SHERIFFDOM OF TAYSIDE CENTRAL AND FIFE AT FORFAR

[2018] FAI 5

B327/15

DETERMINATION

BY

SHERIFF PINO DI EMIDIO

UNDER THE FATAL ACCIDENTS AND SUDDEN DEATHS INQUIRIES (SCOTLAND) ACT 1976

into the death of

N

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Act: Mrs N. Ross PFD; Hanton PFD
Alt (1): Mr GS (father) unrepresented on his own behalf and for Mrs KS (mother)
Alt (2): NHS Tayside - Fitzpatrick, Advocate

Forfar, 26 January 2018

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Note to readers: Appendix 2 contains a glossary of terms used in this determination.

DETERMINATION

The sheriff having resumed consideration of the Fatal Accident Inquiry into the sudden death of baby N on 30 September 2012, DETERMINES in terms of section 6 of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976 as follows: -

1. That N was born at 05.10 hours on 30 September 2012 at the Community Maternity Unit, Montrose Royal Infirmary, Bridge Street, Montrose DD10 8AJ ("Montrose CMU"). She died at 08.35 hours that day in Montrose CMU.
2. That the cause of death was certified as I.(a) Peripartum Hypoxia.
3. That the death might have been avoided by the following reasonable precautions:
    a. The provision of more precise and accurate evidence-based information about birth site choice to the prospective parents during the course of the pregnancy in order that they might make an informed choice of birth site. In particular the following information ought to have been provided within the scope of a structured conversation with midwives which was adequately recorded:
        i. although such events are rare, and despite careful risk assessment designed to ensure that only low risk mothers give birth in a midwife led remote CMU like Montrose, from time to time babies are born in CMUs unexpectedly unwell at term and may require urgent specialist treatment;
        ii. in some cases delay in delivering treatment to such an ill newborn baby may significantly reduce prospects of success and even lead to the death of the baby;
        iii. the facilities available at a midwife led remote CMU like Montrose in the event that the baby was born unexpectedly unwell at term are limited in nature as there is no specialist obstetric or paediatric care available on site;

iv. if a baby is born unexpectedly unwell at term in an Alongside Midwifery Unit ("AMU") or a specialist hospital like Ninewells Hospital, Dundee ("Ninewells") she will have access to specialist care within a few minutes;

v. a seriously unwell baby would have to be taken to the specialist obstetric or paediatric care units at Ninewells;

vi. there is no specialist recovery service that can be deployed at short notice to take a seriously unwell baby to specialist obstetric or paediatric care; and

vii. the period of delay that may occur in taking a seriously unwell baby to specialist care or in specialist assistance arriving at Montrose CMU can extend to several hours.

b. The provision of a 999 ambulance for retrieval of babies born unexpectedly unwell within the Montrose CMU as a primary option as part of the NHS Tayside ("NHST") guidelines for neonatal transfers.

4. That there was the following defect in a system of work that contributed to the death:

   the failure to provide a 999 ambulance service for the retrieval of babies born unexpectedly unwell within the Montrose CMU as a primary option as part of the NHST guidelines for neonatal transfers.

5. The following further recommendations arise from the evidence led at the Inquiry: -

   a. There should be greater communication and co-operation between NHST and NHS Grampian ("NHSG") in relation to the care of patients who are resident in the geographical area of one authority and subject to treatment in a facility run by the other.

   b. NHSG should make greater efforts to co-operate in Significant Clinical Event Analysis ("SCEA") inquiries in NHST where there has been

involvement of NHSG staff and facilities in the care of a patient affected by the significant clinical event under consideration.

c. NHST should take steps that the information provided in its "My Birthplace" App is fully available to those prospective parents who do not have or do not make use of online resources of this kind.

d. The following information ought to be provided to prospective parents considering water birth:

    i. there is no good scientific evidence based on clinical trials comparing outcomes for people giving birth in water and those not giving birth in water to say that giving birth in water is as safe as giving birth out of water;

    ii. in the experience of midwives as a collective body (both nationally and internationally) it is practised commonly and, based on anecdotal evidence of midwives, it would appear to be safe;

    iii. if their choice is to opt for water birth at a remote CMU the mother and baby will receive midwife led care;

    iv. the facilities available at a midwife led remote CMU like Montrose for a baby born unexpectedly unwell at term are limited in nature as there is no specialist obstetric or paediatric care available on site;

    v. a seriously unwell baby would have to be taken to the specialist obstetric or paediatric care units at Ninewells;

    vi. there is no specialist recovery service that could be deployed at short notice to take a seriously unwell baby to specialist obstetric or paediatric care; and

    vii. the period of delay that may occur in taking a seriously unwell baby to specialist care or in specialist assistance arriving at Montrose CMU could extend to several hours.

6. That the other facts relevant to the death are as found and further discussed below. They are also dealt with in the Discussion section below.

Issues

The following issues were identified in the Petition by the Crown seeking that an Inquiry be held.

A. Procedures for communication of risk regarding birth site choice with prospective parents in order that they might make an informed choice regarding delivery locations.
B. Procedures for communication of risk regarding the safety of water birth with prospective parents in order that they might make an informed choice regarding water birth.
C. Procedures to minimise the risk to the newborn of being born at a remote maternity unit.
D. Procedures for carrying out maternal and foetal heart rate monitoring and procedures for ensuring timeous review of foetal heart rate monitoring recordings by appropriate medical staff.
E. Procedures to ensure that a system exists for timeous emergency specialist medical assistance for patients born at remote community maternity units who require it.

Findings in Fact

The Montrose CMU

1. The Montrose CMU is based in the geographical area served by and administered under the auspices of NHST. It is at the northern end of that area. The nearest specialist neonatal unit of NHST is at Ninewells, which is a major medical facility serving the Tayside Region.

2. In average traffic conditions the time to drive from Montrose CMU to Ninewells is about 40 minutes though this is heavily dependent on traffic conditions.

3. The Montrose CMU is a community midwife led unit within Montrose Royal Infirmary. In September 2012 there were two large birth rooms in the unit, four post-natal beds and a number of other ancillary rooms. During the day there were usually two midwives on duty. During the night one midwife was on duty with a second midwife on call within the Infirmary premises.

4. In recent years Montrose CMU has provided an increasingly popular choice of birth site for some expectant mothers classified as low risk. As at 30 September 2012 there were in the region of 200 births each year there. The Infirmary is a relatively small medical facility. In 2012, in addition to the CMU, the same building accommodated an unconnected unit which dealt with geriatric and terminally ill patients. There were no anaesthetists on duty elsewhere in the Infirmary who could assist when a baby was born unexpectedly unwell within the CMU.

5. The midwives at Montrose CMU had limited options available to them in the unit itself when a sick baby was born there to a mother who had been classified as low risk. Where such births occurred despite the screening efforts of midwives, it was necessary to provide access to advanced life support, including neonatology support for midwives.

Neonatal Transport from Montrose CMU in cases of urgency

6. There are not enough resources to allow a specialist recovery team of a clinician and a specialist nurse to be available to be deployed at very short notice to a CMU, such as the Montrose CMU, at any time of day or night. There is a serious practical difficulty in providing full specialist support to the Montrose CMU very quickly in the rare circumstances where a baby is born unexpectedly unwell.

7. In Scotland, as at 30 September 2012, the professional consensus amongst paediatricians was that it was preferable to seek to stabilise the baby at the CMU and then transport the baby to the nearest principal hospital for specialist care.

Classification of low risk pregnancy

8. The offer of the opportunity to give birth in a CMU depends on the pregnancy being classified as being at low risk of obstetric complications. Classification requires to be re-visited regularly during pregnancy. There are a large number of circumstances that affect classification. An expectant mother who needs continuous foetal monitoring, or who has high blood pressure, would not be classified as low risk. Events may occur during the pregnancy that cause a mother to be changed to a different category whether temporarily or for the remainder of the pregnancy. For instance significant bleeds should lead to re-classification. It is possible to move back and forth between categories during the pregnancy.

9. In the NHST area about one third of pregnancies are in the low risk category at the point of birth and thus will have the choice of giving birth within a CMU. Identification of risk by means of a low risk triage policy is an important part of the process of birth site choice. Such choices are only offered to those suitable for it. The policy requires referral of the mother for obstetric care if she is no longer in the low risk category.

10. The main way in which NHST tried to avoid problems arising from the birth of sick babies at a remote CMU like Montrose was by allowing, so far as possible, only those mothers who were categorised as low risk to have the choice of having the birth at a remote CMU. In order to identify those prospective mothers

who were to be categorised low risk, NHST relied on the skill of its midwives. Such births were not wholly avoidable even when screening worked well.

Current status of labour in water for pain management and Water Birth

11. The Joint Statement of the Royal Colleges of Obstetricians and Gynaecologists and of Midwives of about 2009 and the Guidance of the National Institute for Clinical Excellence (NICE) are the basis on which immersion in water for labour is made available as an option to pregnant women who are classified as low risk for the purposes of pain management. The professional bodies support the use of the pool for pain control during labour.

12. The practice of giving birth in water has happened for many years in the United Kingdom. A significant number of women do it and it is a practice in which midwives are often skilled. There is no robust evidence base for the practice though there are observational studies that suggest it seems to be safe. The Royal Colleges recommend that women make an informed choice about water birth.

13. The birthing pool at Montrose CMU is used by 70% of the women who give birth there.

Training of midwives with regard to the provision of information to prospective parents so that they may make informed choices

14. Training of midwives dealt with the provision of information to prospective parents so that they may make informed choices. There were published guidelines both by NICE and at local level dealing with these matters. All of the following expectations and requirements are dealt with in guidelines for midwife led intrapartum care which midwives are expected to comply with in their practice.

a. Discussion between prospective parents and midwives is vital in order that informed choices can be made by prospective parents on issues such as choice of birth site and water birth.
b. Written information should always be used to supplement verbal discussion.
c. Records should be kept of what written information has been provided and midwives should summarise in the records the verbal information that has been provided.
d. Midwives also require to ascertain from prospective parents what information they have already obtained. There is a great deal of information available from a variety of sources. Many prospective parents will have accessed such information. Midwives cannot have effective discussions with prospective parents which will lead to informed decision making by them unless they frame the conversation in ways that allow them to know the prospective parents' existing state of knowledge.

Monitoring of foetal heart including use of Cardiotocograph ("CTG")

15. CTG may be used to monitor foetal heart rate. The normal range for a baby such as N, who was at term and full grown, would be between 110 and 160 bpm. Interpretation of CTG traces allows variability in the heart rate to be considered during labour. Generally speaking, accelerations in heart rate may be reassuring and decelerations may not be reassuring. An average heart rate or baseline has to be identified to allow there to be evaluation of whether there are accelerations or decelerations present. In the early stage of labour the normal requirement is for intermittent monitoring of the foetal heart every 15 minutes. In the second stage of labour the normal requirement is for intermittent monitoring of the foetal heart every 5 minutes.

Newborn babies – normal condition at healthy birth

16. Healthy babies are born blue in colour. They "pink up" within 5 or 6 minutes and gradually become pinker in colour within the first hour or so of life. This is a normal scenario for a newborn baby without complications.

17. A baby's APGAR score is part of the way in which a baby's condition is assessed after birth. It is one of the tools available to professionals responsible for the care of newborn babies. Clinical decisions are based on observation of the baby's tone, colour and condition in addition to measurement of vital signs.

The BAPM Framework Document

18. The BAPM is a UK wide group most of whom are specialist consultant neonatologists, though it is intended to be multi-disciplinary. It publishes framework documents in areas of professional interest or concern.

19. In May 2011 the BAPM published a document entitled "Neonatal support for Stand Alone Midwifery led Units (MLUs) A Framework for Practice." Crown production number 6 is a copy of the document. The preparation of this document reflected concerns in the preceding five or six years about aspects of support for stand-alone midwifery led units. The document was the result of an extensive and public consultation process. The views expressed carry the authority of the whole BAPM. This document was an attempt to draft a framework for neonatal support in standalone midwifery units. There was some Scottish input in the preparation of the framework. It contained the statements set out in the next three findings.

20. In the Introduction at pages 1-2:

> "Whilst operational protocols should minimise the chance of sick babies being born in [a CMU] the potential exists for babies to become unexpectedly unwell, or for unexpected preterm birth, and these rare occurrences need to

be anticipated with clear guidelines to manage the situation. It is clearly essential that careful consideration is given to recognising the need for and providing appropriate support for any baby requiring anything above routine care both at delivery and in the immediate postnatal period."

21. Under the heading "Patient Information" at pages 4 – 5:

"Written and verbal information provided to women who book for delivery in [CMUs] must include: -

- The availability and level of maternal and newborn care for women and babies who become unexpectedly unwell: this should cover the rare but unpredictable need for neonatal resuscitation, stabilisation and transfer.
- The distance and time involved along with the locally-agreed mechanisms for transfer if a transfer is required should be explicitly discussed at booking. This information is particularly important for women who are booked to deliver in remote/rural [CMUs]."

22. In the "Procedures" section under the heading "Emergency procedures and Communication" at page 8:

- "Clear pathways of care should be established for stabilisation and transfer of sick and stable newborns in and from each [CMU], with guidelines to support the process easily available in written form in addition to intranet access. These pathways will vary depending on the geography and neonatal service provision in the Consultant Unit.
- The fastest way for a mother or a baby to travel to hospital may be by 999 ambulance accompanied by the midwife who leads on and delivers any required newborn resuscitation and stabilisation procedures, whilst supported by the ambulance personnel.
- In areas/regions where neonatal transfer teams are used, often due to geographical considerations, the baby may need to remain on the [CMU] for several hours. In these circumstances locally agreed stabilisation procedures and training are required which may include the possibility of using other clinical staff to support the infant."

23. As at 30 September 2012 there was in Scotland ongoing professional uncertainty and disagreement as to what was the appropriate model to support geographically isolated CMUs notwithstanding the publication of the BAPM Framework document in May 2011.

NHST Neonatal Transport Policy and Guidelines as at 30 September 2012

24. As at 30 September 2012 there was no dedicated "flying squad" for the emergency retrieval of sick infants born unexpectedly unwell in a remote CMU like Montrose to take them to Ninewells. NHST Operational Guidelines for CMUs were in place and made provision for transport arrangements if a baby needed to be moved from a CMU to Ninewells. Crown Production number 13 is a document that contains the terms of the guidelines that applied to Montrose CMU. This provided for a dedicated neonatal transport rota team arranged along with Aberdeen Maternity Hospital ("AMH") which included an on call consultant and ANNP. This provision was separate from usual paediatric consultant cover for the neonatal ward at Ninewells. The neonatal transport rota team covered Tayside, Grampian and Highland areas. If not otherwise engaged in other work, the neonatal transport rota team would normally be used to retrieve a sick baby from a remote CMU.

25. If the neonatal transport rota team was not available, the options were either to seek help from one of the neonatal transport rota teams based in Edinburgh or Glasgow or to bring together an *ad hoc* team to undertake the retrieval of the sick baby that required to be transferred from the remote CMU.

26. Women who chose to give birth at Montrose CMU had to rely on midwifery staff until such time as the neonatal transport team arrived which may be anything up to six hours.

27. As at 30 September 2012 the NHST policy and guidelines were in line with practice elsewhere in Scotland. Since 2003 when ScotSTAR, the Scottish neonatal transport and retrieval service had been set up, Scottish practice has not favoured the use of 999 ambulances to transfer babies born unexpectedly unwell at remote CMUs like that at Montrose to Ninewells. The prevailing view was that in the

case of remote CMUs it was preferable for the midwives at the remote CMU to support a baby until he or she was sufficiently stable to be transported.

28. As at 30 September 2012 babies born unexpectedly unwell at home in the area served by NHST were transported to Ninewells by 999 ambulance.

29. As at 30 September 2012 babies born unexpectedly unwell in remote CMUs in some parts of England were transported to specialist hospital units for intensive care by 999 ambulances.

30. As at 30 September 2012 the procedures for babies born unexpectedly unwell in remote CMUs in the NHST area did not meet the standards set out in the BAPM Framework document of May 2011 both in relation to clear pathways in the emergency procedures in place and in the level of information provided to prospective parents.

Mr and Mrs S's family structure and history

31. N was KS's fourth baby. Throughout the pregnancy she and her husband lived in the geographical area served by NHSG. In about May 2012 they moved from Stonehaven to an area near to Laurencekirk. Their home was close to the Montrose CMU.

32. KS's three earlier births had been uneventful. The first had been at AMH and the second and third at Montrose CMU. She had used a birthing pool for pain relief in all three of her earlier births. The third baby had been born in water.

The fourth pregnancy

33. In early 2012 KS learned that she was pregnant again. She attended the usual midwifery appointments. She considered the issue of place of birth for her fourth baby. She considered the options of a home birth and birth at Montrose CMU.

She knew that Montrose CMU was a midwife led unit and that there were no specialist doctors on site. It was presented to her as a home from home in which she could give birth in a more relaxed environment.

34. She had the usual antenatal appointments during her fourth pregnancy. KS's first appointment was 23 February 2012. There were reviews on 13 March 2012 (at Stonehaven) and on 18 June 2012 and 16 July 2012 at Auchenblae. Later appointments were at Montrose CMU.

Provision of information on birth site and water birth during the fourth pregnancy

35. At no stage of her pregnancy with N did she see a doctor. This is not unusual for a prospective mother in the low risk category.

36. KS did not receive written information in leaflet form in relation to her earlier pregnancies though she did receive the "Ready Steady Baby" book that is issued to all prospective mothers in relation to each pregnancy in Scotland. This provided limited information about birth site choice.

37. On 13 March 2012 she was given a leaflet entitled "Where to give birth?" This is noted in Crown production number 10/254J. She had not retained a copy of it and could not recall its full content. It provided her with a brief insight into her birth site choices. It did not deal with water birth at all.

38. During her fourth pregnancy no midwife discussed the safety or otherwise of giving birth in water with KS. She was told that she or the baby would be taken by ambulance to hospital if anything went wrong after the birth took place. AMH was about 40 to 60 minutes' drive away depending on traffic and time of day. The time to get to Ninewells would be about the same. She was never told it might be several hours before a doctor would come to the Montrose CMU if her baby became unwell during or after birth.

39. On 25 August 2012, when she was 34 weeks pregnant, KS nominated Montrose CMU as her expressed choice of birth location (Crown production number 10/128). She knew that there were no doctors in attendance at Montrose CMU. She knew that if she wished an epidural for pain relief she would have to go to Aberdeen.

40. The information provided to KS in relation to choice of birth site and water birth was very limited. The information relating to neonatal transport was inadequate. Recording of the extent of information provided to KS on these issues was inadequate and incomplete.

41. If KS had known at the time when she made her choice of birth location that there might be a significant wait for transport to specialist help at Ninewells for her baby, should N be born unexpectedly unwell at term, she would not have chosen to give birth to N at Montrose CMU.

The bleeds during the fourth pregnancy

42. KS had two bleeds during her pregnancy. The first occurred at about 8 weeks and was not thought to be clinically significant either at the time or later.

43. The second bleed occurred at about 28 weeks and involved spotting. This was the first time she had experienced such a bleed during pregnancy involving clots. KS called AMH for advice and was told to rest and to contact the midwives at Aberdeen if it got any worse. [Crown production number 10/354Q & R.]

44. On about 16 July 2012 at a regular antenatal appointment KS reported the bleed. It is noted as PV (*per vaginam*) bleeding. The episode had occurred at the weekend in the previous four week period. No referral was made to hospital for further investigation.

Events of 29 September 2012

45. At about 13.05 hours KS and GS attended at Montrose CMU following spontaneous rupture of membranes. At this stage KS was experiencing regular contractions. Midwife Knox was alone on duty at the time. KS was examined shortly after arrival. She was noted to be at 38 weeks and 6 days gestation.

46. At about 15.55 hours midwife Knox commenced the use of CTG. At 16.15 midwife Knox noted "CTG query high base line, Variability good. Query due to FM [foetal movements] to continue observation. " Crown production number 18 is an enlarged copy of the relevant trace extracted from the medical records.

47. At about 16.40 hours midwife Knox noted "CTG difficult to interpret. Query baseline tachycardia with decelerations. Query normal baseline with prolonged accelerations due to foetal movements. Latter more likely as variability good and foetal movements frequent." She thought the CTG was difficult to interpret at this point.

48. At about 16.55 hours midwife Knox faxed a part trace to AMH as she was not sure whether the CTG trace was satisfactory or indicative of foetal distress. At 16.55 she noted "CTG faxed to AMH LW reg [Labour Ward Registrar] unable to view at present due to going to theatre. [KS] remains on CTG." After she sent the faxed CTG trace, Midwife Knox phoned AMH and spoke to the nurse in charge of the ward. Neither the Labour Ward Registrar nor any other relevant member of obstetrics and midwifery staff called her back after reviewing the CTG trace sent by her. The usual protocol required that there would be a call from a suitably qualified member of staff in the specialist unit to the midwife in the remote CMU within 30 minutes.

49. KS remained on the CTG. At about 17.25 hours, midwife Knox was content with the later part of the reading and the CTG was discontinued. Her note stated:

"CTG discontinued. Low risk. Irregular contractions. Baseline rate equals 145 beats per minute. Variability 10 bpm. Accelerations present. No decelerations present. FM's + + + Overall reassuring CTG. I am confident on looking at 2nd part of trace that the? high baseline was prolonged acceleration, second part of the trace is reassuring. [KS] home to return tomorrow at 7.30 unless in labour prior. Aware of meconium meaning need to go to AMH. L/W informed of same". KS was sent home as there appeared to be no imminent prospect of her giving birth. She was instructed to return the following morning unless labour became established sooner.

Events of 30 September 2012

50. At about 02.00 hours KS and GS returned to Montrose CMU. KS was experiencing increased contractions. A different midwife was on duty, Sandra Menzies. Midwife Knox was also providing overnight cover and assisted Midwife Menzies with the birth when the time came.

51. At about 03.45 hours labour was established and KS entered the birthing pool. On observation her temperature, pulse and blood pressure were all in normal limits. She used the birthing pool as she had found it to be a good form of pain relief. The temperature of the pool on entry was 38 degrees.

52. At about 05.00 hours the second stage of labour commenced. The foetal heart rate was noted as 80 bpm and that it slowly increased to 160. A foetal heart rate of 80 was low and outside normal limits. It was not noted again prior to the birth of N.

53. At about 05.07 hours there was spontaneous rupture of membranes as the head was born.

54. At about 05.10 hours N was born. The midwives noted: "Spontaneous birth of a live girl. Cord round the neck loose. Slipped over. Baby white and floppy. HR above 100. No respiratory effort. Cord clamped and cut. Baby taken to the

Resuscitaire. 5 inflation breaths – chest moving". A small amount of blood was observed to come behind the baby but this could not be measured because the birth took place in the pool.

55. At birth N was pale and floppy. Her APGAR score shortly after birth was 2. The midwives were concerned by both the APGAR score and the condition and tone of baby N. Most babies soon after birth have an APGAR of 8 or 9 out of 10. In this case the score of 2 reflected a good heart rate. The other APGAR measures of appearance, tone and reflexes each scored nil.

56. The umbilical cord was clamped and cut and N was taken to the resuscitaire which was kept in the next room to that in which the birth had taken place. The midwives applied inflation breaths with bag and mask and noted good chest wall movements. They continued their resuscitation efforts for about 8 minutes from about 05.11 hours.

57. KS remained in the pool as she had requested a natural placenta delivery. She delivered the placenta in the pool.

58. The midwives continued their resuscitation efforts for about 8 minutes from 05.11 hours. Their note was: "Heart rate remains [above] 120 bpm. Tone poor, colour poor, no resp[iratory] effort."

59. At about 05.18 hours the senior registrar on duty in the Neonatal Unit at Ninewells, Doctor Nicholas Connolly, was contacted by his bleeper by the midwives at the Montrose CMU for advice. He responded promptly. An ambulance was requested. Doctor Connolly instructed the midwives to continue neonatal resuscitation and said he would get back to them. Doctor Connolly called back and informed the midwives that a transport team would be sent to retrieve N.

60. At about 05.19 hours midwife Knox noted "Paed contacted, now some resp effort but shallow, ventilation breaths continue. HR 135 bpm".

61. At about 05.25 hours midwife Knox noted "Now breathing independently. Some facial 02 at times. Resps 40/min, HR: 140 bpm. Transport team coming for baby. Parents kept informed of process. Grunting." By 15 minutes of age N was breathing independently, which is late. Her breaths and heart rate were in normal ranges. N's oxygen saturations were continuously monitored from an early stage and, at around 90%, were at the lower end of the normal range prior to her deterioration. Grunting in a newborn baby is a sign of some respiratory distress. From about 05.25 hours N was observed to be breathing spontaneously and her heart rate and oxygen saturations were within normal ranges. She was not in a stable condition because of her poor tone and colour i.e. she was pale and floppy.

62. The specialist neonatal ambulance which covered Ninewells was not available at the time when N was born. It had been despatched to an emergency in the Wick area in the North of Scotland. As a result it was necessary to make other arrangements in respect of the birth of baby N. Doctor Connolly decided that staff at the Neonatal Unit in Ninewells should undertake the necessary transfer of N.

