving a blood transfusion. This management was appropriate.

At 11.00pm woman F was reviewed by the anaesthetist on call, who noted her history and suggested that they continue to monitor her blood pressure, heart rate and oxygen saturation (amount of oxygen carried by haemoglobin in the blood) closely and continue giving her boluses of gelofusine (a plasma expander used to replace blood loss) intravenously.

At 1.45am on August 9<sup>th</sup>, the obstetric registrar reviewed woman F again. He documented that she was a Jehovah's Witness and that she had pre-eclampsia with her hypertension treated and significant proteinuria (protein in her urine)

of 1.7g. Her multiple sclerosis was also recorded. Since her operation, he noted that she had received two doses of the drug oxytocin, and a total input of 1.84 litres of fluid and a urine output of 230ml. Blood pressure and pulse were satisfactory at 150/90mmHg and 70 beats per minute respectively. However, he documented that she felt dehydrated. She had no signs or symptoms of pre-eclampsia, but her abdomen showed a distended girth at the level of the umbilicus, which was measured as 75cm. It was noted that she had no bleeding diathesis, or disease that predisposed her to bleeding, and no bleeding from her vagina. Blood results are then documented, which showed a platelet count of 60 (which is low), a prothrombin (substance found in the blood which is necessary for clotting) time of 20.8 seconds (which is prolonged) and an APTT (a test used to test for abnormalities in the clotting of blood) of 34.8 seconds. Her urea and urate levels remained elevated and her ALT levels had increased to 601iu/l. Her level of bilirubin (substance that results from red blood cell breakdown) was also slightly elevated at 18mmol/l. His diagnosis was that she was developing HELLP syndrome (haemolysis elevated liver enzymes and low platelets, a severe form of pre-eclampsia) with a differential diagnosis of intraperitoneal bleeding (bleeding into the peritoneum). His plan of care for her was: half-hourly observations with regular assessment of her urine output and repeat blood investigations as a matter of urgency.

The obstetric registrar also discussed the need for blood transfusion with woman F, but she was clear she did not wish to have a blood transfusion.

At 2.45am on August 9<sup>th</sup> 2003 her haemoglobin had dropped further to 5.0g/dl. The situation was discussed with the consultant obstetrician



on call, who agreed that she was developing pre-eclampsia. The situation was also discussed with the consultant anaesthetist. It was agreed that woman F should be transferred to the intensive care unit and that it should be explained to her that she required fresh frozen plasma (contains clotting factors and is used to treat patients who develop deficiencies in their clotting factors) as a matter of urgency. The obstetric registrar informed woman F of this, but she remained adamant she did not want to receive blood or blood products.

The obstetric registrar informed the haematology specialist registrar about woman F, who in turn discussed the situation with the consultant haematologist. The advice was to prescribe steroids but to avoid antifibrinolytic (prevent the breakdown of clotting factors) medication and vitamin K (helps in the production of some clotting factors). A written entry in the notes indicates that there had been multiple requests for the results of the repeat haematological tests, suggesting that there was a delay in obtaining them.

At 5.30am she was reviewed by the anaesthetist on call who recorded in the case notes that he had explained at "length and clearly" to woman F "that without blood or blood products she may die". It is documented that woman F and her family understood this.

At 7.40am woman F was admitted to the intensive care unit. At this stage she had raised blood pressure, disturbed liver function tests and clotting abnormalities. The haematology specialist registrar reviewed woman F at 8.03am. Her condition was stable, her blood pressure was 180/90mmHg and her platelet count remained low at  $89 \times 10^9/L$ . Her white blood cell count had increased and her liver enzymes were raised. The haematologist felt that the

diagnosis which best fitted was HELLP syndrome, although some of the features were not characteristic, for example, her levels of bilirubin were within normal limits. An alternative diagnosis was acute fatty liver of pregnancy. Again, the haematologist discussed blood transfusion with woman F, but she did not wish to consider receiving blood or blood products. It was noted that woman F was receiving methylprednisolone (steroid) 1mg intravenously, which is appropriate in patients who have HELLP syndrome, as it promotes recovery.

By the evening her haemoglobin level had stabilised at 4.5g/dl, although it was still low, and she was transferred to the medical high dependency unit at 9.00pm.

On August 10<sup>th</sup> at 2.00am an entry in the case notes by a nurse reads "found patient on ward at start of shift" and refers to "Hb1.6" (Hb is shorthand for haemoglobin). The next entry, recorded at 11.30am, refers to "?Hb 1.6 – apparently a mistake" and "repeat bloods sent this am". A subsequent entry indicates that the haemoglobin was stable, and her liver function tests showed further deterioration.

On August 11<sup>th</sup> 2003 woman F was reviewed by the consultant haematologist, who suggested that woman F should have folic acid daily and a single dose of Vitamin K.

On August 12<sup>th</sup> 2003, woman F was transferred to the labour ward. Her haemoglobin remained low at 5.1g/dl.

On August 13<sup>th</sup> woman F was well enough to visit her baby in the neonatal unit.

On August 14<sup>th</sup> 2003 the use of erythropoietin (a naturally occurring hormone produced by the kidneys which stimulates the body to produce more red blood cells) was discussed with woman F and she agreed to receive it. It was

suggested that woman F should receive 15,000 units three times per week.

A senior house officer reviewed woman F on August 15<sup>th</sup> 2003 and documented that she had HELLP, that her liver function tests were improving, and that her platelets had increased to  $172 \times 10^9/L$  and her haemoglobin was 5.1g/dl. He also documented that an ultrasound scan of her liver showed evidence of hepatic infarction (a blockage in the supply of blood to the liver) and that erythropoietin had been prescribed. Woman F was wearing thromboembolic deterrent stockings to reduce the risk of thrombosis, which was appropriate.

Woman F was transferred to a postnatal ward on August 15<sup>th</sup> 2003. The postnatal ward was very busy, with three midwives responsible for caring for 30 women and 25 babies. The midwives caring for woman F described her as being very unwell and said she needed help with washing and eating. They also described her as being breathless and said that she should possibly have been cared for in a high dependency unit.

Over the next few days woman F's condition improved, although a scan of her liver was abnormal. There is no evidence that woman F was reviewed by a doctor on August 16<sup>th</sup>.

On August 17<sup>th</sup> woman F was reviewed by a staff grade doctor. The midwifery staff asked the staff grade doctor to see her because they were concerned about her shortness of breath and she was complaining of a pain in her leg. Staff caring for woman F told us that she required a lot of care and that she became breathless very easily. Staff were unable to recall if woman F was reviewed by a consultant obstetrician during the weekend of August 16<sup>th</sup> and 17<sup>th</sup> 2003, although a consultant obstetrician was informed on August 17<sup>th</sup> 2003 that woman F's haemoglobin was still low and advised that

erythropoietin should be continued. We were told that, with hindsight, woman F should have been nursed on a ward where she could have received more intensive care.

There was some confusion about the type of erythropoietin that was to be administered and, on August 18<sup>th</sup> 2003, a written entry in the case notes states that it had not been given to woman F. There are two types of erythropoietin and the prescribing doctor must specify which type is to be given. It is not clear whether or not the erythropoietin was given as the medication prescription chart suggests that it was given at 11.00pm on August 15<sup>th</sup> 2003, and again at 7.40pm on August 17<sup>th</sup> 2003. A note on August 15<sup>th</sup> reads to "hold off any further epo until discussion with haematology team". This would suggest that treatment had been started.

On August 18<sup>th</sup>, blood tests showed that woman F's haemoglobin had improved slightly and was 5.2g/dl but that her platelet count was low. It was also noted by the senior house officer for obstetrics that she had been short of breath for a couple of days and that her legs were swollen and painful. Her heart rate had been high for the last few days, up to 140 beats per minute.

At 10.40am on August 19<sup>th</sup> 2003 woman F was reviewed by her consultant obstetrician, who had by this time returned from annual leave. Her problems at this time were documented as anaemia (low haemoglobin), shortness of breath and abnormal liver function. Repeat blood tests showed that her haemoglobin had decreased to 3.9g/dl and that her platelet count had also fallen. The impression of the consultant obstetrician was that the shortness of breath was due to severe anaemia and probable pleural effusions (presence of fluid between the membranes covering the lungs). A CT (computerised tomography) scan confirmed the pleural effusions. It also showed that the

abdomen was enlarged and that there was excessive fluid in the tissues of the small bowel.

At 12.15pm woman F was reviewed by the doctors from the intensive care unit. She was short of breath, had chest pain and increasing swelling, which was likely to reflect at least in part the marked hypoalbuminaemia (low albumin-water soluble proteins). Her heart rate was high at 120 beats per minute, her legs were swollen, up to the level of her thighs, she was considered to have pleural effusions and her abdomen was enlarged. Her blood results were abnormal: she had a haemoglobin of 4.3g/dl, a platelet count of  $87 \times 10^9/l$  and ALT of 165. Serum albumin was low at 16g/l (low albumin levels can be to liver impairment, due to impairment of the liver and leakage of albumin into the tissues and loss of albumin in the urine). The impression formed was that the shortness of breath was secondary to severe anaemia and probable pleural effusions. Pulmonary embolism (the lodging of a clot in the lungs) was considered unlikely, but intra-abdominal pathology was considered.

Other investigations were ordered, including a CT scan. This showed pleural effusions on both sides, an enlarged abdomen full of fluid, the small bowel was noted to be swollen, there was no obvious uterine collection and, in the liver, periductal haemorrhage (bleeding) was noted. Computerised tomography pulmonary angiography was also performed which showed no filling deficits so excluding pulmonary embolus. Ultrasound venography (x-ray study of veins using "dye" or contrast solution to outline veins and identify problems) was performed and showed no evidence of deep vein thrombosis (a blood clot in a vein).

Woman F's liver function test was extremely abnormal, raising the possibility of a fatty liver. An ultrasound scan on August 13<sup>th</sup> 2003 had

shown that the liver was enlarged and looked highly abnormal, although her liver function tests were improving.

The haematology consultant reviewed woman F at 6.30pm, on August 19<sup>th</sup>, and recommended that haematinic therapy and erythropoietin should be continued. He noted that the anaemia was likely to be due to possible liver haemorrhage and that the coagulopathy (a condition affecting the blood's ability to form a clot) was due to disseminated intravascular coagulopathy (overstimulation of the blood clotting mechanisms in response to disease or injury leading to abnormal levels of clotting factors). It was concluded that pulmonary embolism was likely to account for her deterioration.

At 8.20pm on August 19<sup>th</sup> 2003, woman F was taken back to the intensive care unit. The medical registrar covering the intensive care unit has documented that his impression was that woman F had a chest infection and swelling due to the retention of fluid in the tissues (swelling due to the retention of fluid in the tissues) and deep vein thrombosis and that a pulmonary embolism was unlikely.

On August 20<sup>th</sup> 2003, woman F suffered a cardiac arrest. Despite attempts to resuscitate her, she died at 8.35am.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist states that woman F had a number of problems, including pre-eclampsia, HELLP syndrome and sickle cell trait. Woman F developed multi-organ failure and disseminated intravascular coagulation and she suffered a cardiac arrest as a result of multifactorial problems. The post mortem included a histological examination of a sample of the liver.

## Inquest

The verdict of the inquest was that woman F died of “the consequences following pregnancy and caesarean section having made an informed decision. Blood transfusion and blood products were refused against medical advice”.

## Actions taken by the trust following the death of woman F

The death of woman F was reported to the London local supervising authority midwifery officer and the North West London Strategic Health Authority.

The senior midwife with responsibility for clinical governance in maternity services was not involved in the trust’s internal review of the death of woman F. She asked about carrying out an internal review but was informed that it would be managed by the head of clinical risk and legal services.

The following staff provided reports for the coroner:

- The consultant obstetrician who was responsible for the care of woman F provided a report giving an overview of the antenatal care, care during delivery and postnatal care provided to woman F. The consultant obstetrician was not asked to provide an opinion about whether or not the care she received was appropriate.
- An intensive care consultant at Northwick Park Hospital provided a report of the care woman F received on the two occasions she was admitted to the intensive care unit. The report is addressed to “HM Coroner”, is signed and dated September 24<sup>th</sup> 2003.
- The specialist registrar in anaesthetics provided a report for the coroner. It provides a chronology of events following her emergency caesarean section operation on August 8<sup>th</sup> 2003.

There is a *Synopsis of Incident and Outcome* report and this has a case reference number. This report gives a very brief summary of events relating to the caesarean section operation and the development of HELLP syndrome, and the clinical care on the ward and in the intensive care unit given to woman F. A summary of the analysis of the root cause (method used to establish underlying causes of incidents) concludes that all efforts were made by staff to persuade woman F to accept blood. There was no evidence of poor medical care and there was evidence of good team work. The report states that in “the absence of blood products clinical staff were unable to treat the patient’s HELLP syndrome, which resulted in a progressive fall in the haemoglobin and inevitable death”. There is a recommendation that opportunities should be taken to ensure all staff learn from this case. Although the report is not signed, the Healthcare Commission was told that the report was written by the head of clinical risk and legal services, with assistance from the consultant obstetrician with responsibility for the management of obstetric clinical risk.

A letter from a firm of solicitors to the head of clinical risk and legal services informs her of the outcome of the inquest. The letter says that the solicitors were closing their file on woman F as they had been instructed to represent the trust only at the inquest.

There is a series of correspondence between the husband of woman F and the head of clinical risk and legal services. Woman F’s husband requested copies of his late wife’s

case notes. The trust responded to this request on September 3<sup>rd</sup> 2003. The head of clinical risk and legal services wrote to the husband of woman F on September 10<sup>th</sup> 2003, indicated that the notes for the weekend of August 15<sup>th</sup> and 17<sup>th</sup> 2003 were missing. The letter indicates that staff were reviewing the care that woman F received and the trust promised to investigate this and respond to her husband.

On October 2<sup>nd</sup> 2003 the husband of woman F wrote again to the trust, reiterating his concern about the lack of notes for August 16<sup>th</sup> and 17<sup>th</sup> 2003.

The head of clinical risk and legal services replied on November 7<sup>th</sup> 2003, noting the husband's concerns. The letter gives a summary of care received by woman F between August 12<sup>th</sup> and 17<sup>th</sup> 2003. The letter also says that the consultant obstetrician states that a midwife would have called the medical team on August 16<sup>th</sup> if there were any signs of concern, and that, on August 17<sup>th</sup> at 7.00pm, woman F was reviewed by a staff grade doctor who did not document any significant problems.

The husband of woman F sent a further letter to the head of clinical risk and legal services asking why his wife was transferred to the postnatal ward on August 15<sup>th</sup> 2003 when her heart rate was fast and her haemoglobin was low. He again asked for a copy of the case notes for August 16<sup>th</sup> and 17<sup>th</sup> 2003.

On December 11<sup>th</sup> 2003 the head of clinical risk and legal services wrote to the husband of woman F, enclosing a copy of the case notes for the August 16<sup>th</sup> and 17<sup>th</sup> 2003. It also says that the medical team will respond to his concerns about why his wife was transferred to the postnatal ward.

On December 15<sup>th</sup> 2003 the husband of woman F wrote to the chief executive complaining

about the care woman F received. His main concerns were:

- Why was a blood transfusion the only treatment offered to her on August 8<sup>th</sup> 2003?
- Why did she only stay in the intensive care unit for 24 hours after the caesarean section operation?
- Why was his wife put on the postnatal ward, where there were only two midwives to care for 30 women, when she was very unwell?

He also complained about the lack of monitoring of his wife's blood pressure and heart rate and the care his wife received.

On December 15<sup>th</sup> 2003, the husband of woman F sent a further letter to the head of clinical risk and legal services asking for a copy of the written notes for August 16<sup>th</sup> and 17<sup>th</sup> 2003. He asked the trust to clarify if there is anything documented in the case notes of woman F between 11.00am on August 15<sup>th</sup> and 7.30pm on August 17<sup>th</sup> 2003. He also informed the head of clinical risk and legal services that he had made a complaint to the chief executive.

On January 14<sup>th</sup> 2004 the clinical director of obstetrics and gynaecology provided a response for the chief executive to send to the husband of woman F. This letter acknowledged that there was no medical entry in the records for August 16<sup>th</sup> 2003. The letter was sent to the husband of woman F with a covering letter from the chief executive on January 15<sup>th</sup> 2004.

The husband of woman F wrote to the chief executive in May 2004 accepting an earlier offer of a meeting with the consultant obstetrician who was involved in caring for his wife and the clinical director of obstetrics and gynaecology.

In August 2004 the husband of woman F attended a meeting with the consultant



obstetrician, a senior midwife and the clinical director of obstetrics and gynaecology. A family friend accompanied the husband and took notes of the meeting. There was no representative from the trust's complaints team at the meeting.

At the meeting the staff conceded that the care provided to woman F was not of an acceptable standard, although they kept reiterating that if woman F had agreed to a blood transfusion, the outcome would have been different. The husband of woman F was happy with the antenatal care his wife received. She had been seen regularly by the consultant obstetrician caring for her and a plan of care was agreed. However, following her caesarean section operation he did not feel the staff referred to this plan of care, although his wife continued to tell them it was in her case notes.

He was concerned that not enough had been done for his wife when she was on the postnatal ward. He felt she was transferred out of the high dependency unit too early. On the postnatal ward, woman F required more intensive care than the staff were able to give her, because of low levels of staffing.

The clinical director was late for the meeting and notes were not taken of the meeting by staff. The friend of the family who accompanied the husband took notes of the meeting and submitted a copy to the trust and to us.

In relation to the care of his son, the husband of woman F felt he received a lot of support from the staff in the neonatal unit. They visited him at home after the baby had been discharged from hospital.

The husband of woman F has since received a letter from the new chief executive of the trust offering to meet with him.

