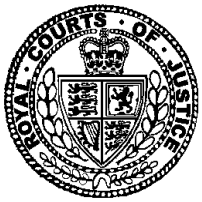

Neutral Citation Number: [2019] EWHC 548 (QB)

Case No: HQ16CO3343

IN THE HIGH COURT OF JUSTICE
QUEEN'S BENCH DIVISION

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 08/03/2019

Before:

MR JUSTICE STEWART

- -

Between:

MR KWAKU KEH (THE ADMINISTRATOR OF THE ESTATE OF ADELINE KEH, DECEASED)	**Claimant**
- and -	
HOMERTON UNIVERSITY HOSPITALS NHS FOUNDATION TRUST	**Defendant**

- -
- -

Mr Giles Mooney (instructed by **Universa Law Ltd**) for the **Claimant**
Mr Angus McCullough QC (instructed by **Bevan Brittan LLP**) for the **Defendant**

Hearing dates: 19th, 20th, 21st, 22nd and 25th February 2019

- -

Approved Judgment

I direct that pursuant to CPR PD 39A para 6.1 no official shorthand note shall be taken of this Judgment and that copies of this version as handed down may be treated as authentic.

.....

MR JUSTICE STEWART

Mr Justice Stewart:

Introduction

1. On 9th October 2013 Mrs Adeline Keh ("the deceased"), who had been born on 14th January 1973, died as a result of sepsis caused by an infection in the operation wound in her uterus. The operation wound related to a caesarean section carried out on 18th September 2013 when her child, Mawusi, was delivered.

2. The Claimant is the deceased's widower. The claim is brought in negligence against the Defendant under the Law Reform (Miscellaneous Provisions) Act 1934 on behalf of the estate, and under the Fatal Accidents Act 1976 on behalf of the dependents, namely the Claimant and Mawusi. Damages have been agreed, subject to liability in the sum of £150,000.

3. A very brief outline chronology is as follows:

   • 16th September 2013: the deceased attended the Defendant hospital for a blood pressure check. She was 36 weeks and 6 days into her first pregnancy. Because of concerns about the baby she was admitted.

   • 18th September 2013: urgent caesarean section undertaken as labour had not progressed. Mawusi born.

   • 22nd September 2013; the deceased began to be treated with antibiotics for post-natal sepsis.

   • 4th October 2013: CT scan.

   • 5th October 2013: antibiotics appearing to have effected an improvement; proposal that the deceased should be discharged.

   • 5th/6th October 2013: overnight the deceased's condition deteriorated.

   • 6th October 2013: deceased diagnosed as having acute respiratory distress syndrome (ARDS).

   • 7th October 2013: deceased transferred to Papworth Hospital.

   • 9th October 2013: deceased died.

The issues in outline

4. There are three bases upon which it is said that the Defendant acted negligently so as to cause the deceased's death.

5. The first basis is that there was always a high risk that induction would be unsuccessful and that labour would result in an urgent C-section. It is said that the deceased should have been warned of the risk and offered a C-section at the outset. Had she been so warned, the Claimant says that the deceased would have elected to go straight to a C-section. These issues arise:

i) what advice, if any, was given to Mrs Keh;

ii) was the advice in fact given, or the lack of advice, negligent?

iii) what would Mrs Keh's decision have probably been had she been given non-negligent advice?

6. As to causation the Claimant says that most C-sections do not result in infections. Relying on *Chester v Afshar* [1] the Claimant submits that it is sufficient to establish that, had the C-section taken place at a different time to when it actually did, then infection would probably have been avoided, even if the risk of infection was unaltered by the timing of the operation. The Defendant's case is that the microbiologists agree that the infective organism derived from the deceased's skin "which was implanted into the deep surgical site during the caesarean section." On that basis, a caesarean section carried out prior to 18th September 2013 would probably have caused the infection. The oral evidence of the microbiologists needs careful examination on this point.

7. The second basis is that the deceased should have been offered a C-section on 18th September 2013 an hour earlier than was the case, or at some stage earlier than that; also that the section negligently took 18 minutes longer than it should have done. The same issue as to causation arises as in the first basis of claim.

8. The third basis is that between 22nd September 2013 and 5th October 2013 there was a negligent failure to consider and perform a hysterectomy.

9. There is a measure of agreement on some issues, namely:

• a CT scan should have taken place on 3rd October 2013, rather than 4th October 2013. The CT scan ordered on 3rd October 2013 was cancelled, and for some reason delayed until the following day.

• The Defendant was also in breach of duty in failing to have a consultant review on 3rd - 5th October 2013. The first such review took place on 6th October 2013.

• The source of the deceased's infection was the uterus; a hysterectomy performed on or before 5th October 2013 would probably have prevented the deceased's death.

10. Therefore, the battleground on the third basis is breach of duty. Was it negligent not to have performed a hysterectomy by 5th October 2013 at the latest? If it was then causation is not disputed.

Witness evidence

11. I heard evidence from the following witnesses:

i) The Claimant: witness statements dated 21st February 2018 and 16th January 2019.

[1] [2004] UKHL 41; [2005] 1 AC 134.

ii) For the Defendant[2]:

a) Mr Dorman, consultant obstetrician and gynaecologist with the Defendant - witness statement 18th April 2018.

b) Doctor Ravikumar, now speciality doctor in obstetric ultrasound; in 2013 a specialist registrar in obstetrics and gynaecology with the Defendant - witness statement 16th April 2018.

c) Miss Arpita Ray, now consultant gynaecologist and reproductive medicine specialist; in 2013 a locum consultant in obstetrics and gynaecology with the Defendant – witness statements 15th April 2018 and 11th September 2018.

d) Doctor Spiegler, general practitioner; in 2013 GP trainee starting in the obstetrics and gynaecology department with the Defendant – witness statement 5th April 2018.

12. There is also a witness statement from Doctor Schwiebert. This is dated 19th April 2018. Doctor Schwiebert is, and was, at the relevant time, a consultant anaesthetist with the Defendant. He was not called to give evidence.

13. There was originally an allegation based on the timing of prophylactic antibiotics at the caesarean section. This is no longer pursued. Doctor Schwiebert was responsible for administering the prophylactic antibiotics and his evidence is agreed. The Claimant concedes that prophylactic antibiotics were given before "knife to skin" at the caesarean section.

14. There are expert witnesses in three disciplines, namely obstetrics, microbiology and radiology. I heard from the obstetric and microbiological experts. There was no significant disagreement between the radiologists. It is agreed that the radiology and in particular the CT scan on 4th October 2013 was properly reported. The radiology reports were admitted in evidence by agreement.

15. The obstetric experts are:

i) Professor Phillip Steer. He provided a letter dated 23rd October 2017 and a report dated 1st May 2018. He gave evidence for the Claimant.

ii) Mr Derek Tuffnell. His report is dated May 2018. He gave evidence for the Defendant.

16. The microbiology expert evidence was from:

i) Doctor Michael Rothburn. His report is dated 24th April 2018. He gave evidence for the Claimant.

ii) Professor Gary French. He provided a report dated June 2018 and a letter dated 2nd December 2018. He gave evidence for the Defendant.

[2] The order in which they gave evidence was: Doctor Ravikumar, Doctor Spiegler, Miss Ray (by videolink) and Mr Dorman.

17. The radiology reports were from Doctor Weston dated 1st January 2018 (for the Claimant) and Doctor Richenberg, dated July 2018, for the Defendant.

18. The joint statement of the obstetrics experts is dated 20th September 2018. The joint statement of the microbiology experts is dated 6th October 2018.

Case law

19. I was referred to the following cases:

Breach of Duty

20. *Bolam v Friern Hospital Management Committee*[3]. McNair J set out the classic test as follows:

> "…he is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical men skilled in that particular art……Putting it the other way round, a man is not negligent, if he is acting in accordance with such a practice, merely because there is a body of opinion who would take a contrary view."