63. From about 05.25 hours the midwives at Montrose CMU were awaiting the arrival of the transfer team. They continued to monitor N. They were very concerned about the poor condition in which N had been born.

64. At about 05.30 hours the midwives commenced an observation chart for N. (Crown production number 10/355Y).

65. At about 05.30 hours the consultant in charge of the neonatal unit, Doctor Rajesh Sharma, was contacted by Doctor Connolly and requested to attend the unit, which he agreed to do.

66. At about 05.40 hours the midwives noted, amongst other things, "Neonatal team en-route".

67. At about 05.45 hours Doctor Sharma arrived in the neonatal unit.

68. At about 05.45 hours an ambulance transfer was requested for N by staff in the neonatal unit. This required to be ordered from the ambulance depot within the Ninewells complex.

69. At about 05.50 hours the midwives noted N's condition as "Grunting continues but less frequent. Remains pale and floppy, unresponsive". Her heart rate, respiration rate and oxygen saturations remained normal; the midwives remained concerned as to whether N was getting enough oxygen.

70. At about 06.00 hours the midwives noted "Obs stable but remains pale and floppy".

71. At about 06.05 hours an ambulance arrived at the neonatal unit. It did not have an incubator and was considered unsuitable by Doctor Connolly and the ambulance driver. A second ambulance was requested.

72. At 06.05 hours Doctor Sharma and Doctor Connolly ought to have appreciated that N's condition as reported by the midwives to Doctor Connolly shortly after the birth gave rise to a situation of considerable urgency. Doctor Sharma did not obtain an update on the condition of baby N from the midwives at Montrose CMU and did not take prompt measures to provide assistance to them.

73. At about 06.20 hours the midwives noted "Obs stable. No change in condition. Awaiting paeds". They expected the team from Ninewells to arrive in early course.

74. At about 06.30 hours the midwives noted "Mum has quick cuddle with baby."

75. At about 06.35 hours the second ambulance arrived at the neonatal unit.

76. At about 06.40 hours the Neonatal team consisting of Doctor Connolly and ANNP left Dundee.

77. At about 06.40 hours the midwives noted "Breathing appears more shallow. Respiratory rate 38/min". The fact that breaths had become shallower meant that N's condition was deteriorating.

78. At about 06.45 hours the midwives noted "Ventilation breaths given as HR [heart rate] [below] 100". N's heart rate increased but she remained pale and with poor tone. They moved N to a larger room so that there was more space in which the Neonatal transport team could work on arrival. They continued to assist her with bag and mask.

79. At about 07.05 hours midwife Menzies, concerned at the visible deterioration of N, called the Neonatal Unit at Ninewells to seek an indication as to when the Neonatal transport team would arrive. She stated that N was deteriorating. There were decelerations in her heart rate and her breathing was becoming shallower. She was told by the senior midwife on duty that the team would be there soon.

80. At about 07.10 hours the midwives noted "CPR commenced as HR absent. resps shallow, gasping pale ++ floppy ++". In other words N had arrested.

81. At about 07.15 hours the midwives noted "Neonatal team arrived." Doctor Connolly and his colleague commenced advanced life support straight away. She

was intubated with an endotracheal tube. An umbilical venous catheter was inserted. CPR and IPPV were continued. Adrenaline, dextrose and a sodium chloride fluid bolus were given.

82. At about 07.30 hours N had another arrest as the Neonatal transport team worked on her. Efforts at resuscitation continued.

83. At about 08.10 hours Doctor Sharma requested a police vehicle to transport him to Montrose CMU.

84. These various measures were repeated and others also employed including the provision of sodium bicarbonate to counter possible acidosis. At one stage N's heart rate was re-established at above 100 bpm. It then began to fall below 60 bpm. The heart rate could not be maintained despite these strenuous efforts at resuscitation. Doctor Connolly spoke with KS and GS. He explained what had been done for N since his arrival in the CMU. He secured their agreement to stop resuscitation measures for N.

85. At about 08.35 hours N was pronounced deceased by Doctor Connolly.

86. At about 08.50 hours a police car arrived at Ninewells to transport Doctor Sharma to Montrose CMU. He was advised of the death of N whilst en route.

87. At about 09.15 hours Doctor Sharma arrived at Montrose CMU. After being briefed by Doctor Connolly, he spoke with KS and GS and provided them with further explanations.

88. The extent of communication between the specialist unit at Ninewells and the Montrose CMU after the birth of N was inadequate. The midwives were not sufficiently supported from Ninewells. As result the paediatricians were not

fully informed and did not sufficiently monitor the condition of N in the crucial first 90 minutes of her life.

89. The neonatal transport arrangements were inadequate. The failure to include a 999 ambulance option curtailed significantly the choices open to the consultant paediatrician in charge at Ninewells when the birth of N in unexpectedly poor condition occurred. As a result she was rendered less assistance than would have been provided to a baby born in similar condition at home, or in an AMU.

Facilities for resuscitation of babies at Ninewells.

90. If a term baby like N had been born in the Ninewells AMU or in the labour ward unexpectedly unwell and required as much as 10 minutes resuscitation, specialist paediatric medical staff would have been called to the resuscitation. It would take medical staff about 2 minutes to get to either the AMU or the labour ward from the neonatal unit. If called to a resuscitation the paediatrician would take charge and would decide what needed to be done to help the baby. A blood gas test could be done. The baby could be given CPAP as the necessary device is available at Ninewells. All of the advanced life support measures Doctor Connolly took when he arrived at Montrose CMU, and others for which equipment and drugs were available at Ninewells, would have been available to be used within minutes had the birth happened either in the labour ward or the AMU at Ninewells.

Post mortem findings re N

91. The post mortem was carried out by Doctor Paul French on 5th October 2012. The report is Crown production number 1. The cause of death was certified as I.(a) Peripartum Hypoxia. N was a well grown female Caucasian neonate with a body weight between the 75th and 91st centiles. On examination the nuchal cord was found to be normal. Internal and external examination of the neck of N disclosed no signs of compression or constriction. She was found to be pale and floppy.

She was a normally formed infant. Her muscle bulk was normal. On internal examination the thymus gland had a slight pallor but there were no congenital abnormalities of the organs. On microscopic examination the placenta appeared healthy. Neuropathological examination of brain samples showed evidence of early injury due to ischaemia. The conclusion as to the cause was of death was based on the clinical presentation and the neuropathological findings.

Interpretation of the condition of baby N during her life.

92. From about 40 minutes after her birth, N was making internal compensations but was gradually failing to maintain observable signs. There was about a 90 minute window within which if she had been subjected to prompt specialist treatment of the kind available within the specialist unit at Ninewells there was a lively prospect that she would have survived at least in the short term. After that every five minutes up to 2 hours her prospects decreased. She was starting to fail from about 06.40 hours presaging her collapse at about 07.10 hours. If a 999 ambulance had been dispatched promptly after the midwives reported her condition to Ninewells, N would have been treated in the specialist unit there within the 90 minute window before her observable signs began seriously to deteriorate.

Subsequent Developments: KS's fifth pregnancy

93. In 2013 KS had a further baby and chose to have that child born in the specialist maternity hospital at Aberdeen. That child was born by caesarean section. Even if she had been having a natural birth, she would have chosen to go to AMH to have the baby.

Subsequent Developments: Conclusions of the SCEA

94. A Significant Clinical Event Analysis Review was carried out in relation to the death of N. A SCEA is a shared governance responsibility of the Director of Medicine and the Director of Nursing of NHST. The SCEA meeting took place on 28 January 2013. KS and GS were not invited to attend the SCEA review meeting

as this was a review oriented to professional concerns and processes. The final report of the SCEA review in this case is dated 23 May 2013 and is Crown production number 4.

95. The conclusions of the SCEA review panel, so far as relevant to this Inquiry, were that (a) the standard of care provided to N was acceptable; (b) those present were reassured that the interface and working relationship between Montrose CMU and NHSG Maternity Services was very good; (c) with regard to an assumed delay regarding specialist neonatal transport, after full explanation, that all actions were appropriate and staff made every effort to provide specialist support to the midwives in the CMU; (d) that the system for neonatal transport was appropriate and there was flexibility to manage emergency situations; and (e) the written information available to patients needed to be reviewed.

96. Some follow-up work was done after the SCEA meeting. The SCEA review report failed to address fully the problems identified in the review. The conclusions were inadequate. With regard to the conclusions set in the preceding finding: (a) the standard for care provided to N was less than would have been provided to a baby born at home because there was no 999 ambulance option available as part of the NHST neonatal transport guidelines; (b) Concern ought to have been noted in relation to the deficiencies in the working relationship with NHSG; (c) not all actions of staff in providing specialist support to the midwives were appropriate; and (d) the system for neonatal transport was neither fully appropriate nor sufficiently flexible.

Correspondence with KS and GS following the SCEA review

97. KS and GS received a copy of the SCEA review report under cover of a letter from Doctor Andrew Russell, Medical Director of NHST dated 6 June 2013. NHST production number 7/4 is a copy of that letter.

98. Following receipt of that letter, on 6 August 2013 there was a meeting between KS and GS and the Medical Director and Nurse Director Doctor Margaret Maguire of NHST to discuss their continuing concerns. On 9 August 2013 Doctor Maguire wrote to KS and GS setting out certain actions that NHST had agreed to undertake as a result of the concerns expressed at the meeting. NHST production number 7/5 is a copy of that letter. These actions related to and included antenatal care arrangements with NHSG, the follow up with NHSG in relation to KS's antenatal vaginal bleed, a review of information provided by CMUs to prospective parents on birth site choice, knowledge of ambulance staff on fitting necessary neonatal equipment into ambulances, the need to include fathers in bereavement counselling and seeking clarity on boundary issues and collaboration between NHST and NHSG.

99. On 11 October 2013, Doctor Maguire followed up with an update on the actions that NHST had agreed to undertake. NHST production number 7/6 is a copy of that letter.

Neonatal transport in Scotland: ScotSTAR

100. The ScotStar Neonatal transport service is based in Paisley for the West of Scotland, Edinburgh for the East of Scotland and Aberdeen for the North of Scotland. This is not a "flying squad" service dedicated to nothing other than swift response.

101. As at late 2016 the service had grown over the years in that it had more staff. It did not have more transport. A key performance indicator was that the service aimed to be away from the home base within 1 hour, assuming that is where the dedicated ambulance is at the time. It is now coordinated across Scotland. There is scope for transports to move between regions, if necessary.

102. There are about 1600 uses of the ScotSTAR service each year. The figures had been stable for a number of years. Only about 5% of these were urgent. This is about 80 a year or about in excess of 1.5 per week. Spread is unpredictable and there could be several in one day. There can be long gaps with no emergencies at all.

Subsequent Developments: NHST policy on neonatal transfer – 2016 Guidelines

103. In about April 2015 NHST withdrew from the Neonatal Transport Service.

104. As at March 2016 NHST had prepared revised interim operational guidelines for accessing support for and transfer of newborn infants from community group maternity units to NICU Ninewells Hospital (Crown Production number 17) which were due to go into force at the beginning of November 2016. These revised interim guidelines allowed the use of emergency ambulances in exceptional circumstances as option 4. The circumstances in which that option may be deployed is stated as follows:

> "Although every effort will be made to provide cot-side support as quickly as possible, it may take several hours for support to arrive either from Ninewells Neonatal Unit or via the National [ScotSTAR] Neonatal Transport Service. In exceptional circumstances a 999 ambulance transfer without neonatal clinicians may be considered appropriate although this mode of transfer in itself has inherent risks associated which need to be considered".

105. In September 2016 NHST issued the final revised version of the operational guidelines. The circumstances in which the 999 ambulance option may be used is stated in the same terms as quoted in the previous finding in fact.

106. Under both revised versions of the operational guidelines no maximum number of hours can be put on how long it may take for a clinical team to arrive to support a baby in a remote CMU. Usually it has been possible to get a team to a CMU in a few hours.

Subsequent developments: Procedure for communication of risk – Development of the "My Birthplace" App

107. The "My Birthplace" App has been developed by NHST as an important means of improving communication between midwives and prospective parents. It was launched by NHST in about early 2016. The App is viewable by parents by a google search and is also downloadable.

108. Within the NHST area it is one of the principal means for providing information to midwives for onward communication to prospective mothers. About 20% of expectant mothers would not have direct access to it. In those cases, midwives were expected to go over matters more fully with mothers.

109. There is no specific training given to midwives in its use, though they are made aware of the availability of the "My Birthplace" App. The software had been licenced by NHST from external providers in England who continue to maintain it for NHST. The content can be altered and bespoke elements added as desired for NHST purposes. The text of the "My Birthplace" App is set out in paper form in Crown production number 14/618-624. This states in respect of an ill baby the following:

> "On very rare occasions, the neonatal transport team may take several hours to arrive. In such circumstances, every effort will be made to provide the CMU with onsite support until the transport team arrives."

110. At pages 618-627 of Crown production number 14, a hard copy version of the content of the App, the text refers to both transport of mothers and of sick babies.

111. As at 30 September 2012 NHST processes for communication of risk to prospective parents were inadequate both in relation to birth site choice and water birth. Since then the most substantial attempt to improve such processes was in the development of the "My Birthplace" App. The development of the App was an important step forward in seeking to communicate information to

prospective parents. It is well used by staff and patients. It enables NHST to monitor its use.

112. As at late 2016 the content of the App was inadequate as regards communication of risk in relation to birth site choice and water birth. Prospective parents could not make an informed choice based on the information provided to them through the App.

113. Other methods of communication of risk also remained inadequate. Although it would not be a complete solution, substantial enhancement of the content of the App could play a significant part in improving the extent of communication of risk of birth site choice and water birth to prospective parents.

114. As at 2012 in order to place them in a position where they could make an informed choice, prospective parents ought to have been given the following information within the scope of a structured conversation with midwives which was adequately recorded:

    i. although such events are rare, and despite careful risk assessment designed to ensure that only low risk mothers give birth in a midwife led remote CMU like Montrose, from time to time babies are born in CMUs unexpectedly unwell at term and may require urgent specialist treatment;
    ii. in some cases delay in delivering treatment to such an ill newborn baby may significantly reduce prospects of success and even lead to the death of the baby;
    iii. the facilities available at a midwife led remote CMU like Montrose in the event that the baby was born unexpectedly unwell at term are limited in nature as there is no specialist obstetric or paediatric care available on site;
    iv. if a baby is born unexpectedly unwell at term in an AMU or a specialist hospital like Ninewells she will have access to specialist care within a few minutes;

v. a seriously unwell baby would have to be taken to the specialist obstetric or paediatric care units at Ninewells Hospital, Dundee;
vi. there is no specialist recovery service that can be deployed at short notice to take a seriously unwell baby to specialist obstetric or paediatric care; and
vii. the period of delay that may occur in taking a seriously unwell baby to specialist care or in specialist assistance arriving at Montrose CMU can extend to several hours.

Subsequent Developments: Use of telemedicine in NHST CMUs

115. In about early 2016 a video conferencing link between the NICU at Ninewells and Montrose CMU has become available. This has allowed for greater information to be available to the specialist practitioner at Ninewells. Though the picture quality is moderate it is possible to observe the sick newborn so that the specialist clinician at the unit at Ninewells can observe the baby. This allows some appreciation of the colour of the baby and improves understanding of the baby's condition.

Subsequent Developments: Use of Harnesses in NHST

116. Since about mid 2016 special harnesses are now available that allow a small baby to be strapped securely in an ambulance in the event that there is a need for emergency transfer to Ninewells.

The use of cooling for babies who have potential hypoxic damage

117. In about the last ten years clinicians in specialist centres have developed the use of cooling for babies born with potential hypoxic damage. Midwives in a remote CMU would not be expected to initiate cooling of a baby who had suspected hypoxic damage.

Subsequent Developments: near miss in 2015

118. In about 2015 there was a further incident involving a baby born in a remote CMU within the NHST area of operation which resulted in a long wait for ambulance after the birth. This incident did not involve a baby in an unstable condition but it took some five hours to retrieve the baby.

119. Following this incident the NHST head of midwifery brought pressure to bear that resulted in a change in operational guidelines within NHST so that a 999 ambulance could be made available in exceptional circumstances. This was reflected in the revised guidelines in findings 104 to 106 above.

Communication of risk and birth site choice

120. The information provided to prospective parents should include factual material about the limited available facilities in a remote CMU for those classified as low risk. This should include the beneficial aspects including that the care is midwife led and may be a more convenient and pleasant environment. There should also be clear information about what is not there such as specialist staff and equipment. It ought also to be made clear that the classification as low risk does not exclude a catastrophic event occurring either to the baby or the mother. In that event there may be a delay in transfer for specialist and intensive help. That delay would be much shorter if the birth occurred either in an AMU or a specialist hospital unit.

NOTE

Introduction

[1] The hearings in this Inquiry took place on the following dates: - 3, 4, 5 and 6 May, 12, 13 and 14 September, 3 October, 1, 2, 3 and 14 November, 12 and 19 December 2016 and 23 January and 2 February 2017. Appendix 1 contains the details of the witnesses who gave evidence including some cross references to the printed notes.

[2] I have referred to prospective parents when discussing the issues of provision of information about birth site choice and water birth. I have used this expression to acknowledge the sensitive and engaged role of baby N's father GS in this case. It should be borne in mind when reading the findings in fact and the discussion that follows that KS as the mother of N was the patient at all times. Nothing that has been stated is intended to detract from that basic position.

Observations re conduct of the Inquiry

[3] The parents attended every day of the Inquiry. They were unable to secure legal representation and GS conducted proceedings on behalf of both of them. While GS made a significant contribution to the Inquiry, it is a matter of concern that his lack of legal training left him at a significant and obvious disadvantage when pitted against expert counsel who is highly skilled and experienced in dealing with cases of this nature.

[4] This disadvantage was compounded by the obvious lack of experience of those conducting these proceedings for the Crown which led to a rather superficial approach. This lack of experience was manifested repeatedly. For instance, in the course of the

Crown's midwifery expert Professor Humphrey's evidence it emerged that the Crown had not shown her at any stage in advance, let alone asked her to comment on, the expert midwifery report of Doctor Sanders lodged on behalf of NHST. It was necessary to adjourn to allow the witness to see the report of Doctor Sanders so that she could give evidence about its terms. This resulted in significant delay as it was necessary to recall Professor Humphrey who was about to depart for a prolonged foreign trip for professional purposes. Similarly the report produced by the Crown did not fully focus the criticism made by Doctor Turner in the witness box of the consultant on call. As a result NHST had not proposed to call Doctor Sharma as a witness and the Crown had not arranged to call him. He required to be called out of sequence. Other witnesses had to be taken out of sequence in order to try to make progress.

[5] This is not a personal criticism of either of the deputes who were involved in the conduct of this case. There was an unfortunate combination of inexperienced depute, unrepresented parents and expert counsel for NHST. There was not equality of arms. As a result I found that I required to intervene rather more than I would have wished in the course of the hearing of evidence in order to try to compensate for the lack of specialist assistance.

[6] On a number of occasions counsel for NHST undertook some further questioning of witnesses at my prompting. He demonstrated great fairness of mind in his approach to his responsibilities to the Court in the course of this Inquiry without in any way detracting from his responsibilities to those instructing him.

[7] Although I took a more inquisitorial role than I would have preferred, this was not a substitute for equality of arms in an Inquiry of this length and complexity. I could not consult with expert witnesses to determine the extent of dispute between them. I did request additional information, for instance, about the nature of midwifery training on provision of information to prospective parents about choice of birth site. Some additional detail was provided to the Inquiry in response to those requests.

[8] There were a variety of reasons for the length of the Inquiry. Some of these related to difficulties with the availability of expert witnesses who required to travel significant distances and had other professional commitments. There was further unavoidable delay due to an unfortunate period of ill health suffered by the Procurator Fiscal Depute who had taken over the conduct of this Inquiry for the Crown.

[9] I regret that it has taken me some time to write up this determination. The Inquiry was spread across several months and this added to the amount of work required to complete writing it up. Owing to pressures in the court schedule, there was no opportunity for judicial case management of this Inquiry. If there had been, it could have been significantly shorter in length. That would have required that resources were made available to have meaningful preliminary hearings at which the presiding sheriff could, by virtue of advance reading time, be in a position to engage with the material. In this case this might have involved the court in ordering meetings of experts to narrow down the extent of dispute between, or amongst, them when they give evidence in court. I appreciate that this will be one of the last of the inquiries under the old legislation but I have thought it right to mention these matters.

Agreement of evidence

[10] The parties entered into a Joint Minute agreeing certain parts of the evidence. The parties also furnished the court with an agreed timeline in relation to the events of 29 and 30 September 2012. I have expanded that timeline substantially in preparing the findings in fact.

Witnesses

KS – Mother of N

[11] KS thought it was important that there be an FAI into the death of N. She did not think that there was enough information available as to the danger that might arise in places like Montrose CMU. She had been under the impression that if her baby was born sick an ambulance would be called, and if it were an emergency the baby would be taken to hospital for specialist care quickly.

[12] She thought that the medical help offered to Montrose CMU was insufficient. The information given to her about an appropriate place to give birth was not sufficient to allow her to make an informed choice.

[13] KS was asked to look at Crown production number 14 which was a print out of the textual content of the "My Birthplace" App now used by NHST. This was not available when she was pregnant with N. She thought the information at p 627 was inadequate. Although it states there that it may take several hours for medical help to arrive, she did not think that this was sufficiently prominently stated.

[14] KS was not aware that in some medical quarters water birth was viewed as an experimental technique. She had found use of the birthing pool to be helpful for pain relief in labour in this and her earlier pregnancies.

[15] KS thought that when it became clear that N was in serious difficulty there should have been a blue light ambulance sent straight away as that was the quickest way to get help for baby N.

GS – Father of N

[16] Aged 30 at date of giving evidence, he had been present throughout KS's labour with N, the birth of N and her death.

[17] He wanted there to be an Inquiry because he thought that the NHST SCEA had raised issues and more faults than he had previously realised might have occurred. He and his wife had been told about it but had not had the opportunity to contribute to it when it was ongoing. He was particularly concerned about information given to prospective parents about emergency response times and that the Montrose CMU was in his words "an acceptable emergency response black spot". He had had a similar expectation to KS that an emergency response team would have attended promptly if the baby had been ailing when born. The information provided was not sufficient in his view to allow an informed choice of birthplace to be made. These issues had been discussed in "relaxed terminology".

[18] He contrasted the position of Montrose CMU with a home birth where he understood the procedure was that there would be a 999 emergency response.

[19] GS could not recall any discussion with professionals about the safety or otherwise of birthing in water.

[20] GS was asked to look at the printed version of the "My Birthplace" App (Crown production number 14). GS thought he had not been made aware of even the limited information relating to neonatal transport for ill babies in the "My Birthplace" App at the time when KS was pregnant with N. He did not think that the words which are quoted in finding in fact 109 above were a sufficiently clear statement reflecting the true position as it had been explained in the SCEA report. He did not consider that NHST were being open with prospective parents about the consequences of the choice they make regarding birth site. GS also thought that the last sentence quoted referring to support was not accurate as the only support given to KS and N had been by phone call.

[21] On about 17 March 2016 GS had made a call to Montrose CMU which he recorded, the content of which is contained in the transcript that is production number GS1. In the call GS had pretended to be a current expectant father. He was told that transfer to Aberdeen would take about 25 to 30 minutes. He was concerned at the accuracy of the information being given to a prospective father. He accepted in cross that his inquiry had been in rather broad and unspecific terms.

Midwife 2 – Suzanne Knox

[22] She was aged 31 when she gave evidence on 3 May 2016. Midwife Knox holds a degree in midwifery and a diploma in higher education in midwifery. She qualified in 2006 and started work as a midwife in February 2007. Her midwifery training included

work on basic resuscitation of newborn babies and support for unstable infants. She had had continuing professional training in these subjects including yearly updates in neonatal resuscitation. In September 2012 she was based at Montrose CMU. As at May 2016, when she gave evidence, she was working as a community midwife in Forfar.

[23] Midwife Knox was asked about information given to prospective parents about transfers during labour. If parents asked they would be told transfer to Ninewells would take about 1 hour. This included not just travel time but also the time required to organise the transfer. An urgent neonatal emergency would require some organisation because there is no flying squad available to rush immediately to the location of an urgent situation relating to a sick newborn baby.

[24] Prospective parents were not routinely given information about neonatal transfers because these were rare (about 4 in 1000). If they asked for information it would be provided. They would be told that midwives were not trained for resuscitation and that on the rare occasion it might be required it might take "a couple of hours" for a further support team to come to the CMU. Perhaps unsurprisingly, she was quite vague on this point. She had had to call for emergency assistance on only two occasions in her career.

[25] As to record keeping, she thought there was now some auditing of notes to make sure that there has been a documented discussion of neonatal transfer. Since the latter part of 2015 her practice as a community midwife was to tell prospective mothers that neonatal transfer might take several hours. This was done at the time a birth plan was discussed, usually at between 34 and 36 weeks. She had also been encouraging mothers

to use the "My Birthplace" App since the latter part of 2015. The guidance given from late 2015 reflected both changes in the neonatal transport service and the introduction of the "My Birthplace" App.