### **Findings and conclusions on the care and treatment provided to woman F and the actions taken by the trust**

The consultant obstetrician who was caring for woman F developed a plan of care for how to treat her by means other than blood transfusion. The plan was based on guidance from the Royal College of Obstetricians and Gynaecologists. This was appropriate management.

The consultant haematologist was involved in her antenatal care.

Woman F was informed of the effects of refusing blood and blood products.

The appropriate care protocol was included in the case notes of woman F.

This consultant obstetrician was on annual leave when woman F delivered her baby, and although the consultant obstetrician had handed over her care to another consultant obstetrician, there was a lack of input by consultants during the post-delivery period.

There is evidence that junior doctors discussed the condition of woman F with consultant obstetricians. However, for a patient who was this unwell, and considering the additional risk due to the fact that she was refusing blood and blood products due to religious beliefs, woman F should have been reviewed by a consultant obstetrician on a daily basis.

A management plan for the care of woman F after the baby was delivered was not in place.

Woman F's baby was delivered by caesarean section operation. This was an appropriate mode of delivery, including the type of anaesthesia she received.

Following delivery of the baby, woman F's haemoglobin dropped from 11.8g/dl to 6.1g/dl and, although she had passed a large blood clot, this could not account for the decrease. There was no investigation to establish why this happened.

There may have been some delay in implementing treatment with erythropoietin, but, on the balance of probabilities, this did not influence the outcome of this case.

Woman F was transferred within the hospital a number of times before she died. After her operation she was cared for in the labour ward, she was then transferred to the intensive care unit, from the intensive care unit to the labour ward, then to the postnatal ward and then back to the intensive care unit.

Woman F had a number of medical problems and it is questionable that the postnatal ward was the most appropriate place to care for her: it was a very busy postnatal ward, with three midwives responsible for caring for 30 women and 25 babies.

Woman F was not reviewed by a consultant obstetrician when she was on the postnatal ward between August 16<sup>th</sup> and August 17<sup>th</sup>.

It is clear from the case notes that every possible opportunity was taken to offer a blood transfusion to woman F.

There is evidence in the case notes that the gravity of the situation had been explained to woman F and her family.

Conclusions are mentioned in the trust's *Synopsis of Incident and Outcome* report but there is no record of who reached these conclusions.

There is no evidence of any midwifery involvement in the internal investigation.

There is no evidence of what the learning points were from this case as referred to in the report titled *Synopsis of Incident and Outcome*.

There is no evidence that the care and treatment provided to woman F was ever thoroughly reviewed by the trust.

A representative from the complaints team did not attend the meeting between the husband and the obstetric and midwifery staff. The trust did not take a record of the meeting. The trust should have taken a record of the meeting and notes of the discussion. A representative from the trust's complaint team should have attended the meeting between the obstetric and midwifery staff to act as a facilitator. The trust's management of the concerns raised by woman F's husband was poor.

It is also unclear why the head of clinical risk and legal services, and not a member of staff from the complaints team, responded to the concerns of the husband.



## Woman G

Woman G was in her forties and was from Asia. Her ethnicity was documented in her case notes and it was recorded that an interpreter was not required. This was her fourth pregnancy, and she had one living daughter. Two of her previous pregnancies had ended in miscarriage at eight weeks gestation. During her first pregnancy, she had had pre-eclampsia (high blood pressure greater than 140/90mmHg, developed during pregnancy in a woman whose blood pressure was previously normal). Her first baby was small for dates, and had been delivered by caesarean section. Woman G had undergone a myomectomy (removal of fibroids in the uterus) in 2001. This was an uneventful procedure and the anaesthetic assessment did not identify any heart problems.

### Antenatal care

Woman G first attended Northwick Park Hospital for her antenatal care on June 4<sup>th</sup> 2003. It was noted that she had suffered with high blood pressure during her first pregnancy in 1998, and that she had had a caesarean section. It was also noted that when she had been discharged she had been prescribed atenolol (a drug used to control high blood pressure) and was currently taking aspirin to prevent recurrence of pre-eclampsia.

The baby was due on December 25<sup>th</sup> 2003. In view of woman G's previous history, it was agreed that the baby would be delivered by caesarean section. It is unclear if this decision was made at her booking assessment or later in the pregnancy.

Woman G was seen regularly for antenatal care, although the records do not indicate that she was ever assessed by a consultant obstetrician.

Her blood pressure remained normal. At 29 weeks pregnant, an ultrasound scan showed that she had four fibroids in her uterus, but it was not anticipated that they would cause problems during the caesarean section. The mode of delivering the baby was discussed with woman G and it was noted that she wanted to try to have a vaginal delivery. The risks associated with this were discussed with her.

When she was 33 weeks pregnant, woman G was given the options of delivering the baby vaginally or by caesarean section operation. However, an ultrasound scan at 36 weeks pregnant showed that the baby was small for dates and woman G was advised to have a caesarean section. This was therefore booked for December 18<sup>th</sup> 2003.

### Care during delivery

The caesarean section was carried out by the consultant obstetrician responsible for undertaking elective caesarean section operations for that day. The consultant obstetrician told the Healthcare Commission that he only saw woman G briefly before the caesarean section. He was aware that she had previously had a caesarean section and a myomectomy.

Before the procedure, woman G was given compression stockings to wear to prevent the risk of developing deep vein thrombosis. The caesarean section was difficult because of adhesions (bands of fibrous tissue joining two surfaces which are normally separate). This would be expected in the course of the procedure as it was being carried out after previous surgery to her uterus. It took 28 minutes (longer than would be expected) to deliver the live baby girl. Woman G lost 800ml of blood, but this is consistent with a caesarean section, where there are known complications.

Monitoring of woman G's cardiorespiratory parameters throughout the operation indicated that there were no problems.

In his interview with the Healthcare Commission, the locum consultant obstetrician said that it was a difficult procedure, he had difficulty accessing the uterus and that he took his time to avoid causing damage to the bowel or bladder. There were no bowel adhesions but the uterus was stuck to the wall of the peritoneum.

### Care after delivery

After the delivery, woman G had an increased heart rate, ranging between 144 beats and 130 beats per minute. Her blood pressure also increased after the delivery and ranged from 160/100mmHg to 140/90mmHg. The anaesthetist was informed and advised staff to observe her closely. Blood was taken for haematological investigation and showed that her haemoglobin (the part of the blood count that shows whether or not the patient is anaemic) had dropped from 12.6g/dl prior to the caesarean section to 11g/dl after the caesarean section. This was consistent with the observed blood loss in theatre. Woman G also had a greater than expected blood loss from her vagina and passed a 300ml blood clot. At 6.30pm her heart rate was 110 beats per minute and a decision was made to prescribe her oral antibiotics in case she had developed an infection (increased bleeding following a caesarean section can be an indication of infection). Later in the evening her temperature was slightly raised and she was prescribed intravenous antibiotics.

It was documented there was an increase in the girth of her abdomen thought to be due to an excessive amount of intestinal gas, although this is not uncommon after surgery.

On December 19<sup>th</sup> 2003, woman G was complaining of feeling nauseous, the gaseous distension persisted and there were no bowel sounds. All of this suggested that there was reduced gastric and small intestinal motility, usually termed paralytic ileus (a type of intestinal obstruction). This is not an uncommon complication after any sort of abdominal surgery. The locum consultant obstetrician who carried out the caesarean section told the Healthcare Commission that he reviewed woman G and noted that her abdomen was distended. He asked for a naso-gastric tube to be inserted to keep the stomach empty until normal intestinal function returned. Woman G was given intravenous fluids to keep her hydrated and told not to eat or drink anything. Blood test results showed her to have a slightly low haemoglobin (10.6g/dl) and that levels of urea (substances formed in the kidneys and removed from the blood by the kidneys) was slightly elevated, which was consistent with mild dehydration.

The next day woman G felt a little better and at midnight she was transferred to the postnatal ward.

On December 21<sup>st</sup> 2003, woman G was able to care for herself and for her baby. At 9.30am woman G asked for a bottle to feed her baby. Later in the morning the midwife caring for woman G went to do the necessary postnatal check but could not as woman G was still feeding her baby. Shortly after this, at approximately 10.45am, a healthcare assistant noticed that woman G had collapsed across the bed. She sought help from the midwife, who put out an emergency call for the assistance of the hospital's resuscitation team. The midwife and healthcare assistant commenced cardiopulmonary resuscitation (heart massage).

The hospital's resuscitation team attended and resuscitation measures were carried out for approximately 40 minutes. However, woman G did not respond to the resuscitation measures and died at 11.30am. The actions taken to resuscitate woman G are clearly documented.

Following the death of woman G, the supervisor of midwives was contacted and went into the hospital to provide support to the midwives. The head of clinical risk and legal services for the trust also went into the hospital.

The Healthcare Commission was told by staff working on the ward that there was concern that the resuscitation trolley on the postnatal ward had not been checked and that some of the equipment on it was not working.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist concludes that "death was due to natural causes ..., cardiac arrest due to or as a consequence of focal myocardial fibrosos". The focal scarring found in the heart probably resulted from previous ischaemic (lack of blood due to constriction or a blockage) or inflammatory episodes and could initiate an abnormal heartbeat, leading to cardiac arrest. This heart condition had not been identified prior to death and she had exhibited no cardiac symptoms or signs in any assessment recorded. No macroscopic evidence of peritonitis was found during the post mortem. There were some adhesions between the bowel and the uterus.

### **Actions taken by the trust following the death of woman G**

North West London Strategic Health Authority was notified of the death of woman G in March

2004. The death was also reported to the local supervising authority midwifery officer.

The senior midwife with responsibility for clinical governance in maternity services went in to the trust on the day woman G died, as she was the supervisor of midwives on call that day. The head of clinical risk and legal services also went in to the trust to provide support to staff and she subsequently managed the trust's internal investigation into woman G's death. The Healthcare Commission was told that a debriefing meeting was held with staff who were on duty.

Statements were obtained from the locum consultant obstetrician who carried out the caesarean section operation on woman G, from the midwife who cared for woman G after her caesarean section operation and from the midwife who was on duty when woman G died on December 21<sup>st</sup> 2003. All of these statements are signed and dated. The on call specialist registrar for anaesthetics also provided a statement. This contains his name but it is not signed or dated.

There is a risk management report prepared by the trust's obstetric lead for clinical risk – this is dated January 19<sup>th</sup> 2004. The report provides an overview of events and the findings from the post mortem.

The head of clinical risk and legal services also prepared a report based on discussions with clinical staff involved in the care of woman G. The report again provides an overview of events and concludes that it was not possible to predict that woman G was at risk of sudden heart attack. This report was prepared on February 6<sup>th</sup> 2004.

There is a report titled *Synopsis of Incident and Outcome*, which is a very brief summary of events and an analysis of the root cause

(method used to establish underlying causes of incidents). The report is not dated. The analysis of the root cause shows there was evidence of good teamwork in managing the post-operative complications and the signs of pre-eclampsia. It is unclear why there is a reference to pre-eclampsia, as there is no indication in the clinical notes of woman G that she was suffering from this. It also says that woman G remained on the delivery suite for 48 hours after the delivery but that it was “difficult to monitor her closely due to the volume of work”.

The report concludes that woman G had a cardiac arrest that could not have been predicted and that there were unresolved post-operative problems. It also concludes that there was no evidence of poor care.

The report has two recommendations: that there should be rigorous attention to checking resuscitation equipment and that the trust should ensure all staff attend basic life support training and are familiar with equipment. There is no reference to this in the statements by the staff.

This report is not dated and it is unclear whether or not it was discussed with staff in maternity services.

The head of clinical risk and legal services told the Healthcare Commission that she was unable to recall the exact details but thought that one of the medical staff had needed some equipment that was not on the resuscitation trolley. We were also told that, in 2003, the systems for ensuring all staff were trained in basic life support and that all resuscitation trolleys contained the necessary equipment were not implemented, but that this has since been improved.

Following this maternal death, staff were allocated to attend basic life support training, however, due to staff shortages not all staff managed to attend. The trust resuscitation officer was involved in updating the list of resuscitation equipment on the resuscitation trolley.

### **Communication with the relatives of woman G**

The head of clinical risk and legal services became the contact person for the family of woman G. On December 30<sup>th</sup> 2003, she wrote to the family offering her condolences and the opportunity for the family to meet with the consultant obstetrician to ask any questions they may have.

The report concludes that woman G had a cardiac arrest that could not have been predicted and unresolved post-operative problems. It also says that the trust would meet with the family once the review was completed and provide a written summary of the care she received.

On February 6<sup>th</sup> 2004, a copy of the report of the care that woman G received was sent to her family.

In May 2004, the family of woman G wrote to the trust requesting a meeting at a later date. They enclosed a list of questions for the staff who had cared for woman G. The questions related to the caesarean section operation, her immediate care following this, the management of the resuscitation and the findings of the post mortem.

The head of clinical risk and legal services sent a letter of acknowledgement saying that she would reply once she had the answers to their questions.

On June 28<sup>th</sup> 2004, a letter was sent to the family responding to all of their questions.

Feedback was provided to the midwife who had cared for woman G on the day she died.

### **Findings and conclusions on the care and treatment provided to woman G and actions taken by the trust**

Woman G attended regularly for her antenatal care, and the antenatal care woman G received was appropriate.

There is no record in the case notes indicating if woman G was ever assessed by a consultant obstetrician prior to the caesarean section.

There is no written evidence that the consultant obstetrician counselled woman G about the surgical approach and/or the potential complications. This is contrarary to good practice. (Good practice in *Consent Implementation Guide*, Department of Health 2001)

The caesarean section was difficult but carried out in a satisfactory manner.

Woman G developed complications after the operation and these complications were managed appropriately.

There was no evidence that woman G had any heart abnormalities during or after the pregnancy.

When woman G collapsed, staff initiated action to resuscitate her, and the resuscitation was managed appropriately.

The information in the *Synopsis of Incident and Outcome* report suggests that there was some problem with the resuscitation equipment, but it does not specify what the problems may have been.

There is no evidence of how the conclusions mentioned in the report were reached, nor any evidence of who reached these conclusions.

The report includes recommendations but it is unclear how or why the recommendations were made.

The name of the author is not included in the report.

The report highlights the difficulty of monitoring woman G in the labour ward because of the high volume of work, but does not make any further recommendations regarding this.

At this time there was no guidance available in the trust about how often resuscitation trolleys should be checked. There was no effective system to ensure that staff attended basic life support training, or that resuscitation trolleys were checked regularly to ensure they contained all the necessary equipment.



## Woman H

Woman H was in her twenties and was from Asia. This was her first pregnancy and she had no significant past medical history or significant family medical history. There were no obvious risk factors.

### Antenatal care

On October 21<sup>st</sup> 2003, when she was 11 weeks pregnant, woman H booked to have her baby at Northwick Park Hospital. At this time her blood pressure was 98/62mmHg, increasing to 110/70mmHg when she was 39 weeks and four days pregnant.

Woman H attended regularly for her antenatal care and no complications were identified.

On May 10<sup>th</sup> 2004, when she was 40 weeks and four days pregnant, woman H attended the day assessment unit because she was concerned that the movements of the baby had reduced. Cardiotocography (recording of the baby's heart beat) was performed and confirmed that the baby was well.

Woman H's blood pressure was also checked and was 146/94mmHg (high). A sample of her urine was tested for protein and was found to be positive. A midstream specimen of urine was tested to exclude a urinary tract infection and blood was taken for haematological and biochemical investigation.

Woman H had increased blood pressure and protein in her urine, which were consistent with a diagnosis of pre-eclampsia (high blood pressure greater than 140/90mmHg, developed during pregnancy in a woman whose blood pressure was previously normal). She was seen by the locum consultant obstetrician who was covering the day assessment unit that day and it was decided she should be admitted and have her labour induced.

Woman H was admitted to the antenatal ward on May 10<sup>th</sup> 2004 at 4.00pm. Following her admission, woman H developed chest pain. Her blood pressure was 187/96mmHg and her heart rate was fast at 106 beats per minute. An electrocardiogram (a test that records the electrical activity of the heart, detects the presence of any damage to the heart and checks regularity of the heartbeat) was performed. The baby's heartbeat was also checked and was found to be satisfactory. Blood was taken for haematological and biochemical tests. The results of the tests showed that her haemoglobin was low at 6.4g/dl, (this result was not reviewed until May 13<sup>th</sup>), and the indices on the full blood count were consistent with iron deficiency anaemia.

At 8.00pm on May 10<sup>th</sup> 2004 her chest pain had subsided, her blood pressure was 144/93mmHg and her heart rate was 94 beats per minute.

The next day, May 11<sup>th</sup> 2004, woman H was not reviewed by the medical staff. Her midwifery notes do not contain a plan to induce her labour. The midwives had documented that her blood pressure at 7.00am was 134/89 mmHg and that she was complaining of "pressure on her chest". Woman H was offered analgesia but she declined. Following breakfast, a routine antenatal check was carried out and it was noted that she had oedema (swelling due to the retention of fluid in the tissues) in her ankles and hands and that a sample of her urine was to be tested later that day. The baby's heart rate was recorded.

### Care during delivery

On May 12<sup>th</sup> 2004, woman H's induction of labour began. Her blood results from May 10<sup>th</sup> had not been reviewed by the medical staff prior to the induction of her labour. The midwife caring for woman H took some more blood for

haematological and biochemical tests. The biochemical tests were within normal range. She also recorded her blood pressure, which was 148/87mmHg.

Woman H had a cervical score of two, which is highly unfavourable for induction, and 2mg of prostin (a drug used to stimulate the uterus to contract and can be used to induce or augment labour) was administered to the vagina to ripen the cervix. This was appropriate management of an unfavourable cervix. Following the administration of prostin her blood pressure was 145/90mmHg. At this stage, although the increase in woman H's blood pressure was not critical, consideration should have been given to whether or not she needed medication to reduce her blood pressure.

However, the delivery suite was busy and could not accommodate woman H, so the induction of her labour was abandoned.