21. *Maynard v West Midlands RHA*[4]. Lord Scarman said:

> "Differences of opinion and practice exist, and will always exist, in the medical as in other professions. There is seldom any one answer exclusive of all others to problems of professional judgment. A court may prefer one body of opinion to the other: but that is no basis for a conclusion of negligence."

22. *Bolitho v City and Hackney Health Authority*[5]: Lord Browne-Wilkinson explained and refined the *Bolam* test in this way:

> "……the court is not bound to hold that a defendant doctor escapes liability for negligent treatment or diagnosis just because he leads evidence from a number of medical experts who are genuinely of opinion that the defendant's treatment or diagnosis accorded with sound medical practice……The use of these adjectives - responsible, reasonable and respectable - all show that the court has to be satisfied that the exponents of the body of opinion relied upon can demonstrate that such opinion has a logical basis. In particular in cases involving, as they so often do, the weighing of risks against benefits, the judge before accepting a body of opinion as being responsible, reasonable or respectable, will need to be satisfied that, in forming their views, the experts have directed their minds to the question of comparative risks and benefits and have reached a defensible conclusion on the matter…….

[3] [1957] 1WLR 583.
[4] [1984] 1WLR 634
[5] [1998] AC 232

> …… if, in a rare case, it can be demonstrated that the professional opinion is not capable of withstanding logical analysis, the judge is entitled to hold that the body of opinion is not reasonable or responsible."

23. In *C v North Cumbria University Hospitals NHS Trust*[6] Green J, as he then was, gave a helpful analysis of the case law on breach of duty. He said[7]:

> "25. …….It seems to me that in the light of the case law the following principles and considerations apply to the assessment of such expert evidence in a case such as the present:
>
> i) Where a body of appropriate expert opinion considers that an act or omission alleged to be negligent is reasonable a Court will attach substantial weight to that opinion.
>
> ii) This is so even if there is another body of appropriate opinion which condemns the same act or omission as negligent.
>
> iii) The Court in making this assessment must not however delegate the task of deciding the issue to the expert. It is ultimately an issue that the Court, taking account of that expert evidence, must decide for itself.
>
> iv) In making an assessment of whether to accept an expert's opinion the Court should take account of a variety of factors including (but not limited to): whether the evidence is tendered in good faith; whether the expert is "responsible", "competent" and/or "respectable"; and whether the opinion is reasonable and logical.
>
> v) Good faith: A *sine qua non* for treating an expert's opinion as valid and relevant is that it is tendered in good faith. However, the mere fact that one or more expert opinions are tendered in good faith is not *per se* sufficient for a conclusion that a defendant's conduct, endorsed by expert opinion tendered in good faith, necessarily accords with sound medical practice.
>
> vi) Responsible/competent/respectable: In Bolitho Lord Brown Wilkinson cited each of these three adjectives as relevant to the exercise of assessment of an expert opinion. The judge appeared to treat these as relevant to whether the opinion was "logical". It seems to me that whilst they may be relevant to whether an opinion is "logical" they may not be determinative of that issue. A highly responsible and competent expert of the highest degree of respectability may, nonetheless, proffer a

[6] [2014] EWHC 61.
[7] In truncating the citation for purposes of brevity: (a) I have not failed to take account of the passage as a whole; (b) I hope I have retained the essentials, at least for the purposes of this case.

> conclusion that a Court does not accept, ultimately, as "logical". Nonetheless these are material considerations….The following are illustrations…."Competence" is a matter which flows from qualifications and experience. In the context of allegations of clinical negligence in an NHS setting particular weight may be accorded to an expert with a lengthy experience in the NHS……..This does not mean to say that an expert with a lesser level of NHS experience necessarily lacks the same degree of competence; but I do accept that lengthy experience within the NHS is a matter of significance. By the same token an expert who retired 10 years ago and whose retirement is spent expressing expert opinions may turn out to be far removed from the fray and much more likely to form an opinion divorced from current practical reality…..A "responsible" expert is one who does not adapt an extreme position, who will make the necessary concessions and who adheres to the spirit as well as the words of his professional declaration (see CPR35 and the PD and Protocol).
>
> vii) Logic/reasonableness: By far and away the most important consideration is the logic of the expert opinion tendered. A Judge should not simply accept an expert opinion; it should be tested both against the other evidence tendered during the course of a trial, and, against its internal consistency…….There are 2 other points which arise in this case which I would mention. First, a matter of some importance is whether the expert opinion reflects the evidence that has emerged in the course of the trial. Far too often in cases of all sorts experts prepare their evidence in advance of trial making a variety of evidential assumptions and then fail or omit to address themselves to the question of whether these assumptions, and the inferences and opinions drawn therefrom, remain current at the time they come to tender their evidence in the trial. An expert's report will lack logic if, at the point in which it is tendered, it is out of date and not reflective of the evidence in the case as it has unfolded. Secondly, ……..it is good practice for experts to ensure that when they are reciting critical matters, such as Clinical Notes, they do so with precision……Having said this, the task of the Court is to see beyond stylistic blemishes and to concentrate upon the pith and substance of the expert opinion and to then evaluate its content against the evidence as a whole and thereby to assess its logic. If on analysis of the report as a whole the opinion conveyed is from a person of real experience, exhibiting competence and respectability, and it is consistent with the surrounding evidence, and of course internally logical, this is an opinion which a judge should attach considerable weight to."

Consent

24. In *Montgomery v Lanarkshire Health Board*[8], where the facts of the case, albeit involving the question of caesarean section/vaginal delivery, were very different Lord Kerr and Lord Reed said:

> "87. …An adult person of sound mind is entitled to decide which, if any, of the available forms of treatment to undergo, and her consent must be obtained before treatment interfering with her bodily integrity is undertaken. The doctor is therefore under a duty to take reasonable care to ensure that the patient is aware of any material risks involved in any recommended treatment, and of any reasonable alternative or variant treatments. The test of materiality is whether, in the circumstances of the particular case, a reasonable person in the patient's position would be likely to attach significance to the risk, or the doctor is or should reasonably be aware that the particular patient would be likely to attach significance to it….
>
> 89 … the assessment of whether a risk is material cannot be reduced to percentages. The significance of a given risk is likely to reflect a variety of factors besides its magnitude: for example, the nature of the risk, the effect which its occurrence would have on the life of the patient, the importance to the patient of the benefits sought to be achieved by the treatment, the alternatives available, and the risks involved in those alternatives. The assessment is therefore fact-sensitive, and sensitive also to the characteristics of the patient.
>
> 90 Secondly, the doctor's advisory role involves dialogue, the aim of which is to ensure that the patient understands the seriousness of her condition, and the anticipated benefits and risks of the proposed treatment and any reasonable alternatives, so that she is then in a position to make an informed decision. This role will only be performed effectively if the information provided is comprehensible. The doctor's duty is not therefore fulfilled by bombarding the patient with technical information which she cannot reasonably be expected to grasp, let alone by routinely demanding her signature on a consent form.

……..

Baroness Hale said:

110 …..The principal choice is between vaginal delivery and caesarean section. One is, of course, the normal and "natural" way of giving birth; the other used to be a way of saving the baby's life at the expense of the mother's. Now, the risks to both mother and child from a caesarean section are so low that the National

[8] [2015] UKSC 11

Institute for Health and Clinical Excellence (NICE clinical guideline 132 (new 2011), para 1.2.9.5) clearly states:

> "For women requesting a [caesarean section], if after discussion and offer of support (including perinatal mental health support for women with anxiety about childbirth), a vaginal birth is still not an acceptable option, offer a planned [caesarean section]."