[26] Midwife Knox was on duty when KS came to Montrose CMU on 29 September 2016. She spoke to the clinical notes relating to her attendance with KS that afternoon. A variety of signs were checked and found to be normal in the first instance.

[27] At about 15.55 hours an external CTG was commenced. Midwife Knox monitored the readings produced and tried to interpret them. At about 16.55 hours she experienced some difficulty. She was unsure whether the baseline was high with drops in it, or whether the lower line was the normal baseline and the higher line was accelerations due to foetal movements. The former would be concerning as indicative of foetal distress but the latter would be reassuring.

[28] As she could not speak to the registrar at AMH midwife Knox continued the CTG till about 17.25 hours when she was satisfied that there was no cause for concern. If she had remained concerned she would have sent KS to AMH.

[29] With respect to the process of obtaining a CTG trace, she explained that KS was asked to press a button which made a mark on the CTG trace each time she felt the baby move. This allowed the midwife to tell how the heart rate corresponded with the movement of the baby. Crown production number 18 is a copy of the CTG for KS which is four pages long. The first two pages show the section that was faxed to AMH at about 16.55 hours. This was the section that midwife Knox found hard to interpret. It was not clear whether the bottom line is a base line with accelerations or whether the upper

section is a base line with decelerations. From about 17.00 hours the base line started to settle and the trace was discontinued at about 17.25 hours.

[30] When she was uncertain about the CTG trace she followed standard practice by faxing part of it to AMH. She continued the trace and became confident in the later part of it, even in the absence of any response from AMH (Crown production number 6/354Y). It was likely that if the CTG had been unsatisfactory the registrar would have requested to see KS if she was not yet in established labour. There was no reason to expect a problem prior to the birth.

[31] Although midwife Knox's shift finished at about 20.00 hours, and she handed over to Ms Menzies, she remained on call and slept over at the Montrose CMU. At about 05.00 hours she got a call from Ms Menzies to come on duty. When midwife Knox arrived at the unit KS had returned to the Montrose CMU and was in the birthing pool in the advanced stage of labour. The notes in Crown production number 11 from page 355(y) were made by midwife Knox. N was born at 05.10. At 05.11 her APGAR score was noted as 2 and N was pale and floppy. The umbilical cord was clamped and cut and N was taken to the resuscitaire. The APGAR score and the condition and tone of N were all of concern. Most babies soon after birth have an APGAR score of 8 or 9 out of 10. In this case the score of 2 reflected a good heart rate. The other measures of appearance, tone and reflexes scored nil. The midwives applied inflation breaths with bag and mask and noted good chest wall movements. The midwives were breathing for N, in effect.

[32] Midwife Knox was shown the NHST Community Midwifery Unit operational guidelines for accessing medical or clinical support for the newborn infant. These are to

be found in Crown production number 13 at 550ff. The guidelines were not strictly followed in that midwife Knox beeped Doctor Connolly in the normal way. She told Doctor Connolly that he was being contacted in relation to an unstable newborn baby. The details provided by her reflected the note of 05.19 hours. Midwife Knox and her colleague were very concerned about N. She observed, tellingly, that there was nothing they could do other than continue neonatal resuscitation.

[33] Both midwife Knox and midwife Menzies spoke to the parents at separate times to inform them of what was being done.

[34] Midwife Knox's experience was that a blue light ambulance called for a mother who required transfer to Ninewells would usually take about 45 minutes to get from Ninewells to Montrose CMU. Her recollection was that Doctor Connolly had called back to say that they were on their way. At about 05.50 hours it was noted that N remained pale and floppy. Although baby N's heart rate, respiration rate and oxygen saturations remained normal, she remained concerned as to whether N was getting enough oxygen. This was an unusual situation. This had been communicated to Doctor Connolly. The midwives were not in a position to do very much for N beyond monitoring her and assisting her to breathe. From about 06.40 hours N was beginning to deteriorate and at about 07.10 hours N had an arrest a few minutes before the arrival of the transport team.

[35] Had N been born at home pale and floppy making no respiratory effort and if she did not respond to initial resuscitation, midwife Knox would have phoned 999 and got the baby to hospital as soon as possible.

[36] Midwife Knox had been present at the SCEA which took place into the death of N.

[37] After birth the heart rate had not been noted as dropping below 100 prior to 06.45 hours. As regards respiration rate, the range of acceptable breaths is 40 to 60 breaths. Most of the time N was within that range when midwife Knox observed her. These observations did not match the presentation of the baby in front of the midwives at the time. There was no tele-medicine facility in 2012 to allow specialists to observe babies but there is a video conferencing unit at Montrose CMU now. She could not remember the number of conversations she had with Doctor Connolly prior to his arrival.

Midwife 1 - Sandra Menzies

[38] Midwife Menzies qualified as a general nurse in 1975 and as a midwife in 1977. She had worked at Montrose CMU since 1982. She retired in 2012.

[39] On examination after arrival at about 02.00 hours on 3 September 2012 KS was found to be in the early stages of labour and there were no abnormal signs. She was not concerned that the pool temperature was 38 degrees as it would cool quickly after the mother entered it. She had called midwife Knox at about 05.00 hours as she thought that the second stage of labour was imminent. She had noted that at 80 bpm the foetal heart rate was low but was reassured when it slowly increased after that. Apart from the single low reading of 80 bpm, intermittent auscultation of the foetal heart rate had not suggested prolonged deceleration of heart rate. There were no signs of meconium in the

waters or of any vaginal bleeding. The second stage of labour, commencing at about 05.00 hours, was very quick in this case. The cord was loose and removed from around the baby's neck very soon after birth. Inflation breaths are provided using bag and mask at higher pressure than ventilation breaths. The five inflation breaths used in this case was not an unusually large number.

[40] The notes of the birth had been written up retrospectively later in the morning because the midwives had had to resuscitate baby N. She and midwife Knox had made notes of the relevant times on pieces of paper so that they would be able to write up the notes when the opportunity arose. She could not write up the notes as she went along for understandable reasons given the urgency of the medical situation that presented itself. I accept that the notes accurately reflect the events that occurred during the birth of N.

[41] Although she was later told of a small tear in the cord, she had not noticed this at the time of the birth. N had been born unexpectedly pale and floppy. She had expected N to turn pink once she had been resuscitated. When this did not happen in the first ten minutes or so after birth she began to be seriously concerned for the baby. A baby born in normal condition would be quite flexed. N's poor tone meant that when her arm was lifted it just fell back down. She was also white in colour. Midwife Menzies had experience of babies born in this condition but who quickly recovered, so that they became flexed and turned pink in colour within a few minutes of being born. The cord was deliberately cut at a length that enabled the Neonatal team to insert an umbilical catheter.

[42] She appreciated at an early stage that N had been born in an unexpected condition and that her life was in danger. She applied suckers to the nose and mouth to remove any secretions. She did not consider that there were any observable secretions that obstructed N's breathing. The baby was placed in the correct position to prevent any obstruction to her breathing. In the course of the call to Ninewells which was made by her colleague but which she overheard N began to breathe spontaneously. She thought it very unusual that a baby who had a good heart rate and was making a respiratory effort should be in such a poor condition, i.e. very pale, with poor tone and not responsive. It had taken about 15 minutes for baby N to breathe independently. This was an unusually long period of time. Once baby N was breathing for herself she was kept warm by covering her and using the warming equipment above and below the baby that was part of the resuscitaire. At no stage did N's tone and colour improve.

[43] At about 07.05 hours midwife Menzies called the Neonatal Unit at Ninewells such was the level of her concern about the deteriorating condition of N.

Doctor Paul French

[44] He carried out the post mortem examination of N. He is a consultant specialist paediatric pathologist based at the Southern General Hospital in Glasgow. Aside from the positive findings in his report he had carried out a series of investigations to seek to identify a variety of possible causes or contributory factors in the death of N. There was no pathological finding to support the occurrence of placental abruption. Histological examination disclosed no evidence of amniotic fluid aspiration (inhalation of contents of

the womb prior to birth) or broncho-pneumonia (infection in the lungs) or myopathy (disease of the muscle). Electro microscopy disclosed no abnormality. No biochemical or micro biochemical abnormalities were identified on examination. Toxicological analysis was negative for the presence of drugs or alcohol.

[45] Everything known about N prior to birth and the findings at post mortem suggested that all was well up to labour yet she was born unexpectedly pale and floppy. As a result Doctor French concluded that some event occurred around the time of delivery that caused the hypoxia to the brain. That something, which caused lack of oxygen to the brain, could not be more precisely identified but may have happened prior to delivery or shortly after the time of delivery. There were lots of potential causes but his examination had not identified any particular cause of the failure in or impairment of oxygenation of the brain. He could not say whether any potential cause was more likely than any other.

[46] He was asked about Doctor Sanders' theory that there was a haemorrhage from the spinal cord. While he agreed that this was a possibility he did not consider that his findings added support to this theory. He accepted he might have missed a small tear. He had received 31 centimetres of cord. He expected the whole cord to have been about twice that length at N's gestation but he did not expect to get the whole cord in a case of this kind.

[47] There were no findings at post mortem that would support a suggestion of drowning due to have been born in a birthing pool other than a biochemical finding of a low vitreous sodium level. He made reference to an article in the form of a clinical report

published in the official journal of the American Academy of Paediatrics in April 2014 which recorded the views of two eminent committees of paediatricians on the one hand and obstetricians and gynaecologists on the other as follows:-

> "…the practice of immersion in the second stage of labor (underwater delivery) should be considered an experimental procedure that should only be performed within the context of an appropriately designed clinical trial with informed consent."

He merely drew attention to this report and did not himself express a view on it as a pathologist.

[48] Doctor French did not consider that the documented bleeds suffered by KS earlier in her pregnancy (at 8 and 28 weeks) would have had a significant adverse effect on N. There was nothing at post mortem examination or investigation to suggest abnormal growth.

Doctor Nicholas Connolly

[49] Since January 2015 he has been a consultant paediatrician in community child health within NHST. In September 2012 he was working as a specialist registrar in Ninewells. He had some training in neonatal transport. He was involved in medical education in addition to his clinical role. He had experience in providing support to the CMUs within the NHST area which were based at Montrose, Arbroath and Perth.

[50] As at 30 September 2012 he was familiar with the operational guidelines for the NHST CMUs. He was on duty in the neonatal unit when the midwives at Montrose

CMU contacted the unit after the birth of N. He responded promptly when he received the bleeper message.

[51] When he spoke to the midwives, he had noted that baby N was experiencing respiratory distress. He had noted "flat at delivery. 10 minutes of resus. Now tachypneic and grunting.. Remains pale, floppy and dyspneic". He explained that community midwives such as those at Montrose CMU were trained in resuscitation techniques. While some might be trained in further more specialist steps this was not normally the case. For instance, a midwife would not normally administer proteins through a tube inserted into the lungs.

[52] Doctor Connolly recalled only two calls with the midwives in Montrose. In the second one he had advised the midwives to keep the baby warm and that transfer would be arranged. He was aware that heart rate and oxygen saturations were within normal ranges. He was clear that, on the information he had at 05.21 hours (i.e. after the first call to the midwives), that baby N would definitely require to be transferred to Ninewells. He knew that the midwives were worried about her. He did not appreciate the situation was so serious that he could predict that baby N was going to collapse while awaiting retrieval from Montrose CMU. After the first call, he was made aware by nursing staff that the transport team was in Wick. In consequence, he required to consider alternative arrangements for the retrieval of N.

[53] It would be quicker for his unit at Ninewells to undertake the transfer rather than try and arrange for one of the other Scottish Transport teams based in Edinburgh and Glasgow for assistance. Those teams were further away and he was aware that an

ANNP (Pam Irving) was available to travel with him to the Montrose CMU. He called the consultant on call Doctor Sharma who agreed to come in to look after the neonatal unit. At the time Doctor Connolly was also providing cross-cover with the paediatric ward and required to inform those in that ward of what was happening. He also had to deal with a variety of other matters. A member of the nursing staff in his unit made the call requesting an immediate ambulance to the depot at Ninewells at about 05.45 hours. He expected an ambulance to arrive within 20 minutes to 30 minutes of being requested. There was a pre-packed bag of equipment available to be taken in the ambulance along with a drugs bag. Doctor Connolly had been part of an *ad hoc* neonatal transport team of this kind on a number of earlier occasions.

[54] When the ambulance arrived at his unit at about 06.05 hours, the driver told him it was a normal front line ambulance and not a neonatal transport vehicle. As such it did not contain the fixings required to allow an incubator (which would be needed to bring baby N back from Montrose CMU) to be securely fixed within the ambulance. He was concerned that it was unsafe to travel with a heavy incubator that was not properly secured. The ambulance driver told him that a neonatal transport ambulance was in the School Road ambulance station. He instructed the driver to go and get it. He did not know why the first ambulance that was sent was not a neonatal transport ambulance. At this point he did not think that any delay in getting to Montrose CMU would make a difference. He does not appear to have considered going to Montrose in the first ambulance without an incubator so that at least some specialist help and support would

arrive at the earliest time. He did not check on the condition of N at the time of this decision.

[55] His notes of his attendance at Montrose CMU, which are in Crown production number 11, were written in retrospect. He had no idea prior to arrival that baby N would be in cardiac arrest. Along with ANNP Irving he immediately took over resuscitation efforts from the midwives and commenced advanced life support. He also spoke with his superior Doctor Sharma for advice and told him he needed to come to Montrose. The decision to stop attempts at resuscitation was taken after discussion with N's parents.

[56] He did not know why N had arrested and died. He noted that he did not think it was a pneumothorax. There was a blood gas analyser at Ninewells that could have been used to do a blood gas test to determine whether there was acidosis present. That equipment was not available at Montrose CMU.

[57] He could not say whether N would have survived if she had been born in Ninewells but he thought that her chances of survival would have been greater because of quicker access to specialist services. He had thought about this case a lot. He did not think he would have made different decisions based on what he knew at the time.

[58] In cross by GS he stated that he had not expected N to collapse. It was unusual, in general, for a baby to have heart rate, respiration and oxygen saturations at the level she did once resuscitated and suddenly get much worse.

[59] In cross by counsel for NHST he outlined that he saw his task as being to stabilise N at Montrose before any transfer to Ninewells. He was concerned that outcomes are

much worse if a sick baby suffers an arrest while travelling in an ambulance. He had only occasional experience of a sick newborn baby being brought into a hospital in an ambulance though he could recall going to assist after a sick baby had arrived at hospital. He had very little experience of a baby that had not improved following on resuscitation. He had simply not expected baby N to collapse in the way she did after responding to initial resuscitation. He would have expected some warning that the baby was going to collapse and that the midwives would have contacted him. He had never had a 999 ambulance called to a remote CMU. He had never gone to transport a baby and not been able to bring the baby back alive. He was unable to offer an explanation for what had happened other than to say that sometimes a death like this happens (both in hospital and elsewhere) and it is not fully explained why the baby came out unwell. He accepted that sometimes speed of response can make a difference but sometimes it does not. He did not think it would have made a difference to N if he had arrived earlier but he just did not know.

[60] He explained that the five elements observed when providing an APGAR score were heart rate, colour, grimace, tone and spontaneous breathing. Each category was scored out of two. His recollection was that he had a second discussion with the midwives in the period between 05.25 and 06.35 hours when he departed in the ambulance. It had not been recorded and he thought it was before 06.00 hours as his practice would be to tell the midwives in the CMU what was going to be done. He had not viewed the situation as a clearly deteriorating one at the time. He had not expected to be involved in advanced resuscitation when he got to Montrose.

[61] Under reference to Doctor Turner's report he did not think that there had been any delay in the period 05.19 to 05.45 hours as necessary arrangements to go to Montrose were being made then. He thought the situation he found himself in on arrival at Montrose was extreme and unusual. He had thought the purpose of his trip to Montrose was to bring baby N back. Therefore he did not consider going without an incubator at 06.05 hours. He agreed with Doctor Turner that "a significant number of cases of perinatal hypoxia remain unascertained or unknown." As a result he thought that it was very hard to be definitive about what he could have done to help baby N. He was not sure if his earlier arrival might have helped. He accepted it might have made a difference but he did not know. He agreed that baby N probably had persistent respiratory and metabolic acidosis which may have been correctible. He thought that Doctor Turner's views in his report were expressed with the benefit of hindsight and knowing what actually happened. He thought that every case was different. There might be babies that should simply be rushed from a remote CMU to the main hospital facility in a 999 ambulance but there might also be occasions when that might simply add further risk and complication in that some sick babies needed stabilisation.

[62] In re-examination he maintained that even with the benefit of hindsight he would have acted in the same way in the circumstances. The various adverse signs reported to him at Ninewells by the midwives did not cause him to think that the baby was about to collapse. He thought he needed to get there quickly but that it was not a "drop everything and go" situation.

ANNP Pamela Irving

[63] She had been involved in neonatal transport since about 1991. She had taken in part in about 40 or 50 such transfers.

[64] She formed part of the transfer team with Doctor Connolly. She had fetched the transport incubator and checked that it was charged prior to departure. When they arrived at Montrose her role was to support him by getting equipment ready to intubate baby N and to pass an umbilical line into her umbilicus. She also made up medications and fluids that were given to baby N. She continued to assist until treatment ceased.

Doctor Rajesh Sharma

[65] He gave evidence over a live link from Abu Dhabi on 3 November 2016. The link was at times unreliable and contact was lost several times for technical reasons. Despite these difficulties, his evidence was capable of being fully understood.

[66] He did his initial medical training in India and came to work in the United Kingdom about 1999. He is a member of the Royal College of Physicians in paediatrics and child health and a fellow of the Royal College of Paediatrics and Child Health. He had been a neonatal consultant with NHST at Ninewells from September 2009. He left to go to work in Abu Dhabi in December 2012. As at 30 September 2012 he was serving his notice period and living in hospital accommodation at Ninewells.

[67] When he was contacted by Doctor Connolly he was close by and got to the Unit at about 05.45 hours. At that point he took charge. He consulted with Doctor Connolly and nursing colleagues who were on duty. When Doctor Connolly called him he was

not expecting a transfer request. He was told that the neonatal transfer team was out at Wick. He consulted others in the team before deciding how to proceed. He decided he should remain at Ninewells as there were about 20 sick babies in the unit at the time.

[68] He did not contact the Montrose CMU himself but relied on the information provided by Doctor Connolly. From the observation of vital signs reported to him he took the view that this was a stable baby that required to be brought in to Ninewells. This informed his approach that morning.

[69] He did not consider asking for an update from Montrose. He relied on the midwives to tell him if there was a serious deterioration in baby N's condition. He thought that if baby N remained pale and floppy for a couple of hours she still would be in a stable situation.

[70] His recollection was that he received a call at about 06.05 hours to inform him that the ambulance that had arrived did not have an incubator and it would be quicker to fetch a properly equipped ambulance than to try to fit equipment to the first ambulance. He did not consider whether Doctor Connolly and ANNP Irving should travel to Montrose CMU at that time even without specialist retrieval equipment. He recalled that he was told by a member of the nursing staff that there had been a dip in N's observations. He did not recall speaking to the midwives at Montrose. They had called to inquire about the arrival of the *ad hoc* transfer team and had reported the dip in observations.

[71] When Doctor Connolly called to report that N was in a state of collapse when he got to Montrose he relied on him to follow protocol in his efforts at resuscitation. Doctor

Connolly performed these tasks every day at Ninewells so he confined himself to some points of advice at that stage. He arranged other cover for the unit so he could leave as soon as possible. He was en route when Doctor Connolly called to say that N was dead. There was nothing more that could have been done medically in the circumstances. He had decided to set off at a point when he might have been able to assist. When cross examined by GS he accepted that if N had been born at Ninewells she would have been subject to much closer monitoring.

Doctor Andrew Russell

[72] As at the date of giving evidence he was Medical Director of NHST. As such, he had responsibility, along with the Director of Nursing, for the clinical and care governance of NHST. His responsibility related to the governance of the medical workforce (including both employed and contracted staff) and to ensuring that the standard of care was at a level considered to be appropriate. He also had regulatory responsibility as the GMC's responsible officer for Tayside. NHST employs some 14,500 people and has a budget of about £950 million. He worked closely with the Director of Nursing. He stressed the importance of his interaction with the Director of Nursing at the level at which he dealt with matters like this within NHST.

[73] He had arranged for the SCEA review in this case. Such a review took place in cases where it was thought that a particular event might lead to the identification of the need for organisational and structural change going beyond the individual practice of particular specialist groups of practitioners. Reviews of this kind are managed through

the Clinical Governance and Risk team. That team would be involved in ensuring that any recommended changes were actually carried through after the SCEA review had occurred. The purpose was to provide constructive challenge to practitioners. The review was done by a panel of various interested parties within NHST who had not been directly involved in the particular clinical event. Representatives of NHSG were invited but declined to attend shortly prior to the SCEA meeting.

[74] He had played a leading role in the SCEA review process in relation to baby N. He had sought to formulate issues of concern at the SCEA. On technical issues he tended to defer to the responsible specialist experts in the field. On the issue of neonatal transportation the advice from Doctor Fowlie at the SCEA was that it was not thought any improvements could be made on the current arrangements. In relation to the issue of whether to transfer an unexpectedly sick baby immediately by emergency ambulance from a remote CMU, there was a divergence of approach between Scotland and England. At least in some areas in England there appeared to be a policy of moving babies in difficulty to a more specialist centre as quickly as possible. He was not willing to comment on the question of the reasons why the Scottish approach was to be preferred but deferred to the relevant specialist practitioner on this issue, Doctor Fowlie. He did acknowledge that there was a need to develop NHST's understanding in circumstances where, as in the case of neonatal transfer, there were differing bodies of opinion amongst the specialists in the field.

[75] He had been involved in discussions in the Scottish Association of Medical Directors on draft guidelines for support for peripheral community midwifery units. His

concern was to ensure that NHST was not out of line with national practice in Scotland. He was aware of the internal operational guidelines used in NHST but not of the exact detail as he did not normally involve himself in the detailed arrangements.

[76] In correspondence with KS and GS he had been at pains to distinguish between the skills in advanced life support that midwives working in remote CMUs might be able to utilise and the advanced life support available in a neonatal intensive care unit.

[77] With regard to the provision of information about risks associated with choice of birth site location, his view was that, notwithstanding that the midwife practitioners perceived themselves as communicating well with mothers, the consensus was that there was a need to improve. This was reflected in the subsequent development of the "My Birthplace" App and revision of some of the literature provided to prospective parents.

[78] He accepted that there was a need for his organisation to be far more thoughtful about being able to offer an understanding of risk that is meaningful to the particular individual. Consequently the seeking of consent from a patient based on describing risks as they affect a population in statistical terms may not be a wholly appropriate way of describing risks for the individual person who may experience an adverse outcome. He had in mind the decision in *Montgomery* (which is discussed further below). He expressly acknowledged that when discussing a requirement for advanced life support for an ill baby, it was important that the prospective parents understood the risks properly. The expectation in a case which was assessed as low risk was that a baby

delivered at a remote CMU would not require advanced life support because the birth had been classified as a low risk delivery but this could never be guaranteed.

[79] He had also been concerned at the SCEA review to ascertain that there were not any cultural problems impeding inter-professional support when problems occurred at a remote CMU. His colleague the Director of Nursing had taken the lead on this issue and had been seeking to ascertain that current NHST practice was in accordance with contemporary standards.

Doctor Peter Fowlie

[80] He is a consultant paediatrician of long standing at Ninewells having taken up his post in 1997. He had a close connection with the development of neonatal transport policy. He had experience of coordinating and contributing to movement of babies from NHST CMUs to the neonatal unit several times a year. He had played a significant role in the SCEA. Doctor Russell repeatedly deferred to him for knowledge in the area of paediatric specialism. He had written a note addressed to Doctor Russell which is Crown production number 5 and which provides comments on Doctor Turner's report and deals with certain other inquiries made by the Crown.

[81] His view was that there is no proven benefit from immersion in water at the second stage of labour. The published Cochrane review that preceded the death of N confirmed this. He referred to the published views of the American Academy of Paediatrics and the American Academy of Obstetricians and Gynaecologists on the practice of immersion in water at the second stage of labour. I have already referred to

the relevant passage at paragraph 47 of this Note. In his view this published material points to a lack of evidence and does not suggest that water birth is unsafe. Despite this the practice of water birth is much used in Scotland and elsewhere in the United Kingdom and parts of Europe. Immersion in water is associated with pain relief. He acknowledged that water birth has become an established practice in the midwifery profession and that it is hotly debated whether or not it should be regarded as experimental.

[82] Overall he considered that there was no external evidence to suggest that the type of care provided and the model of care should change following the death of N and the SCEA review.

[83] Doctor Fowlie thought the "My Birthplace" App (which he had not seen nor been involved with) could be an aid to a conversation with a prospective or expectant parent but no more. As noted in the Discussion section below, I consider this must be correct.

[84] He did not have knowledge of the *Montgomer*y case though the views he expressed at the SCEA showed considerable awareness of the importance of putting prospective parents in a position to make an informed choice of birth site.