On May 13<sup>th</sup> 2004, the results from the blood tests of May 12<sup>th</sup> showed that woman H's haemoglobin was 6.9g/dl and three units of blood were cross matched (this is the procedure used to determine if blood is compatible with the blood of the recipient, usually carried out in preparation for a blood transfusion). The obstetric registrar was also notified of the result of the blood test taken on May 10<sup>th</sup>. The consultant obstetrician was notified of this latest haemoglobin result. Two obstetric registrars were involved in the care of woman H and one of them recommended that she should have three units of blood. Subsequently, the consultant obstetrician arrived to do the ward round but they were unable to find woman H. The consultant obstetrician recommended that woman H should have two units of blood and that the induction of labour be delayed until after the blood transfusion was complete.

Woman H received two units of blood by means of a transfusion.

On May 14<sup>th</sup> 2004 woman H's haemoglobin had increased to 8.8g/dl, and no further units of blood were prescribed. Staff were unable to proceed with the induction of her labour as the labour ward was still too busy.

On May 15<sup>th</sup> 2004 further attempts at inducing her labour continued. At 10.00am, woman H's blood pressure was 141/94mmHg and the baby's heartbeat was satisfactory. At 10.10am 1mg of prostin gel was applied to her cervix and at 5.10pm she had developed irregular contractions and had a Bishops score of four (assessment of the readiness of cervix for labour).

The next day woman H was given a further 1mg of prostin gel at 11.25am. At 2.10pm she complained of a temporal headache. Her blood pressure was 118/68mmHg and she was complaining of irregular tightenings. At 6.00pm woman H's blood pressure was 140/98mmHg, but she was not complaining of a headache or visual disturbance.

During her seven days on the antenatal ward, woman H was reviewed by a consultant obstetrician only once. However, her blood pressure was checked regularly by the midwives. In their statements the midwives caring for woman H have documented that the labour ward was very busy and this was why woman H's induction of labour was repeatedly abandoned.

In the early hours of May 17<sup>th</sup> 2004, woman H was having contractions and her cervix was 3-4cm dilated, and at 1.40am she was transferred to the labour ward. At 8.45am she was reviewed by the obstetric registrar on the ward round. A vaginal examination was carried out to assess her progress. Her cervix was still only 3cm dilated. The plan was for her to have an



epidural infusion for pain relief and for an intravenous infusion of syntocinon (medication used to induce labour) to be commenced if no further progress was made. At 11.00am an infusion of syntocinon was commenced.

At 12.15pm the cardiotocograph (recording of the baby's heart rate) showed shallow decelerations (slight decreases in the baby's heart rate). This was reviewed by the senior house officer and he advised that he would inform the obstetric specialist registrar.

At 1.00pm a vaginal examination was carried out and following this the cardiotocograph showed decelerations with bradycardia (decreased heart rate) that was slow to recover. The obstetric specialist registrar was informed and when he reviewed woman H at 1.15pm, the cardiotocograph recording had improved.

The obstetric specialist registrar reviewed woman H at 3.00pm and again at 4.15pm. At 3.00pm woman H's cervix was 6cm dilated and she was also passing grade two meconium stained liquor (this can be a feature of a healthy baby becoming distressed and needs a comprehensive assessment and possible further investigation). At 4.15pm woman H's labour had progressed and her cervix was 8cm dilated. A sample of the baby's blood was obtained as there was concern for the welfare of the baby because its heart rate was showing signs of slowing down. However, the blood gas analyser (machine used to analyse the sample of blood) had not been calibrated and it was not possible to carry out an analysis of the blood sample from the baby. Following this, the baby's heart rate began to increase, indicating that the condition of the baby was satisfactory and the labour of woman H was allowed to continue.

At 4.50pm woman H was reviewed by the consultant obstetrician who was covering the

labour ward during the day. He gave instructions to increase the syntocinon infusion at 6.00pm if there was no further progress with her labour.

The locum consultant obstetrician who was on call for that night reviewed woman H during his ward round when he came on duty at 6.25pm. It was noted that she had a high temperature and intravenous antibiotics were started. Her cervix had not dilated beyond 8cm and a decision was made to perform a caesarean section operation. In his statement the locum consultant obstetrician has said that he left instructions that woman H should receive 40 units of syntocinon in 500ml of normal saline over four hours to reduce the risk of post partum haemorrhage (there is an increased likelihood of post partum haemorrhage in a patient who has a high temperature). He left the maternity unit at 7.00pm.

The obstetric specialist registrar carried out a caesarean section at 7.50pm and a live baby girl was delivered at 8.05pm.

The obstetric specialist registrar told the Healthcare Commission that the operation went smoothly, the baby was easily delivered and the placenta was complete. He estimated that the blood loss was 500ml, which is within normal limits and said that following delivery, the uterus contracted straight away and there was no unusual bleeding from the uterus.

It is documented in the anaesthetic section of woman H's case notes that her haemoglobin was 9.6g/dl and that the estimated blood loss from the surgery was 500ml. At this time it was usual practice to estimate the blood loss during surgery – it was not usual practice to weigh the surgical swabs. It is also documented in the anaesthetic notes that immediately after the caesarean section woman H had experienced an episode of increased tachycardia (increased

heart rate) and a drop in her blood pressure and had been given ephedrine (a drug used to increase blood pressure) intravenously.

### Care after delivery

The following information is taken from statements made by staff after woman H died, interviews with staff undertaken as part of this investigation and the case notes, some of which are contemporaneous and some which were written following the death of woman H.

The obstetric specialist registrar handed over the care of woman H to the locum obstetric registrar who was on call for that night at approximately 8.45pm on May 17<sup>th</sup> 2004.

The locum obstetric registrar told the Commission that when she came on duty at 8.00pm the labour ward was very busy. There were nine women in the delivery rooms and four women in the recovery bay, one of whom was still recovering from surgery to repair a ruptured uterus. The staff covering labour ward that night included four hospital midwives, four agency midwives, two midwifery assistants and one nurse, who was trained but not practising as a midwife.

When woman H was handed over to the locum obstetric registrar, at approximately 8.45pm, the locum obstetric registrar was told that woman H had been admitted a week earlier with pre-eclampsia and that prior to the caesarean section her temperature had been raised and she had been given antibiotics. The obstetric registrar assessed woman H and noted that her temperature had been high but it was now coming down and that her blood pressure was within normal range. The locum obstetric registrar told the Commission that she was not informed that immediately after the caesarean section woman H had

experienced an episode of tachycardia (when the heart rate increases) and a drop in her blood pressure and that she had been given ephedrine (a drug that causes constriction of the blood vessels) intravenously.

Following the caesarean section, woman H was cared for, in a four-bedded bay, by an agency nurse who was trained but not practising as a midwife. The agency nurse was also looking after another woman in another area of the labour ward. At the start of the shift the agency nurse had to leave woman H to check on the other woman she was caring for. The blood pressure, heart rate and respirations of woman H were recorded at five minute intervals. There was also an agency midwife caring for the other women in the four-bedded bay.

At 9.20pm, the staff grade anaesthetist has documented in his statement that he reviewed woman H and that her blood pressure and heart rate were stable.

Woman H had a persistently increased heart rate and at 9.30pm her blood pressure was low at 80/56mmHg and her heart rate was fast at 111 beats per minute. This was rechecked and although her blood pressure had increased to 140/98mmHg, her heart rate was even faster at 150 beats per minute.

Woman H was reviewed at 10.00pm by the locum obstetric registrar, who documented that her blood pressure was 141/111mmHg and her heart rate was 96 beats per minute. The locum obstetric registrar noted that woman H had minimal vaginal bleeding and her uterus was well contracted. The locum obstetric registrar failed to document that woman H had a persistently increased heart rate, at times as high as 160 beats per minute. Instead, she recorded the heart rate as 96 beats per minute. At one stage woman H had a heart rate of around 88 beats per minute, but the entire

heart rate chart should have been reviewed, rather than a single isolated reading. During an interview with the Healthcare Commission, the locum obstetric registrar on call said that she was unaware that woman H's tachycardia was persistent, as the recordings of her blood pressure and heart rate were not consistently documented on the chart used to record observations post operatively – they were documented in her case notes – thus giving an incomplete picture of her clinical state.

At 10.15pm woman H was given morphine to relieve her pain, and her blood pressure and heart rate were recorded and documented in her case notes. It is usual practice to record these observations on a specific chart that is kept by a patient's bed.

At 10.19pm her blood pressure had dropped to 62/22mmHg and her heart rate was slow at 57 beats per minute. The locum obstetric registrar was called to review woman H and arrived immediately. At this time her blood pressure was 58/24mmHg and her heart rate was 136 beat per minute. Such a fall in blood pressure can be an indication that major blood loss has occurred. The midwives had already commenced an intravenous infusion of gelofusine, a plasma expander used to replace blood loss.

The locum obstetric registrar assessed woman H and found that her abdomen was soft and not enlarged, and the uterus was considered to be well contracted and there was minimal bleeding from her vagina. Her urine output was satisfactory. A further unit of gelofusine was ordered and administered intravenously. At 10.30pm the locum obstetric registrar documented in the case notes the actions she had taken. The staff grade anaesthetist was called.

At 10.40pm woman H's blood pressure was 113/58mmHg. In his statement the staff grade anaesthetist has documented that when he arrived he noticed that the blood pressure recordings were erratic, reading 141/111mmHg and dropping to 56/27mmHg. He ascribed this to problems with the blood pressure cuff (it was the wrong size) and asked that the blood pressure cuff be changed to the standard size and that it should be put on the left arm to give a more accurate recording.

At 10.45pm he also took blood for an urgent full blood count and cross matching for four units of blood. The blood samples were given to the midwifery coordinator to be sent urgently to the laboratory. The midwife coordinator told the Commission she gave them to a junior doctor.

At this time the midwife coordinator arranged for an agency midwife to take over the care of woman H.

During this time the locum obstetric registrar told the Commission that woman H had "a twitch in her right hand" and she thought that she may have been about to have an eclamptic seizure, which she discussed with the staff grade anaesthetist. The locum obstetric registrar was very concerned about woman H and thought that she had lost more blood during the caesarean section than was recorded in her operation notes, and that the twitching of her hand was due to cerebral hypoperfusion (a decrease in the blood supply to the brain). Woman H's sister, who had been with her since she came out of surgery, told the locum obstetric registrar that her hand had been twitching since she had returned from the operating theatre and that she had told the midwife, but that no one had taken any notice of it.

Her blood pressure was rechecked and it had increased to 114/58mmHg. The locum obstetric registrar read woman H's case notes and saw

that on May 13<sup>th</sup> her haemoglobin was 6.9g% and that she had received two units of blood.

At 11.00pm the locum obstetric registrar was called to see another woman, and they were still waiting for the blood to arrive. The staff grade anaesthetist asked that woman H's blood pressure be recorded at five minute intervals and that her urine output be closely monitored.

Between 10.30pm and 11.05pm woman H's blood pressure and heart rate were recorded at five minute intervals for fifteen minutes and then sporadically. It was noted that her blood pressure was stabilising. However, at 11.20pm her blood pressure dropped to 96/54mmHg and her heart rate was fast at 135 beats per minute.

At 11.30pm the locum obstetric registrar was called again to see woman H because her blood pressure had dropped. Woman H had received two litres of gelofusine but her blood pressure was 95/55mmHg and her heart rate was 140 beats per minute. The locum obstetric registrar checked if there was any vaginal bleeding and felt woman H's uterus. There was minimal bleeding from her vagina and her uterus was contracted.

The locum obstetric registrar contacted the blood bank to find out if the blood that had been sent for urgent cross match at 10.45pm was ready. She was told it would be ready in 10 minutes.

At 11.40pm the locum obstetric registrar contacted the consultant obstetrician who was on call. Initially she contacted the wrong consultant, because the wrong name was on the white board. When she spoke to the locum consultant obstetrician she told him woman H's observations and he advised that woman H should receive a blood transfusion. The locum obstetric registrar told the consultant about woman H's low blood pressure and he repeated that she should proceed with the blood

transfusion. In his statement the locum consultant obstetrician said that he asked the locum obstetric registrar if she wanted him to come in and she said no. She also told him that she did not think woman H was bleeding as she had examined her and her abdomen was soft and her uterus had contracted.

While they were waiting for the blood to arrive, the locum obstetric registrar asked the midwife coordinator if un-cross matched O negative blood was available on the labour ward. She was considering giving it to woman H until the cross-matched blood arrived. She was told it was not available on the labour ward and that if she wanted to give it to woman H she would have to contact the consultant haematologist who was on call for that night.

During her interview with the Healthcare Commission the midwifery coordinator said that O negative blood was available on the labour ward, but they decided against using it.

In his statement, the staff grade anaesthetist said that he "popped in and out between 11.00pm and 11.30pm to see woman H".

At 11.37pm woman H was reviewed by the staff grade anaesthetist. He noted that her systolic blood pressure was low at 88mmHg, and that her heart rate was fast at 154 beats per minute.

In his statement the staff grade anaesthetist has documented that when he reviewed woman H at 11.37pm, he noted that her blood pressure had dropped and her heart rate had increased to 154 beats per minute. At this stage he did consider that she was bleeding. He checked her sanitary pad to see whether there was any bleeding. The pad showed minimal loss. He then asked the locum obstetric registrar to assess her uterus, which she did and concluded that woman H's abdomen was soft and her uterus was contracted below the

umbilicus. The staff grade anaesthetist considered whether they were dealing with “thrombo-embolic phenomena” (a blood clot within a vein or artery that becomes detached from the vessel wall and then lodges elsewhere) and undertook an electrocardiogram (recording of electrical activity in the heart often referred to as an ECG). The electrocardiogram showed “massive ischaemic changes” (restricted or lack of oxygen supply). He considered if the changes were caused by anaemia and he noted that woman H looked very pale.

The staff grade anaesthetist asked if the blood for transfusion was ready and was told that it was not. He also asked the midwife coordinator if the results of the blood taken at 10.45pm were available. The midwife coordinator checked on the computer and found results from blood that had been taken at 9.00pm. The staff grade anaesthetist contacted the laboratory to ask if there had been a mistake and was told the blood for transfusion would be available in 10 minutes.

In her interview with the Healthcare Commission, the midwifery coordinator said that at this point they realised that the blood they had taken at 10.45pm had not yet left the ward. It was found in the pathology specimen box waiting to be collected. The blood was sent urgently to the laboratory. The blood for transfusion did not arrive on the labour ward until after midnight.

The staff grade anaesthetist showed the electrocardiogram to the locum obstetric registrar. It was agreed that they would not give woman H the blood because of the electrocardiogram recording.

The locum obstetric registrar contacted the registrar who was on call for cardiology and asked her to review woman H. She was told

that she was seeing patients but would be able to see woman H in about 20 minutes.

The locum obstetric registrar contacted the locum consultant obstetrician again and told him about the electrocardiogram recording. He agreed that the blood should not be given. The locum consultant obstetrician in his statement recalls the telephone conversation and being told that they were planning to transfer woman H to the intensive care unit. He remembers thinking that woman H was not bleeding and he was reassured that woman H was not bleeding.

Woman H’s condition deteriorated and at midnight the staff grade anaesthetist called the anaesthetic registrar who was on call and was also a locum doctor. He took an arterial sample of blood which showed a dilute blood content (appeared very pale in colour) and gave a haemoglobin reading of 1.6g/dl, which is incompatible with life. This was repeated and the result was a haemoglobin reading ranging between three and 4.3g/dl.

The locum anaesthetic registrar has documented in his statement that he attended immediately. When he arrived he found woman H unresponsive to painful stimuli, her blood pressure was low at 80/50mmHg and her heart rate was very fast at 150-160 beats per minute. He administered naloxone 400ug (a drug used to counteract the effects of overdosing on opioid drugs such as morphine) intravenously and following this woman H responded briefly by opening her eyes. Her blood pressure increased but woman H became unconscious again. He noted that her abdomen was distended and he suspected that she had had a post partum haemorrhage.

The medical senior house officer was also in attendance at this time and they were querying whether or not woman H had had a pulmonary



embolism (a blood clot from another part of the body that travels to the lungs).

The staff grade anaesthetist was then called to attend to an emergency, along with the locum obstetric registrar.

The locum obstetric registrar contacted the locum consultant obstetrician to inform him of the emergency and that woman H was not stable. He agreed that she should attend to the other emergency. This left the locum anaesthetic registrar with woman H.

In his statement, the locum consultant obstetrician commented that, in the phone calls he had from the locum on call specialist registrar, “staff did not come across as too worried”.

The midwifery coordinator contacted the locum consultant obstetrician and he asked to speak to the locum anaesthetic registrar. The locum anaesthetic registrar told him that he thought woman H was bleeding and the locum on call consultant obstetrician said he would go into the hospital. It took him about 10 minutes to get to the hospital.

The locum anaesthetic registrar also contacted the consultant anaesthetist who was on call that night, who decided to go into the hospital and also advised him to take more blood to check the level of haemoglobin. At this stage woman H’s condition was extremely serious.

The locum anaesthetic registrar decided that woman H should receive a blood transfusion and the first unit of blood was given at 12.55am on May 18<sup>th</sup> 2004.

At 1.05am the locum anaesthetic registrar was told by woman H’s sister that woman H was staring and when he examined her he could not find a pulse and she was not breathing. He put out a call for the cardiac arrest team and

commenced resuscitation of woman H. The consultant anaesthetist on call arrived at approximately 1.10am (eight minutes after he had been called). When he arrived he found that woman H had already had a cardiac arrest and had been intubated (when a tube is placed down the person’s throat to assist breathing or for other medical reasons) and was being manually ventilated. He noted that her abdomen was distended and once the locum consultant obstetrician on call arrived they agreed to transfer her to theatre for a laparotomy (exploratory operation).