111 That is not necessarily to say that the doctors have to volunteer the pros and cons of each option in every case, but they clearly should do so in any case where either the mother or the child is at heightened risk from a vaginal delivery. In this day and age, we are not only concerned about risks to the baby. We are equally, if not more, concerned about risks to the mother. And those include the risks associated with giving birth, as well as any after-effects….."

Causation

25. In *Chester v Afshar* the Defendant neurosurgeon advised the Claimant to undergo a surgical procedure on her spine which carried a small risk that the Claimant would develop cauda equina syndrome. The Claimant reluctantly agreed and the procedure was carried out. She subsequently developed cauda equina syndrome and sued the Defendant in negligence. The judge found that the Defendant had negligently failed to warn the Claimant of the risk of developing the syndrome, that had she been aware of the risk she would have sought advice on alternatives to surgery and the operation would not have taken place when it did. The Claimant could not say that she would not have had the procedure on a subsequent occasion. The claim succeeded by a majority (Lords Steyn, Hope and Walker), the dissenting minority being Lords Bingham and Hoffman.

26. Lord Steyn pointed out at [19] that:

> "…it is a distinctive feature of the present case that but for the surgeon's negligent failure to warn the claimant of the small risk of serious injury the actual injury would not have occurred when it did and the chance of it occurring on a subsequent occasion was very small. It could therefore be said that the breach of the surgeon resulted in the very injury about which the claimant was entitled to be warned."

27. Lord Hope said:

> "81 I would accept that a solution to this problem which is in Miss Chester's favour cannot be based on conventional causation principles……the risk of which she should have been warned was not created by the failure to warn. It was already there, as an inevitable risk of the operative procedure itself however skilfully and carefully it was carried out. The risk was not increased, nor were the chances of avoiding it lessened, by what Mr Afshar failed to say about it. ….

> 82 Nor does it seem to me that an appeal to common sense alone will provide a satisfactory answer to the problem…….
>
> 86 I start with the proposition that the law which imposed the duty to warn on the doctor has at its heart the right of the patient to make an informed choice as to whether, and if so when and by whom, to be operated on……
>
> 87 To leave the patient who would find the decision difficult without a remedy, as the normal approach to causation would indicate, would render the duty useless in the cases where it may be needed most. This would discriminate against those who cannot honestly say that they would have declined the operation once and for all if they had been warned. I would find that result unacceptable."

Mr Keh's evidence

28. When reviewing the Claimant's evidence, I will restrict myself as far as possible to facts essential to the disputes I have to determine. I am obviously fully aware of the hurt and distress which Mr Keh has suffered and which are clear from his testimony.

29. Mr and Mrs Keh were Jehovah's Witnesses. They married in September 2007. They had attempted to conceive a child from 2010 onwards and tried IVF where they had two unsuccessful cycles. Mr Keh says that his wife's desire to have a child was almost an obsession, hence her following the IVF instructions religiously. However, by the end of 2012 they were resigned to the fact that parenthood was perhaps something which they would never experience. Then in January 2013 Mrs Keh became pregnant. This was news of great joy to the Kehs.

30. The Defendant was responsible for Mrs Keh's pre-natal care as well as for her labour and delivery of Mawusi. In cross examination Mr Keh said he attended almost all antenatal appointments. He did not recall any discussions about the type of delivery or the risks effecting Mrs Keh's pregnancy. He was asked about three specific appointments:

    i) 2nd April 2013: this was the first antenatal appointment. According to the notes, it is recorded that the deceased had hypertension and was on medication. Risk factors were identified, namely the fact that her age was over 40 and she had had more than two years infertility. There is an entry which says that the risk factors had been explained. The intended place of delivery was the delivery suite with delivery by a midwife. It is noted that Mr Keh was there. Mr Keh did not recall any discussions about the type of delivery nor the risks effecting the pregnancy. He said it was not discussed that there were risk factors. The only time anything was discussed was when, in the hospital, they were about to administer the epidural[9]. As far as he was concerned the pregnancy was normal.

[9] This was at 22:00 on 17 September. There is a detailed note about discussions on this in the records. It was suggested that Mr Keh's memory proved correct on this. However, it may well be that seeing this detailed noted during the litigation has jogged his memory.

ii) 18th April 2013: this was the first time when a consultant was seen at the antenatal clinic. Mr Keh said he recalls seeing a consultant. The notes record the maternal age, pre-existing hypertension and the medication. It then says that delivery will be IOL (induction of labour) at 39 weeks at the latest (earlier if concern). Mr Keh did not recall any discussion about the possible effects of hypertension on delivery of the baby. He did not remember any discussion about delivery to be by induction or that it would take place not later than 39 weeks.

iii) 18th July 2013: there is a note that Mrs Keh was a Jehovah's Witness, that she accepted minor fractions and cell salvage. Also that there is an advanced directive filed. Mr Keh had a recollection of this. He said he did not appreciate that not being able to accept blood products might cause a problem. He recalled a discussion that surgery would increase the risk of bleeding. He was not aware that surgery should be avoided if possible, as he thought this would be covered by the cell salvage. There is a further entry of plan of induction of labour at 39 weeks in view of raised blood pressure and maternal age. Mr Keh said the only discussion he recalled about induction in labour was in September. If there was a long-standing plan, he was not aware of it. Nor was he aware of any discussion involving his wife to the effect that she was happy with the plan because she would rather avoid surgery with caesarean section.

31. Mrs Keh was admitted into the care of the antenatal ward on 12th September 2013. She was sent home the next day. She was not quite ready to deliver. It is clear from the notes and from the evidence (see later) that Mrs Keh saw Miss Ray on 12th September 2013. Mr Keh did not recall seeing Miss Ray until after the caesarean section on 18th September. He thought that Mrs Keh told him that the baby was small. He was not aware that Miss Ray had booked Mrs Keh in for IOL on 23rd September. He said his wife did not discuss this with him.

32. Mr Keh's evidence is that they returned to hospital on 16th September 2013. His wife was examined and was told that it would be best to induce her as there was some concern that the baby was not growing anymore. Before they could induce her, they wanted to control her high blood pressure. He says that matters did not progress as quickly as they would have hoped after the induction. He remembers doctors and nurses coming in and out of the ward examining his wife and talking to them. He says he listened carefully to what was being said, not just because he felt he should be informed but also because his wife would often ask for his views and advice on matters. From his wife's admission into hospital until Mawusi was born, Mr Keh slept and woke up at the hospital. He was constantly by his wife's side. He was there from when she was induced.

33. In oral evidence Mr Keh said he was not aware that his wife had seen Mr Dorman on 16th September 2013. His wife did not tell him anything about IOL rather than caesarean section. In re-examination Mr Keh said he remembered going with her into the hospital on 16th September. He said he always went with her. He stayed with his wife in the hospital, albeit he did not recall meeting a doctor that day until after he re-read his witness statement. The notes and Doctor Ravikumar's evidence show that she consulted with Mrs Keh at 16:05 on 16th September. Mr Keh said he did not recall this either.

34. Mr Keh said that things stayed much the same until the early hours of 18th September 2013 when there was some concern over Mawusi's heart rate and the decision was made to send his wife to theatre for an emergency C-section. At no point prior to then does he recall anybody talking to them about having an earlier elective C-section. He was in theatre and observed the birth. He said the mood was in theatre was relaxed and jovial. When the consultant delivered Mawusi he held him up and said, "welcome to the world".