[85] There is no guaranteed ability to get support to a remote CMU rapidly. Even with the suggested beefing up of the NHST operational guidelines for neonatal transport this would remain the position. There were skills involved in moving babies between hospital facilities. This in turn impacts on what prospective parents should be told in order that informed consent can be given when choice of birth site is being considered.

[86] The main safeguard was the careful selection of low risk cases. As at September 2016 a video link of moderate quality was available to help the clinician in the specialist hospital unit observe the baby if a problem arose in the remote CMU.

[87] His position was that the major studies suggested that there was no difference in the outcomes achieved in relation to babies born in major centres and in CMUs. Epidemiological studies in England, Europe and North America found that adverse events in low risk pregnancy are extremely rare.

[88] He was not prepared to go as far as Doctor Turner and to exclude water birth as a contributing factor in the death. He simply could not say on the evidence. As a paediatrician he appeared to take a rather different view from the midwives in relation to the efficacy of water birth. He accepted that this was not an area in which he would normally be giving medical advice to prospective parents.

[89] From his reading of the notes Doctor Fowlie considered that after initial resuscitation N had had good respiratory effort but was grunting and had a heart rate well over 100. This indicated that there had been significant improvement in her condition compared to her initial APGAR score of 2 though he accepted that some indicators at the time suggested that she was still compromised, i.e. she was pale and quiet. He considered N's condition was stable and she did not seem in imminent danger of collapse. He did not think there was any indication that she was going to collapse catastrophically. He contrasted the situation as he read it in the notes with that of a baby that was actively deteriorating. If there was a chance the baby might survive that would point towards the option of moving the baby by ambulance. On the findings I have

made and the expert evidence I have accepted, his interpretation of the notes seems to fail to take full account of the extent of the seriousness of N's condition at the time. For more detail see the Discussion section especially at paragraph 320.

[90] There is no guaranteed ability to get support to a remote CMU rapidly. Even with the suggested addition of a 999 ambulance option in limited circumstances to the operational guidelines this would remain the position. This in turn impacts on what prospective parents should be told in order that they can give informed consent when choice of birth site is being considered.

[91] He referred to ongoing professional uncertainty and disagreement as to what the model should be to support geographically isolated CMUs. The rejection of "scoop and run" in Scotland was due to the strong contrary feeling amongst neonatal clinicians. He did not consider that the provision of option 4 in the draft revised guidelines would make the position any better. The situation in England was broadly comparable, although there was no significant difference between the circumstances that might arise in each country. The rarity of these events made it difficult to train sufficient staff to be able to transport sick babies safely as a matter of routine from a remote CMU in urgent circumstances. He had contributed to the BAPM report which is Crown production number 6 of process. Whilst a 999 ambulance might be the quickest way to get a sick baby to specialist help it was not necessarily the safest.

[92] He had expressed the view in his report, Crown production number 5, that earlier medical attention might have altered the outcome for N. This was based on clinical experience that suggested that some babies are compromised at birth and early

intervention leads to a positive outcome. His view in court under cross examination by NHST's counsel was more circumspect. Earlier intervention might have increased her chances of survival. A small number of babies born at Ninewells each year in a compromised state do not survive.

[93] He had been involved from the outset in the establishment of the national neonatal transfer service. With regard to the revised NHST guidelines for neonatal transport, the operation of option 2 requires the release of staff to travel to a remote CMU. It is dependent on there being staff available to cover within the neonatal unit at Ninewells. Ordinarily both an experienced neonatal clinician and an experienced neonatal nurse are required. Staff can only leave the neonatal unit if it is safe to do so and the babies being cared for there are not being exposed to increased risk.

[94] Option 4 in the revised NHST guidelines, which is set out above in finding in fact 104, is expressly for exceptional circumstances. One drawback of this option in his view is that it may expose the baby to additional risk due to the minimal support available in an ambulance. He thought that option 4 involved a very difficult clinical decision. There was no evidence on which to conclude whether "scooping and running" was the better option. Each case required to be looked at on its own merits.

[95] There is limited capacity to provide support for a sick baby in an ambulance. The provision of support for breathing is difficult. There is significant risk in taking option 4. Option 4 was not a normal option at the time of N's birth though it was not actually prohibited. The decision of Doctor Sharma corresponded to option 2. As at September 2016 the introduction of harnesses which enable a small baby to be strapped securely in

an ambulance and of telemedicine improved the quality of the remote assessment process. He thought option 4 would be most likely to be used where a baby was thought very likely to deteriorate in the very near future. He emphasised the importance of adequate respiration and heart rate as the crucial indicators of the baby's condition.

[96] He expected continuous updating on the condition of the baby from a remote CMU. He described a recent occasion when he had been called on to assist a colleague when a problem occurred during daytime hours in a CMU. He was called from office duties to take over communication with the midwives in the remote CMU while his consultant colleague went to the CMU. He spent about an hour and a half in phone communication with the midwife while having the benefit of a video link to the CMU so he could view the baby. Even without the video link, the continuous communication with the midwives in the CMU contrasts very strongly with the extent of communication between the Montrose CMU and Ninewells in N's case, even making allowances for the time of day at which she was born.

[97] He thought that prospective parents needed to be told explicitly that there will be a delay in rendering specialist assistance if a baby is born in a compromised state in a remote unit. Although cases like that of N are rare, when they occur there are limited clinical resources in remote CMUs and the time taken for specialist assistance either to get to the sick baby or for the baby to be taken to the specialist help may be open ended. His view was not based on any epidemiological evidence that there was greater risk associated with birth within a remote CMU but of the perception that such parents would experience from being given this information.

Mrs Justine Craig

[98] She came into post as Head of Midwifery at NHST after the death of N, having been appointed on 25 November 2013. She had extensive midwifery experience in Glasgow and Edinburgh and also degree level qualifications.

[99] She had provided the Crown with a short report, which is Crown production number 7. This contained her response to a letter of inquiry from the Crown which raised certain issues. She had also been asked to provide comments on Doctor Turner's report. I was not provided with a copy of the letter to which she was responding until some time after her evidence was completed. She was not made aware by the Crown prior to giving evidence of the matters that had been identified for consideration at this Inquiry.

[100] She had stated that she believed that the delay in getting to N was a contributory factor in her death. She was a strong supporter of water birth. She could not state categorically that the outcome would have been significantly different if N had been born at Ninewells. By reference to published material she noted that the most urgent requirement of an asphyxiated baby at birth is that the lungs are aerated effectively. Provided that the baby's circulation is sufficiently oxygenated, blood will then be conveyed from the aerated lungs to the heart. The heart rate will increase and the brain will be perfused with oxygenated blood. The reported paleness of baby N was a feature that influenced her assessment. Following sufficient aeration the neural centres responsible for normal breathing in many instances function and the baby will recover.

In the vast majority of cases merely aerating the lungs is sufficient to effect recovery. In a few cases cardiac function will have deteriorated to the extent that the circulation is inadequate and in these cases a period of chest compression may be needed. In a very few cases lung aeration and chest compression will not be sufficient.

[101] In cross by counsel she accepted that as it could not be known why N died it was not possible to say that the delay had contributed to the death. Notwithstanding this, I understood her to maintain that that delay had reduced N's chances of a successful outcome following specialist treatment.

[102] It emerged in cross examination by GS that there had been another incident in about 2015 involving a long wait for a neonatal transport when a baby had been born unexpectedly unwell far from the specialist facilities at Ninewells. The delay in the 2015 incident had been for more than five hours but fortunately there had been no adverse consequences. Mrs Craig had been very concerned by this incident and was aware of the circumstances of the death of N. In particular, she did not think it right that the blue light ambulance service was available for home births but not for CMU births. She had discussed the matter with Doctor Jackson who was responsible for the ScotSTAR service. As a result she had appreciated more fully that there was no time limit on the arrival of the neonatal transport service.

[103] She considered that the new option 4 provided for in the most recent draft NHST neonatal transport guidelines was an important advance because previously the option had not been available at all. She was supportive of expanding the availability of that option in the future. As a result the process to be followed would be similar to that at a

home birth. An attempt would be made to stabilise the baby and then continue resuscitation until the baby arrived at the specialist unit. It was better for the women, the babies and the midwives that this option now existed. It was not merely a matter of perception for prospective parents.

[104] Various other innovations were brought to the attention of the court. She also laid stress on the importance of the video conferencing facility for midwives to speak to consultant paediatricians. Increased resource had allowed this to be introduced. She also referred to the recent acquisition of harnesses for newborn babies.

[105] Her view on neonatal transport was obviously very different from that of Doctor Fowlie. To her knowledge there was a range of views amongst paediatricians within NHST on this issue. She understood that the SCEA report proceeded on the basis that a neonatal transport team could take up to six hours to arrive at the CMU, but she had learned from her discussions with colleagues that this was factually incorrect. There was no time limit for the arrival of the team. This was a concerning matter for her and it was important to expand the pathways available within the guidelines. She herself would not choose to give birth in a CMU if she knew that she could be waiting for up to 12 hours for her baby to be transferred.

[106] She supported the use of water birth for low risk mothers. She relied on the Joint Statement of the Royal Colleges of Obstetricians and Gynaecologists and of Midwives and the Guidance of the National Institute for Clinical Excellence (NICE) who all thought it to be safe for low risk women (see finding in fact 11 above). There was research that suggested it was safe for that category of women. The experience and

recovery of women who delivered in CMUs tended to be qualitatively better. She conceded that there had not been a definitive large scale randomised controlled trial about the safety of water births. She thought the views of Doctor Fowlie (and others) on the subject were not rational and resulted from having no experience of it.

[107] She confirmed that not all points made in the SCEA report had been actioned. She did not think that a leaflet was appropriate on this subject. If there was one leaflet for one form of pain relief it would be necessary to have leaflets for all others as well. This would not be a helpful proliferation of materials. She thought water birth was a subject to be tackled in discussion with prospective parents within the context of the discussion of pain relief. In recent years every pregnant woman in Scotland has received a copy of the "Ready Steady Baby" book which contains some relevant information.

[108] The SCEA review report had been followed by the acquisition and development of the "My Birthplace" App. She provided a real time demonstration of the "My Birthplace" App in court using in addition the hard copy Crown productions number 14 and 19. She emphasised the importance of empowerment of women in making informed choices. The content viewed online in court was current as at 13 September 2016 at about 14.19 hours. It appeared to correspond to the printout in Crown production number 14. Use of the online version of the App provided a greater impression of its functionality than did the paper version. Despite a suggestion by counsel to the contrary she was clear that page 5 of Crown production number 19 actually referred to the transport of babies. Page 23 was not out of date.

[109] She thought that about 80% of prospective parents would have access to the internet and thus could be encouraged to view the App. Midwives were expected to discuss options and plans for labour and birth with prospective parents in conjunction with the use of the App in cases of parents who did not have access to the internet. She confirmed that no other directions were given as to how these subjects were to be approached by midwives when discussing choice of birth site with prospective parents.

[110] The content of the "My Birthplace" App made reference to statistics. There was emphasis on the assertion that outcomes are the same for babies born to low risk mothers in a remote CMU and an AMU.

[111] She was aware of the case of *Montgomery v Lanarkshire Health Board* and its emphasis on informed consent. Despite this there was no sign of there having been any direct change in the approach of NHST to the provision of fuller information to prospective parents.

[112] Her attention was drawn to references in the content of the App to "undesirable outcomes" without full elaboration within the text of the meaning being given to this expression. She made the point that much must depend on individual circumstances. Some parents will want lots of information and others little or none at all. She accepted that more information about "undesirable outcomes" should be provided to make the information on the App more meaningful. She identified a need to balance the provision of information so as to avoid overloading the recipient. She stressed the importance of conversations between midwives and parents at antenatal appointments.

[113] She thought that the provision of harnesses in ambulances, the availability of video conferencing and the introduction of option 4 were all welcome improvements since the date of death of N.

Ann Marie Wilson

[114] At the date of giving evidence she was the Head of the ScotSTAR Neonatal transport service based at Paisley. Her background is in nursing and midwifery. She had been involved in neonatal transport in the West of Scotland since 2003. The ScotSTAR Neonatal transport service is based in Paisley for the West, Edinburgh for the East and Aberdeen for the North of Scotland. Ninewells was part of the service but pulled out in 2014. So far as she was aware recruitment problems were said to be the reason for this. In any event there was no helicopter facility at Ninewells which meant that the team on duty had to go to Aberdeen by taxi first if a helicopter required to be used in the transfer.

[115] She spoke to the recent provision of harnesses in front line ambulances which were capable of securing a newborn baby. This applied across the UK and was a significant additional safeguard.

[116] She also spoke to the growing use of telemedicine as an adjunct to the neonatal transport service for remote CMUs. Stornoway had pioneered this and had been using telemedicine to provide backup to midwives out of hours for 5 or 6 years.

[117] Her approach to the use of a 999 service ambulance to transport newborn babies echoed that of Doctor Fowlie. She emphasised the potential problems that might arise in

the course of a journey to hospital. I found this concentration on the potential pitfalls to be misplaced. There was no proper reasoned basis put forward for saying why such a supposedly defective system was acceptable in the context of neonatal transfer for home births but not for transfers from CMUs.

[118] She spoke to the elements involved in a transfer and to the built in delays that would inevitably be involved. The elements of a transfer were as follows: (a) a team has to be organised; (b) the team has to travel to the remote CMU; (c) the baby has to be stabilised; (d) the baby has to be transferred into the ambulance; (e) the ambulance has to travel to the major hospital; (f) the ambulance might have to stop if the baby needed treatment en route; and (g) time would be expended in the transfer of the baby into the hospital. Each element took some time. It followed that prospective parents contemplating using a remote CMU needed to be told what would be involved if there was a serious problem.

[119] She emphasised the importance of accurate information being provided to those who have to make decisions to deploy neonatal transport.

[120] She considered that a baby born with vital signs like N as regards heart rate, respiration rate and oxygen saturations would be regarded as stable and not in need of urgent transfer. This applied even if such a baby was born pale and floppy and remained pale and floppy throughout the first hour of her life.

[121] She attached great weight to a baby being kept warm and did not seem to be aware of the possible use of cooling in appropriate circumstances.

Expert Evidence

[122] This Inquiry focussed on events that occurred in areas where there were intersections of professional areas of responsibility. The Crown and NHST led evidence from experienced paediatricians and experts in midwifery. The Crown also called a consultant obstetrician. Doctor Tom Turner explained that when an emergency of the kind that is the subject of this Inquiry arises after birth it is the paediatrician's call as to what action is to occur. This was not disputed by the other experts who gave evidence.

Doctor Tom L. Turner – retired consultant paediatrician called by the Crown

[123] He provided a report to the Crown which is Crown production number 2. He was a consultant paediatrician in Glasgow from about 1977 to about 2012. Before retirement he was clinical director for neonatal services in Greater Glasgow. In this latter role he had oversight of some of the transport services in Glasgow as well as significant input into a number of assessments of medical practices covering situations where there had been poor outcomes. His experience of peripheral CMUs related to those at Oban and Vale of Leven and was relatively limited.

[124] He was surprised that a request by the midwife in a remote CMU for CTG interpretation had not met with a substantive response within an hour from the specialist centre at AMH.

[125] A baby born in poor condition similar to N might improve spontaneously within a period of five to ten minutes. If the baby fails to improve progressively in that time frame it is a situation that requires intervention to support or encourage the baby's

progress. This would include direct respiratory support and supporting the circulation. These measures might be done in a scaled way commencing a few minutes after the birth. The extent of intervention would depend on the response of the baby.

[126] His interpretation was that N had both respiratory and metabolic acidosis. The former was correctible by ventilation or intubation and the latter by an infusion of saline or plasma. If born in a hospital with specialist assistance available nearby such a baby would be described as being "flat" and usually within five minutes of a call for help specialist intervention would commence.

[127] Midwives might ventilate by bag and mask but not intubate a baby. Ventilation by bag and mask may become counter-productive if continued over a prolonged period as it causes the stomach to fill with air in addition to the lungs.

[128] A birth of this kind is unusual in a remote CMU that handles about 200 births a year. The senior on call consultant paediatrician in this case had arrived on the scene at Ninewells promptly. The absence of the neonatal transport owing to another call meant that this was not a situation that was expected to have to be accommodated in the unit. There was no other anaesthetic support at Montrose Infirmary that could have assisted.

[129] He had difficulty with the view of the senior registrar Doctor Connolly that he had expected to go the Montrose CMU to retrieve a stable baby. N's measured observations such as her heart rate, respiratory rate and oxygen saturations did not mean that this was the scenario. That approach did not take into account her unexpected pale and floppy condition at birth and that she had taken time to reach those measured levels. She was not improving. Had she done so she would have become increasingly

vigorous and pink in colour as she efficiently oxygenated. N had had some major episode that impaired her ability to respond to her brain telling her to breathe. While there might have been some elements of stability that could be measured, the whole picture had to be considered in assessing her overall condition. She urgently required to be seen with an expert eye. She may have required assistance with respiration or to be given fluids or drugs. A diagnosis would require to be made so that the whole range of available options in a specialist centre could be deployed as appropriate.

[130] He did not think that baby N could be regarded as stable if she failed to make any progress in the first hour of her life. It was not clear why she was born in poor condition. He thought it important that a person with the right skills get to the baby as quickly as possible. He thought that at 06.05 hours, when N was some 55 minutes of age, if he had been the consultant paediatrician in charge, he would have wanted to know if she was improving. If she was not, then he wanted to think about what could be done to help her to improve. This required careful assessment. One option was to go in the available ambulance to Montrose CMU or, though this was less palatable, to travel by taxi or in a police car to get to the baby. He viewed this as an emergency situation and he would have favoured sending specialist staff even without an incubator. This was a decision for the on call consultant paediatrician. The result might have been that assistance arrived about 30 minutes earlier and this could have made a difference. The chances of N recovering if the specialist staff got to her after she had collapsed would be very much smaller.

[131] The situation at 06.05 hours was a serious one given that the information was that the baby was pale and floppy. He did not think enough substance had been given to the fact that the baby was not improving and that she was in a situation where there was limited support available for her. The delay in the arrival of specialist medical assistance was a contributory factor in her death as a persistent respiratory and metabolic acidosis may have been corrected by earlier appropriate intervention. If she had been born at Ninewells she would have been seen within minutes by specialist staff who would have been able to deploy a range of interventions in the first hour or so of her life. Unless he was otherwise engaged in an urgent situation he would expect as the consultant in charge to be informed at 06.05 hours that the ambulance did not have an incubator. It is for the senior person to make the decision as to how to proceed at that stage and the situation at the CMU was sufficiently urgent in nature.

[132] There was no neonatal transport service that would be available straight away to deal with a situation of this kind. He thought that the neonatal transport service had to have a mechanism for thinking outside the box rather than merely following protocols in unusual circumstances.

[133] His concerns about the use of a 999 option were related to being able to maintain control of the airway and the baby's breathing *en route*. There were scenarios where a baby might need urgent surgery when the 999 option would be the quickest option. A 999 ambulance might be the preferable option to get the baby to specialist help but he did not much favour the use of 999 ambulances to transport sick newborn babies. He thought that ambulance staff would have greater training in airway management than

midwives but that they would require some additional training if this was to be a regular part of the job. He was concerned about the risks to a sick baby travelling in an ambulance. Safeguards in the training of those involved in moving the baby would be required and he had little experience of this type of action.

[134] The numbers of infants who die within the first few days of birth is measured in one or two per thousand though it may vary from year to year and according to location. In contrast the numbers of mothers who die in labour is much fewer measured in hundreds of thousands of births. There is more chance statistically of having problems with the baby than with the mother and in that sense the risk is predominantly for the baby. He thought that there was a need for it to be made explicit to parents who are making birth site choices that an infant is vulnerable at birth especially in venues that do not have full on-site resuscitation services.

[135] The use of water births was explored in his cross examination. In a striking phrase he referred to paediatricians as "control freaks" in the sense that his experience was that colleagues in his specialism liked to know that everything was under control. His suspicion was that some of his colleagues might have some anxiety because this was territory over which they were not absolutely sure that they were in control. He had never been against the practice of birth in water. He did not think that there was a connection between the birth having taken place in water and the cause of N's poor condition at birth.

[136] As to the cause of N's birth in unexpectedly poor condition he thought that the suggestion that it might have been due to a small tear in the cord at the placental end

was plausible but not a strong possibility. He would have expected to see a steady increase in heart rate as the baby sought to compensate for blood loss.

[137] In cross by GS, he agreed with the following statement from Doctor Ward Platt's report NHST production number 7/2 of process at paragraph 24.8.8:

> "…mothers choosing to give birth in an isolated [CMU] accept that the small risk of neonatal catastrophe is one of the trade-offs in a more pleasant and convenient birth experience".

He suggested the insertion of the words "appropriately informed" at the start of the quotation.

[138] His critical comments were directed to the consultant in charge and not to the specialist registrar. The situation could have been dealt with in a better way. Timelines were too slack and could have been managed better having regard to the known condition of N. It was the senior members of the team, i.e. both the consultant paediatrician and the senior nursing staff member, who had the responsibility to manage the situation. It was for the senior team member to assume control and if necessary "think outside the box" once he got on to the ward. At 06.05 hours the consultant would have been in the ward for some 20 minutes and was there to manage any other urgent matters that might arise there. The questions that arose once the consultant got to the ward were: (a) how is baby N and (b) what can be done to get to her? He would expect the consultant to be informed of any delay, such as occurred at 06.05 hours, and to be involved in any decision to be taken then unless he was occupied in some other emergency. His preference would have been for the registrar and ANNP to go in the first ambulance. That would have ensured that the persons with the skills

could be there sooner. The arrival of the incubator later was of less importance. The specialist staff might spend time treating the baby at the CMU before she could be moved. The decision to wait for a second ambulance with an incubator prevented the earlier arrival of specialist staff.

[139] The post mortem finding of perinatal hypoxia meant that something had happened in the latter part of labour or during the birth process. As to mechanism he interpreted what he had learned of the birth of N as meaning that she had a condition called persistent foetal circulation or persistent pulmonary hypertension (PPH). This is a condition in which the blood vessels in the baby's lungs fail to adapt to postnatal life. It can be provoked by hypoxia in the birth canal or in the womb. In normal circumstances once a baby is born and it starts breathing it starts getting air into its lungs, and the blood vessels of the lungs relax. More blood flows into the lungs and the baby is oxygenated by the breathing process. This was one of the reasons he thought baby N had a respiratory and a metabolic acidosis. This was the mechanism he had identified but it did not explain why it happened. PPH is a failure to adapt to extra-uterine life. It is not a common condition but common enough for a neonatologist to be able to recognise it. It can only be recognised after birth but it can be treated after birth by a variety of methods. It requires sophisticated support to relax the blood vessels in the lungs to reverse the condition. It was on this basis that he had stated that if N had been born at Ninewells he believed that the outcome may have been significantly different. He accepted that the pathologist had not found objective signs of vasoconstriction of the blood vessels of the lungs.

[140] He considered that earlier medical attention may have altered the outcome. As a result the delay in the arrival of the specialist registrar may have been a contributory factor in the death of N. This conclusion was based on his experience that the sooner you treat babies in this situation the better they will do and hence the more likely they are to survive. Earlier intervention made it more likely that there would be a response to treatment.

Professor Tracy Humphrey – midwifery expert called by the Crown

[141] She is a graduate midwife who has done postgraduate work at masters and doctoral levels. Her Ph.D. was in obstetrics and gynaecology. She had 19 years' continuous experience as a midwife including time spent in a clinical academic post as a consultant midwife in Aberdeen. She had a lot of experience of working in low technical settings. Until her move to Edinburgh in April 2015 she had been employed by NHSG. She was the lead clinician for midwifery care and practice. She had worked on referrals from Montrose CMU. She was familiar with practice there. She now held the post of dean at Edinburgh Napier University with responsibility for education and research provision related to health and social care within the University. She also holds an honorary position within NHS Lothian which allows her to continue to practise as a midwife. She continues to undertake her own programme of research and teaching. Her report is Crown production number 3 and is in the form of answers to a series of questions posed by the Crown in correspondence.

[142] During her evidence Professor Humphrey expressed some concern at the number of water births taking place at Montrose CMU. This is significantly above the average for such units. I sustained an objection by counsel for NHST to the Crown pursuing a line of evidence about the number of water births at Montrose CMU on grounds of fairness and lack of notice. I did not think that the number of such births at Montrose CMU was within the scope of the Inquiry.

[143] With regard to ante natal care of KS, the notes disclose that the midwife had noted a bleed involving clots but there was no record of any obstetric referral. Such a referral should have occurred in accordance with the relevant guidelines but there is no record of this having been done. The result of referral might have been a conclusion that there was no serious cause for concern and KS might have been again classified as low risk. On the other hand she might have remained reclassified so that she would not have given birth in a remote CMU.