At 1.10am the locum obstetric registrar joined them in the operating theatre. The laparotomy was carried out by the locum consultant obstetrician, assisted by the locum obstetric registrar. Cardiopulmonary resuscitation continued simultaneously. On opening the abdomen of woman H, the locum consultant obstetrician noted there was no intra-peritoneal bleeding and no extra uterine bleeding. The uterus was very grossly distended (large) and on opening it he found fresh blood and blood clots (at least three litres of blood and blood clots), which he removed. The uterus was “floppy” and he pressed on it to make sure it was empty and no longer bleeding. He injected one dose of carboprost (a drug used to stimulate the uterus to contract and help stop bleeding from the uterus) 250ug into the uterus.

The locum obstetric registrar told the Commission that during the laparotomy she observed that the lower segment of the uterus was “lying in the pelvis”. It was not included in the sutures that had been put in following the caesarean section. The locum obstetric registrar said that the lower segment did not look like it had ever been sutured. The locum obstetric registrar described woman H’s abdomen as distended and although there was



no vaginal bleeding there was blood in the uterus. The locum obstetric registrar also said that when she had assessed woman H's uterus at 10.30pm that it was contracted. The locum obstetric registrar documented in her statement that when she assessed woman H's uterus at 11.30pm it was still contracted, however, she thinks that just prior to the laparotomy it must have relaxed.

The anaesthetists continued resuscitating woman H for another 20 to 30 minutes, but were unsuccessful and woman H was pronounced dead at 1.50am on May 18<sup>th</sup> 2004. The locum consultant obstetrician closed the uterus and the locum obstetric registrar closed the abdomen.

The consultant anaesthetist and the locum consultant obstetrician went to break the news to the family.

The locum consultant obstetrician told the Commission that he documented his actions, but that the notes were subsequently lost. He did write a statement for the subsequent investigation.

During the course of these events the midwifery coordinator continued to oversee and help as much as she could, but was limited by the full and busy labour ward she had to manage.

The locum obstetric registrar told the Commission that following the death of woman H she became aware that her haemoglobin preoperatively was 8.6g/dl and that blood had not been cross-matched. The blood taken for haematological tests at 10.45pm showed that her haemoglobin level was 4.4gm/dl.

Following the death of woman H, the midwifery coordinator informed the supervisor of midwives who went into the maternity unit to provide support to the midwives. At this time there was no midwifery manager on call system in place.

The consultant anaesthetist informed the relatives of woman H of her death.

The Commission was told that there was a delay in involving the haematologists in care of woman H.

The trust has provided a copy of their guidelines for the induction of labour. They are dated March 2004 and include references to the National Institute for Clinical Excellence *Induction of Labour Guideline, June 2001* and the Royal College of Obstetricians and Gynaecologists *Guideline 1998*.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist states that the preliminary cause of death was: "necrosis [death of tissue] of caesarean section suture line, and pre-eclamptic toxemia". Following information obtained from the coroner and from histological findings, this was amended to "uterine haemorrhage, necrosis of uterus and caesarean section suture line and cervix, genital tract sepsis in third trimester of pregnancy and pre-eclamptic toxemia". It is classified as a direct maternal death.

A detailed clinical summary, post mortem report and some samples of tissue were sent to a consultant histopathologist (medical specialist who studies human tissue). He commented that "the cervix and uterus was the centre of the problem and, whilst it cannot be proven, the possibility that there was infection starting in the cervix prior to surgery and advancing rapidly thereafter needs to be considered". Evidence of this is not documented in the surgical notes by the obstetric specialist registrar who performed the caesarean section.

## Inquest

An inquest concluded that woman H died from concealed haemorrhage following a caesarean section operation. “The gravity of her worsening condition, with increasing blood loss was not recognised” and “there was a delay in providing necessary treatment which led to her death”.

## Actions taken by the trust following the death of woman H

Following the death of woman H the trust board was notified. The trust notified North West London Strategic Health Authority and the London local supervising authority midwifery officer. The death was also reported to Ealing Primary Care Trust, as woman H lived within this catchment area.

The trust declared the death a serious untoward incident and the head of clinical risk and legal services coordinated the internal investigation with support from the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk.

The senior midwife with responsibility for clinical governance in maternity services began an initial review of the case notes, but, before she could complete this, the head of clinical risk and legal services requested the notes. The head of legal services and clinical risk has stated that she took this action in order to reduce the level of stress for the senior midwife responsible for clinical governance, who was due to go on maternity leave.

The senior midwife with responsibility for clinical governance in maternity services informed the director of midwifery about the death of woman H. The head of legal services and clinical risk has stated that the head of midwifery was at a national conference and a request was made for him to return to the trust

to provide support to the staff. The director of midwifery told the Commission that he did not receive the information about woman H's death until two days later, and on receiving the information he returned to the hospital. A debrief was held with all staff who had worked the night shift, and staff rotas were amended to allow staff to take the following night off.

The obstetric, anaesthetic and midwifery staff who were involved in the care of woman H provided statements. The name of the member of staff concerned is included on each statement but not all are dated and signed.

It is important to note that the statements from the locum consultant obstetrician and the locum obstetric registrar differ in their accounts. The locum obstetric registrar states that she informed the on call locum consultant obstetrician of the seriousness of the situation but did not receive any guidance from him. In the statement made by the on call locum consultant obstetrician, he states that he asked the locum obstetric specialist registrar if she wanted him to come in, and she said “no, [because woman H] was not bleeding”.

The trust advised the locum obstetric registrar that the trust would represent her interests at the inquest but that she should seek her own independent advice in addition to this.

The locum obstetric registrar told the Commission that a few days after the death of woman H, she discussed the case with the consultant obstetrician who had responsibility for the management of obstetric clinical risk. He advised her to write a statement. She also spent time with the head of clinical risk and legal services. The locum obstetric registrar said that she informed both the head of legal services and the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk that the lower segment of

the uterus was lying in the pelvis. When asked by the Healthcare Commission why she did not include the information that the lower segment of the uterus was not correctly sutured in her statement, the locum obstetric registrar responded that the head of clinical risk and legal services told her that the locum consultant obstetrician would write about the laparotomy in his statement. She asked for a copy of the operation notes, but was told they could not provide her with a copy.

The head of clinical risk and legal services has stated that at no time during the investigation did the locum obstetric registrar state that she saw the lower segment of the uterus lying in the pelvis.

The locum obstetric registrar said she felt like she was used as the “scapegoat” for this death. She understands that there was a meeting to discuss what happened to woman H, but she was not invited to attend. The obstetric specialist registrar who carried out the caesarean section was at the meeting, along with the locum consultant obstetrician who did the laparotomy. The head of clinical risk and legal services has stated that she is unsure which meeting the locum obstetric registrar is referring to. The trust did hold a meeting for all staff who were going to be witnesses at the coroner’s inquest, and the locum obstetric registrar attended this meeting.

The locum consultant obstetrician told the Commission that when they took woman H back to theatre for the laparotomy, her uterus was similar in size to when she was pregnant. Looking at the uterus from the outside it looked normal – there were no obvious signs of bleeding. When he cut through the sutures, the uterus felt warm and contained blood clots. The bleeding was coming from inside the uterus. The locum consultant obstetrician could not

understand why the blood did not flow outside of the uterus, i.e. why woman H had no vaginal bleeding. In his statement he has written that there did not appear to be anything untoward about the uterus, however he suspects that it is possible that at least some stitches might have gone through the back of the uterus, into the ridge that appears after delivery of the baby and the placenta in the posterior of the wall of the uterus, thus making passage of blood from the cavity of the uterus difficult. During his interview with the Commission he said that he suspected that it was more probable than possible that the uterus “had not been correctly” sutured following the caesarean section. However he does not agree that the lower segment was lying in the pelvis.

The obstetric specialist registrar who carried out the caesarean section was asked by the Commission if it was possible that he had incorrectly sutured the uterus following the caesarean section, and he said no – he had closed it according to usual practice and carried out the standard checks. He would have been surprised to learn that he had sutured the uterus incorrectly and that he was surprised that this had been suggested. This was the first time this possibility had been put to him.

The head of legal services and clinical risk has stated that the possibility that the uterus was incorrectly sutured was discussed with the obstetric specialist registrar who carried out the caesarean section operation.

The locum obstetric registrar told the Commission that with hindsight she realises that she should have asked the locum consultant obstetrician to come in earlier.

The head of clinical risk and legal services and the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk prepared a preliminary risk

management report. The report, dated July 2004, provides a detailed overview of the care of woman H from when she was admitted to the antenatal ward on May 10<sup>th</sup> 2004 through to her death on May 18<sup>th</sup> 2004. A chronology of events is attached to the report. The report includes comments about the care given to woman H and preliminary recommendations.

The report acknowledges that there was a lack of input by a consultant while woman H was on the antenatal ward, and a failure to take action on the blood test results of May 10<sup>th</sup> 2004. In relation to the care she received once she was transferred to the labour ward and the delivery of the baby, the report concludes that the care was of an acceptable standard. The review of the care after the baby was delivered highlights a number of failings, including failure to adequately record the blood pressure and heart rate, failure to request assistance in the light of clinical signs of haemorrhage and a failure by the midwifery staff to consider whether the consultant obstetrician should be called in.

Recommendations relating to care of woman H on the antenatal ward are included in the report but there are no recommendations relating to her care after the baby was born. There is no evidence of any midwifery input in this report.

In consultation with the strategic health authority, the trust sought an independent review of the care of woman H. In a letter to the independent expert dated July 19<sup>th</sup> 2004, the head of clinical risk and legal services asks the independent expert to prepare a report dealing with “breach of duty, causation and clinical risk issues for the trust”. The independent expert is also asked to comment on whether or not the care provided to woman H was of an acceptable standard.

The report from the independent expert concluded that there were deficiencies in the antenatal care, care during delivery and post-delivery care provided to woman H, and included a number of recommendations.

The trust is of the view that the strategic health authority had received a copy of this report. There is no evidence that the strategic health authority had, in fact, received a copy of the report.

At the inquest, the coroner commented on the fact that a “major hospital in north London has to rely so much on locum cover. However good a locum, they cannot provide continuity of cover in a major [teaching] hospital”.

The coroner concluded that woman H died from a concealed haemorrhage after a caesarean section operation and that the gravity of the situation was not recognised, which resulted in a delay in providing the necessary treatment.

The locum obstetric registrar wrote to the head of clinical risk and legal services, expressing her sadness at the death of woman H and acknowledging that there were important lessons for her to learn from it. She included a list of three major points, including the need to express clearly when she requires the help of a consultant.

The trust was aware that the locum consultant obstetrician had not documented what he did once he took woman H back to theatre on May 18<sup>th</sup> 2004. In a fax to the independent expert on October 8<sup>th</sup> 2004, the head of clinical risk and legal services said: “I enclose a report prepared by the locum consultant obstetrician following the death, this was to the request of the family who were concerned there was no operation note of the final surgery. Whilst unsigned I can confirm that he has seen it and has confirmed the contents to be as he recalls (ie no extra

uterine bleeding]”. This report was written after the death of woman H.

The Healthcare Commission was told by the locum consultant obstetrician that he wrote in the case notes, but that he did not write much as he wanted to see the family.

The Commission has been provided with a copy of the report from the independent expert.

The trust did not raise any concerns about the actions of the locum consultant obstetrician who was on call on May 17<sup>th</sup> 2004, for example the fact that it took three phone calls before he went into the hospital. The trust thought that the actions taken by the locum consultant obstetrician on call on May 17<sup>th</sup> were appropriate and did not identify any specific learning for him. The Healthcare Commission was told that he retired in August 2004.

There is no evidence that the trust implemented any of the recommendations arising from its preliminary report.

Although staff told the Healthcare Commission they were unaware of any meetings taking place to discuss the recommendations, a meeting was arranged for the medical staff to discuss this case, and there was further discussion of this case at a regular labour ward meeting. Two midwives attended the latter meeting.

Midwives involved in the care of woman H have told us that they did not receive any feedback about the death of woman H until after the death of woman J.

The family of woman H received copies of the preliminary report and statements from the staff involved. Her husband was also given the opportunity to meet with the chief executive. He found that the trust was helpful, but there was no information about what changes they intended to make as a result of his wife's death.

### **Findings and conclusions on the care and treatment provided to woman H and the actions taken by the trust**

Woman H was on the antenatal ward for seven days and she was only reviewed once by a consultant obstetrician during this time. This is contrary to good practice.

There is little evidence of discussion with woman H and her relatives about her care during this time.

Woman H's haemoglobin result on May 10<sup>th</sup> 2004 was not reviewed and acted on. No action was taken until woman H was seen by a consultant obstetrician on May 13<sup>th</sup>. Her low haemoglobin should have been corrected before her labour was induced on May 12<sup>th</sup>, so that her ability to deal with any significant blood loss during delivery was not compromised.

The midwives caring for woman H while she was on the antenatal ward adhered to the trust's guideline for induction of labour.

Woman H's induction lasted five days and this cannot be considered optimal care.

The management of woman H's care lacked senior input at critical phases, including when she was admitted to the antenatal ward and after the caesarean section operation.

The nurse allocated to care for woman H was not a practising midwife and was eventually reallocated to care for another woman when the situation became serious.

It is possible that the obstetric specialist registrar did not recognise signs of infection in the uterus when he carried out the caesarean section operation. This would indicate that the problems started while woman H was in the antenatal ward and that they may have been caused by the continual starting and terminating of her induction of labour, during

which there were four vaginal examinations (repeated vaginal examinations can increase the risk of infection).

Following caesarean section, woman H's blood pressure was at times high, but she had a persistent tachycardia with a heart rate as high as 147 beats per minute. This apparently was attributed to the fact that she had a pyrexia (high temperature) and was suffering from pain. This is an important point. Staff caring for women in pregnancy and the post partum situation should be aware that young, fit women can maintain their blood pressure for a considerable time in the face of substantial blood loss. They will usually, however, have a tachycardia. They will compensate reasonably well until blood loss is massive, at which point a major collapse will occur. Thus, in patients with a persistent tachycardia, it is critical to establish whether or not there is significant blood loss, which may be concealed within the uterus or on the abdomen, particularly in the post-delivery period.

The automated blood pressure recordings taken on woman H, following delivery, showed prolonged and repeated episodes of severe hypotension and tachycardia.

The automated blood pressure recordings were not all recorded on the observation chart. It is usual practice to document blood pressure and heart rate recordings on the same chart to observe any trends in recordings.

The staff grade anaesthetist noticed that woman H had an erratic blood pressure and his comments in his statement show that he considered that woman H was haemorrhaging. He should have considered inserting an arterial line to be sure of the real blood pressure.

When woman H had a convulsion this was attributed to pre-eclampsia, instead of a lack of

oxygen, despite the fact that woman H's blood pressure was low at this time.

The locum obstetric registrar recorded that the uterus was well contracted at 10.30pm and has documented in her statement that when she assessed it again at 11.30pm it was contracted. This assessment was wrong. The uterus could not have been well contracted. Instead, what she may have felt was a uterus that was tense because of a large volume of blood contained within it. A vaginal examination should have been performed. This would have alerted those caring for her of the massive internal bleeding, which, in a patient with a pre-existing anaemia, would be even more hazardous.

The electrocardiogram showed ischaemia (restricted or lack of oxygen supply). This was caused by severe anaemia, rather than heart problems.

The blood taken at 10.45pm was not sent immediately to the laboratory.

The consultant haematologist, who was on call, was involved in the care of woman H. However there was a delay in notifying him. This may have been because the obstetric staff were locums and may not have been aware that, in the event of a major bleed, the haematologists should be notified as soon as possible.

There are inconsistencies in the information about the availability of un-cross matched O negative blood, although the trust has confirmed that it was available.

The midwife coordinator did speak to the locum consultant obstetrician, however she should have taken a more proactive role in calling in the locum consultant obstetrician.

The locum consultant obstetrician should have attended, whether or not he was asked to. Although he may not have been given enough



information about the situation, and the investigation is unable to determine this, in any event he should have attended following the second telephone call from the locum obstetric registrar. The fact that he did not is inexcusable. It would be usual practice for a consultant obstetrician to attend immediately once he or she was informed of such a situation.

Once the consultant anaesthetist was informed he attended immediately, however, he should have been called in sooner.

When the exploratory surgery was carried out on woman H, after she had arrested, the uterus was found to be flabby and full of blood.

From the verbal information from staff we have concluded that it is also probable that the uterus was sutured incorrectly after the caesarean section, which resulted in concealing any bleeding from the uterus.

There is no doubt that the locum obstetric registrar was concerned about what was happening to woman H. However, despite her experience she was out of her depth, and trying to manage a complex situation during a very busy shift with little support or direction from the locum consultant obstetrician.

The situation became grave before anyone realised the extent of the seriousness of the situation. This was compounded by a busy labour ward.

This case illustrates a lack of direction by a senior obstetrician, and poor coordination of care from the time woman H was admitted to have her labour induced through to the time of her death. The care received by woman H was poor and inadequate.

The care provided by the midwives after the baby was born was seriously inadequate.

This case highlights that there were systemic problems in the maternity services, including the use and support of locum obstetric staff, the lack of senior medical support for less experienced medical staff and a lack of input by consultant obstetricians during crucial events.

Not all of the staff involved in the care of woman H were given the opportunity to discuss all the issues relevant to the case, hence the new information coming to light during the course of this investigation. The investigation carried out by the trust, although more thorough than previous investigations, had a strong medico-legal focus and while preparations for the coroner's court are important, consideration must also be given to ensure staff learn from these events.

Statements made by staff are signed and dated. This is an improvement on the standard of documentation when compared with previous investigations carried out by the trust.

There is no evidence of any midwifery involvement in the management of the investigation.

The statements provided by staff contain information about the level of activity in labour ward on the night of May 17<sup>th</sup> 2004. The statements indicate that the labour ward was very busy.