35. Mr Keh was questioned closely by Mr McCullough QC. In his statement at paragraph 12, Mr Keh had said "I was worried about blood loss but the way the consultant did the C-section resulted in minimal blood loss which allayed my initial fears." In summary Mr Keh said:

    a) his only recollection of a discussion with his wife or with doctors about a caesarean section was just before it happened;

    b) he would have been worried about blood loss in relation to caesarean section. That is why they had the cell salvage machine. However, the worry was not an extreme fear. It was more of a concern. He said many people have a caesarean section. Caesareans are common;

    c) he did not think the risks were greater because his wife could not have a blood transfusion for religious reasons;

36. Mr Keh said that there was no reason why, if his wife had been told that it was more likely than not the induction would fail and she would need an emergency C-section, that she would not have opted to have an earlier elective C-section.

37. After the birth Mrs Keh was sent back to the maternity ward to recover. It was thought that she would leave hospital by 21st September 2013. However, a few days later they learnt that she had an MSSA infection. She remained in hospital, although Mr Keh remembers being told that it looked as though she would be able to come home on 5th October 2013. During the period from the birth until this date, Mr Keh visited his wife almost every day after work, remaining from about 6 p.m. until about 8 p.m.

38. Looking back on matters Mr Keh says that he was never told how serious his wife's condition was prior to her admission to the ICU. All he was ever told was that she had an infection, it was normal and she would get better. To Mr Keh his wife had seemed well for the previous few days, though he was concerned that she was secluded and he had to wash his hands whenever he went into her room. She was able to walk to the toilet in her room.

39. On 5th October 2013 Mr Keh arrived at the Defendant hospital. He was looking forward to his wife and baby coming home. However, he was told that his wife was not well enough to be discharged. Her mood was better that day, Mr Keh helped to feed the baby and they chatted away. During his visit he met a doctor who told him that Mrs Keh would not be returning home because they needed to keep her a few more days. No indication was given of the severity of her illness. All the signs were to the effect that it was under control. Mr Keh remained until about 10 p.m. before

going home. He was not worried as none of the doctors had told him that there was anything to worry about.

40. I shall not repeat the distressing events of the following few days since they are not material to the issues I have to decide.

41. Mr Keh also said:

i) when the infection struck it was like the doctors caring for his wife did not really know what was wrong with her.

ii) He now knows, having seen the documents, that despite junior doctors asking for help, the consultant never bothered to review his wife until it was too late.

iii) There is no doubt in Mr Keh's mind that if the senior clinicians had done what they were supposed to have done, the outcome would have been different.

iv) No one ever discussed alternative treatment options at any time he was at the hospital. It is also inconceivable that his wife would not have told him about this type of conversation had if it had happened.

v) He remembers at the inquest the Coroner asked Doctor Ray if there had been any consideration of offering Mrs Keh a hysterectomy. He does not remember the questions in their entirety, but he remembers Doctor Ray saying that Mrs Keh had said she "wanted to be back here", implying that she had said she wanted more children. Mr Keh said that this is not true. He and his wife had spoken about it and had agreed that neither of them had any desire whatsoever to have more children. They felt blessed to have one child, but given the previous heartache in trying to conceive, and given Mrs Keh's age, they had decided that one child was enough.

vi) Mr Keh says that if the option of a hysterectomy had been given to Mrs Keh she would have taken it. The Kehs did not want more children. Mrs Keh would not have refused potentially lifesaving surgery. Mr Keh would, without any doubt, have advised her to have the surgery. It would have saved his wife's life and Mawusi would have had his mother.

Assessment of Mr Keh's evidence

42. Mr Keh was a decent, honest man doing his very best to recall what did or did not happen in circumstances where, although there were some ante-natal concerns, these were not of major significance. The birth went well. It was the subsequent arrival of infection that caused the serious problems.

43. One of the matters of which the court must be aware is that the language of risk factors used in medical literature and in court may convey alarm to a layperson. In the clinical setting, they are likely to be transmitted in a way that does not inspire fear/worry, unless the risks are such that this is unavoidable. Mrs Keh was not in this category ante-natally.

44. Some indicators of the unsurprising fallibility of Mr Keh's memory[10] are:

- The ante-natal appointment of 2nd April where it is specifically noted that Mr Keh was present and that two risk factors of the pregnancy had been explained. Although the author of the note was not called, it would be very unusual for that to be noted if it had not happened.

- On 18th April it is unlikely that there was no discussion with Mrs Keh about early induction of labour.

- Miss Ray did see Mrs Keh on 12th September, but Mr Keh had no recollection of seeing Miss Ray until post delivery; nor was he aware that his wife had been booked in for IOL on the 23rd.

- Mr Keh was unaware that Mrs Keh had seen Mr Dorman on 16th September even though he said that he always went with her. He did not recall either that Doctor Ravikumar had seen his wife that day. It was tentatively suggested to Mr Dorman that perhaps he had not seen Mrs Keh and had just made a note. For reasons which Mr Dorman gave (see below) I reject this suggestion. No such suggestion was put in relation to Doctor Ravikumar's consultation. She made a much more detailed note.

45. Therefore, Mr Keh's recollection of what took place antenatally is, I find, patchy.

Mr Dorman's evidence

46. Mr Dorman has been a consultant obstetrician and gynaecologist at the Defendant hospital since October 2000. He does not recall Mrs Keh's case and therefore relies on the medical records and what he describes as his "invariable clinical practice".

47. From the notes, Mr Dorman said in his witness statement:

(i) On 16th September 2013 Mrs Keh was re-admitted. An entry not made by him shows that the re-admission was at 11:03. He understands the entry to mean that she was almost 37 weeks pregnant with an estimated delivery date of 8th October 2013. She was noted to be hypertensive. A CTG trace gave a trace line of 150 bpm, with a variability of 5-10bpm. No decelerations, contractions or accelerations were noted. Mrs Keh could feel her unborn baby moving.

(ii) Mr Dorman saw Mrs Keh at 13:00 hours. He made this note: "Note IUGR (Intra-uterine growth restriction)/SGA (small for gestational age) on a background of essential ↑ BP (high blood pressure) and bilateral notches in uterine arteries. Feeling FMs (foetal movements) but unreactive/flat CTG today. Suggest IOL (induction of labour) today on 2012 (ward 2012)." Mr Dorman says he would have been aware from the records that Mrs Keh was 40 years of age, and would not accept a blood transfusion due to her religious beliefs. She had an obstetric history of two miscarriages. These factors, in conjunction with her clinical presentation on 16th September 2013 and unresponsive CTG, led him to conclude that an induction of labour was the

[10] Or on some occasions that he may not have been present

safest option for Mrs Keh and her baby. Mr Dorman was not directly involved with Mrs Keh's care again.

48. In his witness statement Mr Dorman said he could not remember whether he examined Mrs Keh's cervix before recommending an induction of labour. It would not necessarily have been his practice to do so. His clinical decision for recommending induction of labour was based on a number of factors:

Mrs Keh was near to full term, had a foetus in cephalic presentation, had signs of foetal compromise and required delivery. He considered induction to be probably the safest means to achieve delivery. He did not recommend a C-section because this would have involved major abdominal surgery, a longer recovery period and greater blood loss than induction and normal delivery. Even in the event of unsuccessful induction, leading to emergency caesarean section, the risks to maternal health are not significantly greater than those posed by elective caesarean section. Therefore, he said, in the absence of any clinical indicator to proceed to a caesarean section, it was reasonable to recommend an attempt at induction and vaginal delivery. This would be substantially safer if successful and the risks to the mother would not be significantly increased even if unsuccessful.

49. In relation to the suggestion that Mrs Keh ought to have been offered an elective caesarean section and that there was a failure to warn her that she was at a high risk of an emergency caesarean section, and that the risk of infection is greater than an emergency caesarean section than in an elective caesarean section.[11] Mr Dorman commented in his witness statement as follows:

(i) his usual practice would have been to advise Mrs Keh that her baby needed to be delivered for reasons relating to risks of stillbirth and risk to her own health;
(ii) he would have advised her that, particularly in the light of her wish to decline blood transfusion, it was preferable to avoid caesarean section because of the greater risk of blood loss associated with operative delivery;
(iii) he would have gone on to explain the need for close monitoring of her own and her baby's response to induction of labour;
(iv) he would have explained that induction of labour may fail, or there may be concerns about her baby's wellbeing in labour, leading to delivery by caesarean section.