[144] If KS had been brought in for assessment at 28 weeks it would have been a matter for clinical opinion as to whether she was kept on a high risk pathway with obstetric led care. There is some evidence from observational studies that if someone has antepartum haemorrhage with an undiagnosed root cause there is a small risk of poor outcomes at the end of the pregnancy. Therefore there is a basis for keeping such mothers under obstetric led care. The relatively small amount of bleeding reported by KS meant that there was scope for differing clinical opinion on the course of action to be followed if there had been a referral at 28 weeks. One of the main reasons for referral upon report of antepartum haemorrhage would be to exclude placenta praevia or

abruption. The former did not apply. If there had been any significant abruption it is likely that this would have affected the rest of KS's pregnancy and foetal growth would have been affected as well. This did not occur.

[145] As at 29 September 2012 KS was classified as at low risk of obstetric complications and was at term with a full grown foetus. As a result relevant national guidelines would not normally have required that she be made the subject of a CTG. CTG is a screening tool providing a continuous trace of the baby's heartbeats and not a diagnostic aid. There is a danger of unnecessary interventions if it used when not necessary. Once it had been decided to use CTG she thought it ought to be performed to the appropriate clinical standard and until the midwife was confident of a correct interpretation. When looking at a CTG trace a midwife would look for variability, i.e. accelerations or decelerations in the baby's heartbeat. There can be differences of view about CTG traces amongst midwives and obstetricians precisely because the traces require to be interpreted.

[146] In the case of N she agreed that there were a number of reassuring features in the CTG. There was good variability throughout the trace, there were foetal movements present, and obvious accelerations regardless of how the baseline is interpreted. Nevertheless she thought the first part of the CTG trace was difficult to interpret to the extent that it was uninterpretable. There was what she called a "wandering baseline". She would have wished to continue it for a longer period of time than occurred here. She did not necessarily disagree that this was a trace that indicated a baseline around 140 bpm with accelerations. She agreed that the last 10 minutes of the trace were re-assuring

but the appropriate clinical standard (the NICE Guidelines) would be to seek to be satisfied as to heart rate for around 25 to 30 minutes. It was highly unusual that the CTG had been on for as long as it was in this case. She differed from Doctor Smith and Doctor Sanders to the extent that she would have wished the CTG to be on for longer. She would have expected there to have been a prompt response when a part trace was faxed to AMH. Even if the registrar was not available others should have been able to provide support and advice.

[147] Counsel for NHST also objected to a line about training of midwives in the use of CTG. I repelled the objection in that I considered that fair notice of the line had been given by the terms of the witness's report that had been disclosed in advance and lodged in process. Her point was that if midwives were going to be provided with equipment like CTG they should also have the benefit of additional and regular training in the use of it.

[148] There is a distinction to be drawn between immersion in water for labour and water birth. As regards the former, although there was no robust research finding on the issue, the Royal Colleges supported immersion in water for labour as being beneficial to pain management for the mother. The Royal Colleges do not support or advocate water birth itself because it is acknowledged that there is not enough robust evidence. Despite this water birth is a common practice in the UK including at Montrose CMU. On average about 13 to 15% of women were giving birth underwater in units like Montrose CMU in about 2014. The water birth rate was substantially higher at Montrose CMU in about 2014.

[149] With regard to foetal heart rate monitoring around the time of birth, the normal range for a healthy baby would be between about 110 to 160 bpm. The measurement of 80 bpm obtained about 10 minutes before N was born would be abnormal. This was probably due to head compression as the baby's head was coming through the pelvis about to be born. This was something that might be expected to occur in a rapid second stage of labour when birth is imminent. No further measurement was noted even though this should have been done at 5 minute intervals. The omission to note a further measurement had little practical effect because there was little that could be done at that time given that this was the second phase and the birth was imminent. There was no evidence at post mortem that N had aspirated water during birth so Professor Humphrey thought it highly unlikely that there was any causal link between the birth in water and the cause of death.

[150] She had identified in the notes that the pool temperature at the point when KS entered it was 38 degrees which was above the recommended maximum of 37.5 degrees. The recommended figure is from the NICE Intrapartum Care Guidelines of 2008. The reason for this is that it is known that the exposure of the foetus to *in utero* temperatures of 38 degrees is associated with poorer foetal outcomes. There was no noted measurement of KS's temperature after she entered the pool though in accordance with guidelines this should have happened hourly. Although she was unable to say whether the pool temperature would have reduced after KS entered it, she agreed that it was unlikely that the temperature of the pool had anything to do with the tragic outcome in this case.

[151] Where a fully developed baby is born in unexpectedly poor condition fully developed at term the optimum scenario is to have all the facilities, technology and specialist services available within minutes in order to seek to maximise the assistance to be rendered to the baby. There is a brief spell when an effort would be made to try to achieve effective resuscitation as quickly as possible. Although statistics suggested that there was no difference in outcomes between a birth at a remote CMU and at a specialist centre her view was that the proximity of specialist equipment and experience was significant. It is a matter of common sense to think that if a baby is ill but he or she is in the right place with the right technical support, as well as clinicians with the right skills and knowledge, that outcomes are likely to be better. For instance, a baby born in a similar condition now might have access to cooling which is a relatively new treatment that neonatologists can use if babies have been subject to hypoxia. Cooling the temperature has been shown to optimise outcomes but it is necessary to have relatively quick access in order to benefit. Specific equipment would have been required in order to do this. It is not clear whether this would have been available at Ninewells in 2012. It became available at AMH in about 2013.

[152] Professor Humphrey had seen a fully developed baby born unexpectedly unwell in an obstetric unit and still die. There was a possibility that birth at or near a specialist unit might have made a difference for N either by prolonging her life for a short time or by her long term survival. It is difficult to be firmer because the mechanism that caused her death is not really known. Overall although there were a number of identified

failures to comply with recognised standards for note taking around the time of the birth, it could not be said that these had contributed to the death of N.

[153] Professor Humphrey emphasised the importance of a systems based approach to auditing compliance with professional standards to ensure consistent and appropriate implementation in practice. Such a systematic approach allows feedback to be received that can lead to further training or equipment provision as necessary. She did not have the kind of information that was needed to allow her fully to evaluate how this was done in the NHST area. Clinical records of an individual case like that of N did not allow full evaluation of these practices, nor did the SCEA review touch on these matters to any significant degree.

[154] With regard to communication of risk regarding choice of birth site she considered that prospective parents ought to be told who would be providing care at the site chosen and the extent of assistance that would be available there in the event that a problem occurred. The clinical notes of KS did not cover any substantial discussion of informed choice.

[155] With regard to communication of risk regarding water birth she explained her practice in relation to the sort of information that required to be provided to prospective parents to ensure that they were enabled to make an informed choice. In such circumstances she would record that a preference for water birth had been expressed. The information she considered required to be provided was as follows:- (a) there is no good scientific evidence based on comparing outcomes for mothers giving birth in water and those not giving birth in water to say that giving birth in water is as safe as giving

birth out of water; (b) in the experience of midwives as a collective body (both nationally and internationally) it was practised commonly and based on anecdotal evidence it would appear to be safe; and (c) the nature of the type of care to be provided at the chosen location. I understood point (c) to relate to the midwife led nature of care in a CMU.

[156] She would be neutral in discussions with prospective parents about use of the pool for giving birth though she would support the choice of a woman who has been assessed as suitable to give birth in water. She would be frank in acknowledging that the lack of robust evidence makes the decision a quite difficult one. She would raise the issue of water birth with women who do not ask about it where it is a choice that is open to them.

[157] Where a mother had previously experienced water birth, in the course of a later pregnancy there had to be a new discussion as it could not be assumed that there had been informed choice on the earlier occasion. The woman's previous experience of water birth might form part of the discussion on the subsequent occasion. She had had discussions of this kind hundreds of times in her own midwifery practice.

[158] She had led the design of the NHSG leaflet entitled "Where to Give Birth", a copy of which had been provided to KS. A copy of the leaflet was lodged late in the Inquiry and is Crown production number 23. It was not shown to KS when she gave evidence. The leaflet set out options about birth site choice. It did not deal with water birth at all. In the NHSG area around 2012 the expected practice was that midwives should discuss birth site choice options fully with the prospective parents at between 34

and 36 weeks of the pregnancy though such conversations often took place at an earlier stage. She highlighted the need to seek to use simple language in these discussions.

[159] She emphasised the importance of the approach taken to discussion with prospective parents. She had been involved in the development of the guidelines in Grampian. She was not satisfied from her own knowledge that as at 2012 that in the NHSG area these expectations were fully complied with. There were a number of reasons for this. Midwives worked under considerable pressures. At times written information tended to be used in place of full discussion. She had also audited practice in Tayside and Highland areas. The professional regulator is the Nursing and Midwifery Council. The basic principle is that "if you don't record it you didn't say it". There was a fine balance to be struck by midwives who have to interact with prospective parents to establish an effective relationship, carry out clinical assessments, ascertain their state of knowledge and concerns, provide the information needed by them and to provide an adequate record of what has been discussed. Where possible continuity of personnel in the provision of advice by midwives was desirable.

[160] She was asked to review information about water birth provided online for mothers in Angus, a copy of which was NHST production number 7/7. She thought it insufficiently detailed in that there was no detail provided about matters such as how rare complications might be, what those complications might be and what the experience in the pool would be like. She also reviewed NHST production number 7/10 which was a document dated 2009 produced by NHST that appeared to provide some useful information about water birth and which seemed to be targeted at both midwives

and prospective parents. This might be a useful adjunct to fuller discussion with a midwife at the point of making a decision as to choice of birth site.

[161] She had not had an earlier opportunity to see the "My Birthplace" App in use. She agreed that this was something that could contribute to communication of risk by midwives to prospective parents but she observed that it would be important that this occurred as part of a wider dialogue. In addition training of midwives should be developed to ensure that they were enabled to make full use of technological advances of this kind. Not all midwives were trained to degree level and the extent of their IT skills tended to vary within the group. In other words practice required to develop with such advances as the introduction of an App.

[162] More generally, midwives, especially those working in remote CMUs, tended to work in an isolated way. They saw parents on their own. They were often on duty alone or with one colleague. Support and guidance for them was important. Training and audit practices were important elements in the process of monitoring implementation in practice of that which is taught in the education of midwives. There were three main ways in which professional standards were maintained and developed: - (a) Peer review and clinical supervision of midwives in their clinics; (b) auditing of midwifery records; and (c) consulting women and their families about their experience of care.

[163] Auditing had application to all areas of midwifery practice. In the present case it was most relevant to use of CGT, foetal monitoring when a mother is in the pool and the provision of information to prospective parents about risk associated with birth in a remote CMU and water birth. Consultation with women and their families is an

important part of the process of developing new guidelines. Training and auditing are important in the implementation of recognised standards and guidelines.

[164] Professor Humphrey thought Doctor Sanders' hypothesis that a partial snapping of the cord had occurred was an appropriate suggestion to make. She thought it was highly unlikely to be correct because she would have expected to see decelerations in the foetal heart rate. There was only one recording of deceleration and that was very close to birth. There was no note to suggest that there was any sign of heavily blood stained liquor (solution) within the amniotic sac. If there had this would have been visible in the pool. Similarly there was no recording of the baby having been born covered in lots of blood. The pathologist recorded 31 centimetres of cord which is short but Professor Humphrey thought it was likely to have been longer given that it had been observed to be loose around baby N's neck.

[165] On the issue of neonatal transport she had had experience of working under both the system where the preferred option was the 999 ambulance transfer and the system used predominantly in Scotland that preferred to get a sick baby born unexpectedly unwell at term stabilised within a remote CMU and transferred some time later. She thought there was no clear evidence that one is likely to lead to better outcomes than the other. There were advantages and disadvantages to both approaches. It would depend on the assessment of the clinicians there at the time having regard to the available transport, the particular context and the geography of the area in question. She welcomed the additional option 4 now available to clinicians in terms of the NHST

revised guidelines. It expanded what clinicians could choose to do in the exercise of their clinical judgment in any particular set of factual circumstances.

[166] In cross by GS she acknowledged that some caution required to be taken in Scotland in dealing with the NICE guidelines and the English "My Birthplace" study of 2011. The infrastructure issues can be different because of the small population spread across a large land mass with different transport conditions. Common sense suggested that, notwithstanding that the evidence is to the effect that outcomes are similar in remote CMUs and in AMUs, timely access to specialist services is likely to improve outcomes. She agreed that the midwifery notes indicated that from about 06.00 hours it was obvious that there was some deterioration in N's condition. There would have been intervention significantly in advance of that time in a specialist unit.

Doctor Martin Ward Platt - consultant paediatrician, specialist neonatal consultant called by NHST

[167] He was at the time of giving evidence a consultant paediatrician, specialist neonatal consultant based at the Royal Victoria Infirmary, Newcastle upon Tyne. In addition to his basic medical qualifications he is a member of several Royal Colleges. He is an Honorary Clinical Reader in Neonatal and Paediatric Medicine at Newcastle University. He has been involved in both teaching and research over many years in the fields of neonatology and paediatric medicine. He was also the clinical lead for the national congenital anomaly and rare disease registration service for England. He had substantial experience as an expert witness in the courts in England.

[168] His report was NHST production number 2. His experience covered remote CMU type facilities at Hexham and Alnwick. Therefore he had experience of very closely comparable arrangements where a large specialist teaching hospital served smaller outlying units some distance away. His unit worked in a multi-disciplinary way so he had some responsibility for midwives. The remote CMUs in his area were very similar to the Montrose unit.

[169] A baby, like N, that was born pale and floppy was, in effect, like a person who was unconscious. These babies do not assume the normal default flexed position of arms and legs of a healthy baby. Such a baby could not be said to be stable even with established heart rate and respiratory rate within normal ranges. In the case of N although her heart rate, respiratory rate and oxygen saturations remained within satisfactory ranges, it was worrying that she remained pale, floppy and unresponsive. Although such a presentation should be uncommon in a CMU, it was not uncommon in a specialist teaching hospital environment like Newcastle where they track high risk deliveries. Such a baby would be under specialist care within 10 or 15 minutes. Birth at a remote CMU meant that there was very little that the midwives in attendance could do but to call for help.

[170] Observation of the sick baby was very important. For this reason the introduction of a video link was a positive step. He was concerned that there could be some failure in communication between the CMU and the specialist centre when all that was relied on was phone conversations.

[171] He considered that birth in a CMU could be compared most closely to a home birth. The lack of facilities should anything go wrong unexpectedly at birth made these birth site locations very similar. In the North East of England a blue light ambulance was the means of getting a sick baby to the specialist hospital for urgent treatment. He supported that method. He thought the reservations about this approach were exaggerated by his professional colleagues. Ambulance technicians have very good skills sets for dealing with any deterioration during transfer. Developments such as the (now extensive) use of laryngeal masks as a reasonable alternative to tracheal intubation are examples of modern techniques that do not require high level training. Doctor Ward Platt acknowledged that the availability of the new Option 4 of the interim NHST guidelines expressly restricted to use in exceptional circumstances only reflected greater discomfort within NHST with the 999 ambulance option than applied in his local area. In his report he characterised the prior lack of a 999 ambulance option as a latent system defect.

[172] He relied on his experience to suggest that the chances of survival of N would have been greater if she had been brought to a specialist hospital quickly. He had had a lot of experience in dealing with babies who were born unwell. He characterised what had happened in this case as being comparable to a road traffic accident in the sense that something had happened a long way from a specialist hospital which required to be responded to in a very short time. From about 40 minutes after her birth the indications were that N was making internal compensations but was gradually failing to maintain observable signs. The chronology in this case means that there was a 90 minute window

to save N (assuming she could be saved). After that every five minutes up to 2 hours her prospects decreased. She was starting to fail from about 06.40 hours. Therefore it was appropriate to compare the situation which arose when N was born to a home birth where the baby is born unexpectedly unwell.

[173] He was not very enthusiastic about the 06.05 hours ambulance going out without the incubator and its specialist trolley. It was striking that when he was invited to consider Doctor Turner's view that at 06.05 hours, if he had been the consultant paediatrician in charge, he would have wanted to know more about the baby before deciding not to go, he thought that was a weak point in what happened. I took that answer to mean that he thought that there was a failure by the consultant in charge to check the situation at a significant point in time.

[174] He would always argue that the thing to do is to get the baby to specialist care quickly rather than try and operate any other model such as the retrieval approach preferred by NHST at the time. Had the 999 ambulance option been available there was a reasonable chance that N could have been brought alive to Ninewells. If she had been in a specialist unit blood pressure monitoring would have provided further information about her condition. As to her later progress and the extent of any damage she might have sustained at birth, he was less certain. There was a realistic chance of saving her life "before she got to that moment when she was going down the slippery slope in that last half hour". He reached that view based on his experience of being involved in trying to stop a baby's descent down the "slippery slope" and pulling him or her back. He

thought that there was a pretty good chance if you could avoid getting to the point where a baby is losing its heart rate and it is a term baby.

[175] It was difficult to compare the condition of N at Montrose CMU to what would have been the position if she was in a specialist unit because actions would have been taken to alter her condition in the latter location. At the CMU very little could be done but to call for help. The drop in her heart rate from about 06.00 hours suggested that N was unwell and heralded worse to come. As her tone and colour remained pale and floppy this suggested that her body was making internal compensation as she gradually failed to maintain observable signs prior to a catastrophic collapse.

[176] It would not be of assistance to provide midwives in a CMU with more advanced resuscitation and stabilisation skills such as intravenous cannulation. These would be rarely be used and even regular training would not allow a sufficient level of competence to be achieved. Only a practitioner in an intensive care unit could maintain the appropriate level of competence. For this reason a CMU had great commonality with a home birth situation.

[177] The use of cooling for the therapeutic management of brain asphyxia is a very important development for dealing with sick babies and has been in use for some ten years. He had had a recent experience where on the basis of the conversation between the specialist unit and the CMU it was possible to instruct that the baby be kept cool while travelling in an emergency ambulance.

[178] He thought Doctor Sanders' theory as to the underlying cause of death being due to a short cord was plausible but on reflection he would not go beyond that. He posited

a further potential explanation as foeto-maternal haemorrhage. This could only be detected at the time it occurred but could be a serious detriment to the foetus in that there is leakage of the baby's cells into the mother's system. It is unlikely to be detected unless a test of the mother is done within a short time. It could have accounted for the baby's N's condition at birth though it could not now be proved, though it is a rare occurrence.

[179] On the question of informed consent, clear information required to be given to prospective parents as to the nature of what he called the trade-off between a more pleasant birth environment and the unavailability of specialist treatment if it is unexpectedly required. This could be done in simple language. The language he used in his report when he spoke of there being a trade-off being made by parents who choose to have a birth at a remote CMU by accepting a small risk of neo-natal catastrophe for a more pleasant and convenient birth experience was quite appropriate for communicating this information. The reason for this was that, broadly speaking, things do not go badly wrong if risk management is got right. However the risk does not go away, and the only way in which it is possible to say if a situation was genuinely low risk or high risk is in retrospect. In other words the prospective parents have to accept the hazard when making their choice of birth site. The risk of catastrophe, whether in relation to a mother or a baby, within a CMU is low but it is a certainty that the specialist people and equipment are not there to put it right if it does happen. In his region there had been an issue of this kind at Hexham. He emphasised that it was important that people understood the meaning of the decision they made to choose to give birth in a

CMU. The Patient Information section of the BAPM Framework document reproduced in findings in fact 19 to 22 highlighted the need for the provision of full straightforward factual information about the consequences that flow when a baby is born unexpectedly unwell in a remote CMU.

[180] The BAPM Framework document section on emergency procedures emphasised the need for a pathway for people to follow when an emergency arises. As at 30 September 2012 in NHST there needed to be a plan and to have been discussions and communication within the framework of the plan. That was missing in 2012 in NHST. He supported the new NHST guidelines and thought them well expressed. In particular, he thought that regular communication was important as was a video link. The consultant was the leader of the team when an emergency arose and should be making the important decisions. He noted that option 4 only applied in exceptional circumstances. He thought this reflected the less expansive view of the 999 ambulance option north of the border. He referred to there being "grudging acceptance" of the use of that option in extreme circumstances.

Doctor Norman Smith - retired consultant obstetrician called by NHST

[181] He retired as a consultant obstetrician in about 2013 having spent his entire career as a consultant at AMH. He had experience of giving expert evidence and is also still actively engaged in postgraduate training. He had done doctoral research on perinatal hypoxia. He had experience of remote CMUs as there are similar units within

the NHSG area at Fraserburgh and Peterhead. His report is NHST production number 7/1 of process.

[182] He agreed that KS should have been referred to the specialist unit at AMH on reporting the bleed at 28 weeks. He was not swayed from this by the more detailed account given in evidence by KS as to the nature of the bleed that occurred at this stage of the pregnancy. As he put it "being an obstetrician you think of the worst side of things". The result was likely to have been that KS would have remained low risk given the minor nature of the bleed and the lack of any other similar happening.

[183] He criticised the failure to provide a response when midwife Knox at Montrose CMU faxed a part trace to AMH. A senior midwife could have provided advice on the faxed CTG on 29 September 2012 if no medically qualified member of staff was available. Despite this, he thought that midwife Knox had correctly interpreted the last section of the tracing that ended at 17.25 hours. It showed a baseline rate of 140 and acceleration in response to movements. If the foetus had been distressed and hypoxic you would not get foetal movements. The last part of the tracing indicated a normal reactive foetus. He thought it appropriate to have discontinued the trace when midwife Knox did so as it was reassuring.

[184] In his view foetal heart rate monitoring was not a serious cause for concern in this case. The regular pre-birth readings up to 04.55 hours were within normal ranges. The CTG on 29 September 2012 ultimately did not give rise to serious cause for concern. This was a healthy baby being born at term to a mother who was, on the face of it, a low risk category mother. The only heart rate reading of concern was at 05.00 hours. This

was not depressed for a sufficiently long time to cause damage to the foetus. The second stage of delivery followed so rapidly that no corrective action could have been taken to hasten the birth.

[185] It is not unknown for babies to be delivered unexpectedly flat at birth. This happens occasionally. He could not say that there was a specific point where foetal hypoxia occurred. You would have to have a sustained period of bradycardia to cause that, such as 10 to 15 minutes. The measured heart rate of 80 bpm about 10 minutes before birth did not appear to suggest this had occurred. The mechanisms for bradycardia could be either compression of the baby's head or compression of the cord. He could not substantiate any theory about cord compression though he had suspicions that this may have occurred. A further possible mechanism for prolonged bradycardia might be hypertonic uterine activity but there was no evidence of that. If there was prolonged bradycardia then one reaction would be to expedite the birth by use of forceps or vacuum. There was a short second stage of labour in this case.

[186] Doctor Smith's recollection was that there were about 1000 low risk category births a year in the AMU in Aberdeen and about 4,500 to 5,000 deliveries overall at AMH. From those they got about 1 or 2 born in a floppy condition each week. That equated to about between 52 to 104 cases a year in which babies required urgent assistance even when born to a low risk mother. In each case the baby would be whisked off for medical treatment right away. He referred to this as a "numbers game". The numbers born at Montrose were a lot lower and the same facilities were not available there.

Doctor Julia Sanders – midwifery expert called by NHST

[187] She is a registered general nurse, a registered midwife, a consultant midwife for Cardiff University Health Board and Reader in Midwifery at Cardiff University. She continues to carry out some practice as a midwife as well as undertaking substantial academic duties involving teaching and research. Her main practical work is in the context of the main delivery suite in an AMU. She had little current involvement in community based care. She was a member of NICE Guideline Development groups for antenatal care in 2003 and intrapartum care in 2007. She has had experience as an expert witness in the last 10 years. The majority of those instructions have come from the Central Legal Office of the NHS in Scotland. Her report dated 10 April 2016, which was instructed by the NHS Central Legal Office, was NHST production number 7/3 of process. There is a short addendum covering minor changes dated 8 November 2016 in NHST production number 7/16 of process.

[188] As KS had chosen to give birth at Montrose CMU if her baby became unwell the baby would have come within the scope of specialist services at Ninewells. As she lived in the NHSG area if she had required specialist obstetric care of this sort it would have been provided by NHSG at AMH. She had come across these sorts of arrangements in other locations.

[189] She agreed that in making a choice as to birth site location prospective parents should be made aware of what services were available in each location.

[190] With regard to KS's reported bleed at 28 weeks her view was that if a woman mentioned clots in a telephone conversation with a midwife at that stage of pregnancy she should expect her to be asked to attend for a fuller assessment. This would be done in accordance with the Royal College of Gynaecologists' 2011 guideline known as the "green top" guideline. There might then be a series of assessments. In the case of KS, despite the failure to carry out any assessment, there was no clinical evidence of placental abruption or placental praevia. There was nothing to link the bleed at 28 weeks to N's compromised condition at birth.

[191] With regard to events in labour on 29 September 2012 she made reference to a serious debate within midwifery practice as to whether CTG should be carried out at all within CMUs. There was a school of thought that the use of CTG led to unnecessary interventions. That view was not followed at Montrose CMU in 2012. With regard to Crown production number 18, the enlarged version of the CTG trace, she could understand why a cautious midwife would have faxed the first part of the trace up to about 16.48 hours to AMH for a second opinion. There was a proper basis for the midwife to be uncertain as to how it should be interpreted. She thought that a second opinion could have come from another midwife; it did not require the input of an obstetrician. She would have expected a prompt reply from AMH whether from an obstetrician or a midwife. She thought the second part of the trace to 17.25 hours was easier to interpret, and reassuring. She did not think it necessary that the CTG was continued for a longer time.