Although the trust preliminary report finds concerns with the care woman H received while she was on the ante-natal ward, it does not raise any concerns about the failure of the locum consultant obstetrician to attend, irrespective of whether or not he was asked to do so.

The preliminary report by the trust does not address the failure by the consultant to document in the surgical notes the action he

took when he took woman H back to the theatre.

Conclusions about midwifery practice have been reached without midwives being involved in the review.

There is no reference to the number of locum staff that were on duty on the nights of May 17<sup>th</sup> and 18<sup>th</sup> 2004, in the trust preliminary report.

The report contains a number of recommendations but there is no action plan for implementing them.

It is unclear how or where the findings of the external report were shared with staff in order to ensure lessons were learned.

There is no evidence that all of the staff involved in caring for woman H received feedback from either the trust report or the external report.

## Woman J

Woman J was a 29 year old woman from Asia. This was her first pregnancy and she had no significant past medical history. There was a family history of insulin dependent diabetes.

### Antenatal care

Her pregnancy during the antenatal period was uneventful. Her ethnicity was recorded in her antenatal notes, along with the fact that there was no need for an interpreter. It is documented that she was a carrier of the group B streptococcus bacteria and that she was to receive intravenous antibiotics during her labour. Woman J was initially cared for by the community midwives. There were no significant problems during her pregnancy, and her blood pressure and urine analysis were normal.

### Care during delivery

When she was 40 weeks and two days pregnant, woman J was admitted to Northwick Park Hospital at 2.50pm on June 20<sup>th</sup> 2004 in spontaneous labour. Her contractions were one in every 10 minutes and her cervix was 2cm dilated.

Woman J was given her first dose of antibiotics at 7.35pm.

At 9.00pm woman J was reviewed by the obstetric specialist registrar, who noted that the cardiotocograph (recording of the baby's heart rate) was reactive and asked for the progress of her labour to be reassessed. It was noted that the baby's heart rate was slightly fast with variable decelerations.

At 10.15pm the obstetric specialist registrar reviewed woman J again. The cardiotocograph was reviewed and there were no concerns. At

10.40pm, woman J's contractions were strong and she was distressed. The obstetric specialist registrar requested that she have an epidural for pain relief. At 10.25pm she vomited and at 10.40pm appeared distressed.

At 10.45pm the cardiotocograph showed that the baby's heart rate was slow, indicating that the baby was in distress. Woman J was placed on her left hand side and given oxygen. The baby's heart rate did not improve and the midwife put out an emergency call for the obstetric specialist registrar to attend.

The obstetric specialist registrar responded immediately to the call, and on assessing woman J considered that she needed to have an emergency caesarean section.

The obstetric specialist registrar left the room to inform the labour ward staff that woman J would need to have an emergency caesarean section operation. The staff grade anaesthetist was called.

Woman J was transferred to the operating theatre: the anaesthetist arrived simultaneously and found woman J cyanosed and unresponsive with a slow carotid pulse (heart rate assessed at the carotid artery in the side of the neck).

When the obstetric specialist registrar entered the operating theatre, the anaesthetist was preparing to intubate (when a tube is placed down the person's throat to assist breathing or for other medical reasons) woman J. The obstetric specialist registrar requested the paediatric resuscitation team and the adult resuscitation team to attend. The consultant obstetrician who was on call was also called at approximately 10.48pm. The obstetric specialist registrar performed an emergency caesarean section. A live baby girl was delivered at 10.54pm.

Shortly after the baby was delivered, woman J suffered a cardiac arrest (when the heart stops beating) and the obstetric specialist registrar performed cardiac massage and woman J was revived. The help of the consultant anaesthetist and two other anaesthetists was enlisted.

The consultant obstetrician arrived in the operating theatre between 11.10pm and 11.15pm and asked the obstetric registrar to close the uterus.

However, excessive blood was noted in the abdomen and was mopped out with large swabs. The bleeding did not settle.

The consultant obstetrician then went to the neonatal intensive care unit to talk to the mother of woman J, and to the father of the baby. At this time woman J had been resuscitated and her condition appeared stable.

At 11.50pm the consultant obstetrician was informed of the bleeding and he returned to the operating theatre. At 11.55pm woman J was given carboprost, a drug used to stimulate the uterus to contract and help stop bleeding from the uterus. The blood appeared to be coming from higher in the abdomen and the consultant obstetrician prepared to operate. The consultant surgeon who was on call was called in. The consultant obstetrician made a midline incision into the abdomen to allow exploration of the upper part of the abdominal cavity. There was no bleeding from the spleen but there was a slow welling of blood just below the liver.

The consultant surgeon arrived at around 12.30am. He re-explored the upper abdomen. The uterus was atonic (floppy) and brace sutures (a technique used for control of massive bleeding post delivery) were applied.

Woman J had a further episode of bradycardia (decreased heart rate) and heart massage was initiated. The bleeding was identified as coming

from the posterior aspect of the liver, anterior to the vena cava (one of the main veins in the body) and the liver appeared to have sustained a rupture. Surgical swabs were used to 'pack' the area that was bleeding, to allow time for adequate replacement of the blood she had lost.

Once woman J was stable, further examination showed there was a wound and bruise on the left lobe of the liver. The surgical swabs that had been used to pack the bleeding point were replaced and a drain was placed in the pelvis. The drain was left closed in order to maintain pressure in the abdomen to suppress the bleeding.

The consultant surgeon has informed the Commission that he carried out a Pringle's manoeuvre (technique to obstruct the flow of blood) but this can only control bleeding while the manoeuvre is maintained. The consultant surgeon packed the abdomen with surgical swabs in the manner taught by the Royal College of Surgeons of England. At the time the cause of the rupture of the liver was unknown and 'packing' is an appropriate method of managing traumatic bleeding from the liver. The consultant surgeon considered he had done everything within his powers for woman J.

The total blood loss of woman J was estimated to be between six and eight litres. This included two litres in the abdomen before the brace sutures were applied, one to two litres were lost during exploration of where the bleeding was originating from and two litres on the floor, as well as the blood noted on the swabs.

Woman J developed a coagulopathy (a condition affecting the blood's ability to form a clot) secondary to the blood loss and she was given a transfusion of blood and blood products to replace the blood loss. At 2.00am woman J was transferred to the intensive care unit. The plan was to review her progress in the morning,

and to consider removal of the packs of surgical swabs following discussion with the consultant surgeons.

### Care after delivery

In the intensive care unit, woman J continued to bleed and the consultant obstetrician reviewed her at 3.15am. The drain that had been placed in the pelvis was opened and seven litres of blood and fluid drained out. It was clear that the 'packs' had been ineffective in controlling the bleeding and that woman J would require further surgery.

The consultant surgeon was contacted, but did not attend himself. North West London Hospitals NHS Trust does not provide specialist services for patients with problems of the liver and he suggested that the obstetric team contact the liver transplant units at Royal Free Hampstead NHS Trust or King's College Hospital NHS Trust. In his letter to the Commission the consultant surgeon stated that he felt that he had done all that he could and that woman J needed to be transferred to a specialist hospital immediately. The consultant surgeon states that if he had known that woman J was not going to be transferred immediately he would have gone into the hospital and started the laparotomy.

According to the consultant obstetrician, he made the decision to contact the liver transplantation unit at the Royal Free Hampstead NHS Hospitals Trust.

The doctor on call for the liver transplantation unit at the Royal Free Hampstead NHS Hospitals Trust was a senior fellow and he advised that the team should correct the blood clotting problems. The condition of woman J was too unstable for her to be transferred to another hospital and after discussion with members of his team, the senior fellow agreed to go to Northwick Park

Hospital to perform a laparotomy, (exploratory operation). The senior fellow also advised that the team should administer recombinant Factor Vlla (a component of blood that can help stop bleeding).

At 4.00am the consultant haematologist authorised administration of the recombinant Factor V11a and this was given via an intravenous infusion. Arrangements were made to transfer woman J back to the operating theatre at 5.00am and in the intervening time the consultant obstetrician and the obstetric specialist registrar alternated in applying external pressure through the upper abdomen to the surgical packs.

A further laparotomy (exploratory operation) was performed at 5.00am on June 21<sup>st</sup> 2004. The surgery was undertaken by the senior fellow from the liver unit at Royal Free Hampstead NHS Trust, assisted by the obstetric specialist registrar and the surgical registrar who was on call. The consultant obstetrician was also in attendance in the operating theatre. The abdomen contained three litres of blood and clots. The surgical swabs were removed and the area of bleeding was identified and surgicel, a membrane designed to assist in controlling persistent oozing of blood, was applied. The abdomen was repacked and closed.

At 6.15am woman J was returned to the intensive care unit, and her blood pressure dropped again. Her haemoglobin was low and she was given a bolus dose of adrenaline and four units of blood. The intensive care team contacted the intensive care registrar at Royal Free Hampstead NHS Trust. It was agreed that woman J should be transferred to intensive care at the Royal Free Hampstead NHS Hospital as soon she was stable enough to be transferred.

At 10.00am there was evidence of further bleeding and the condition of woman J continued

to deteriorate. At 11.00am woman J was taken back to theatre for a further laparotomy. The abdomen contained four litres of blood. During the surgery, woman J suffered a cardiac arrest and despite attempts to resuscitate her she died at 1.20pm on June 21<sup>st</sup> 2004.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist concluded that the death of woman J was caused by massive abdominal haemorrhage in the abdomen due to spontaneous rupture of the liver. The death was classified as a direct maternal death.

### **Actions taken by the trust following the death of woman J**

The trust reported the death of woman J to North West London Strategic Health Authority and the London local supervising authority midwifery officer. The trust board was also informed of the death.

The Healthcare Commission was told that there was no internal review of this death as the cause of death was "quickly apparent".

The head of clinical risk and legal services coordinated the obtaining of statements for HM Coroner. Statements were obtained from the consultant obstetrician who cared for woman J on June 20<sup>th</sup> and 21<sup>st</sup>, the senior anaesthetist (senior clinical fellow) on call, the consultant surgeon on call and staff grade anaesthetist who was on call for the intensive care unit on June 20<sup>th</sup> 2004.

The statements are all signed and dated and addressed to "HM Coroner". There are no statements from the any of the midwives involved in the care of woman J, the hepatic (liver) surgeon, theatre staff, or the doctor who performed the caesarean section operation.

It is not clear from the statements if the consultant surgeon was asked to return to the hospital by the consultant obstetrician after he had reviewed woman J at 03.15am.

There is a copy of a form titled "a serious untoward incident initial / 3 day report proforma". The form contains the date, time and location of the death of woman J. The form indicates that the lead director is the head of clinical risk and legal services. It contains a brief summary of the incident and states that the family of woman J were present at the time of her death. In the section that asks who the incident will be reported to the trust has written "the London local supervising authority Midwifery Officer, both PCTs (Brent and Harrow), H M Coroner".

There is also a risk management report written by the consultant obstetrician who had lead responsibility for the management of obstetric clinical risk. The report is dated August 27<sup>th</sup> 2004. The report provides an overview of the care woman J received during her pregnancy and after delivery of the baby.

### **Findings and conclusions on the care and treatment provided to woman J and the actions taken by the trust**

Woman J had no complications during her pregnancy.

Woman J was admitted in spontaneous labour.

There was evidence that the baby was in distress when woman J was admitted.

An emergency caesarean section operation was performed. This was the appropriate management for the situation.

When woman J collapsed before the caesarean section operation she was given oxygen and



help was called for. This response was appropriate.

The consultant obstetrician was summoned and attended appropriately.

Other specialists were called to assist, for example, the consultant surgeon. This was done in an appropriate and timely manner.

The consultant surgeon attempted to control the haemorrhage from the damaged portion of the liver by using surgical packs to apply pressure. This was in line with guidance from the Royal College of Surgeons of England.

When the consultant surgeon was contacted the second time he did not come in to the hospital, but it is not clear if he was asked to do so. From the statement made by the consultant obstetrician after woman J died, it seems that both the consultant obstetrician and the consultant surgeon agreed that woman J should be transferred to an NHS trust that provided specialist liver services. Although the consultant surgeon did not attend, and this could be seen as less than perfect surgical support, he stated that he thought woman J was going to be transferred immediately. However, it may have been more appropriate for the consultant surgeon, rather than the consultant obstetrician, to contact the specialist services.

By the time the senior clinical fellow arrived from Royal Free Hampstead NHS Trust, woman J was in a very serious condition. She had already suffered two cardiac arrests and she had had massive blood transfusions. Even with a specialist liver surgeon immediately available, it was very probable that she was going to die.

It is possible but unlikely that the outcome may have been different had a consultant liver surgeon attended this patient for the second laparotomy, although to do so would have left a nationally designated liver centre without

consultant cover. An experienced liver consultant may have tied off the blood supply to the affected segment of the liver, or removed either all or part of the affected segment of liver.

The haematologists were involved and all necessary blood and blood products were made available.

The anaesthetic team provided appropriate resuscitation for this difficult case.

Spontaneous rupture of the liver is known to be associated with a very high mortality rate. Despite all the measures taken, woman J died from a spontaneous rupture of liver, which could not have been predicted.

There is no evidence that the trust undertook an internal review of the care and treatment provided to woman J.

## Woman K

Woman K was in her twenties and was from Asia. This was her first baby and she had no significant past medical history. There was a family history of high blood pressure and diabetes. Her baby was due on February 14<sup>th</sup> 2005.

### Antenatal care

At the time of booking to have her baby at Northwick Park Hospital, woman K weighed 51kg and was 151cm tall, giving a body mass index of 23, which is normal. The antenatal period of woman K was uncomplicated. When she was 32 weeks pregnant (December 2004) there was some concern that the baby might be large for dates but a growth scan was carried out which showed abdominal macrosomia (meaning that the baby was considered to be larger than normal). Woman K also had a glucose tolerance test.

On February 10<sup>th</sup> when she was 39 weeks and three days pregnant, woman K complained of itching and was reviewed at the day assessment unit. She was prescribed a cream for the rash. Tests to check for obstetric cholestasis (disorder of the liver) were normal. An ultrasound scan was also performed and estimated that the baby's weight was 3.693kg.

On February 11<sup>th</sup> woman K was seen in the day assessment unit, by the consultant obstetrician who was covering it for the day. He recorded on the antenatal sheet "big baby". In his statement he has written that he did not think the baby was too big "to permit a vaginal delivery".

Woman K was seen at the day assessment unit on February 18<sup>th</sup> and her observations were normal.

On February 22<sup>nd</sup> 2005 woman K was seen in the day assessment unit with possible

spontaneous rupture of membranes (the opening of the membranes enclosing the baby during childbirth). A speculum examination showed that her cervix was closed. Liquor was seen and this was mixed with "show". She was not having contractions and a cardiotocograph (recording of the baby's heart beat) was performed which was reassuring. Woman K was booked to have her labour induced on February 24<sup>th</sup> 2005, if she did not go into labour spontaneously before then, and sent home.

At 8.40pm on February 22<sup>nd</sup> 2005 woman K was readmitted in the early stages of labour. A vaginal examination showed that her cervix was dilated. Woman K was sent home and told to come back when her contractions were more regular.

### Care during delivery

At 12.40am on February 23<sup>rd</sup> 2005 woman K was readmitted in labour, she was complaining of painful contractions since 2.00pm and was assessed by the midwife. Her blood pressure was recorded and was 120/85mmHg and analysis of a sample of her urine showed a trace of protein. At 1.20am a cardiotocograph was carried out at and the baby's heart rate was 134-140 beats per minute. At 2.45am a vaginal examination was carried out to assess the progress of her labour and her cervix was 5cm dilated. At 7.10 am a further vaginal examination showed that woman K's cervix was 8cm dilated.

On the morning of February 23<sup>rd</sup>, woman K was cared for by a student midwife and a midwife. The student midwife who was looking after the care of woman K under the supervision of the midwife, has documented that a further vaginal examination was performed and woman K's cervix was 8cm dilated. The consultant obstetrician who was covering labour ward that morning reviewed woman K at 9.15am and

requested that an intravenous infusion of oxytocin (a drug used to stimulate the uterus to contract) be commenced. The consultant obstetrician did not document his assessment in the notes, nor did he write a prescription for the oxytocin. In his statement he has written that the oxytocin was written on the back of the prescription chart “in the handwriting of the midwife”, and that this was done in accordance with his request. Woman K made slow progress and at 9.35am she was given the drug syntocinon (an oxytocic medication used to stimulate the uterus to contract) intravenously to try to speed up the labour. She was also given antibiotics as spontaneous rupture of membranes had been present for 24 hours (this increases the risk of infection).

During the morning the midwife caring for woman K increased the rate of the infusion of syntocinon. At 10.05am it is documented that the cardiotocograph showed variable decelerations with early recovery and at 10.30am it is documented that the cardiotocograph was suspicious. At 11.30am it is documented that the cardiotocograph remains reactive.

Between 10.00am and 12.00pm, there was also evidence on the cardiotocograph of hyperstimulation of the uterus. At times the uterus did not appear to be relaxing between contractions.

At midday the midwife caring for woman K discussed her progress with the obstetric specialist registrar. A vaginal examination showed that woman K’s cervix was still only 8cm dilated. The midwife was advised to continue and to reassess progress in two hours. At 12.30pm the cardiotocograph was showing variable decelerations (transient slowing down of the heart rate that may indicate that the baby is in distress) of the baby’s heartbeat, and the syntocinon infusion was decreased.

At 1.45pm woman K’s heart rate increased to 133 beats per minute and her temperature was slightly raised at 37.4°C.

At 1.55pm the obstetric specialist registrar carried out a vaginal examination and noted that she was fully dilated, and the baby’s head was in the left occipital anterior (LOA) position, which is favourable for delivery, station level with ischial spines (the lowest part of the baby’s head is level with this landmark), with no caput (swelling, if the labour is easy there will be little swelling) or moulding (when the bones of the baby’s skull overlap due to pressure being exerted on it). The plan was to encourage woman K to commence pushing in one hour.