50. Mr Dorman said that it is normal practice to reassure patients that the resulting caesarean section (whilst being emergency rather than elective) is still carried out calmly, and with all the same precautions as would be the case with an elective caesarean section; therefore, that the risks are very similar. Precautions include prophylactic antibiotics and prophylaxis to prevent deep vein thrombosis.

51. Mr Dorman said that his experience was that, in the light of this discussion, most patients in the situation of Mrs Keh opt for induction of labour. The minority who request caesarean section rather than induction of labour will generally be offered caesarean section, after further discussion of the specific risks associated with the decision.

[11] Particulars of negligence (iv)-(vi)

52. In cross examination Mr Dorman accepted that there was always a risk of caesarean section. He was taken to the NICE clinical guidelines[12]. These show that about 25% of women have a caesarean section. He had decided the delivery needed to be expedited. This was because of hypertension, a falling off of the foetal growth and the CTG that morning. He said that a small baby may have more difficulty in long labour and this may also be indicated by the flat trace. It was in the interests of both mother and baby to expedite the delivery. The response of the foetus to labour is always something that he monitored closely. If there were concerns it was straightforward to abandon vaginal delivery and move to caesarean section. The mother's hypertension should not militate against a vaginal delivery and managing somebody with hypertension and pre-eclampsia can be such that one proceeds to IOL.

53. Risk factors that were not specifically mentioned by Mr Dorman were put to him. As to these he said:

    i) maternal age – he accepted that older women in their forties are more likely to need a caesarean section;

    ii) Mrs Keh being a Jehovah's Witness – Mr Dorman said there was concern about loss of blood. He thought it better to try IOL than CS in this regard[13];

    iii) as regards IOL, Mr Dorman said that women who are most likely to avoid caesarean section are those who go into spontaneous labour. Mrs Keh would never have had spontaneous labour. If you do not attempt IOL then caesarean section becomes an inevitability with the attendant risks of it;

    iv) whilst the NICE tables show an increased risk of caesarean section with increasing weight, Mr Dorman said that in the Homerton department the risk of caesarean section in women with a BMI of 35 was not much greater, albeit increased. At Mrs Keh's BMI she would be at higher risk than somebody with a BMI of less than 25;

    v) ethnicity – Mr Dorman accepted that black African women have a higher caesarean section rate; also that a person who has had a vaginal delivery is at a lower risk than somebody giving birth for the first time, such as Mrs Keh.

54. In relation to these statistics generally, Mr Dorman said there was a wide variation in England and Wales, and even in London, in respect of caesarean section rates. Factoring in ethnicity, statistics at Homeerton for caesarean section are lower than at other hospitals. He said that the national statistics are helpful but only to a degree. It is necessary to look at the performance in the Homerton unit. One of the things they did was to recommend IOL at 37 weeks. That was a way of achieving lower caesarean section rates.

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[12] NICE clinical guidelines 132 caesarean section August 2012 (the NICE guidelines)

[13] The NICE guidelines at paragraph 1.1.2.1 were put to him. These suggest that planned caesarean sections may reduce the risk of early post-partum haemorrhage. He pointed out that, however, planned caesarean section is said also to potentially increase the risk of hysterectomy caused by post-partum haemorrhage. He said in some circumstances planned caesarean section may increase the risk of blood loss.

55. There would also be overlap in the risks, so for example older women are likely to have a higher BMI and more likely to be hypertensive. The main factors would be the foetal well-being.

56. As to assessment of the cervix, Mr Dorman said that he would not have examined the cervix. He had made the recommendation and in doing so implicitly delegated assessment of the cervix to whoever was going to start the IOL. The starting point of assessing the cervix is only one matter. The assessment of the cervix would be prior to the administration of the Prostin gel. The two reasons for the Bishop score are to assess how easy or difficult IOL might be and to guide the dose of the Prostin. It is the progress in the ensuing hours after the Prostin which is more important. In the Homerton practice, examining the cervix is deferred until after Prostin and the decision to IOL is monitored.

57. Mr Dorman was asked whether in fact he had actually seen Mrs Keh. He said it was unlikely he had not seen her. Indeed, he thought he could rule that out as a possibility. Had he not done so he would have recorded in his notes that (e.g.) it was a discussion with another doctor. I accept this evidence.

58. As to discussion of options with patients Mr Dorman said that at 37 weeks the chance of a successful IOL was quite high. If the patient preferred that option to caesarean section then it would be worth trying IOL, with recourse to a caesarean section if needed. He was confident that it was his invariable practice to have said that there were two possibilities, either caesarean section or IOL. At Homerton they individualise care and therefore the wishes of the patient are taken into account in the decision about delivery. In the majority of cases in planning delivery he would not mention details of the decision in the notes. He would say for example that the patient was happy to have IOL[14]. Accepting that Mrs Keh would have been well above the 25% risk of caesarean section, he would have weighed up these factors. He had no direct memory but he was fairly certain that Mrs Keh would have wanted vaginal delivery. His belief would have been that an attempt at vaginal delivery was the safest option if it could be achieved. He believed that it would have been a close call as to whether it should be IOL or straight to caesarean section, but if he had been asked to make the decision he would have recommended IOL. He accepted that this was not in the witness statement.

59. Mr Dorman said: "I think….. an audit of my recordkeeping in 100 sets of maternity notes going back however long you like, would show that my documentation is brief to the point of being shorthand. But the patients in my clinic will often be in the room for 45 minutes having a discussion about planning of mode of delivery and induction of labour or Caesarean section. And although the discussion for a patient, such as Mrs. Keh who was in the hospital with hypertension rather than in the clinic, would have been slightly different. I am absolutely certain that my discussion would have run along the lines that I have suggested."

60. Finally Mr Dorman said if there had to be a subsequent caesarean section, that did not carry much greater risk then caesarean section at the outset. He believed he considered the options, and that he compared the benefits of attempting IOL with caesarean section. His discussion about delivery with every woman always starts

[14] It was pointed out to him that his notes did not say that on this occasion.

with the two options of IOL or caesarean section. The wish to avoid blood products would have come into the decision making process.

Assessment of Mr Dorman's evidence

61. Mr Dorman is clearly a very experienced obstetrician. He was obviously doing his best to assist the court truthfully as to what had occurred in the conversation over 5 years ago. He was hampered by his own style of note keeping. Unsurprisingly, he had no recollection of the conversation with Mrs Keh on 16th September. He had to rely on his usual practice which he said was invariable.

62. The major problem the court has with Mr Dorman's evidence is the fact that his oral evidence contained important matters in addition to what was contained in his witness statement. Nowhere in the statement does he say that he would have given Mrs Keh the option of a caesarean section, or that he communicated to her in some way that she was at a higher risk than average of ending up with a caesarean section in any event. This was in circumstances where the specific allegations in the particulars of claim he was addressing[15] were that Mrs Keh ought to have been offered an elective caesarean section, and advised that she was at a high risk of an emergency section. It may be (a) that he did say something along these lines to her, or (b) his practice has evolved with time or (c) as the evidence focused his attention on the risks in much greater detail than he would have had time to consider at the clinic, he came to believe that he would have said more than he did.