[192] In hindsight baby N may have suffered some compromise leading to hypoxic damage a short time prior to delivery. The heart rate reading of 80 bpm at 5 pm was the main indicator of this. At that time the second stage of labour had been reached and the delivery was imminent. The textbook advice in such circumstances was the midwives should not interfere such as by use of forceps or getting KS out of the pool. The failure to record auscultation every five minutes at this point was not crucial as the birth was just about to occur. She noted that the SCEA recommendation to take the maternal pulse when listening to the foetal heart rate was not practicable. At Cardiff if a baby born in the nearby AMU required more than bag and mask ventilation the time taken for specialist help to arrive from the point of an emergency call being made was about two minutes.

[193] With regard to the issue of neonatal transfers, her experience at Cardiff from about 2005 was that they had used a 999 ambulance transfer for babies born at remote units outside the city. The local neonatologists had been unwilling to use a retrieval system because they did not think that they could provide the appropriate speed of response. Transfer times were about 40-50 minutes. From about 2005 the ambulances were fitted with neonatal transfer harnesses. She accepted that the despatch of an appropriately equipped retrieval team allowed for attempts at stabilisation of the sick baby but she was concerned that possible waiting times of up to six hours or even more left a lot of time for deterioration. Such delays were not acceptable. If a baby shows respiratory distress there is always the risk of deterioration even over one or two hours. The potential for collapse was always there for a compromised baby. She had had

experience of long delays in getting specialist help to babies under a retrieval system. She favoured the 999 ambulance option. The neonatal specialist teams remain in the specialist unit. The process of taking a sick baby to the specialist unit was more in line with what is done in other areas of medical practice when there is an emergency. Notwithstanding her clear preference for the 999 ambulance option she favoured specialist staff having the option of a retrieval system available to them. Whichever system was employed or available it was important that staff had clear pathways identified in guidelines.

[194] Despite baby N having been born pale and floppy, she thought that the observations as to heart rate, respiration and oxygen saturations were positive signs that tended to suggest that baby N would soon become more normal. The priority would be to keep the baby warm as the midwives did in this case using the resuscitaire. As I understood her, the death might have been avoided at least in the short term had there been early intervention though she could not say whether in the longer term baby N would have survived.

[195] As there was no underlying maternal illness and the birth had seemed otherwise completely normal, with some diffidence she put forward a theory that some blood loss had occurred around the time of birth. N's pale and floppy condition at birth with normal heart rate was unusual and the short length of cord recorded (31 cm) suggested that there may have been traction on the cord during the birth process. She acknowledged that the short length of cord was not consistent with the finding that the cord was wrapped loosely around N's neck at birth.

[196] In her report under the heading "Aspects of Care" she made reference to the large scale "Birthplace in England" study of 2011 which found that interventions received by women during labour were higher amongst women who had planned birth in a obstetric unit setting with no apparent benefit to mothers or babies. Further, the outcomes for babies born at home or in CMUs or AMUs were, in statistical terms, not significantly different from those for babies born in an obstetrics unit. She accepted that this did not mean that outcomes would not be different for different individuals.

[197] There was a substantial degree of agreement between her and Professor Humphrey on a number of subjects. This included the need for more explicit information to be provided to prospective parents on planned place of birth and the use of water birth. There were some important differences of emphasis on the provision of information. She approached the issue of the information that prospective parents should receive to assist them in choosing a birth site by placing her own interpretation on the NICE guidelines of 2014 that followed the publication of the Birthplace in England study. The 2014 NICE recommendation was: "Advise low risk multi-parous women that planning to give birth at home or in a midwifery-led unit (whether freestanding or alongside) is particularly suitable for them because the rate of interventions is lower and the outcome for the baby is no different compared to an obstetric unit." The conclusion she had drawn was that the important message for women was that according to the best available evidence planning birth in a remote CMU is not risky for themselves or their baby. For the reasons set out below I do not

consider that this is a sufficiently full statement of what prospective parents need to know to be appropriately informed.

[198] As regards information about water birth, pools are now used extensively by mothers for pain relief. She thought there was general agreement that better information was needed on the relative risk to both the mothers and the babies of water birth and birth out of the pool. There was no feasible way of assessing this by means of a large scale randomised test. For the present there is no good evidence of increased risk but more evidence is needed before it can be said there is no increased risk. The best that can be said to prospective parents is that birth in water appears to be safe but the quality of the currently available evidence is not very good. She reviewed a number of documents that stated broadly the same message. In particular NHST production number 7/10 of process was a leaflet produced by NHST in about 2011 headed "water, labour and birth questions" the content of which she described as reasonable. It provided midwives with a source of information that could be supplied to those mothers who were in the low risk category and might be contemplating choosing birth in water. She pointed out that there were a large number of potential complications that may occur very occasionally, perhaps in 1 in 500 cases. Each potential complication of this kind would not normally be discussed with prospective parents. She thought that women understand that there are risks associated with childbirth and she expected that particularly risk averse mothers would not opt for a standalone CMU. She did not think that there was need to expand on the information already available.

[199] Later in her evidence she drew attention to evidence that there seemed to be considerably greater incidence of snapped cord during the births in the pool. The reason for this was not known. She accepted that prospective parents ought to have access to this sort of information when considering water birth as an option. Information ought not merely to be available online. There was a danger that some prospective parents would be excluded from its provision if there was excessive or exclusive concentration on online provision.

Submissions

[200] I do not intend to rehearse the terms of the parties' written submissions in detail. They are available as part of the court process and were spoken to and adopted in court on the day when I heard oral submissions. Therefore I will only provide a brief outline of the main themes of the respective submissions.

Crown submission

[201] In summary the Crown's position was that except for the issue of provision of information as to birth site location, this was a rare set of circumstances and no systemic failures had been identified in the course of the Inquiry. Although the Crown's position in writing was that the information now provided to parents in Tayside is adequate, it was accepted in the course of oral submissions that that suggestion was not correct. There is no sense in this case of the Crown having represented the interests of the

parents or assisted them either in the leading of evidence or in submission. There was little assistance to be gained from the Crown submission.

Mr and Mrs S - submission

[202] Mr and Mrs S produced a helpful and thoughtful submission. With regard to Issue A, they submitted that the greatest risk to women choosing to give birth in a remote CMU is the lack of specialist care and the fact that specialist care may take a long time to arrive. There were no notes in KS's records to suggest that she had been put in a position to make an informed choice. The information in the "My Birthplace" App was misleading.

[203] With regard to Issue B, they submitted that they were not aware of such a lack of evidence regarding the safety of water birth. KS had never been told of any danger or advised that water birth could be considered to be an experimental procedure.

[204] With regard to Issue C, they submitted that procedures to minimise risk were scarce and basic. The failure to allow for a 999 ambulance meant that sick newborn babies and mothers were allowed to remain in a CMU with no access to advanced clinical skills for an unlimited period of time. Prior to 2016 there was reliance on telephone conversations between units which were intermittent at best. It was only in about 2016 that NHST had belatedly introduced telemedicine and the option of a 999 ambulance.

[205] With regard to Issue D, they submitted that there was no evidence that NHST had current procedures for timeous review of foetal heart rate monitoring. The evidence

in this case demonstrated the extent to which interpretation of CTGs is not an exact science.

[206] With regard to Issue E, they submitted that prior to 2016 although they knew that timeous emergency specialist medical assistance was not possible for a patient in a remote CMU, NHST were content to allow patients in remote CMUs to wait for an unlimited period of time. There was evidence from Doctor Turner that, where available, he would anticipate that advanced lifesavings skills would be administered within the first 5 or 6 minutes.

[207] The submissions of the parents as to reasonable precautions focussed on the following issues.

a. Failure to take action about the bleed at 28 weeks;

b. Failure to give clear information about transfer times to prospective parents; and

c. Failure to provide a 999 ambulance option which was quicker than what was available under the operational guidelines for neonatal transport.

[208] The Defects said to have arisen could be summarised under the following heads.

a. NHST failed to implement the BAPM guidelines of 2011 – reference was made to Crown production number 6 regarding the use of 999 ambulances and to the evidence of Doctor Ward Platt that the whole point was to avoid this kind of situation arising in the first place.

b. NHST failed have a satisfactory level of communication between professionals after the birth of N in poor condition. There was a lack of

urgency in the response by Doctors Connolly and Sharma when the emergency arose following the unexpected birth of N in poor condition.

c. NHST failed to tell prospective parents about possible unlimited waiting times for an ambulance to retrieve a sick baby under the then operational guidelines.

[209] In conclusion they submitted that NHST failed to implement the BAPM Framework of 2011 which reflected good practice in a timely manner. There was a reasonable chance that the tragic outcome for baby N would have been different had they done so. Further the failure to instigate an investigation of the 28 week bleed was significant as it may have altered their decision to choose a remote CMU for the birth; if they had been informed accurately of the truth about transfer times they would not have chosen a remote CMU; and had N received earlier medical attention her chances of survival would have been increased. The delay had been a contributory factor in her death.

NHST Submissions of the terms of section 6(1)(c) of the 1976 Act

[210] Counsel for NHST in his written submission presented an argument as to the interpretation of section 6(1)(c) of the 1976 Act. I was urged to follow the reasoning of the Sheriff in the *Bellfield* FAI [2011 FAI 21]. He also advised the court during his oral submission that he was aware of a case which was then at Avizandum in the Outer House of the Court of Session in which the issue of the meaning of section 6(1)(c) was being considered by the Lord Ordinary (Armstrong) in a petition for judicial review at

the instance of a consultant cardiac surgeon aggrieved at the determination of a sheriff in an Inquiry under the 1976 Act. The decision in respect of that case was issued on 28 February 2017, that is, after the completion of oral submissions in this case. It is *Sutherland Petitioner* now reported at 2017 SLT 333 (OH); [2017] CSOH 32. The same authorities have been canvassed in the Outer House as were discussed in the submissions to me in this Inquiry.

[211] In the course of his oral submissions counsel expanded his analysis in the context of this case. He suggested that any criticisms in this Inquiry would be under section 6(1)(e) and section 6(1)(c). It would not serve any useful purpose to make a finding that Doctor Connolly failed to take precautions that might have prevented the death. He and his colleagues were trying to do their best. A distinction ought to be drawn between what would have been a reasonable precaution at the time and what would be a reasonable precaution for the future. A FAI encompasses both kinds of precautions. There was a need to look back without hindsight. A reasonable precaution was one that required foreseeability. For the reasons set out below in the discussion of this preliminary issue I have not accepted this submission having reached the conclusion that the Lord Ordinary's analysis in the subsequently published decision in *Sutherland Petitioner* is to be preferred.

[212] Counsel for NHST submitted that there was no compelling or satisfactory evidence that N had a realistic chance of survival. Further he submitted that there was no rational basis upon which the court could select and prefer any of the evidence which

might be said to point in that direction over any evidence which does not. To purport to do so would amount to speculation.

NHST Submissions on the issues focussed in the Inquiry

[213] Counsel helpfully supplied a list of questions numbered **(i)** to **(x)** that the Inquiry might wish to consider in his written submission. At the oral submissions hearing the other parties agreed that these questions properly reflected the main issues to be considered the Inquiry. NHST's overall position can be summarised as follows.

i. **Was N's death avoidable?**

   On the evidence it would be speculative to find that it was.

ii. **On the hypothesis that the hypoxia was survivable, were there steps omitted which, if taken, may have been conducive to such an outcome?**

   A number of scenarios had to be considered and these are set out more fully in the following questions.

iii. **Might the death have been avoided had KS been reviewed at Aberdeen following the 28 week bleeding?**

   KS would most likely have been returned to midwifery led care if she had had a scan.

iv. **Might the death have been avoided if KS had *chosen* not to deliver at Montrose?**

If the court found that further and better information should have been provided, the place for any recommendation is under section 6(1)(e) and not 6(1)(c).

v. **Might the death have been avoided had KS been given further information concerning the safety of water birth?**

There is no evidence that N's birth in the pool had any connection with her death.

vi. **Might the death have been avoided had there been timeous review of the CTG?**

There is no evidence that the review of the CTG would have had any consequence for the course of KS's labour.

vii. **Might the death have been avoided had the ambulance been called sooner than 05.45?**

Calling the ambulance sooner should not be characterised as a reasonable precaution.

viii. **Might the death have been avoided had it been decided at 0605 for the registrar to go to Montrose in the first ambulance?**

Going without the incubator should not be characterised as a reasonable precaution.

ix. **Might the death have been avoided had closer inquiry been made whether N was truly stable, or if her persistent poor tone and pallor had been accorded greater significance?**

Any failure to seek updates from the midwives is very unlikely to be characterised as a reasonable precaution that would have prevented the death.

x. **Might the death have been avoided had a 999 ambulance transfer option been available and implemented?**

The court does not have sufficient material to adjudicate between competing models for care of newborns who become unexpectedly unwell in a remote CMU. It is not possible to say whether at any particular time a 999 call should have been made as a precaution that might have prevented the death.

[214] Where counsel expanded on the written submission at the oral hearing I have provided a summary of what was submitted to the court.

[215] With regard to his question **(iv)**, Counsel for NHST accepted that the evidence tended to suggest that KS should have been given more information during pregnancy about birth site choice but urged me to deal with that matter under section 6(1)(e).

[216] With regard to his question **(vi**), it was submitted that on 29 September 2012 midwife Knox was entitled to be satisfied on the basis of the extended CTG trace that it was appropriate to send KS home even though AMH had not responded to her earlier request for assistance in interpretation of the partial CTG.

[217] With regard to Issues C and E, counsel reminded the court of Doctor Fowlie's position which had been that the retrieval system followed in Scotland hitherto aimed to transport a sick baby from a remote CMU in an hour or two. This was satisfactory. This was not an emergency situation like a cardiac arrest.

[218] With regard to his question **(ix**), even if the court found it remarkable that there was little evidence of communication with the CMU after the birth, counsel questioned what was to gained by, for instance, calling the CMU every five minutes for an update from the midwives.

Discussion

[219] In terms of section 6(1)(c) the sheriff is required to determine "the reasonable precautions, if any, whereby the death and any accident resulting in the death might have been avoided". The purpose is not to determine any question of civil or criminal liability, nor to apportion blame. Not all precautions which might conceivably have been taken will be reasonable precautions. As noted in the section dealing with the

submissions of NHST, there was a preliminary issue in this case as to how section 6(1)(c) ought be construed and this is dealt with in the next section.

[220] In terms of section 6(1)(d) the sheriff is required to determine "the defects, if any, in any system of working which contributed to the death or any accident resulting in the death." 'System of working' is to be interpreted widely, and in the present context would include any system, or lack of system, of working, supervision, or routine in a CMU or hospital, where this has positively contributed to the death or accident resulting in the death. Similar considerations apply to a finding under this subsection as to a finding under subsection (c), with the difference that the evidence must be sufficient on a balance of probabilities to justify the finding. In other words the standard of proof in relation to causation is higher. A precondition to making a recommendation under subsection (d) is satisfaction that the defect in question did in fact cause or contribute to the death.

[221] In terms of section 6(1)(e), the sheriff is required to determine "any other facts which are relevant to the circumstances of the death". The wording of this provision gives wide scope, in that there is no requirement for there to be a causal connection between the 'other facts' and the death, but such facts must be relevant to the circumstances of the death and are not a proper substitute for findings in fact. This sub-section may therefore be appropriately used to make recommendations, and to list observations, which are relevant to the death but lack a causal link to it. There may be a line to be drawn between findings under section 6(1)(e), and matters which although of concern to the court did not directly relate to the death, in which case observations in a

Note attached to the determination may be more appropriate than a formal finding under section 6(1)(e).

[222] There are two preliminary issues which I propose to deal with before I consider the merits of the issues dealt with in this Inquiry.

Preliminary Issue 1: The Approach to section 6(1)(c) of the 1976 Act

[223] I am persuaded that the interpretation of section 6(1)(c) adopted by the Lord Ordinary in *Sutherland Petitioner* is to be preferred. With respect, the approach in *Bellfield* (and the other cases that have followed the same approach) appears to be unduly restrictive having regard to the terms of the statute and the nature of an FAI under the 1976 Act. The Lord Ordinary said the following:

> "[30] The statutory provisions of the 1976 Act are intended to permit retrospective consideration of matters with the benefit of hindsight.
>
> [31] In determining whether the death might have been avoided by a reasonable precaution, the appropriate test has been described as that of a "lively possibility". Such a description is entirely apt and is consistent with the language of section 6(1)(c). According the provision its ordinary meaning, certainty or probability are not relevant considerations in determining whether the death might have been avoided. Further, given the nature of the process as I have described it, in considering whether a precaution is reasonable, foreseeability has no part to play. That question falls to be determined with the benefit of hindsight, and a finding that the death might have been avoided by the application of a reasonable precaution carries no implication that the failure to take the precaution was negligent or unreasonable. Whether or not a precaution was reasonable does not depend on foreseeability of risk, or whether at the time the precaution could or should have been recognised.
>
> [32] In this context, there is nothing so particular, in relation to a death which occurs in medical circumstances, that merits the disapplication of that general approach. There is no statutory provision to the effect that findings as to reasonable precautions in such cases should involve different considerations, and

> no objective justification for imposing the common law concepts of the applicable test in matters of clinical negligence onto a general statutory model, in circumstances where to do so would restrict the public utility of the process.
>
> [33] …Whether the death might have been avoided is a matter to be determined on a consideration, with the benefit of hindsight, of the whole facts which emerge from the enquiry, including the according of due weight to relevant expert medical opinion."

[224] The Lord Ordinary in *Sutherland Petitioner* at paragraph [34] accepted that in a situation involving the exercise of clinical judgment whereby a doctor is presented with two or more options and could not know which is in the patient's best interests, it would not be appropriate to determine that the selection of another of the available options would have been a reasonable precaution. To do so would distort the meaning of "reasonable precaution" and would in any event be of no assistance in the future. The Lord Ordinary was satisfied that the circumstances of the petitioner's decision in *Sutherland* were not of that type. A similar analysis applies to the areas in which I have decided to make recommendations in this case. Neither of the recommendations set out below made under section 6(1)(c) turn on any particular degree of specialist medical expertise and no medical practitioner was placed in a situation where there were two or more options and could not know which was in the patient's best interests. The first recommendation relates to the provision of information to prospective parents and the training of midwives. The second recommendation relates to the provision of similar options for the transport of unstable newborn babies whether born at home or in a remote CMU.

Preliminary Issue 2: NHSG

[225] NHSG did not participate in this Inquiry and the Crown has called no one from AMH to explain what occurred in relation to those aspects of the case which involved them. This is regrettable as it is not possible to ascertain the sequence of events at AMH after the faxed CTG was received on 29 September 2012 and thus there is no explanation in evidence before the Inquiry as to why it was not responded to at all. Furthermore NHSG were invited to participate in the SCEA review but no one attended there either. A degree of regret was expressed by Doctor Russell when he gave evidence at the lack of co-operation from NHSG in the SCEA process. My understanding was that, like the Scottish Ambulance Service, NHSG was aware of this Inquiry and opted not to participate.

[226] During a break in the Inquiry hearings I instructed the Sheriff Clerk to write to NHSG to point out that there might be remarks or criticism of it in the determination of this Inquiry. As a result on 27 February 2017 a detailed reply was received from the Chief Executive of NHSG. In summary his response was as follows.

a. Provision of information during the pregnancy.

   The information provided simply confirmed what was already known from the medical records. A copy of the leaflet "Where to Give Birth?" was enclosed. Another copy of the same leaflet had already been lodged as Crown production number 23 at a late stage of the evidential hearings in this Inquiry.

b. Report of vaginal bleed at 28 weeks.

   NHSG accept that KS should have been referred to AMH for further assessment when she reported a vaginal bleed.

c. Failure to review the faxed CTG on 29 September 2012

   NHSG accepted that it would have been normal procedure for a senior midwife or an obstetrician to review a CTG trace faxed into the labour ward and that this should happen in a timely manner. A copy of the CTG trace was contained in the maternity record in Aberdeen. There was a note that indicated that Midwife Knox spoke with a senior midwife at about 18.35 hours.

d. Failure to attend the SCEA review.

   The Head of Midwifery, a consultant obstetrician and the Midwifery Manager from NHSG had attended an initial case review held by NHST. The Head of Midwifery had tendered apologies for non-attendance at the SCEA review and would have arranged for a deputy to attend if required. The others did not recall receiving an invitation to the review.

[227] I took the view that the content of the letter from the Chief Executive of NHSG did not add materially to the factual evidence already available to the Inquiry. I have not sought to extend the Inquiry to take further account of the views expressed by the Chief

Executive of NHSG. I did not consider that I should extend the Inquiry further given the extensive discussion of the issues in the expert evidence. As regards the CTG matter the evidence did not support the suggestion that it had contributed to the death. As regards the failure to refer on a report of bleeding at 28 weeks I accepted Doctor Smith's evidence that although there should have been a referral this would have resulted in KS being returned to the low risk classification. As regards the choice of birth site issues, ultimately I took the view that the final choice of Montrose CMU left responsibility with NHST as the midwives there were responsible for her care in the latter part of her pregnancy. The NHSG notes relating to the pregnancy were available to the Inquiry. By coincidence Professor Humphrey had extensive knowledge of midwifery practice in NHSG at the time of the KS's pregnancy and the birth and death of baby N. Her evidence was of substantial assistance.

Assessment of witnesses

[228] Prior to discussing the merits of the issues in the Inquiry, I set out in the following paragraphs my assessment of the witnesses who gave evidence either in court or by a live link.

KS – mother of N

[229] KS was a careful and level headed witness. At the inquiry she spoke with the benefit of hindsight and with the unfortunate experience of a disastrous outcome. She appeared interested in the advice that had been available to her during her various

pregnancies. She wished to have her baby in as pleasant an environment as could be achieved but this was not at any cost. I consider she would have taken account of such advice as was given to her. I accept that she was not provided with sufficient information at the times when she was considering choice of birth site. This was the case both in the earlier stages of her pregnancy with baby N when she was under the care of midwives employed by NHSG and when she was being dealt with by NHST midwives. Had she been made fully aware of the existing arrangements for neonatal transfer from Montrose CMU in the event that her baby was born unexpectedly unwell she would not have chosen to give birth there.

GS – Father of N

[230] GS gave the impression of having reflected on the information provided in the SCEA and that he had been left with genuine concerns of the kind he outlined in his evidence. I accept that like his wife had he been fully informed he would not have chosen Montrose CMU as a birth site for the pregnancy. I also commend his articulate, thoughtful and dignified conduct in the oral hearings.

Midwife 2 – Suzanne Knox

[231] Midwife Knox was a careful and experienced midwife who did her best in the circumstances in which she found herself. I accept that she portrayed the situation accurately to Doctor Connelly when they spoke for the first time after the birth.

Midwife 1 - Sandra Menzies

[232] She was a very senior and experienced midwife who did her best with the limited range of options available to her but she was perhaps too deferential in attitude to the specialist doctors at Ninewells. There is no note of any other call with Ninewells Neonatal Unit and midwife Menzies could not recall any other conversation between that which midwife Knox had at about 05.40 hours and 07.05 hours. It was only after very significant deterioration in N's condition had occurred that she as the senior midwife made any inquiry as to when the Neonatal transport team would arrive. This might point towards a culture that did not expect much support in what was an emergency situation. The responsibility for providing such support for midwives in an isolated CMU like Montrose lies elsewhere but the reaction of the midwives might suggest just how low their expectations were at this time.

Doctor Paul French

[233] Doctor French was a careful and competent witness. There was little in dispute in his evidence. In large measure it served to exclude certain possible causes of N's death rather than to point conclusively to why she died.

Doctor Nicholas Connolly

[234] There is no doubt that Doctor Connolly made strenuous efforts to save N once he arrived at Montrose CMU. Given the operational guidelines in force at the time, it is difficult to criticise him for his decision in relation to deciding to make arrangements for

an *ad hoc* transport team. As he said he was not in a position to provide an emergency response service. Nonetheless, on the basis of the information he was given by the midwives when he responded to their call, it is difficult to see why he did not treat the transfer of N with a greater sense of urgency. There was broad consensus amongst the various specialist practitioners and experts whose evidence I accepted that the pale and floppy condition of N indicated serious problems and a likelihood that she might collapse. It may be that his lack of similar experience caused him not to take this possibility seriously. Doctor Connolly accepted that he did not know why N had been born unexpectedly pale and floppy. It is surprising that there were no more discussions with the midwives who were left to cope alone at a remote site for an extended period of time. That might have caused him to treat the matter with a greater sense of urgency and might also have provided them with more support. Once Doctor Sharma came on the ward it is difficult to understand why there was no more communication with the midwives at Montrose CMU. The decision not to go in the first ambulance has been criticised by Doctor Turner but that criticism is directed at the consultant, rather than Doctor Connolly who was in a more junior role at the time. Doctor Connolly was Doctor Sharma's main source of information as to the condition of baby N. It is difficult to know to what extent Doctor Sharma's approach was informed by the unalarmed approach of Doctor Connolly. While the cause of the unexpected state of baby N was unascertained at the time, had she been born at Ninewells I have no doubt strenuous efforts would have been made to assist her as soon as her condition was noted after birth.