At 2.00pm the midwife caring for woman K gave her two paracetamol tablets because her temperature was slightly raised. She did not inform the obstetric specialist registrar of the raised temperature or that woman K had an increased heart rate. Woman K’s temperature decreased to 36.9°C, but her heart rate remained fast.

At 2.50pm woman K was encouraged to push and meconium grade two (this can be a feature of a healthy baby becoming distressed and needs a comprehensive assessment and possible further investigation) was noted. The obstetric specialist registrar reviewed woman K at 3.15pm. He noted that there was change: 0/5 of the head was palpable (this means that none of the head could be palpated abdominally, it was all within the pelvis) and he felt that instrumental delivery was inappropriate. He thought the baby was proportionately (SIC) large and that it could not be delivered vaginally.

He discussed the progress of woman K with the consultant obstetrician who was covering the labour ward for the afternoon (but did not examine woman K personally), who agreed that

arrangements should be made for the baby to be delivered by caesarean section operation.

The obstetric specialist registrar carried out the caesarean section and a live baby girl was delivered at 4.08pm. Although woman K had a caesarean section, forceps were used to deliver the baby's head. It was not possible to obtain the pH of the baby's cord blood (which is usual practice) as the machine was out of use. At 4.10pm the placenta was delivered by controlled cord traction (application of controlled force). The placenta was complete but the membranes appeared incomplete. When the placenta was delivered the obstetric specialist registrar swabbed out the uterus and checked that it was empty. He then began to close the uterine wound.

At 4.12pm the obstetric specialist registrar noticed that the bleeding from the site of the placenta was greater than normal and that the uterus was atonic (floppy) and there was significant bleeding. A syntocinon infusion was commenced and two doses of 250ug of haemobate were given into the myometrium (lining of the uterus) by the obstetric specialist registrar. The obstetric specialist registrar continued to close the uterus as he felt it was becoming firmer. At 4.28pm the uterine and abdominal wounds were closed and the obstetric specialist registrar cleaned out the vagina. At this stage the bleeding increased again. Misoprostol 1,000µg (a prostaglandin agent used to stimulate the uterus to contract) was given to woman K per rectum. This seemed to have little effect on the haemorrhage and the obstetric specialist registrar performed bimanual compression of the uterus (a technique used for control of massive bleeding post delivery). The consultant obstetrician who was covering the labour ward that afternoon was informed that the obstetric specialist registrar required assistance.

### Care after delivery

At about 4.30pm on February 23<sup>rd</sup> 2005 the consultant obstetrician covering the labour ward that afternoon went into the operating theatre. A major obstetric haemorrhage alert was raised by the registrar and O negative blood was called for. The consultant anaesthetist who was covering the labour ward that day followed the consultant obstetrician into theatre. At 4.37pm a three litre haemorrhage was noted. At 4.40pm woman K received the first unit of O negative blood. The consultant obstetrician performed a vaginal examination and the uterus was still atonic. The consultant obstetrician who had covered the labour ward in the morning was also on the labour ward and told the Healthcare Commission that he was aware of what was happening and had been going to go into theatre, but the consultant obstetrician who was going to be on call for that night arrived and he offered to attend as he was going to be responsible for her ongoing care that night.

At 4.43pm it is documented that woman K was prepared for general anaesthesia, at 4.46pm the rate of the syntocinon infusion was increased and at 4.48pm gelofusine (a plasma expander used to replace blood loss) was commenced. A further 250ug of carboprost was given at 4.54pm and the fourth unit of blood was given at 4.58pm.

The cumulative blood loss at 5.00pm was estimated at four litres. Between 4.40pm and 5.24pm woman K received eight units of blood and four units of fresh frozen plasma (contains clotting factors and is used to treat patients who develop problems with their clotting factors).

The consultant obstetrician who was on call for that night went into theatre at 5.04pm.

At 5.27pm woman K's uterus was reopened by the consultant obstetricians on call for that afternoon and that night. There was no vaginal bleeding at this stage. A brace suture (a technique used for control of massive bleeding post delivery) was inserted in an attempt to control the bleeding. The consultant obstetrician who was on call for that night told the Healthcare Commission that initially there was a good response to their attempts to control the bleeding and they believed that woman K had stopped bleeding. There was no vaginal bleeding at this stage.

By 5.31pm woman K was receiving her tenth unit of blood – she had also received fresh frozen plasma, but by 5.50pm the estimated blood loss was 4.86 litres. At 5.52pm the lower segment of the uterus was closed.

Woman K continued to receive blood and blood products but the bleeding continued. At 6.07pm the decision was made to perform a hysterectomy. The anaesthetist inserted a central venous pressure line. This was done by 6.41pm and an infusion of trasylol (an antifibrinolytic drug that inhibits the breakdown of blood clots) was commenced at 6.46pm.

The consultant obstetrician who was on call for that night told the Healthcare Commission that they had contacted a consultant gynaecologist, but he was not available at this time as he was busy attending to another emergency. The consultant gynaecologist did call back later and ask if he was still needed (and in fact was on his way into the hospital), and was told that it was not necessary for him to go into the hospital. During this time a consultant vascular surgeon was also put on standby, but was eventually told that she would not be needed. This was because no specific bleeding point had been observed and it was likely that the cause of bleeding was the coagulopathy (a condition affecting the blood's ability to form a clot).

At 7.02pm the estimated blood loss was over seven litres. However, woman K's condition appeared to stabilise and her abdomen was closed at 7.47pm. Her total blood loss was estimated at 10 litres, but this was revised to 15 litres, taking into account the amount under the operating table.

The consultant obstetrician went to see the relatives of woman K and explained to them what had happened.

At 9.00pm woman K was transferred to the intensive care unit and the vascular surgery registrar reviewed her at approximately 10.00pm. Her fingers were blue but her feet were a normal colour. She was diagnosed with having a lack of blood flow and oxygen to the digital artery. The vascular surgery registrar prescribed that an intravenous infusion of glycerol trinitrate (a drug used to make the blood vessels wider, thereby enabling blood to flow more freely around the body) should be commenced. He also recommended that use of the drug heparin (a drug to prevent clotting) should be considered if the situation did not improve and that the haematologists should be involved. It was also recommended that her systolic (higher number) blood pressure should be maintained at 140mmHg.

The consultant obstetrician asked the obstetric registrar who was on call for the night to review woman K later, and to inform him of his assessment.

By midnight, woman K's blood pressure was low and she had an increased heart rate. The obstetric registrar reviewed her and noted that her abdomen was distended and it was considered that she had ongoing intra-abdominal bleeding. Woman K's haemoglobin had dropped from 11.5g/dl at 10.10pm on February 23<sup>rd</sup> to 8.4g/dl in the early hours of the morning of February 24<sup>th</sup> 2005.



At 12.10am, on February 24<sup>th</sup> 2005, the obstetric registrar discussed the situation with the consultant obstetrician. The consultant obstetrician ordered that the blood tests should be repeated and that a further four units of blood should be cross matched and for two units of blood to be given immediately to woman K.

At 12.42am the consultant obstetrician reviewed woman K. He ordered an immediate transfusion of blood and for repeat blood tests following this. He also asked to be kept informed if her haemoglobin did not stabilise and documented these instructions in the notes.

At 6.50am, the obstetric registrar reviewed woman K again and was concerned about her condition. There was a high suspicion that woman K was continuing to have bleeding in the abdomen. Her heartbeat was fast at 144 beats per minute and her blood pressure was 103/70mmHg. Her abdomen was tense and a fluid thrill (a test to assess for fluid in the abdomen) indicated that there was blood in the abdomen. The two surgical drains which had been inserted following her hysterectomy contained 200ml of serosanguinous (reddish in colour due to bleeding) fluid in one, and 400ml had collected over one hour in the other. There was no active bleeding from her vagina.

The obstetric registrar called the consultant obstetrician, who went into the hospital. The consultant obstetrician contacted the consultant vascular surgeon and the clinical director of the maternity services.

By 7.00am it was recorded that woman K had received five units of blood overnight and that her haemoglobin had dropped from 11.6g/dl to 7.2g/dl. Her blood pressure remained low and her heart rate was fast. These signs are consistent with continued intra-abdominal bleeding. The doctor who reviewed her

diagnosed continued bleeding in the abdomen, which was correct. It was planned to perform a laparotomy (exploratory operation).

Between 7.00am and 8.45am woman K was prepared for theatre – the time was used to stabilise woman K for anaesthesia and allow time for the necessary blood and blood products to be made available. At 9.00am woman K was taken to theatre for a laparotomy.

The clinical director was unable to attend theatre and asked a consultant gynaecologist to attend in his place. The consultant obstetrician who had been on call, consultant gynaecologist and consultant vascular surgeon were all in theatre. When the abdomen of woman K was opened they found a large haematoma (collection of blood) in the right para-colic gutter (right hand side of woman K's abdomen). The haematoma extended up to the renal vessels and the inferior vena cava. In view of the findings the consultant vascular surgeon took charge of the procedure with the consultant obstetrician and consultant gynaecologist assisting. The decision was taken to explore the haematoma.

During the exploration significant bleeding occurred from the renal vein and the inferior vena cava. The tissues were friable (easily broken into small fragments). Because of this the consultant urologist was called to assess the right kidney.

The right kidney was removed and the inferior vena cava vein was repaired. The right ovary was also removed.

The consultant vascular surgeon has documented in her statement that she identified a hole in the inferior vena cava but that she was “not able to determine the cause of this injury, it could have been as a result of a tear or disruption from adherent clot”.



The surgeons then had a 20 minute break during which time vigorous resuscitation measures were carried out by the anaesthetists. This included giving woman K further blood and blood products. There was further generalised bleeding from the left ovarian area so the left ovary was removed. The abdomen was then packed with surgical packs. Woman K's estimated blood loss was 10 litres. Following surgery she was transferred back to the intensive care unit.

Back on intensive care, the haematology specialist registrar reviewed woman K. The continued bleeding was noted and woman K was given Recombinant Factor VIIa. This management was not inappropriate.

It appears that the family of woman K was not kept up-to-date. At 11.00pm on February 24<sup>th</sup> 2005 a clinical fellow, who had no primary knowledge of the events, had a long discussion with the family. He attempted to answer their questions about the cause of the bleeding and the future care and treatment of woman K. Such communication with the family should have been the responsibility of the consultant obstetrician involved with her care. However, the consultant obstetrician told the Commission that following this, he did speak with the family of woman K on a daily basis.

On February 25<sup>th</sup> 2005, woman K remained haemodynamically unstable (meaning that her blood pressure and heart rate were unstable) with a persistent coagulation (clotting) defect. Her haemoglobin remained low. Her abdomen remained distended. It was considered that she had continued bleeding in the abdomen, which was causing splinting in the diaphragm (restricting the downward movement of the diaphragm thus inhibiting expansion of the lungs) and making ventilation difficult.

At midday on February 25<sup>th</sup> 2005 woman K underwent a further laparotomy and more than 2.5 litres of blood and clots were removed, although the team was unable to establish where the bleeding was originating from, despite a careful search. The liver and spleen were intact and the abdomen was repacked with surgical swabs. During this procedure woman K received a further four units of blood and four units of fresh frozen plasma.

Woman K's condition remained critical but stable over the next two days. She had a persistent coagulation (blood clotting) problem that required blood products, and she remained on a ventilator. A further laparotomy was performed on February 28<sup>th</sup> 2005 and nine surgical packs were removed. There was a continued ooze of bleeding from the right inferior epigastric (area of the abdomen) region and this was tied off. The abdomen was then repacked with six packs, mainly on the right side.

Following this procedure, woman K continued to have coagulation problems and she was given further units of fresh frozen plasma to correct this. She was given adrenaline (drug used to maintain blood pressures) and dopamine (drug used to maintain blood supply to the kidneys) via an intravenous infusion.

On March 1<sup>st</sup> 2005, woman K had a further laparotomy and the packs that were put in on February 28<sup>th</sup> 2005 were removed. No acute focal bleeding point was isolated but she was oozing on the right side and this was packed with three packs. The left side appeared satisfactory. She was then treated with steroids and haemofiltration (a technique similar to haemodialysis for removing waste products or poisons from the blood). She continued to receive blood products in an attempt to normalise her coagulation problem.

Woman K had a further laparotomy on March 4<sup>th</sup> 2005. A bleeding point was noted from an artery on the left of the abdomen and this was tied off. There was also some bleeding coming from near the inferior vena cava (one of the two main veins in the body). This was sutured and haemostasis (arresting of bleeding) was achieved. However, there was still a general ooze of blood from this area and it was packed with surgicel (a membrane designed to assist in controlling persistent oozing of blood).

Later that day it was calculated that the total number of blood products given to woman K was 94 units of blood, 130 units of cryoprecipitate, 89 units of fresh frozen plasma and 23 units of platelets to help maintain her haemoglobin and control the bleeding. Woman K continued to receive haemodynamic and coagulation support.

On March 7<sup>th</sup> 2005, woman K had angiography (a test that uses an injection of dye to make the arteries visible on x-ray) to identify the bleeding point. The procedure was performed through the right femoral artery. Angiography identified bleeding from the posterior portion of the right internal iliac artery and this was embolised (insertion of embolic material to reduce or obstruct the blood flow).

Following the angiography, the condition of woman K improved. Her blood pressure and heart rate were stable. On March 8<sup>th</sup> 2005 there was no evidence of any renewed bleeding.

However, the next day, there was again evidence of continued bleeding in the abdomen. Woman K was taken back to theatre again and the abdominal packs were removed. No obvious bleeding point was identified and further packs were inserted. This was repeated on March 9<sup>th</sup> and 11<sup>th</sup> 2005.

Woman K's condition remained critical. She required continued blood product support and inotropes (drugs used to treat a failing heart). She underwent several further procedures at Northwick Park Hospital. On March 13<sup>th</sup> 2005, she was transferred to the intensive care unit at St Mary's NHS Trust, where she died on March 19<sup>th</sup> 2005.

The Commission was told that the previous chief executive and medical director designate met with some obstetric staff prior to the death of woman K.

### **Post mortem**

The post mortem report of Her Majesty's Coroner's Pathologist concluded that the cause of death was lack of oxygen to the brain, disseminated intravascular coagulation (overstimulation of the blood clotting mechanisms in response to disease or injury) and post partum haemorrhage due to uterus atony.

### **Inquest**

An inquest into the death of woman K has not yet been held.

### **Actions taken by the trust following the death of woman K**

Following the death of woman K the trust notified the London local supervising authority midwifery officer and North West London Strategic Health Authority.

The death was classified as a serious untoward incident and the trust conducted an internal investigation. This was coordinated by the head of clinical risk and legal services and was initiated prior to the death of woman K on the advice of the strategic health authority.

A serious untoward incident form was completed. The form identifies the head of clinical risk and legal services as the lead for the investigation and provides a very brief summary of events. It also indicates that the family of woman K had been fully informed, and that media interest was expected.

Statements were obtained from the staff involved, including midwives, obstetricians, consultant surgeons, consultant vascular surgeons and consultant anaesthetists. The statements are signed and many are dated and addressed to "H M Coroner". There is no statement from the student midwife who cared for woman K on February 23<sup>rd</sup> 2005.

There is a preliminary report written by the head of clinical risk and legal services, dated March 2<sup>nd</sup> 2005. The report provides a summary of events and an investigation plan. The investigation plan was to appoint an internal team led by the medical director designate, a consultant obstetrician who was not involved in the care of woman K, and the head of clinical risk and legal services. The plan states that the trust was in the process of gathering statements and, once they had been collected, an analysis of the root cause (method used to establish underlying causes of incidents) would be carried out. The trust was also planning to seek an external review in due course. We have not been provided with any documentary evidence that an analysis of the root cause was carried out.

The terms of reference for the external review were agreed in discussion between the strategic health authority and the trust and included commissioning a report from an external midwifery expert, of the management of the pregnancy, labour and delivery of woman K. The terms of reference are dated March 14<sup>th</sup> 2005.

After this, letters were sent to an external consultant general and vascular surgeon and a consultant obstetrician, thanking them for agreeing to review the care of woman K and including the terms of reference and appropriate documents.

In April 2005, the trust contacted the London local supervising authority midwifery officer, asking that she review the care provided by one of the midwives involved in the care of woman K.

In addition, in May 2005, the trust asked a midwife external to the trust to review the midwifery care that was provided to woman K. This request was based on advice from the strategic health authority received by the trust on March 10<sup>th</sup> 2005.

Following the death of woman K, the previous chief executive of the trust met with some the medical staff involved in her care. The midwives received support and feedback from the head of midwifery and the local supervisory authority midwifery officer.

The Healthcare Commission was told that the supervisor of midwives informed the head of midwifery about the concerns relating to midwifery practice.

### **Findings on the care and treatment provided to woman K and the actions taken by the trust**

Woman K was reviewed once by the consultant obstetrician covering the labour ward on the morning of February 23<sup>rd</sup> 2005.

The consultant obstetrician covering the labour ward on the morning of February 23<sup>rd</sup> 2005 did not document his assessment of woman K in her case notes nor develop a management plan for woman K.

The consultant obstetrician covering the labour ward in the afternoon was on the labour ward, but did not review woman K.

The consultant obstetrician who was covering labour ward in the afternoon discussed woman K with the specialist obstetric registrar and relied on the specialist obstetric registrar to assess and manage her labour.

There is no evidence of documentation by the midwife who cared for woman K from 8.00am on February 23<sup>rd</sup> about the decision to administer syntocinon.

There was evidence on the cardiotocograph of overstimulation of the uterus – this was due to woman K receiving too much syntocinon.

Consideration should also have been given to review the rate of the syntocinon infusions when the cardiotocograph was documented as suspicious at 10.30am.