63. Considering Mr Dorman's evidence, I am not confident on the balance of probabilities that he did communicate to Mrs Keh that she was at a higher risk than average of ending up with a caesarean in any event, or that she was given the option of an elective caesarean section. The probabilities are that he recommended IOL and told her, as he says in his statement[16]: "it was preferable to avoid a caesarean section because of the greater risk of blood loss associated with operative delivery"; also: "…that induction of labour may fail or that the may be concerns about her baby's wellbeing in labour, leading to delivery by caesarean section…."

64. For reasons set out below, in my judgment that level of explanation was insufficient and amounted to a breach of duty.

Doctor Ravikumar

65. Doctor Ravikumar was a specialist registrar in obstetrics in gynaecology and was involved in Mrs Keh's care from 16:05 on 16th September 2013. She referred to the records on admission at 11:03 and 13:00 set out above. She had no memory of the case. She relied on her notes and on what she usually did. She first saw Mrs Keh at 16:05 on 16th September 2013. She noted her age, previous two miscarriages and that this was her first pregnancy beyond 24 weeks. Her blood pressure was raised and she had been given labetalol for that. She also noticed that Mrs Keh was a Jehovah's Witness. Five risk factors were recorded namely:

[15] Witness statement para 10
[16] Witness statement para 10

(i) maternal age 41 years;[17]

(ii) essential hypertensive-booking BP 154-161/95-93;

(iii) Jehovah's Witness – accepts albumin, coagulation factors and immunoglobulin;

(iv) IUGR;

(v) flat CTG in FMU today (seen by Mr Dorman).

It was also noted that Mrs Keh was due to be induced.

66. In relation to the recorded risk factors:

a) women aged 40 and over are at a higher risk when they give birth and are at a higher risk of caesarean section.[18]

b) hypertension: Doctor Ravikumar said that this ties in with IUGR and flat traces. Also, blood pressure cannot be controlled during delivery. She said there is a higher risk of caesarean section for women with higher blood pressure.

c) Jehovah's Witness: Doctor Ravikumar said there was a potentially high risk of blood loss if a patient needed an elective caesarean section or an emergency caesarean section. If a patient needed an emergency caesarean section in the night, then it would be necessary to liaise with the blood bank that there is a higher risk of blood loss with an emergency caesarean section.

d) IUGR: Doctor Ravikumar said that a small baby may struggle with a long labour; therefore there was a higher risk of foetal distress requiring an emergency caesarean section;

e) Flat CTG: Doctor Ravikumar said she would prefer to have seen a more reactive CTG. If the CTG continued flat there would be a higher risk of emergency caesarean section. However on many occasions the CTG improves.

f) IOL was more likely to lead to caesarean section.[19]

67. It was further noted that Mrs Keh's blood pressure was still high but she was clinically asymptomatic. She had protein in her urine. Doctor Ravikumar suspected pre-eclampsia and sent for a protein:creatinine ratio (PCR) to confirm/rule this out. She said in cross examination that she probably would not have considered a

[17] Doctor Ravikumar accepts that in fact there was a mistake as to the age and Mrs Keh was 40 years of age. It is a risk factor if a woman is over the age of 35.
[18] The NICE evidence tables 2004 ("the NICE tables") demonstrate an increasing risk of caesarean section before labour and during labour as women age. At age 40-50 the percentage of women in that age bracket who require CS before labour is 20.1% and CS during labour 15.8%.
[19] NICE tables show 19.3% of women who are induced require caesarean section during labour, compared to 9.8% of women where onset of labour is spontaneous.

caesarean section at that stage. That is because, despite the risk factors, many women still have a normal delivery. Therefore, although she probably would have mentioned emergency caesarean section, she probably would not have mentioned the alternative of having a section at that stage. She could not remember if she told Mrs Keh that she was at a greater risk of caesarean section.

68. The management plan recorded for Mrs Keh was for induction of labour to take place in the labour ward. They confirmed that they would be happy to accept her.

69. Apart from reviewing the deceased on the labour ward with Miss Ray on 17th September 2013 (see below) that was the extent of Doctor Ravikumar's involvement.

70. Doctor Ravikumar was asked about other risk factors which she had not specifically noted. These were Mrs Keh's BMI, ethnic origin and previous infertility. I do not propose to record her answers as the matters were explored with the consultants. Nothing she said on these matter changes things.

71. Questions were asked about cervical examination. Doctor Ravikumar agreed that presentation of the cervix is an indicator of the likelihood of the success of IOL. The more dilated the cervix, the more likely that IOL would work. She said she would not expect dilatation in a first-time mother. There are other factors namely, the softer the cervix the better, the lower down the baby is, the more favourable the outcome is likely to be. She herself did not do such an examination when she saw Mrs Keh at 16:05. In this respect, Doctor Ravikumar said she would not expect a cervical examination at that stage, even though it is an indicator of whether IOL will be successful. Doctor Ravikumar saw Mrs Keh in antenatal. The IOL was going to take place in the labour ward. The hospital protocol would be that the examination would take place on the labour ward. It would be better that the team looking after her should do that examination. Antenatal is a transition between seeing Mr Dorman and the labour ward. It probably would have been the on-call consultant in the labour ward who would have examined. At the very least she would have expected her level of doctor to be responsible for examining Mrs Keh in the labour ward. She was not able to say whether if examination carried out in the labour ward showed an unfavourable cervix, they could overturn the decision to do IOL.

72. Doctor Ravikumar agreed that there was always a higher risk of a caesarean section in Mrs Keh's case. Nevertheless, she said she had seen many women with these risk factors achieving a normal delivery. Vaginal delivery was definitely a possibility here.

73. Doctor Ravikumar said in relation to the allegation that Mrs Keh was not offered an elective caesarean section, that the decision that the deceased would undergo induction of labour had already been made by the consultant and she, a junior registrar, saw no reason to advise differently. She said there was no clinical reason to change the agreed plan. Nevertheless, she would have discussed with Mrs Keh what an induction of labour would have involved and obtained her verbal consent for this. She said she probably would have warned Mrs Keh that there was a risk of undergoing painful vaginal examinations, enduring labour pain and requiring a caesarean section if labour failed to progress for whatever reason. If Mrs Keh had said she did not want to undergo induction of labour, Doctor Ravikumar said she would have noted this.

74. Doctor Ravikumar did not agree that it was reasonable to suggest a caesarean section rather than IOL. She said that some doctors might but she would not have done so at that point. That was her view then and her view now with five years more experience. She said there was no harm in a short trial of labour. It was better to go one step at a time.

75. Doctor Ravikumar agreed that the patient was entitled to know that she was at a greater risk of caesarean section. If she had said why not go straight to caesarean section, that would have been a reasonable decision. It would have been a reasonable option but not one that she would have recommended.

76. The end result of Dr Ravikumar's evidence is that the decision to go to IOL had already been taken prior to her involvement. It was not her evidence that she had communicated to Mrs Keh that she was at a higher risk than average of ending up with a caesarean in any event, or that she was given the option of an elective caesarean section.

Miss Ray – Evidence re pre-birth period

77. As stated above, Miss Ray was a locum consultant in obstetrics and gynaecology in 2013. It was she who first saw Mrs Keh on 12th September 2013. She went into some detail about that consultation. Due to Mrs Keh's age and pre-existing hypertension, Miss Ray thought it prudent to book her in for induction of labour on 23rd September 2013 when she would be 38 weeks pregnant. Nevertheless, she recommended that Mrs Keh be followed up in a week.

78. Miss Ray was taken through the notes in relation to cervical examination. According to the records the first cervical examination was at about 21:15/21:18 on 17th September 2013. This was done by the registrar. There was a note of a Bishop score of two. The Bishop score is a way of scoring cervical examination. A score of two is very low. Miss Ray said the Bishop score does not necessarily relate to the length of labour. It depends upon the next score. Quite a lot of the time the Bishop score may progress significantly after Prostin has been given. It is however an indicator of how favourable the cervix is for labour.