ANNP Pamela Irving

[235] With no disrespect to her, this witness did not add materially to the information available to the court.

Doctor Rajesh Sharma

[236] Doctor Sharma's failure to inquire about baby N's pale and floppy condition or to recognise that it was serious enough caused a degree of complacency as to the need for urgency. He relied too much on Doctor Connolly's report of N's measured signs and did not fully interpret what he was told. His view that this was a stable baby merely awaiting transport was too complacent and did not take full account of the condition of N as reported by the midwives to Doctor Connolly. He ought to have called the midwives in Montrose to support them and also to get an update on N's condition. That failure meant that there was not sufficient effort made to get urgent assistance to a baby that plainly needed it. As is discussed further below his actions do require to be seen in the context of the guidelines under which he was required to operate. When Doctor Connolly called and told him that the baby might not make it, he immediately sought a blue light police car to go to Montrose himself. That is an indication of his reaction when he thought it was an emergency situation.

[237] Had he fully appreciated or interpreted the serious nature of N's condition at 06.05 hours I consider he would have shown a rather greater sense of urgency because he would have considered that he was dealing with an emergency situation.

Doctor Andrew Russell

[238] He showed an impressive capacity to step back and look at the broader picture as is appropriate in his role. He acknowledged shortcomings in relation to communication of risk – this is reflected in the ultimate approach of NHST to the issue of communication of risk as to choice of birth site at the Inquiry. It follows that NHST now accept that a frank conversation with such a parent requires to explain plainly that low risk does not mean there is no risk. His approach to the conflicts that plainly existed amongst different professional groups on the issue of neonatal transport for remote CMUs seemed to amount to deferring to each group for its specialist knowledge. It might be questioned whether that is a useful approach when they held such divergent views as to the approach to be taken when a baby requires to be retrieved as a matter of urgency from a remote CMU. In public at least there was no real acknowledgement that there was such a degree of divergence of view amongst different specialists in NHST.

[239] It was perhaps unfortunate that Doctor Russell was called to give evidence before both Doctor Fowlie and Mrs Craig as the extent of their divergence of view on neonatal transport from remote CMUs was not clear at the stage he gave evidence. While it was appropriate for him to rely on and defer to their respective specialist expertise, it ought to have been clear that there had emerged sufficient differences of view between specialisms as to require some engagement with those differences by Doctor Russell and his Nurse Director colleague. As I understood his evidence, the Directors bear overall responsibility for the medical and nursing aspects of care in NHST. I accept that the extent of divergence of view might not have been as sharply

focussed until Mrs Craig was in post for some time. Nevertheless given the 2015 incident it is rather surprising that the issue was not explored with him or he did not seem to be aware of how much divergence of view had actually emerged.

Doctor Peter Fowlie

[240] He was frank to the point of being blunt about the reality of the risks involved in choosing a remote CMU as a birth site. As a result he advocated, at least by the time of the SCEA, that this was communicated to prospective parents in a clear way to allow them to make an informed choice. His role did not give him any say in the information that was provided to prospective parents and so this did not occur.

[241] He did accept some important basic realities such as that delay was a contributing factor in the death of N and that the App was referring to the transporting of babies and not just mothers. His description of good quality practice in communication with a remote CMU following the birth of an unexpectedly sick baby contrasted starkly with what happened in this case.

[242] His statistical approach to outcomes for babies born in major centres and in CMUs does not take account of the need to explain to patients what the risks and implications actually are if their "low risk" baby is compromised after birth in a CMU. This approach also takes no account of individual experience.

[243] On the question of delay his position was perhaps rather contradictory. He had in his report (Crown production number 5) agreed with Doctor Turner that delay had been a contributory factor in N's death although he was reluctant to attribute blame to

the individual clinician. In cross by NHST's counsel, he appeared to rein back from that clear position. He seemed to accept that because it was not possible to know whether N would have survived if specialist support had arrived earlier, then it could be no more than a possibility that the specialist team could have made a difference in N's case. This is a difficult position to follow. My own conclusion is more in line with his originally stated position.

[244] Doctor Fowlie's evidence suggests that paediatric practice in supporting midwives in remote CMUs has improved since the death of N. There is greater use of live links to facilitate telemedicine and also more regular communication with the midwives on the spot in the CMU. It is important that such improved practice is employed consistently when problems like those in N's case arise.

[245] He had long involvement in neonatal transport and had a strong view that the 999 ambulance option was not one normally to be used in relation to the retrieval of a sick baby from a remote CMU. The new guidelines which were not yet in force at the date he gave evidence reflected what amounted to a concession that amounted to a (perhaps grudging) partial acceptance of the strongly held opposing views of the new head of midwifery. His approach was internally consistent as he clearly thought that prospective parents should be told in clear terms of the "trade off" (to use Doctor Ward Platt's striking expression) that was involved in choosing a remote CMU as a birth site.

[246] While I accept that Doctor Fowlie's view was sincerely held and reflected genuinely held fears about the potential risks in transporting sick newborn babies in this way, I have come to the conclusion that the 999 ambulance option should have

significantly greater prominence for the reasons set out later in this determination (especially at paragraph 320 below).

Mrs Justine Craig

[247] As will be clear from the discussion below, I accept the evidence of Mrs Craig and others in relation to the value of the provision of a 999 ambulance option. After the 2015 incident when there had been a wait of some five hours she had exerted significant pressure within NHST to achieve some loosening of the NHST guidelines. She also demonstrated awareness of the decision in *Montgomery* and its relevance to the need to put prospective parents in a position to make informed choices.

[248] As regards the content of the "My Birthplace" App, I accept that this is potentially a very useful tool for communication of risk to prospective parents. It is not a complete answer in that it will be unavailable to a small but significant proportion. Its content is flawed. The material on it as viewed at this Inquiry was euphemistic, for instance the reference to "undesirable outcomes". There is a need for revision of the content of the App so that it provides more frank and accurate information to those using it. I have expanded on this issue in the discussion dealing with question **(iv)** below and in the passages quoted from the United Kingdom Supreme Court decision in *Montgomery v Lanarkshire Health Board* 2015 UKSC 63. Although Mrs Craig is well aware of the problems associated with provision of information to patients I had the impression that she was not alone in not fully embracing the implications of the need for appropriate candour.

[249] Doctor Fowlie's evidence, and that of Mrs Craig, demonstrate very clearly the way in which the two main themes of this Inquiry, i.e. the extent of communication of risk to prospective parents and the efficacy of neonatal transport, are closely related to one another.

[250] Midwives, obstetricians and paediatricians have to work very closely together. Mrs Craig had obviously exerted considerable pressure to get option 4 added to the neonatal transport guidelines. I think that she was correct to take that approach for the reasons she gave. My conclusions on this issue support the expansion of option 4 so that it is not simply something that applies in exceptional circumstances.

[251] On the issue of communication of risk my conclusion is in line with the view of Doctor Fowlie. I thought that on this issue Mrs Craig had not taken sufficient account of the limited nature of the information provided to prospective parents.

Ann Marie Wilson

[252] Her evidence, which could only be taken at a late stage in the Inquiry, filled in some gaps in information available to the Inquiry. Her evidence on the exact logistics of neonatal transport was clear and helpful. She also assisted on the issue of provision of clear detailed information to drive informed consent about neonatal transport when things go wrong. I do not accept her evidence on the condition of a baby who is born pale and floppy. In this regard both Doctor Turner and Doctor Ward Platt are to be preferred. This was not a stable situation especially when provision of transport was being considered. I also do not accept her evidence about the problems of using a 999

ambulance – again I prefer Doctor Ward Platt and Mrs Craig. For the reasons set out more fully below I consider that greater consideration requires to be given to prioritising the use of 999 ambulances in situations, whether characterised as stable or unstable, which are time critical. I do not doubt that the concerns expressed are genuinely held but they are overemphasised. Her evidence about the provision of harnesses in front line ambulances was helpful and reduces some of the concerns that arise from use of such ambulances for neonatal transport. Her evidence about the adoption of the Scottish approach in some parts of England was not echoed in the evidence of those experts who had up to date knowledge of practice in England, that is, Doctor Ward Platt and Doctor Sanders. Therefore I have significant doubts as to the reliability of this part of her evidence.

Doctor Tom L. Turner – retired consultant paediatrician called by the Crown

[253] I thought Doctor Turner was an impressive witness, especially in relation to (a) his account of the conclusions that could be reached from the reported condition of baby N shortly after birth; (b) as to the urgent nature of the problem created by N's birth in unexpectedly poor condition at Montrose CMU; and (c) the action that could have been taken to provide her with earlier specialist help. He tended to make appropriate concessions in cross. There was little to choose between him and Doctor Ward Platt on the issue of how urgent the situation was following N's birth.

[254] His approach to the use of 999 ambulances is in line with the traditional Scottish approach which I have not preferred for the reasons stated below. I have also preferred Doctor Ward Platt's approach as expressed at paragraph 24.8.5 of his report:

> "In the modern world there is no place for the transfer of sick or potentially sick babies by neonatal medical or nursing staff on an occasional or ad hoc basis, or by personnel with little or no previous experience of neonatal transfer."

I agree that a more systematic approach which provides clinicians with clear pathways to make decisions is more appropriate than asking them to "think outside the box" about foreseeable eventualities.

Professor Tracy Humphrey – midwifery expert called by the Crown

[255] Professor Humphrey is in my view correct to suggest that training and audit practices for midwives must be kept under regular review and the regulatory framework should be adjusted as new advances occur. I did not hear much evidence as to how this has been done within NHST.

[256] Overall I thought Professor Humphrey was a very impressive witness. Her command of the underlying theoretical basis for practical action and her wide experience of practice combined well to provide balanced and helpful evidence. There was a considerable degree of convergence between her and Doctor Sanders. I thought her a careful witness who made appropriate concessions and provided appropriately reasoned responses. It was clear that she has had significant influence in Scotland on the development of good practice in midwifery. Although she was a leading practitioner in the Grampian area till 2015 her knowledge of the state of practice in Tayside came from

doing some auditing of practice standards in that region. Where she and Doctor Sanders differed on issues of midwifery practice and training I have tended to prefer the evidence of Professor Humphrey.

Doctor Martin Ward Platt - consultant paediatrician, specialist neonatal consultant called by NHST

[257] Doctor Ward Platt provided many useful insights and I have accepted much of what he has said in evidence. He gave evidence in a balanced way. I thought him an impressive witness who was still in practice and had wide experience as an expert in areas of work that were directly relevant to the issues that arose in this Inquiry. He was open minded and clear thinking. His evidence served to emphasise the problem of the difference in professional attitudes in the intersecting fields of specialism that are concerned with a case of this kind. Doctor Ward Platt's view of the common features of remote CMUs and a home birth supports his view that the 999 ambulance option should be available. His description of the decision being made as to birth site choice involving a "trade off" very clearly expressed the choice that arises for appropriately informed prospective parents.

[258] I also accept his view that if the 999 option had been available and used promptly to get N to Ninewells before she was about 90 minutes old there was a reasonable chance that she could have been brought to Ninewells alive and would have been able to be subjected to intensive specialist treatment before she began catastrophically to collapse. As I understood him, even after 90 minutes treatment might

have made a difference. Whatever may have been N's prospects in the longer term there was a good chance of saving her that day had she been taken to an intensive care unit in the quickest way.

[259] Doctor Ward Platt strongly endorsed the section on Patient Information at pages 4 to 5 of the BAPM framework (see findings in fact 19 to 22 above) and I am satisfied that he was correct to do so.

Doctor Norman Smith – retired consultant obstetrician called by NHST

[260] His "numbers game" comment was very telling. Births of the kind that happened in this case where there were unexpected complications are relatively routine in or near the specialist unit in AMH, occurring on average about once or twice a week. Such unexpectedly unwell babies are whisked straight for specialist medical treatment within minutes. That is exactly what would have happened to N if she had been born at or near the specialist unit at Ninewells or AMH.

Doctor Julia Sanders – midwifery expert called by NHST

[261] Professor Humphrey was a rather more authoritative witness whose midwifery expertise was very impressive. This is not to be disrespectful in any way to Doctor Sanders who was obviously trying to be a helpful witness. Professor Humphrey had much more recent and local experience. It was perhaps unfortunate that the necessary breaks in Professor Humphrey's evidence caused by her absence abroad led to other evidence being interposed, including that of Doctor Sanders. Her evidence might have

been taken in shorter compass, had it been possible to complete Professor Humphrey sooner.

[262] In particular Doctor Sanders' approach to the events immediately following the birth of N appeared to place too much reliance on the observations of heart rate, respiratory rate and oxygen saturations. She did not give sufficient weight to the implications of baby N having been born unexpectedly in a pale and floppy condition. This was in stark contrast to the evidence of Doctors Turner and Ward Platt and Professor Humphrey. I have accepted their approach to this issue. Similarly I consider that although she did not seek to advocate concealing information from prospective parents, her approach was rather more reticent than that of Professor Humphrey whose own starting point appeared to be a more open one.

[263] In her approach to the sort of information that it was important for women to receive, she concentrated on the statistical conclusions of the Birthplace in England study and the NICE recommendations of 2014. The important message from the study, as she saw it, was that planning birth in a remote CMU is not risky for mothers or their babies. I thought this a problematic approach that might tend to mislead prospective parents. Her formulation of the information that should be provided did not give full weight to the sort of issues that might arise if prospective parents choose a remote CMU. The birth of an unexpectedly unwell baby to a low risk mother is a foreseeable though fortunately rare event. Doctor Ward Platt had a much more sensible view of the meaning of the numbers i.e. that those making the selection of which mothers were low risk and so were suitable to give birth in a remote CMU had generally chosen wisely.

Parents making the choice were making the "trade off" that has been discussed above. I regarded Professor Humphrey's view to be close to that of Doctor Ward Platt on the issue of what information should be provided to prospective parents.

[264] As regards communication of risk in relation to water birth Doctor Sanders appeared to commence from the assumption that the more risk averse would not choose to give birth in water at a remote CMU. She seemed to miss the point about the importance of providing frank and accurate information to prospective parents to enable them to make important decisions in their lives and that of their as yet unborn baby. While I appreciate that to give chapter and verse about every single potential complication that might on some remote chance arise would be impracticable, I do consider that it should be spelled out to prospective parents that the choice of a remote CMU for water birth carries implications for the availability of specialist care that might be required should a foreseeable though rare emergency arise. There should also be accurate information provided as to how water birth is viewed by the main professional bodies in the UK.

The Merits of the Inquiry

[265] I have taken issues C and E together in the discussion that follows. This is because I consider that there is some overlap. Issue C is framed in rather general terms. Issue E expresses more clearly the main of focus for discussion of the risks to the newborn that were considered in this Inquiry.

[266] In the following paragraphs I have set out in bold the questions numbered **(i) to (x)** set out by counsel for NHST in his written submissions. I also agree that, by and large, these questions more fully express the matters that were the focus of evidence at the Inquiry. Question **(i)** raises a preliminary matter. The remaining questions all appear to fit within the issues identified in the course of the Inquiry. I have therefore expressly dealt with each of them when setting out my reasons for reaching the conclusions I have made in this determination.

[267] **Question (i): Was N's death avoidable?**

A variety of views were expressed by the various experts who gave evidence on this issue. The words of the statute refer to whether the death "might have been avoided". The incidence of birth of a baby in an unexpectedly poor condition in a remote CMU, like that at Montrose, may be rare, but it is certainly foreseeable. The evidence of Doctor Smith particularly served to indicate the importance of prompt specialist treatment upon the birth of a baby in unexpectedly poor condition. The evidence of Doctor Ward Platt and others was to the same effect. If baby N had been born in the same condition at an AMU either in Aberdeen or Dundee extremely prompt specialist treatment would have been provided to her and, in that sense, there was at least a lively possibility that her death might have been avoided. See further the discussion below dealing with **Question (x)**.

[268] **Question (ii): On the hypothesis that the hypoxia was survivable, were there steps omitted which, if taken, may have been conducive to such an outcome?** This question breaks down into a number of other issues which are expressed in questions

(iv) to **(x)** and each of which relates to a particular matter which was the focus of discussion in the Inquiry. Therefore I have not provided a separate answer to this broad question. Reference is made to the more detailed answers below. For the reasons stated in the next paragraph I have dealt with counsel's question **(iii)** separately.

[269] **Question (iii): Might the death have been avoided had KS been reviewed at Aberdeen following the 28 week bleeding?**

This question does not strictly relate to any of the issues for determination in terms of the petition. It came to be discussed because it was commented on by an expert who reviewed the clinical history of the pregnancy. Therefore I shall briefly state my conclusion in relation to it. I consider that KS should have been referred but I accept the evidence of Doctor Smith that she would have had an ultrasound scan and a speculum examination and these would have been normal. Professor Humphrey's evidence is also consistent with this conclusion. The likelihood is that she would have been returned to the low risk category after any referral. Therefore I do not consider on the evidence that the death might have been avoided if KS had been reviewed at AMH after the 28 week bleed.

Issue A. Procedures for communication of risk regarding birth site choice with prospective parents in order that they might make an informed choice regarding delivery locations

[270] I commence with the legal background before going on to consider question **(iv).**

[271] The United Kingdom Supreme Court decision in *Montgomery v Lanarkshire Health Board* 2015 UKSC 63 is dated later than the date of the events under consideration in this

Inquiry which has the benefit of looking at events in hindsight. The decision provides a very important framework for consideration of the extent of information that should be provided for prospective parents. In *Montgomery* in the leading judgment with which the other members of the court all concurred, Lords Kerr and Reed JJSC stated at paragraph 81:

> "The social and legal developments which we have mentioned point away from a model of the relationship between the doctor and the patient based upon medical paternalism. They also point away from a model based upon a view of the patient as being entirely dependent on information provided by the doctor. What they point towards is an approach to the law which, instead of treating patients as placing themselves in the hands of their doctors …, treats them so far as possible as adults who are capable of understanding that medical treatment is uncertain of success and may involve risks, accepting responsibility for the taking of risks affecting their own lives, and living with the consequences of their choices."

Further, Baroness Hale then DPSC, in a concurring judgement stated at para. 115:

> "A patient is entitled to take into account her own values, her own assessment of the comparative merits of giving birth in the "natural" and traditional way and of giving birth by caesarean section, whatever medical opinion may say, alongside the medical evaluation of the risks to herself and her baby. She may place great value on giving birth in the natural way and be prepared to take the risks to herself and her baby which this entails. The medical profession must respect her choice, unless she lacks the legal capacity to decide (*St George's Healthcare NHS Trust v S* [1999] Fam 26). There is no good reason why the same should not apply in reverse, if she is prepared to forgo the joys of natural childbirth in order to avoid some not insignificant risks to herself or her baby. She cannot force her doctor to offer treatment which he or she considers futile or inappropriate. But she is at least entitled to the information which will enable her to take a proper part in that decision."

[272] All of this is said in the context of disclosure of risks to a patient who was an expectant mother but I consider that it can equally be applied to the communication of risk to prospective parents. It was not suggested that the underlying principles should

not also be applied to the practice of midwives. The decision in *Montgomery* emphasises the need for prospective mothers to be able to make an informed choice. There has to be candour in what is said to prospective parents, unless pressing considerations of possible serious detriment to the prospective parent arise. It is somewhat patronising to suggest that some prospective parents do not want to hear important information. Prospective parents are entitled to take account of their own values alongside the medical evaluation of risks to the mother and her baby. They need to be provided with the information otherwise they cannot make take proper part in a decision such as place of birth.

[273] The NHST SCEA review report was inconclusive about the sort of information that required to be provided to prospective parents. This is despite the clear view expressed by Doctor Fowlie which is recorded at page 10 of the report that: -

> "…women who give birth in peripheral [CMUs] have no access to a flying or emergency squad and rely on the midwifery staff, and their skills and the training that they have to support the baby until such time as a Neonatal Transport Team arrive, which may be anything up to six hours."

This passage summarises very clearly the position that applied in Montrose CMU at the time. To his credit, as noted at page 14 of the SCEA review report, Doctor Fowlie did raise the question of how explicit NHST Maternity Services were with prospective parents around the level of risk which is present and the support available to the CMU should anything go wrong during a delivery within the CMU. The response noted from the Midwifery Team Leader was vague though it did confirm that timelines were not

specifically discussed. It is also noted at page 15 that Doctor Fowlie and the General Manager for Medicine (Ms Goodwin) were:

> "…agreed that NHST Maternity Services required to be more explicit regarding the risks to allow prospective parents to make an informed choice on where their baby is delivered."

Despite this no firm recommendation was forthcoming that would have enhanced the provision of information to prospective parents. In this respect I consider that the SCEA review failed to address in clear terms a very important aspect of what had gone wrong in the case of N.

[274] The development of the "My Birthplace" App followed the issue of the SCEA report, as did the decision in *Montgomery*. I have endeavoured to set out my recommendation on Issue A so as to take account of both of these subsequent developments as well as the expertise of those who gave relevant evidence about this aspect of the Inquiry.

[275] **Question (iv): Might the death have been avoided if KS had *chosen* not to deliver at Montrose?**

My answer is "Yes" in respect of issue A.

[276] The remoteness of the CMU from timeous emergency specialist medical assistance had serious and tragic consequences in this case. I accept the evidence of KS and GS on this issue. If she had been given more information KS would have gone to AMH as she did for her next child. The risk involved in their choice was not communicated to them adequately. The circumstances of this tragic case demonstrate very clearly why candour is necessary. While, thankfully, risk assessment appears to

work well in selecting only low risk cases for delivery at remote CMUs, it can never completely remove that risk. Medical and/or midwifery practices should outline that risk in an accurate and candid manner to patients who are not assessed as being likely to suffer serious detriment to health if the information was provided. If this is not done the likely result is that prospective parents are left to make decisions on the basis of inadequate information. It is for the informed prospective parents to decide the extent of the risk they are prepared to accept.

[277] Counsel for NHST urged me to conclude from her evidence that KS should be taken to have been willing to accept any risk to the baby arising from being 40 minutes from specialist help. I do not accept this as I conclude that the information provided to her was significantly inadequate. I accept KS's evidence that had she been put in a position that allowed her to understand the nature and extent of the risk of giving birth at a remote CMU she would not have chosen to give birth at Montrose CMU.

[278] If N had been born in an AMU she would have had much prompter assistance. On Doctor Smith's evidence this would have been provided within a few minutes. This was a relatively common occurrence for low risk births like that of N. In the case of a birth of a pale and floppy baby no-one stops to ask whether the reasons for the baby being born in that condition are known, they just get on with trying to save the baby. The information provided during pregnancy was seriously deficient. It did not put KS in a position to make an informed choice as to birth site. It does not matter that KS may have contemplated risk of up to 40 minutes travel time. She did not have the necessary

information to come to a better informed conclusion. She would not have gone to Montrose CMU at all had she known the true position.

[279] Training already emphasises the need for midwives to record discussion of birth site choice with mothers as a matter of good practice. While some may be reluctant to discuss this subject, it is important, as matter of good practice, that patients are properly informed as to the factors that affect decisions they may have to make in the course of a pregnancy.

[280] The achievement of informed choice for prospective parents requires a mixture of midwife interaction and other information including the question of transfer times if there is an unexpected problem after the baby is born. It is important to seek to ensure that problems that may arise with the newborn baby are discussed separately from problems relating to the mother.

[281] The general consensus was that the provision of leaflets was of limited value. The "My Birthplace" App is inadequate for the task of communication of risk on its own. It is a useful tool as part of a broader strategy. It does not deal with those who do not choose to have recourse to social media. Procedures should be sufficiently robust to pick up such patients as they will require other interaction.

[282] NHST placed a lot of reliance on the "My Birthplace" App. I accept that there is a lot of useful information for prospective parents on the App. It is a very helpful means of communication of information for NHST and they have been enterprising in securing it. I accept Mrs Craig's evidence that it is being well used. I have no doubt that in many cases it is a useful part of the process of provision of information although on the

evidence I heard there was no real way of knowing how effective it has been to date. I consider that there has been too great reliance on the App on the issues of communication of risk that arise in this Inquiry because its content is inadequate and its reach is not comprehensive.

[283] I wish to focus on what is not covered. The App's content is inadequate in a number of respects. It is euphemistic in places and simply does not provide the sort of information that is required for informed choice. I was left with the impression that the presentation of information to prospective parents in the low risk category who might be considering choice of birth site was quite selective and, in places, unduly positive. It is deficient in the amount of information provided on the topics of choice of birth site and water birth. Both the content and the mode of delivery of information on these topics need attention. Prospective parents need to understand that although low risk assessment is generally successful there are relatively regular births of babies in unexpectedly poor condition. As numbers have grown at Montrose CMU there appears to have been a failure to appreciate that the risk of such occasional unexplained births at term in poor condition was inevitably going to occur there. There is no direct account of what is meant by the expression "undesirable outcomes" as used on the "My Birthplace" App. There is a danger that this would tend to mislead on an important matter.