The midwife continued to increase the rate of the syntocinon until 12.30pm, when the overstimulation of the uterus was recognised and the rate was reduced. This is contrary to good practice as the rate of the syntocinon should have been decreased earlier.

The accuracy of the assessment carried out by the obstetric registrar at 3.15pm is questionable. If the baby's head cannot be felt when the abdomen is examined, it must be approximately 2cm below the spines in a normally shaped pelvis. This is significant because, if the latter was the case it would have been appropriate (reflecting normal routine obstetric practice), in the absence of other contraindications, to attempt to deliver the baby vaginally rather than by caesarean section operation. However, if the baby's head was at the spines then the abdominal examination was incorrect. This would suggest the registrar had poor clinical expertise and that he should have

been directly supervised. During an interview with the Healthcare Commission the obstetric registrar who made this assessment acknowledged that the findings from his abdominal examination were incorrect and that he had acknowledged this earlier at a meeting held by the trust. He stood by the findings from his vaginal examination.

The decision to deliver woman K's baby by lower segment caesarean section operation when her cervix was fully dilated was discussed with the consultant obstetrician who was on call for the labour ward in the afternoon.

There was little input by the consultant obstetricians covering labour ward in the morning and afternoon into woman K's care when she was in labour, despite the fact that she had a very slow labour.

There is no clear evidence that a trial of vaginal delivery was not possible. Although the obstetric specialist registrar thought the baby was proportionally (SIC) large and that the baby would not be delivered vaginally.

The management of the initial blood loss is unclear because the surgical record does not have space for detailed notes.

The care provided by the anaesthetic team and the haematology team was good, given the difficult circumstances they were working in.

The initial obstetric haemorrhage was recognised and woman K was resuscitated. The response and management was prompt.

The consultant obstetricians were involved once it was recognised that woman K was haemorrhaging. The involvement of the consultant obstetricians was prompt.

The hysterectomy was performed at 6.07pm on woman K. This decision should have been taken earlier. By this time woman K had received F13

units of blood, six units of fresh frozen plasma, platelets and 10 units of cryoprecipitate (substances to help prevent clotting problems). This delay may have contributed to the development of the subsequent coagulopathy (a condition affecting the blood's ability to form a clot).

The glycerol trinitrate infusion was prescribed by the surgeons. It is possible that this added to the problems or confused the situation, by causing an increase in blood flow and lowering the blood pressure.

The consultant obstetrician was not involved in this decision, indicating a lack of coordination between the specialist consultants and the consultant obstetricians about this. Although, medical staff working in intensive care units often make decisions about treatments for patients who have sustained massive blood loss without consulting the surgeons involved. It was particularly important that the consultant obstetrician was involved in this decision, particularly as the management of such a case was unusual and may have impacted on woman K's problem of a major obstetric bleed.

Although interventional radiology is not available on a 24 hour basis, it was available within the trust. It is unclear why this was not considered earlier. It should be noted that a delay in proceeding to surgical or radiological intervention to stem bleeding will worsen a situation through the development of a blood clotting defect. In turn, this can cause generalised bleeding which can make the tissue crumble or tear, making further surgery difficult.

The documentation of the midwife who was on duty in the morning of February 23<sup>rd</sup> 2005 is poor. However, the midwife who took over the care of woman K at 2.15pm documented the care given very thoroughly.

It is unclear if a senior midwifery manager was involved when the events surrounding woman K's case were unfolding on February 23<sup>rd</sup> 2005.

The trust was advised by the strategic health authority and agreed that a review of midwifery care given to this woman was essential.

The trust's agreed terms of reference for the investigation were not implemented in a timely way, although it asked for an assessment of the care provided by one midwife.

There is no evidence of any midwifery involvement in the coordination of this review by the trust.

There was no statement from the student midwife who cared for woman K on the morning of February 23<sup>rd</sup> 2005 and it is unclear what feedback or support has been provided to her.

Feedback has been provided to some obstetric doctors involved in the care of woman K. It is unclear how or if the outcome of the review has been fed back to midwives or other specialists involved, for example, the anaesthetic staff involved in her care.

## 4 Review of other incidents and complaints

In reviewing the care and treatment provided to the 10 women and the investigations undertaken by the trust, the Healthcare Commission has also considered other clinical incidents and complaints that occurred during this time and how they were managed by the trust. This was to establish if there were any underlying common factors previously unidentified by the trust.

The safety of patients affects everyone working in an NHS trust. Building a safe culture depends on strong leadership and the ability of an organisation to promote a culture of reporting and learning from clinical incidents. A clinical incident is defined as any unintended or unexpected incident, which could have, or did lead to harm for one or more patients receiving NHS funded healthcare. (National Patient Safety Agency, 2004) All NHS trusts should have systems in place to identify trends and potential risks, ensure lessons are learnt from clinical incidents and reduce the risk of reoccurrence.

Based on the best available data in England, it is estimated that 10% of patients admitted to NHS hospitals have experienced a clinical incident and that up to half of these incidents could have been avoided.

In this section we look at the type and number of clinical incidents that were reported by staff working in maternity services at the trust between April 2002 and April 2005. We also consider other factors that may have impacted on the ability of the trust to provide a safe and effective service to women who are pregnant.

The trust provided us with information about the number and type of clinical incidents that occurred in maternity services between January 2002 and June 2005. The trust collated the numbers of incidents on a

quarterly basis and, over the three year period, there is an increase in the number of clinical incidents reported.

For example, between July 2003 and September 2003, 48 clinical incidents were reported compared with 75 incidents for the same period in 2004. This increase continues and between January 2005 and March 2005, 137 clinical incidents were reported. This increase could be attributed to an increasing number of women having their babies at the trust, which resulted in more clinical incidents occurring, or it could be that staff were becoming more aware of the importance of reporting clinical incidents.

During this period there is a recurrence of some types of clinical incidents, including:

- equipment failure or lack of equipment
- failure to record blood results in the clinical case notes
- failure to recognise when progress in labour deviates from the normal course expected
- delays in seeking medical advice
- lack of clear management plans for women whose pregnancy is classified as high risk
- concerns about the low numbers of staff and how this may impact on the safety of patients

In the period following the 10<sup>th</sup> death (April 2005 to June 2005) 193 clinical incidents were reported. The main categories of incidents during this time include a failure by staff to detect and communicate abnormal blood test results appropriately and a failure to initiate early investigation and treatment.



## Admissions to the intensive care unit (ICU) from maternity services

The increase in the number of births at Northwick Park Hospital resulted in an increase in the number of high risk deliveries and the number of women requiring admission to the intensive care unit.

The trust provided the Commission with information about the numbers of women admitted to the intensive care unit between April 2002 and April 2005, as well as information about their diagnosis. In some cases, the care of the women was reviewed, but it is not always clear what happened following the reviews or the obtaining of statements from staff.

A total of 49 women from maternity services were admitted to the intensive care unit during this period. However, there are some discrepancies in the information provided by the trust. For example, information produced during the *Clinical Risk Review of Maternity Incidents 2002/2003* shows that 22 women were admitted to the intensive care unit in 2003. Information provided to us for the same year indicates that only 13 women were admitted to the intensive care unit.

The main reasons that the women required admission to the intensive care unit were major obstetric haemorrhage and pre-eclampsia. The information indicates that the trust carried out reviews of the care and treatment provided to some of the women prior to their admission to the intensive care unit.

The Commission asked if there had been any incidents reported of women over 20 weeks pregnant being seen in the A&E department in the six months before and after the death of woman A and was told that no incidents had been reported.

We asked the trust whether or not staff complete clinical incident forms if there is a delay in the induction of labour, as in the case of woman H. We were given conflicting information about this: that a delay in induction of labour is not a trigger for an incident form to be completed because induction of labour is only carried out when it is safe to do so and that staff had been requested to complete incident forms for delays in inductions of labour. Delays occur during busy periods and the decision to delay an induction of labour is taken at a senior level by the labour ward coordinating midwife or senior obstetrician. The trust acknowledges that delaying induction of labour carries risks.

## Reporting of and action on clinical incidents

The trust supplied us with copies of its quarterly reports for the management of risk for the period between April 2002 and September 2004. The information about incidents and accompanying trend analysis from January 2003 does not include information relating to maternity services. It is unclear who decided not to include maternity services information, or the reason for this decision.

A position statement from the trust states that the clinical risk and legal services manager did not present separate reports on maternity services to the trust board in 2004, as “members of the maternity services management team have been reporting, to the trust board, monthly and in person, on the action plan that followed the February review”. This refers to the year 2004. There is evidence that progress on the action plan was reported to the board in June 2004.

Clinical incidents were discussed at the maternity high risk review group (later renamed the clinical risk management group). Minutes for the meetings show that serious untoward incidents and clinical incidents were discussed, however, the detail in the minutes is limited. Staff told the Commission that attendance at these meetings was poor.

Representatives from maternity services, the senior midwife with responsibility for clinical governance (from July 2003) and the director of midwifery also attended the trust clinical risk subgroup, which was a subgroup of the trust's clinical governance committee. The Commission was told that they provided very little input into this committee. The senior midwife told the Commission that she presented quarterly reports of maternity incidents to the clinical risk subgroup and highlighted her concerns about the low staffing levels in maternity services. The minutes reflect that between July 2003 and May 2004 concerns about maternity services were raised three times at the clinical subgroup. The concerns related to training in interpretation of cardiotocography, poor communication between staff and a failure to follow clinical guidelines.

In terms of reporting the 10 deaths to the trust's board, the external review of the first three maternal deaths was reported to the board, but there is no further written reference to the maternal deaths until following the internal review in February 2004. The eighth and 10<sup>th</sup> maternal deaths were reported to the board.

The Healthcare Commission was told that the executive team was informed of each of the maternal deaths, either formally or informally, via the medical director or the head of clinical risk and legal services. We were told that the

board was satisfied that the deaths had been thoroughly reviewed and that there was no common theme linking them. We were also told that the medical director or the head of clinical risk and legal services informed the chief executive about the external reports, who either read the reports or the medical director informed him of the findings of the reports.

The role of the head of clinical risk and legal services was seen as integral in the trust's process for reviewing the maternal deaths. Staff commented that the head of clinical risk and legal services was available within hours of a death occurring to collect evidence. Although there was a senior midwife responsible for clinical governance, the head of clinical risk and legal services was the only person in the trust who was considered to know how to undertake an investigation. The trust acknowledges that there was too much reliance placed on this role, with not enough involvement of members of the executive team in the management of risk. Although the head of clinical risk and legal services was accountable to the medical director, in reality she worked mainly in isolation with very little day-to-day accountability.

The head of clinical risk and legal services informed the Commission that she did not feel that she received adequate support from the executive team. On reflection the head of clinical risk and legal services acknowledges that there were problems with the way the investigations carried out by the trust into the 10 deaths were managed. However, some of the problems were caused by the belief of the executive team that one person i.e. the head of clinical risk and legal services could be responsible for managing the investigations carried out by the trust, the coroner's investigation and also be the contact person

for the families involved and provide support for the staff involved in the investigations.

In maternity services the senior midwife with responsibility for clinical governance informed the director of midwifery about the deaths.

The trust did not always report the deaths to the North West London Strategic Health Authority in a timely manner but the deaths were reported to the Confidential Enquiry into Maternal and Child Health.

In terms of reporting the deaths to the primary care trusts (PCTs), the Healthcare Commission was told by the trust that the PCTs were only informed of the more recent deaths, however, there is evidence that the PCTs were informed of the earlier deaths.

At the maternity services meeting in March 2004, which was attended by staff from the PCTs, it was noted that information on serious untoward incidents has always been available on request to the PCTs but that it was not routinely shared with them. It was agreed that the routine reporting of serious untoward incidents should be introduced. The low staffing levels on the maternity unit were also discussed and the PCTs expressed concern because they had previously been asked by the trust to encourage GPs to increase the number of women they referred there for delivery.

## Complaints

The trust provided us with a summary of complaints received between April 2002 and October 2004. The themes emerging include delays in waiting for appointments and results of tests, poor staff attitude and staff not explaining what was happening to the women. More information about complaints and comments from women who have used maternity services at Northwick Park Hospital

is available in the report of our previous investigation, *Review of Maternity Services Provided by North West London Hospitals NHS Trust*, published in July 2005 and available on our website, [www.healthcarecommission.org.uk](http://www.healthcarecommission.org.uk).

## Other factors

The number of women delivering babies at North West London Hospitals NHS Trust increased from 3,537 in 2002 to 5,028 in the financial year for March 2004/2005. Some of this increase could be attributed to the transfer of the care of some of the women from Central Middlesex Hospital to Northwick Park Hospital. Prior to 2002, Central Middlesex Hospital provided maternity services for low and high risk pregnancies. However, maternity services at Central Middlesex Hospital were closed in 2002 and a birthing centre for women who were expected to have a normal low risk pregnancy was built at Central Middlesex Hospital. Obstetric deliveries were transferred to Northwick Park Hospital but midwifery-led births continued at Central Middlesex Hospital. This resulted in an increase in the number of women, including women whose pregnancies were considered to represent a high risk, delivering their babies at Northwick Park Hospital. Not all of the midwifery staff from Central Middlesex Hospital transferred to Northwick Park Hospital. Some staff from Central Middlesex Hospital left the trust to work elsewhere. Building of the Brent birthing centre was also delayed.

At the same time as the transfer of maternity services to Northwick Park Hospital, the maternity unit was undergoing a refurbishment. At the time of writing this report, the refurbishment is still ongoing.

Plans for the refurbishment included a temporary reduction in the number of inpatient beds on the delivery suite.

During the internal review at the trust in February 2004, it became apparent that capacity in the refurbishment plans was not going to be sufficient. Staff are unsure how this happened as the refurbishment project team was chaired by a non-executive director and had included both clinical and management staff. The refurbishment plans were reviewed. Staff told us that reports on the progress of the refurbishment were submitted to the board and that there were problems with the project running over time and over budget. The trust has acknowledged that if the building works had been on time, the capacity issues would have been less critical.

When asked why the trust did not wait until completion of the refurbishment before transferring the maternity services from Central Middlesex Hospital, the Healthcare Commission was told that the trust had had to close it because the number of women having their babies there decreased and the service was becoming unsustainable. In addition, the building that housed maternity services at Central Middlesex Hospital was being demolished to make way for new buildings. Staff told us that they raised their concerns about the refurbishment at Northwick Park Hospital and the transfer of services from Central Middlesex Hospital with the chief executive, but there is no evidence that these were documented. Staff were not only concerned about the additional number of women delivering babies at Northwick Park Hospital, but also that there would be an increase in the number of women whose pregnancies were considered to represent a high risk, at a time when there were limited resources and expertise to care for them.

Because of financial constraints, the trust was unable to explore options such as moving some of the maternity services at Northwick Park Hospital into another building during the refurbishment.

Staff acknowledged that the management of the refurbishment at Northwick Park Hospital and the transfer of maternity services from Central Middlesex Hospital placed additional pressure on the maternity services at Northwick Park Hospital and that it was an additional risk factor.

North West London Strategic Health Authority is concerned about the way in which the refurbishment has been managed and requested a review of the project.

## The trust's internal review

In February 2004, the trust was concerned about the increased number of serious untoward incidents being reported in maternity services and the management of clinical risk in maternity services. It undertook a *Maternity Clinical Risk Review of Maternity Incidents 2002/2003*. The review was chaired by the deputy chief executive and included the head of clinical risk and legal services, the medical director, clinical director and the director of midwifery. The review highlighted a number of concerns, including an increased number of clinical incidents in maternity services. A significant number of these related to misinterpretation of baby heart rate and recognition and skills of staff in managing major obstetric haemorrhage. It also found that there was no system for learning from and preventing clinical incidents and that the approach to the management of clinical risk verged on "complacency with effective support not available until a time of crisis". This was because staff in the department did not

engage in the management of risk and assumed it was left to the staff who were responsible for the management of clinical risk “allowing consultants to abdicate responsibility”. This was demonstrated in the difficulty experienced in obtaining reports from the obstetric staff. There were also concerns that teamwork and a multidisciplinary approach to care were “grossly underdeveloped”.

A number of recommendations resulted from the review, and it was presented to the trust’s board. The strategic health authority was not informed about the review until June 2004. More information about this review and events following it can be found our previous investigation report.

During the period the 10 maternal deaths occurred there was inadequate cover by consultants on the labour ward. There were poor relationships between staff and poor team working, poor compliance with national guidance and clinical guidelines, and no evidence of specialist services for women with a high risk pregnancy. These issues are covered in more detail in our previous investigation report.

### **External review of the trust cardiopulmonary resuscitation (resuscitation in the case of heart attack) procedures**

In 2004 an external review of the trust’s cardiopulmonary resuscitation procedures was undertaken. The review found that missing equipment on cardiac resuscitation trolleys accounted for a “significant proportion of incidents associated with cardiac arrests” and that success rates in cardiopulmonary resuscitation at the trust were significantly

below the national performance rates. The review also noted that cardiopulmonary resuscitation services had been chronically under resourced.

Recommendations arising from the external review include increasing the number of cardiopulmonary resuscitation officers and standardising equipment on the cardiac resuscitation trolleys. The death of woman G in December 2003 was considered to be unavoidable, but the internal review following her death included recommendations about improving equipment on the cardiac resuscitation trolley.

### **Findings**

There is evidence that staff were reporting clinical incidents. However, it is unclear what action, if any, was taken in response to these incidents as similar incidents continued to occur, for example, failure or lack of equipment, delays in seeking medical advice and failure to record the results of blood tests in the case notes.

As recently as April 2005, it was clear that lessons had not been learnt from the deaths of the 10 women, which were the focus of this report. This is particularly evident in the death of woman H, where staff failed to detect and report abnormal blood test results.

Incidents that relate to the failure of staff to recognise when progress is deviating from the norm, delays in seeking medical advice and a lack of management plans for women who are known to be high risk are all issues that feature in the care and treatment of the 10 women who died.