79. Miss Ray next saw Mrs Keh at 09:29 on 17th September 2013 during a ward round which also involved Doctor Ravikumar. The given reasons for the IOL were a PCR of over 100 (significant proteinuria) and IUGR. Mrs Keh was reviewed by Miss Ray and Doctor Ravikumar at 10:54. Mrs Keh's cervix was soft and 1cm long but the cervical os was closed and artificial rupture of the membranes (ARM) would not have been appropriate at this stage. Miss Ray accepted that things had not progressed much with the cervix twelve hours after the first examination. The Bishop score would be around 4 on these findings. A further milligram of Prostin was administered and re-assessment was to be done in six hours.

80. At 16:46 Miss Ray and Doctor Ravikumar noted that Mrs Keh's cervix was dilated by 1cm and ARM was performed. There had still been very little progress in relation to the cervix.

81. Miss Ray accepted that earlier on the 16th September (when seen by Mr Dorman) the Bishop score would not have been higher than 2. She said that one goes to IOL in order to make an unfavourable cervix favourable; that is the purpose of Prostin.

Expert obstetricians' evidence - overview

82. A great deal of evidence was given in writing and orally by Professor Steer and Mr Tufnell. I will be able to deal with it in much shorter fashion than expected. However, I should set out my overall assessment of their evidence.

83. Although there were some questions to Mr Tufnell suggesting he should have put in more detail on some matters, in accordance with his duty as an expert under Part 35 CPR, I do not find that there was any shortcoming in that regard. His evidence was given in an objective and measured way. It is of note that he had from the outset accepted that there were some failings by the Defendant which were below the level of acceptable practice[20].

84. In closing submissions Mr McCullough QC made a number of criticisms of Professor Steer's evidence. It is convenient to set out here a number of these before I turn to the obstetric evidence in detail:

    i) Professor Steer has not been in regular clinical practice (on call and on the labour ward) since August 2007. This is a factor which must be taken into account in evaluating his ability to give reliable evidence of the range of acceptable clinical practice, notwithstanding his continued involvement in research and teaching, including teaching junior doctors about aspects of clinical practice[21].

    ii) Professor Steer gave his views without acquainting himself with the pleadings or witness statements. On the first day of his evidence said he had not been supplied with these documents by those instructing him. He was unable properly to explain why he took no steps to obtain those them either (a) from his knowledge as an experienced expert that they must have existed by the time that he came to sign his report; (b) when he received the report from Mr Tuffnell, whose report makes reference to those documents; (c) before he met Mr Tuffnell, in order to be properly prepared for the joint meeting; or (d) at any point before stepping into the witness box.

    iii) At the outset of the second day of his evidence, he said that, although he had checked and had in fact been supplied with some, but not all, of the witness statements and pleadings[22], he did not feel that they added anything factual or material to his view of the events.[23]

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[20] In particular cancelling the CT scan requested on 3rd October; failure to have a consultant review in early October.

[21] See para 25 (vi) of *C v North Cumbria*

[22] It appears that he only had 3 of the Defendant's 5 witness statements (Mr Dorman, Dr Ravikumar, and Miss Ray); 2 of the Defendant's 3 expert reports (Mr Tuffnell and Prof French); and the Particulars of Claim (but not apparently the Defence). He had not seen Mr Keh's statement at all, but had met him and discussed the case with him.

[23] See para 25 (vii) of *C v. North Cumbria*

iv) The bulk of Prof Steer's professional career has been spent at the Chelsea & Westminster Hospital, which has a very high caesarean section rate: in 2012 - 13 the highest of any hospital in the country. He did not seem to accept that this might affect his view as to the likelihood of Mrs Keh requiring a section following IOL.

v) Professor Steer gave his view on the factual question of the decision Mrs Keh would have taken if offered a caesarean section on the basis of all the risk factors that he considered were applicable. This was not merely evidence of what proportion of women would and would not elect for caesarean section on the basis of the advice he would have given.

vi) He appeared on a number of occasions to be unable to recognise a range of obstetric opinion extending beyond his own. This was illustrated by his criticism of not performing a vaginal examination before the plan to induce labour was agreed. The paper that he himself had cited demonstrated that even in 2015 there was a range of opinion, based on apparently reputable studies, as to the utility of the Bishop Score in decision-making in relation to IOL. Even having been taken to that paper[24], he seemed unwilling to acknowledge the existence/reasonableness of the alternative view.

vii) It is unexplained how an allegation that it was negligent to induce labour could have been pleaded and reasserted in Reply if it was based on a misunderstanding of Prof Steer's view.[25]

viii) In cross-examination he sought to advance, for the first time, criticisms of Miss Ray in relation to her attendance on 23rd September 2013, and thereafter, that there should have been (i) vaginal examination; and, potentially, (ii) examination under anaesthetic, as being likely to lead to a conclusion that the uterus should be removed. These criticisms had not been put to Miss Ray, even though Professor Steer had been present throughout the trial. Despite them being obstetric matters, no satisfactory explanation as to why they had not been mentioned previously was forthcoming. It was an inadequate explanation to suggest that they were in some way included in his criticism of the lack of a formal multi-disciplinary meeting. These matters will be considered in more detail below.

85. The criticisms carry weight and must affect the court when assessing the reliability of Professor Steer's evidence.

16th September 2013 – Induction/C-section

Joint Statement obstetricians

[24] Banos et al (2015), which showed that even in 2015 there was a range of opinion as to the utility of the Bishop Score: see e.g. p.166, Col 1, with reference to a systematic review published in 2013 that had "recommended not using the Bishop score in decision making."

[25] It would be unusual if Prof Steer were correct in his suggestion that he was only sent the Particulars of Claim in September 2018, and had not previously confirmed that they reflected his views. Even after that point no amendment to the Particulars of Claim was made until after the experts' meeting.

86. Professor Steer and Mr Tufnell agreed that inducing labour was reasonable

Professor Steer said that the option of elective caesarean should have been offered. Mrs Keh had a number of risk factors increasing the likelihood of her requiring a caesarean section in labour. Apart from the risk factors noted by Doctor Ravikumar, he relied on Mrs Keh's BMI of 29.86, her ethnicity and her previous infertility; also that Mrs Keh was a Jehovah's witness which meant that a course of action minimising the risk of her needing a blood transfusion would be advantageous. He said that an elective caesarean is associated with substantially less blood loss than an emergency caesarean. Finally, he said that Mrs Keh had a cervix which was unfavourable to IOL.

87. Mr Tufnell differed from Mr Steer in the joint statement in the following material ways:

i) Mrs Keh was overweight, not obese. It would not be reasonable to consider that she was at increased risk of a caesarean given the significant proportion of the population that is of similar weight.

ii) Ethnic origin would not influence the decision with regard to mode of birth.

iii) As to infertility history, all babies are of significant value.

iv) The factors listed are associations with increased caesarean rates. It is not clear how much it is the factor that is causal or the association with other factors. It seems illogical to offer a caesarean because someone has a factor that puts her a slightly increased risk of a caesarean.

v) None of the factors that were present were medical indications for caesarean. None of the medical guidance indicates that a caesarean should be offered with these factors. In a woman who declined transfusion, the optimal birth would be vaginal.

vi) If caesarean was requested then the options would reasonably be discussed.

vii) If caesarean was considered it would not have been 'elective' in the sense that it would be at a date of convenience to the woman and to the hospital. For Mrs Keh, a caesarean would have been pre-labour if she had not been induced and, in the event, it was pre-labour as labour had not become established. If there is any difference in outcome, it is when comparing elective/pre-labour caesarean to caesarean in established labour – when considering infection and haemorrhage. The period of rupture of membranes with a closed cervix would not increase the risk of complication by a measurable amount.

viii) Therefore, vaginal birth was the appropriate initial plan. Mr Tufnell did not consider it was required to advise caesarean prior to induction. It would have been reasonable to advise that it was better to avoid a caesarean if possible.