[284] Doctor Ward Platt's report at paragraph 28 refers to the choice of a prospective parent to use a remote CMU as involving a "trade-off" between being close to help if something unexpected happens in a low risk birth and a more satisfactory birth experience for a low risk mother in a CMU. The expression "undesirable outcome" does

not really convey fully the importance of the choice to be made. If the language is opaque it may serve to obscure and minimise risk. I do not consider that it is really too blunt or frightening for ordinary people to describe this in the way that Doctor Ward Platt has done at paragraph 28 by reference to a trade-off and by making clear that if they are unfortunate enough to find that that low risk of catastrophe has happened to them, then there are not specialist people or equipment available at short notice to try to pull back from the brink. In the present case that risk of catastrophe materialised when baby N was born pale and floppy. Such rare though foreseeable adverse events could arise in a wide variety of ways. It is probably not sensible to try to itemise what all these events might be but what is clear is that when that rare event does occur specialist medical help and equipment is needed very urgently and is not available in a remote CMU.

[285] There also requires to be adequate recording of discussions. This may require further action even though it is part of the current practice regime. I accept that as regards record keeping, a balance needs to be struck. Midwives are busy professionals. Good record keeping need not be unduly burdensome.

[286] In the determination above I have tried to articulate the further and better information that ought to be provided to prospective parents who are classified in the low risk category when considering choice of birth site. This should focus on the "trade off" involved in birth site choice.

[287] Prospective parents should be told clearly that timeous emergency specialist medical assistance from a place like Montrose CMU is not the same as timeous

emergency specialist medical assistance from the AMU at Ninewells. It is the remote nature of the site where birth takes place that creates an extra potential difficulty. Therefore it is important to ensure that there is informed consent to use a remote site like the Montrose CMU.

[288] The content of the "My Birthplace App" should be enhanced by including fuller and franker information including on the issue of the "trade off" referred to above.

Issue B - Procedures for communication of risk regarding the safety of water birth with prospective parents in order that they might make an informed choice regarding water birth.

[289] The attitude of different professionals who gave evidence to water birth varied a great deal. The information presently provided sticks close to a script but at the risk of being rather misleading. There is scope for giving parents rather more information on the range of views amongst professionals as to how they regard water birth.

[290] The information provided to KS about water birth was quite inadequate as discussed further below. As regards the labour KS was mainly interested in using the pool for pain relief. Heart rate monitoring was perhaps a little more difficult in the pool but no issue arises here in that the significant drop in N's heart rate happened so close to her natural birth. There was no delay in the birth of N that might have made a difference to the condition in which she was born. The lack of adequate information about birth site choice stands on its own and does not depend on the inadequate information on the issue of birth in water. Therefore I do not consider I can conclude that there was a

sufficiently close link between the lack of information provided on the issue of water birth and the death of N.

[291] **Question (v): Might the death have been avoided had KS been given further information concerning the safety of water birth?**

This question relates to issue B. My answer is "No". The evidence does not point to birth in water being connected to the condition in which N was born. Doctor Sanders raised a point about damage to the cord. Professor Humphrey and Doctor Ward Platt did not join her in that view. The weight of evidence did not suggest that the cord was in some way compromised due to the birth having occurred in water. Therefore I do not consider that there was a sufficient connection between the failure to provide information on this topic and the death of N.

[292] Despite this the information provided to KS on the water birth option was seriously deficient. The following information ought to be provided to prospective parents considering water birth:

a. there is no good scientific evidence base to say that it is as safe as giving birth out of water in the sense of clinical trials comparing outcomes for people giving birth in water and those not giving birth in water;
b. in the experience of midwives as a collective body (both nationally and internationally) it was practiced commonly and based on anecdotal evidence it would appear to be safe;
c. if their choice is to opt for water birth at a remote CMU the mother and baby will receive midwife led care;

d. the facilities available at a midwife led remote CMU like Montrose for a baby born unexpectedly unwell at term are limited in nature as there is no specialist obstetric or paediatric care available on site;

e. a seriously unwell baby would have to be taken to the specialist obstetric or paediatric care units at Ninewells Hospital, Dundee;

f. there is no specialist recovery service that could be deployed at short notice to take a seriously unwell baby to specialist obstetric or paediatric care; and

g. the period of delay that may occur in taking a seriously unwell baby to specialist care or in specialist assistance arriving at Montrose CMU could extend to several hours.

Issue C: Procedures to minimise the risk to the newborn of being born at a remote maternity unit.

[293] See Issue E below for full discussion of this matter.

Issue D: Procedures for carrying out maternal and foetal heart rate monitoring and procedures for ensuring timeous review of foetal heart rate monitoring recordings by appropriate medical staff

[294] The failure on 29 September 2012 to support midwife Knox by AMH by responding to her fax of the partial CTG is rather worrying. The decision of NHSG not to provide any explanation either at SCEA or until prompted by the court at a late stage of this Inquiry is also cause for concern. It might be thought to give rise to a perception that it demonstrates an indifference to the parents of N and to the wider public interest served by an Inquiry of this kind in seeking to prevent a similar tragedy happening

again. Aside from the drop in heart rate at 05.00 hours on 30 September 2012 just prior to the birth, the query about the CTG was the most likely opportunity for KS to have been referred to a major centre with timeous emergency specialist medical assistance on hand. The expert evidence was clear that CTG traces require interpretation. The divergence of view between Professor Humphrey and Doctor Sanders as to what was a long enough period for further monitoring tends to emphasise the importance of support for midwives in remote CMUs when faced with CTG traces that require interpretation.

[295] **Question (vi): Might the death have been avoided had there been timeous review of the CTG?**

This relates to issue D. My answer is "No". The expert evidence was unanimous in taking the view that either a senior midwife or an obstetrician should review a CTG trace faxed into the labour ward at AMH in a timely manner. NHSG accept that this should have happened. Despite this, on the evidence it is difficult to say that a timeous review of the partial CTG trace faxed to AMH would have made a difference. At its highest the evidence of Professor Humphrey was that she would have continued the trace for a longer time. She agreed that the later part of the CTG trace was more re-assuring than the earlier part. In the absence of other evidence it would be speculation for me to seek to reach a different conclusion. When this failure to review the CTG at AMH is considered in combination with the lack of action in relation to the 28 week bleed, there is understandable cause for concern even if no direct link can be made. There were a number of missed opportunities which give rise to understandable concerns on the part of the parents notwithstanding my findings on the evidence. It is

not unusual for patients resident in one NHS geographical area to opt to use a CMU facility situated in a neighbouring area. In the present case KS by virtue of her residence remained a patient of NHSG. Flexibility in the choice of birth site location so that administrative borders do not prevent prospective parents making the most important informed choice for them is to be welcomed. It must be properly supported and coordinated including having input into later inquiries when something goes wrong.

Issue E: Procedures to ensure that a system exists for timeous emergency specialist medical assistance for patients born at remote community maternity units who require it.

[296] Risk of a neonate being born unexpectedly in poor condition to a low risk category mother is a real and foreseeable one, even if it is a rare event. That risk can only be minimised if there is timeous emergency specialist medical assistance available. There certainly was not any real effort to minimise the risk in 2012 as professionals disagreed over whether a 999 ambulance response was appropriate. Even now, the most viable option is the 999 ambulance (cf. Doctor Ward Platt, Mrs Justine Craig). The new NHST guidelines merely make this a last resort option for an unstable baby. For the reasons set out more fully below, the guideline should be revised so it becomes an option of first resort. Timeous emergency specialist medical assistance might have given N a chance of survival. Doctor Smith equated a peripheral community midwifery unit to a home birth. That is an insight that fatally undermines NHST's approach hitherto to neonatal transport.

[297] There is undoubtedly a system in place for timeous emergency specialist medical assistance for patients born at remote community maternity units who require it. The real issue relates to how adequate the system may be. Issue E in the petition refers to "patients". I have construed this as meaning both newly born babies and their mothers for present purposes. The focus of the Inquiry was on the newborn rather than the mothers.

[298] Although this was not on open display in public the strong impression gained was that the professional elites within NHST had been engaged in an internal dispute over the issue of neonatal transport from remote CMUs. In doing so, albeit in good faith, they appear to have lost sight of the need to explain the reasons why there is such disagreement to those who might actually be seriously affected by their decisions. Mrs Craig's reaction after the 2015 near-miss is evidence of this in that there was some concession which amounted, as Doctor Ward Platt put it, to "grudging acceptance" of a different pathway in exceptional circumstances.

[299] There is also a further question of whether with the increasing numbers using the Montrose CMU the current arrangements and protocols on neonatal transport ought to be revisited regularly but that is for others to consider.

[300] It follows that those aspects of the SCEA review report that dealt with neonatal transport reached a falsely reassuring conclusion. While the right questions were asked, in particular by Doctor Russell, the responses were accepted and not sufficiently challenged.

[301] **Question (vii): Might the death have been avoided had the ambulance been called sooner than 05.45?**

This question relates to issue E. This question, and question **(viii)**, proceed on the hypothesis that the system for neonatal transfers used by NHST was adequate. For the reasons set out above I disagree. The question whether a 999 ambulance ought to be sent straight away should have been at the forefront of the minds of the professionals on duty when this birth occurred but that was not a pathway expressly open to them. Nevertheless it is appropriate that I set out my views in relation to the issues focussed in these questions. With regard to question **(vii)** I do not think the timing of the call can be criticised given the tasks that had to be done before Doctor Connolly could leave for Montrose CMU. All experts were in agreement that he and Doctor Sharma had acted promptly within the guidelines then in force. The pathways provided by the then existing guidelines were inadequate at a systemic level because there was no 999 ambulance option. That is not something that can affect the assessment of what was actually done up to 05.45 hours by Doctors Sharma and Connolly.

[302] **Question (viii): Might the death have been avoided had it been decided at 0605 for the registrar to go to Montrose in the first ambulance?**

This question relates to issue E and involves the hypothesis referred to in the previous paragraph. My conclusion is that as at 06.05 hours there appeared to be a lack of urgency having regard to the reported condition of baby N. The failure to provide greater support to the midwives as they waited in the Montrose CMU is concerning. N was already starting to deteriorate at about 06.00 hours. What she really needed was to be

taken to Ninewells where she could get specialist help as a matter of urgency. This is expanded on in the discussion of question **(ix)**.

[303] **Question (ix): Might the death have been avoided had closer inquiry been made whether N was truly stable, or if her persistent poor tone and pallor had been accorded greater significance?**

This relates to issues C and E. My answer is "yes"; I do consider that closer inquiry was needed for the detailed reasons given below. This question brings into focus the significance of the failure to understand the urgency of the situation when the midwives reported that N had been born pale and floppy. There was an established system that applied for prompt treatment of a baby born unexpectedly sick in an AMU as opposed to a remote CMU. A baby born in that condition at home would have been taken to Ninewells by 999 ambulance as a matter of urgency. It ought to have been appreciated that the existing pathways disadvantaged those born sick in a remote CMU. It was important to have an established system to bring a sick baby to a specialist unit as soon as possible.

[304] A repeated feature of the hearings was debate on the use of the word "stable" in relation to N's condition in the first 90 minutes of her life. The word tended to confuse rather than to illuminate discussion. In the sense that she had not collapsed it could be said that N was stable, but that did not mean that the period of one or two hours immediately after she was born was not time critical for her. Doctor Turner was correct to highlight the time critical nature of the situation which arose when N was born unexpectedly unwell within the Montrose CMU. He also contrasted the idea of stability

with normality. A newborn baby might be in a stable but ill condition but that would not be thought to be a normal state for a newborn baby. In so far as N was "stable" for about 90 minutes this represented a very weak kind of stability.

[305] Doctors Ward Platt and Turner and others thought that the reported pale and floppy condition of N was a serious cause for concern from the start. There was enough information to allow those at Ninewells to recognise immediately that there was an urgent situation. While a direct comparison to a cardiac arrest is not apposite, the unexpected birth of a term baby at a remote CMU in pale and floppy condition is a matter that requires to be treated as requiring urgent and prompt action.

[306] Neither Doctor Connolly nor Doctor Sharma seems to have recognised the need for action beyond retrieval. It is hard to understand why that should have been the case. Closer inquiry on their part, such as by seeking an update from the midwives, might have provided them with more information which would have affected their reaction to the situation.

[307] All witnesses agreed that telemedicine now provides support for midwives in the Montrose CMU. It is very helpful but in itself this would not have prevented the death.

[308] Doctors Connolly and Sharma operated within the guidelines laid down for them at the time. Their clinical judgment can be criticised for showing a lack of urgency in the case of N after 06.05 hours. I do not consider that their actions up to that time can be criticised. I consider that the neonatal transfer guidelines were wanting. At 06.05 hours N was 55 minutes of age. This was a crucial period for her. When it was realised

that the ambulance that was available was inadequate, and there would be a significant wait for a replacement, there was no movement to take action to retrieve her from Montrose CMU. Doctor Fowlie asserted that the 999 option was available at any time but I am in no doubt that it was frowned on by many of the senior paediatricians within Ninewells at the time.

[309] In fairness, Doctors Connolly and Sharma should not be too strongly criticised for not taking an option that was so clearly discouraged. There was an institutional bias against using a 999 ambulance service. Doctor Turner thought Doctor Sharma should have thought "outside the box" at 06.05 hours. I have considerable sympathy with that view but the situation was one that was plainly foreseeable and should not have required thinking "outside the box" on the part of Doctor Sharma. He had just been roused and had attended promptly in circumstances where he had many other responsibilities. The paediatricians were in a foreseeable but difficult and time critical position after the birth of N unexpectedly unwell. The guidelines should function in such a way that it is possible for them to come to a clear assessment of what option is most appropriate. They should be able to follow appropriate pathways that have been fully thought through in advance.

[310] The problem that is really exposed by the facts of what happened that morning up to 06.05 hours is just how inadequate the neonatal transfer guidelines actually were. This issue is dealt with in the next section.

[311] **Question (x): Might the death have been avoided had a 999 ambulance transfer option been available and implemented?**

This relates to issue E. My answer is "Yes".

[312] All professional medical and midwifery witnesses accepted that there is no way in which there can be a "flying squad" on standby 24/7 to deal with any newborn that might be born at some distance from a recognised specialist medical centre. Nevertheless it is to be expected that there will occasionally be births in remote CMUs which involve a baby who is born unexpectedly not in good condition. The unexpected nature of the birth will occur despite the use of an effective system for the assessment of risk in pregnancy. Every such birth relates to the birth of a particular child. With increased use of remote CMUs there will inevitably be more such births. The inclusion of a 999 ambulance as a primary option within the guidelines cannot guarantee something akin to the benefit of being in an AMU but it would improve the chances of survivability in particular cases.

[313] When N was unexpectedly born pale and floppy it happened to be the case that the dedicated neonatal ambulance that covered Ninewells and outlying CMUs was away in Wick. Therefore Ninewells had to put together an *ad hoc* arrangement to get N to specialist care. The lack of a blue light ambulance option contrasts starkly with the position of an unstable neonate born at a home birth. The situations are comparable but in one case a blue light ambulance would be summoned straight away. The guidelines then in force were adhered to. This meant that the unstable neonate simply languished

at the Montrose CMU with only the basic resuscitation care that could be provided by the midwives who did their best in the circumstances.

[314] The reaction to a birth where the baby was unexpectedly unwell would normally be either to whisk the baby in to the specialist obstetrics unit from the AMU or to send a 999 ambulance to a home birth to retrieve the baby without further ado. The approach was different for remote CMUs only. The regime in force meant that the 999 ambulance transfer option was effectively excluded.

[315] There must be a degree of clinical judgement in each case when selecting from the available options but I do think that GS is well founded in thinking that in this case the 999 option provided the best option for getting N to specialist help at the earliest time. The evidence of Doctors Ward Platt and Sanders and Mrs Craig provide a proper and rational basis for recommending that this ought to be a much more prominent option than simply something that can be done in exceptional circumstances.

[316] I consider that the actions of the paediatricians who operated the system for retrieval then in place at Ninewells cannot be criticised for anything they did up to 06.05 hours. On that basis it is unlikely that the ambulance would have arrived at Montrose before 06.45. That was more than 90 minutes into the life of N. That is probably the earliest point in time when specialist assistance could have been provided to N under the guidelines then in force. That assistance would still be a long way from the specialist centre at Ninewells. That is an inferior service to the use to a 999 ambulance which would in all likelihood have had her in hospital by that time even allowing for the fact that it had to get to Montrose from its point of departure. A decision to send a 999

ambulance to Montrose to retrieve N could have been made and actioned at no later than 05.45 hours when Doctor Sharma arrived in the unit.

[317] While the updated NHST guidelines bring NHST into line with the BAPM framework in providing clear pathways for action in emergency situations, I consider that Doctor Ward Platt was well founded in describing the approach to the use of the 999 ambulance option from a CMU as amounting to "grudging acceptance" of the use of that option. There is a need to go beyond that minimal level of acceptance.

[318] I recommend that the 999 ambulance option should not only be available in such restricted circumstances but accorded far greater prominence in the guidelines. It will be for the individual paediatrician in charge to decide which option to take but both should be available. A further benefit that accrues is that specialist medical staff do not require to leave the specialist centre.

[319] Although none of the experts could say that N would have survived in the longer term if she had had prompter specialist treatment, she might have done. If she had been born in the AMU at Ninewells she would have been in a specialist care area within a very few minutes, that is, at the very start of the time critical period. I think it inconceivable that upon birth the specialist team would simply have washed their hands of N because they did not think she could survive. I have no doubt that strenuous efforts would have been made to save her with all involved proceeding on the basis that she stood a chance of survival. Although this cannot be said with any degree of certainty, I consider that there is at least some reasonable prospect that her death might have been avoided if she had had specialist treatment at the start of the time critical period or at

some stage along that continuum by virtue of having been brought to Ninewells expeditiously.

[320] The reasonable precaution that would have avoided the death would have been to have had a 999 ambulance option as one of the primary options available for use to the consultant paediatrician who had the lead in dealing with the urgent situation that had arisen in Montrose CMU. My recommendation is in line with the BAPM Framework document discussed in findings in fact 18 to 22. This case points up the inadequacy of the current preferred retrieval option. Therefore I recommend much greater prominence for this option. This would not be an expensive option. It is not a flying squad approach. I am not suggesting that the 999 "scoop and run" option is the correct option for every circumstance. The lead paediatrician must in every case assess all the available options. Factors such as the time of day, the precise state of the sick baby as ascertained by use of telemedicine and regular communication with the midwives and the availability of particular transport are all issues that will have to be weighed in the balance. This recommendation increases the available options. It puts the baby born in the remote CMU where risks are undoubtedly higher if a baby is born unexpectedly unwell in a similar position to a baby born at home. For each of these two situations it has to be accepted that there are risks in a 999 ambulance transfer. Such risks are unavoidable but prospective parents should be made aware of them when choosing birth site.

[321] I have not suggested that the response time for providing support to a remote CMU from the specialist centre should be defined more precisely. It will be recalled that Mrs Craig had been concerned to learn that there was no time limit for getting a

neonatal transport team to a remote CMU. I do not consider that the evidence I heard would allow me to reach a conclusion about this matter which might well have significant financial implications. Until and unless there is a precisely defined time for response it should be made clear to prospective parents that there is no time limit for getting a neonatal transport team to a remote CMU.

[322] It follows from my conclusions on the issue of neonatal transport that I differ from the SCEA conclusions on that issue. The findings I have made lead me to the conclusion that the SCEA report was deficient in some regards. While many of the right questions were asked at the review meeting, the answers which were accepted in relation to the obvious problems which had occurred were did not tend to lead to any real improvement either in relation to neonatal transport or provision of information to prospective parents about birth site choice. The obvious conflict between the paediatric and midwifery specialties was left to fester unresolved. The lack of engagement with the patients who had been affected at the stage of the SCEA review is suggestive of an inward looking process that failed to address problems that had resulted in a tragic death in a way that might avoid them occurring again.

[323] One way in which this might have been avoided was if the respective directors of nursing and medicine had made efforts to reconcile the starkly differing views within their staff. After the SCEA review there was no tangible change in the provision of information, other than the subsequent development of the "My Birthplace" App. That App simply replicated the euphemistic approach taken to provision of information to prospective parents. The NHST policy on neonatal transport only shifted, even to a

limited extent, when the 2015 incident occurred and the new head of midwifery exerted considerable pressure. No real steps were taken to address the lack of communication with NHSG.

[324] I have made a number of findings about improvements that have been introduced within NHST since the death of N. These include the use of telemedicine to communicate with remote CMUs, the use of harnesses when transporting sick newborn babies and the development of cooling as a technique to assist babies born with potential hypoxic damage. These are all important and welcome enhancements of the available service when (fortunately rarely but foreseeably) cases of this kind arise and a baby is born unexpectedly unwell within a remote CMU. The list of recommendations is shorter than it would have been as a consequence of these changes.

[325] I wish to conclude by repeating the condolences offered to Mr and Mrs S in court for the death of baby N.

Appendix 1

List of witnesses who gave evidence at the Fatal Accident Inquiry

Date	Witness	Notes of evidence
03.05.16 – Day # 1	KS	14-82
03.05.16 – Day # 1	GS	83-118
03.05.16 – Day # 1	Suzanne Knox	119- 215
04.05.16 – Day # 2	Sandra Menzies	1-133
04.05.16 – Day # 2	Doctor Paul French	134-197
04.05.16 – Day # 2	Doctor Nicholas Connolly	198-246
05.05.16 – Day # 3	Doctor Nicholas Connolly	1-147
05.05.16 – Day # 3	Pamela Irving	148-176
05.05.16 – Day # 3	Andrew Russell	177 -217
06.05.16 – Day # 4	Andrew Russell	13-122
06.05.16 – Day # 4	Doctor Tom Turner	123-264
12.09.16 – Day # 5	Doctor Peter Fowlie	1-202
13.09.16 – Day # 6	Mrs Justine Craig	1-236

14.09.16 – Day # 7	Doctor Tom Turner	1-151
14.09.16 – Day # 7	Professor Tracy Humphrey	151-231
03.10.16 – Day # 8	Professor Tracy Humphrey	1-226
01.11.16 – Day # 9	Doctor Julia Sanders	1-229
02.11.16 – Day # 10	Doctor Martin Ward Platt	am: 1-125
		pm: 1-100
03.11.16 – Day # 11	Doctor Rajesh Sharma	1-63
03.11.16 – Day # 11	Doctor Norman Smith	63-139
14.11.16 – Day # 12	Professor Tracy Humphrey	1-110
12.12.16 – Day # 13	Ann Marie Wilson	
19.12.16 – Day # 14	Doctor Julia Sanders	1 – 235

Appendix 2

Glossary

a. Acidosis – Excess acid in the blood.
b. AMU – Alongside Midwifery Unit.
c. AMH – Aberdeen Maternity Hospital.
d. ANNP – Advanced Neonatal Nurse Practitioner.
e. Antepartum haemorrhage – vaginal bleeding occurring before birth.
f. APGAR score – score out of 10 based on observation of a neonate's appearance at various point in time after birth. There are five elements each of which may attract a score of 2.
    i. Heart rate above 100 bpm scores 2 and below 100 scores 1.
    ii. Respiratory effort – whether the baby starts breathing or the effort is erratic or irregular.
    iii. Colour – 2 for blue-pink; patchy = 1; Pale = 0.
    iv. Activity – reflex movement = 2; limited movement = 1; floppy = 0.
    v. Response to stimulation – zero if impassive or effectively unconscious.
g. APH – ante partum haemorrhage.
h. Auscultation – listening to the internal sounds of the body.
i. Asystolic – heart no longer beating.
j. BAPM – British Association for Perinatal Medicine.

k. Bpm – beats per minute.

l. Bradycardia – slowing of the foetal heart rate.

m. CMU – Community Midwifery Unit.

n. CPAP – Continuous Positive Airways Pressure.

o. CTG – cardiotocograph.

p. Dyspneic – struggling with breathing.

q. Foetal tachycardia – accelerated foetal heart rate.

r. Hypertension – high blood pressure.

s. Hypoxia – a lack of oxygen.

t. Intrapartum – the period from the onset of labour to the end of the third stage of labour.

u. IPPV – Intermittent Positive Pressure Ventilation.

v. Ischaemia – a consequence of a lack of oxygen.

w. Meconium – bowel movement in the womb, often due to foetal distress.

x. Multiparous – having experienced one or more previous childbirth.

y. Neonatology – paediatric subspecialty concerned with disorders of the newborn.

z. Nuchal cord – umbilical cord wrapped around the neck at birth.

aa. Perinatal – around the time of birth.

bb. Peripartum – around the time of delivery.

cc. PPH – persistent pulmonary hypertension.

dd. Placental abruption – a tearing away, separation or detachment.

ee. Placenta praevia – low lying placenta.

ff. Pyrexia – fever.

gg. Resuscitaire – A piece of equipment situated on a trolley used for resuscitation of neonates. It allows them to be kept warm by means of an overhead heater. This was available at Montrose CMU.

hh. SCEA – Significant Clinical Event Analysis.

ii. Tachycardia – rapid beating of the heart.

jj. Tachypneic – breathing fast.

kk. Vasoconstriction – narrowing of the blood vessels.