The refurbishment of maternity services at Northwick Park Hospital and the transfer of

maternity services from Central Middlesex Hospital resulted in an increased number of clinical incidents and placed additional strain on the already stretched maternity services at Northwick Park Hospital. Although there were plans for how the additional deliveries and the increase in the number of women whose pregnancies were considered to represent a high risk would be managed, these were inadequate.

Reports on the progress of the refurbishment were presented to the trust's board. However, there is no evidence of any discussion about the project except in relation to timescales and budget.

The trust's internal review in February 2004 established that there was no system for learning from or preventing similar incidents and established that staff in maternity services did not engage in the management of clinical risk.



## 5 Conclusions

This is a sad report about 10 women who died during what should have been one of the happiest and most important events of their lives. The impact of the deaths on the families of the 10 women cannot be overstated.

The 10 deaths occurred during the period between April 2002 and April 2005 when there were significant problems at all levels in the maternity services at Northwick Park Hospital.

The Healthcare Commission's first investigation report into the maternity services at Northwick Park Hospital describes a maternity service that had severe capacity problems, a lack of clinical leadership, poor relationships between staff, inadequate cover of consultants who were responsible for overseeing care on the labour ward, a shortage of midwives and a lack of specialist services for women whose pregnancies were considered to represent a high risk. There was also the transfer of the obstetric deliveries at Central Middlesex Hospital to the Northwick Park Hospital at the time when a planned refurbishment of the maternity services was due to commence. In this report we see the impact of this on the care of the women using the maternity services at Northwick Park Hospital.

This report focuses on the care and treatment provided to the 10 women who died, the actions that the trust took following each death and the circumstances surrounding the deaths. In all of these aspects we have found some degree of deficiency.

In considering the care and treatment provided to the 10 women we have reached the conclusion that in all but one of the cases there were either major or minor deficiencies in the care the women received, some with serious consequences.

On reviewing the actions that the trust took following each of the deaths, it has to be acknowledged that to some degree it did try to ensure lessons were learnt from each death. However, there was limited success in this and we see similar failings in the case of woman C as in the later case of woman H. The actions that the trust took were not comprehensive and the prevailing culture in maternity services during this period did not facilitate learning from adverse incidents.

During the period of the 10 deaths there was an increase in the number of clinical incidents being reported, which indicates that staff were trying to alert managers to the existing problems. However, the response to this was less than adequate – we see the same type of clinical incident being reported repeatedly. Staff also raised their concerns about the impact of the refurbishment on their ability to deliver quality care. The planning for the refurbishment and the transfer of obstetric deliveries was inadequate.

We know from the first investigation that consultant obstetricians did not routinely carry out ward rounds on the delivery suite and that teamwork between midwives and obstetricians was not as effective as it should have been. Therefore there was no real mechanism in place for staff to discuss concerns they may have had about the women for whom they were caring.

Deficiencies in care include a lack of input from consultants at crucial times, such as in the cases of women H, C and K. There was too much reliance on junior staff to manage complex and difficult situations with little guidance or support.

Although some of these women had pre-existing medical problems, and one of them presented later in her pregnancy than is

advisable, once they had booked to have their babies they attended all their antenatal appointments and followed the advice of the midwives and obstetricians. In the case of women A and E, they sought help when they felt unwell, but the care they received was sub-optimal.

Deficiencies in the management structures also contributed to the poor quality of care the women received, such as midwives being expected to manage a busy delivery suite that was reliant on agency and locum staff, with at times, little professional or managerial support. The unit was known to take women whose pregnancies represented a high risk, yet it did not have a high dependency unit, it was stretched to the limit in terms of its resources and there was no midwifery manager on call whom staff could contact for advice and support.

When the first three deaths occurred, the midwives did not receive adequate support from their supervisor of midwives, who should have gone into the hospital to provide practical help and support.

The clinical protocols provided by the trust were conflicting and recommended treatment that was not available, such as interventional radiology.

We are aware that interventional radiology was not available in the trust on a 24 hour basis and this is not unique to this trust. However, in two of the cases, (women B and K), the women bled profusely following delivery and prompt access to interventional radiology may have allowed for earlier identification and embolisation of the bleeding point. Interventional radiology was used in the case of woman K, however, it was not considered until it was too late.

Anaesthetic staff involved in the care of the 10 women provided appropriate and timely assistance, although there can be occasions when they need to be involved earlier, such as when situations are changing rather than waiting until they become serious. The anaesthetists are to be commended on their expertise and that passed on to their trainees who responded well, often in difficult circumstances. This is so, despite there being fewer staff than the recommended guidelines.

The anaesthetic staff had a good working relationship with the obstetricians, and women who were identified as high risk were referred for review by an anaesthetist. However, there is some concern that the anaesthetic staff did not receive feedback from the reviews of the 10 deaths.

The haematology department provided timely and appropriate support except in the case of woman H, when they should have been contacted earlier by the obstetric team.

One of the women, woman A, did not speak English. This may have been a factor in the failure by staff in the A&E department to establish or acknowledge that woman A was pregnant, even though the notes completed by the ambulance staff were clear and detailed.

In the case of woman F, although she refused blood and blood products, she discussed and agreed alternative arrangements with the consultant obstetrician responsible for her care. These arrangements were adhered to until her consultant obstetrician went on holiday and her care was transferred to another consultant obstetrician. When she became ill, her care was managed by different consultants, which resulted in a fragmented approach. In conjunction with other specialists, the consultant obstetrician who

took over her care should have developed a clear plan of care for woman F and she should have been reviewed daily by a consultant obstetrician. Instead, this was at times left to junior doctors, and sometimes not until the midwives had requested it.

In some of the cases there was poor documentation by the midwifery and obstetric staff, an absence of documentation for surgical procedures by the obstetric staff in the cases of women A and B, and an absence of contemporaneous documentation in the case of woman H.

In relation to the actions that the trust took following the death of each woman, it would be wrong to say that the trust failed to take action. Internal investigations and, in some cases, external investigations, were carried out into the deaths. Reports were submitted, action plans were developed and some changes were made. The trust's board was made aware of the deaths, along with the organisations that have responsibility for the monitoring of performance of NHS trusts and standards of care. In some cases they carried out their own reviews. In March 2004, the trust carried out the maternity clinical risk review, which involved managers and clinicians and resulted in a number of recommendations. There were a further three maternal deaths after this review.

However, the internal reviews were not comprehensive. They were too narrow and focused on the care provided by the obstetricians. They failed to consider the care provided by other specialists, such as the anaesthetists and the haematologists. They also failed to identify whether there were any underlying systemic problems.

It is also of concern that the trust's preliminary investigation reports failed to

identify and address such obviously key problems as the failure by the locum consultant obstetrician to attend in the case of woman H. In this instance, much of the focus was placed on the actions and decisions of an individual doctor.

There was no system in place to ensure that all aspects of the reviews had been completed.

The internal investigations had a strong medico-legal focus, i.e. a great deal of the work was done in preparing for the coroner's inquest. Those aspects related to the identification of clinical risk took second place.

A fundamental problem was that responsibility for the reviews of the maternal deaths was placed with the head of clinical risk and legal services, who tended to work in isolation and was never questioned about the actions taken following each death. Although the head of clinical risk and legal services was meant to be accountable to the medical director, there is very little evidence as to how this accountability was translated into practice. Members of the trust's board were too complacent and did not ask relevant questions about what actions were taken following the deaths.

Some senior staff in the maternity services abdicated their responsibility for the management of clinical risk and relied too much on the head of clinical risk and legal services to carry out this function. Although there were some staff who wanted to take some responsibility and be involved in the internal reviews, they experienced difficulty with this through lack of support from senior staff. This was particularly the case for the senior midwife with responsibility for clinical governance, who wished to have more involvement in the internal reviews, but felt that this was prevented by the head of clinical risk and legal services.

The trust maintained that there were no common factors between the 10 deaths. This was because the focus of the internal reviews was too narrow to properly consider the wider context (for example, staffing, input from consultants) in which the deaths occurred.

Members of the trust's board and the external organisations responsible for monitoring the performance of NHS trusts were aware of the 10 deaths and the other problems in the maternity services. However, they should have appreciated the seriousness of the situation, made the links between the deaths and the problems identified in the Healthcare Commission's previous investigation into the maternity services and taken action at an earlier stage.

While we do not underestimate the impact of the deaths on the staff working in maternity services, there was a failure by management and clinical staff, and the external organisations responsible for monitoring the performance of the trust, to address the underlying problems in maternity services.

There is no doubt that the period April 2002 to April 2005 was a time when maternity services at Northwick Park Hospital went through a very difficult period, a period that allowed poor practice to develop and the safety of women to be compromised. Women using the maternity services did not receive the level of care to which they should have been entitled, and staff were forced to work in situations that compromised their professional standards of care.

Since 2005, with strong, clear leadership and hard work from the staff and external support, the trust is working to turn this situation around. There have been a number of welcome improvements, which have resulted in better and safer care for women and a more supportive environment for staff that promotes good practice.

# Progress made by the trust since April 2005

The previous investigation made recommendations relating to the management of the maternity services, the management of risk, staffing in maternity services and outcomes from care and treatment and the experiences of women.

Following the previous investigation, the trust developed an action plan to implement the recommendations contained in the report and the actions arising from the imposition of special measures. Implementation of the action plan has been driven and monitored by the trust's maternity services action plan group, which includes staff from the strategic health authority and the local primary care trusts. The trust has implemented a number of improvements, resulting in better and safer care for women. The improvements include:

- The recruitment of three additional consultant obstetricians.
- The level of cover by consultants on the labour ward has been increased from 40 hours to 60 hours between Monday and Friday.
- An additional 20 midwives have been recruited.
- Nurses trained in caring for patients recovering from an anaesthetic, and operating theatre nurses have also been employed.
- The number of supervisors of midwives has been increased and is in line with national guidance.
- An on call system for midwifery managers outside normal working hours has been introduced.
- The refurbishment of the labour ward which now includes a high dependency unit.

- More effective teamwork and improved communication in the consultant obstetric team, and between obstetric staff and midwives.
- Consultant obstetricians carry out ward rounds on the labour ward three times per day.
- Up-to-date clinical guidelines have been developed and implemented. Paper copies of the guidelines are kept in each of the rooms on the delivery suite and are also available on the trust's intranet. Individual copies have been distributed to clinical staff.
- Revised and improved clinical governance structures have been put in place in maternity services.
- The policy for reporting and managing serious untoward incidents has been revised. The Commission was told that the trust is focusing on learning from incidents and staff confirmed that there is less of a "blame culture".
- Replacement of defective equipment and implementation of a system for the maintenance of equipment.

The Commission acknowledges that the trust has made good progress in implementing the actions arising from the first investigation.

# Recommendations

As most of the actions arising from the previous report and the imposition of special measures have now been implemented or are in the process of being implemented, our recommendations are limited to the following:

## National recommendations

- The Healthcare Commission realises that, due to a shortage of suitably trained radiologists, it is not possible to provide full time cover for interventional radiology in all obstetric units. However, given the potential to save the lives of patients who have catastrophic postnatal bleeding, trusts with delivery units should, where feasible, engage with their neighbouring trusts to discuss the formation of networks. The aim should be to provide an emergency interventional radiology service that is responsive to patients' needs wherever and whenever they arise.
- All NHS trusts providing maternity services, and organisations responsible for the monitoring of the performance of NHS trusts, must ensure they have robust systems in place for the monitoring of the quality and performance of the maternity services.



# Acknowledgements

The Healthcare Commission wishes to thank the following people for their help and cooperation during this investigation:

- the families of the women who died, who contributed in person, by telephone and in writing
- staff interviewed by the investigation team and those who contributed during the course of the investigation. In particular Mary Wells, Eve Mitchell and Violet Gibson
- the agencies and organisations that gave their views and submitted relevant documents

# Appendix A: The Healthcare Commission's criteria for an NHS investigation

The Healthcare Commission works to improve the quality of healthcare provided by the NHS and the independent (private and voluntary) sector. One of its functions is to investigate serious failures in NHS services.

## What will the Healthcare Commission investigate?

The Healthcare Commission will investigate allegations of serious failings that have a negative impact on the safety of patients, clinical effectiveness or responsiveness to patients. This may include:

- a higher number than anticipated, or unexplained deaths, serious injury or permanent harm, whether physical, psychological or emotional
- events that put at risk public confidence in the healthcare provided, or in the NHS more generally
- a pattern of adverse effects or other evidence of high risk activity
- a pattern of failures in service(s) or team(s) or concerns about these
- allegations of abuse, neglect or discrimination against patients

Other failings with less serious effects on patients' safety may be subject to a review. In determining whether to investigate, the Healthcare Commission will consider the extent to which a local resolution, referral to an alternative body, or other action might offer a more effective solution.

The Healthcare Commission does not investigate:

- a complaint that has not been pursued through the NHS complaints procedure or the Healthcare Commission's independent stage, unless it raises an immediate concern
- individual complaints about professional misconduct
- changes to service configurations
- matters being considered by legal process
- specific matters already determined by legal process

This does not preclude the Healthcare Commission from investigating circumstances surrounding such matters, particularly if there are general concerns about patient safety or suggestions that organisational systems are flawed.

## Appendix B: Definitions of maternal mortality

The report *Why Mothers Die 2000-2002 – Report on Confidential Enquiries into Maternal Deaths in the United Kingdom*, published by the Confidential Enquiry into Maternal and Child Health (CEMACH) in November 2004 states that

“The ninth and 10<sup>th</sup> revisions of the *International Classification of Diseases, Injuries and Causes of Death* (ICD9/10) define a

maternal death as ‘the death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes’ ”.

In its report, the CEMACH also describe how maternal deaths can be subdivided into further groups as detailed in the table below.

Direct (maternal death)	Deaths resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium), from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above.
Indirect (maternal death)	Deaths resulting from previous existing disease, or disease that developed during pregnancy and which was not due to direct obstetric causes, but which were aggravated by the physiological effects of pregnancy.
Late (maternal death)	Deaths occurring between 42 days and one year after abortion, miscarriage or delivery that are due to Direct or Indirect maternal causes.
Coincidental (maternal death)	Deaths from unrelated causes which happen to occur in pregnancy or the puerperium.

Source: *Why Mothers Die 2000-2002 – Report on Confidential Enquiries into Maternal Deaths in the United Kingdom*, the Confidential Enquiry into Maternal and Child Health, November 2004

## Appendix C: The investigation team

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Healthcare Commission

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### **Fiona Sommerville**

Independent Midwifery Consultant

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Investigation Coordinator  
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### **Additional expert advice was sought from:**

#### **Professor Michael Greaves**

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Consultant Pathologist  
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#### **Dr Michael Stewart**

Consultant Cardiologist  
South Tees Hospitals NHS Trust

#### **Dr James Kennedy**

General Practitioner

# Appendix D: Summary of dates and causes of death

Table 1

Woman	Attended antenatal appointments	Date of delivery	Date of death	Cause of death	Maternal death classification
A	Yes	April 9 <sup>th</sup> 2002	April 9 <sup>th</sup> 2002	Intracerebral haemorrhage	Direct maternal death
B	Yes	April 16 <sup>th</sup> 2002	April 17 <sup>th</sup> 2002	Haemorrhage following vaginal delivery and hysterectomy	Direct maternal death
C	Yes	April 21 <sup>st</sup> 2002	April 23 <sup>rd</sup> 2002	Pre-eclampsia intracerebral bleed	Direct maternal death
D	Yes	June 6 <sup>th</sup> 2003	June 11 <sup>th</sup> 2003	Viral encephalitis	Unrelated infection Indirect death
E	Yes, received majority of antenatal care in Nigeria but was seen three times prior to delivery	June 6 <sup>th</sup> 2003	June 26 <sup>th</sup> 2003	Massive intracerebral haemorrhage. Recent pregnancy and probable hypertension	Direct maternal death
F	Yes	August 8 <sup>th</sup> 2003	August 20 <sup>th</sup> 2003	Cardiorespiratory arrest Multi-organ failure and disseminated intravascular coagulation, blood loss following caesarean section, HELLP syndrome and pre-eclampsia	Direct maternal death
G	Yes	December 18 <sup>th</sup> 2003	December 21 <sup>st</sup> 2003	Cardiac arrest due to or as a consequence of focal myocardial fibrosis	Unrelated medical condition Indirect maternal death
H	Yes	May 17 <sup>th</sup> 2004	May 18 <sup>th</sup> 2004	Uterine haemorrhage Necrosis of uterus and caesarean section suture line and cervix and genital tract Sepsis in the third trimester of pregnancy and pre-eclamptic toxemia	Direct maternal death
J	Yes	June 20 <sup>th</sup> 2004	June 21 <sup>st</sup> 2004	Massive intra-abdominal haemorrhage rupture of liver (spontaneous) in the third trimester of pregnancy, due to spontaneous rupture of the liver	Undetermined
K	Yes	February 23 <sup>rd</sup> 2005	March 19 <sup>th</sup> 2005	Cerebral hypoxia disseminated intravascular coagulopathy (DIC). Post partum haemorrhage due to uterine atony	Direct maternal death

## Appendix D: Common factors present across the 10 deaths

Table 2

Woman	Absence of support from the supervisor of midwives?	Absence of medical records?	Poor documentation?	Delay in seeking help from consultants?	Lack of consultant obstetrician input?	Failure to recognise severity of condition?	Failure in referral system?	Delay in laboratory results?	Lack of management plan?	Poor obstetric clinical judgement?	Inaccurate recordings of blood pressure?
A	•	•				•	•				
B	•	•		•							
C	•		•		•	•			•	•	•
D					•						
E							•				
F					•			•	•		
G					•						
H		•	•	•	•	•		•	•	•	•
J											
K			•	•	•	•			•	•	

• = Applicable in this case







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