Synthesis of obstetric evidence

88. A great deal of evidence, much of which I have reflected in the evidence of the treating doctors, explored relative risks and detailed consideration of the suitability of the cervix to IOL. Ultimately, the critical points are:

(i) Professor Steer thought that the likelihood of Mrs Keh needing an emergency caesarean section was very high, probably greater than 50%. He thought that on balance an elective caesarean represented the lesser of the two risks. He said that the option of delivery by caesarean section should have been offered. He said he would have tried very carefully not to suggest what Mrs Keh should decide, but would say that she probably had a 60% chance of ending up with an emergency caesarean section. He would have explained the individual risk factors to her.

(ii) Mr Tufnell accepted that Mrs Keh was at increased risk of requiring a caesarean section to the optimal candidate for a spontaneous vaginal birth. Of the 25% overall caesarean births, 10% are done before labour. He said he would have told Mrs Keh that the background rate of caesareans in labour is about 15% and that she was probably a bit more likely than that. He would have said that the prospects of a vaginal birth for Mrs Keh would be close to 70%, though the section rate at Homerton is slightly higher. He accepted that he had not put in his report or joint statement that Mrs Keh had about double the background risk of a section. He also accepted that Mrs Keh should have been aware that, if she was being induced, she had a higher risk of section in labour compared to if she went into labour spontaneously. Mr Tufnell was taken through Mrs Keh's various risk factors. He pointed out that they are independent risk factors and not additive, many being effectively the same issue. I will not detail his comments; there was a measure of disagreement as to how he interpreted the statistics in relation to Mrs Keh's risk of emergency section. He accepted that she should have been told that she was at significantly greater risk than the average woman; also that she should have been told that one of her options was a caesarean section. It would have been a breach of duty if she had not been told that.

89. On this matter my findings are:

(a) It should have been communicated in some way to Mrs Keh that she had a significantly greater risk than the average woman of having to have an emergency section and that a planned section was an alternative to IOL.

(b) Putting it in that stark manner may well not be how a doctor would transmit the information. One possibility which I floated during final submissions, and to which neither counsel had any particular objection, was to say something like: "If you are induced, you have a 65-70% chance of having a vaginal delivery and therefore a 30-35% chance of an emergency section, which is quite a bit higher than normal. You can have a planned caesarean instead." There would not be the necessity to quantify the risk. The pros and cons could be further explained. Many doctors may use more reassuring language while communicating the substantially the same information.

(c) On the balance of probabilities Mrs Keh was not told that she was at a significantly higher risk than the average woman of having to have a caesarean; nor that she could have the option of a planned caesarean section. That amounts to a breach of duty.

What would have been Mrs Keh's decision if properly advised on 16th September?

90. Mrs Keh clearly cannot answer for herself. Therefore the court has to do its best on Mr Keh's evidence against the background of what did happen.

91. In his witness statement Mr Keh said:

> "I can see no reason why if Adeline had been told that it was more likely than not that induction would fail and she would need an emergency C-section that she would not have opted to have an earlier C-section."

92. As the evidence as to what should have been said to Mrs Keh further crystallised after Mr Keh gave evidence, the premise of the question based on what I have found was not put to him.

93. What he did say was:

(i) His wife would have followed medical advice.

(ii) Had she been told that she could have a caesarean, though IOL was recommended, but there was a possibility it would fail and she would have to have a caesarean later – he said he did not think he could make any comment on that. Before he appreciated that what was being asked was his view as things stood at the outset on 16th September, Mr Keh said he though they would have opted for a caesarean because the length of induction was a period that was uncomfortable for both of them; it was very uncomfortable for Mrs Keh.

(iii) Had she been told that the plan was to induce labour, but there was a high risk that she may need a C-section at some point in the future, therefore did she want one instead of induction – he said that had the risk factors been made known to them he thought they would have opted for a caesarean straightaway. If in those circumstances induction had been recommended, and he had been given the choice, he thought he would have sought a second opinion. Later in re-examination he was pressed by Mr Mooney and said that in those circumstances he thought the response would have been to go for a caesarean.

94. Considering my finding of the information that should have been given to Mrs Keh, it must be accepted that it may have led to further discussion and questions.[26] One question may have been the risk of blood loss. The important matter may well have been the risk of transfusion. In the NICE Guidelines Appendix C is a table comparing planned caesarean section with planned vaginal birth (including % unplanned caesarean section in planned vaginal birth group). Here there is some evidence to show a marginally higher transfusion rate in the latter case. However, in terms of post-partum wound infection there is a slightly increased risk in the former. The 'Evidence Quality and Reference' in respect of each is described as 'Very Low'. I do not find on the balance of probabilities that such information would have influenced Mrs Keh, had she asked for it and obtained it.

95. As I have previously said, the way the risks and recommendations would have been properly presented in a clinical context may well be different from hearing them highlighted in court, especially in the light of the tragedy which occurred. In fairness to Mr Keh, and a tribute to his honesty, he wavered in what he thought would have been the response at the time. Looking at the picture overall, had Mrs Keh been properly advised, my finding is that she probably would not have chosen to have a

[26] If a second opinion had been sought, I must assume that it would have not been different in any material way

planned section on 16th September. She would have followed the plan suggested by Mr Dorman. This also fits with the experience of Mr Dorman and Mr Tufnell.[27]

16th – 18th September – Timing of the C-section

Joint Statement obstetricians

96. The experts agreed that considering the slow progress in labour and the development of a pathological foetal heart rate pattern at 03:10 hours on 18th September, consideration of delivery by caesarean could appropriately have been made at this time.

97. The decision to carry out a Grade 2 emergency section was in fact made at 04:02 hours. It did not commence (knife to skin) till 05:32 hours. According to Professor Steer, it should have started at 05:17 hours i.e. within 75 minutes. He said that the delay did not meet the standards set by clinicians at the time. Mr Tufnell disagreed. He said that 75 minutes is a target not a requirement. In this case the need to arrange cell salvage and make preparations for the caesarean were such that the time taken was within reasonable practice.

Further evidence

98. In closing submissions, Mr Mooney presented a wider case on this basis:

(i) Mr Dorman had said in his witness statement that he would have explained: "the need for close monitoring of her own and her baby's response to induction of labour."

(ii) Mr Dorman was asked whether, based on the fact that over two days the cervix hardly changed at all, he was suggesting that someone should have "pulled the plug" on induction during the two days between the 16th and the 18th September. Mr Dorman replied: "It certainly should have been considered. I am not sure whether or not it was considered and discussed as time went by."

(iii) There is nothing in the notes to suggest a C-section was ever considered until 3:44 am on 18th September, before the decision was made at 4:02 am.

99. The suggestion that it was negligent not to have offered a section in the period after the initial consultation with Mr Dorman until the early hours of 18th September was not pleaded. This is not just a pleading point. The matter had never been explored at joint meetings or put to Miss Ray who was the consultant obstetrician in charge of Mrs Keh's induction[28]. I do not have any witness statements from those staff looking after Mrs Keh in that period. Whether there would have been had the allegation been pleaded I do not know.

100. Mr Dorman also said in evidence that "The response of the foetus to labour is something that we monitor quite closely and if there are concerns about foetal well being in labour, then it is very straightforward to abandon attempts at vaginal delivery and to proceed to caesarean section."

[27] Not with that of Professor Steer, but he would have presented the risks differently.
[28] Perhaps because she gave evidence before Mr Dorman

101. It was no part of Professor Steer's report, nor of the joint statement, to suggest that, because of what was happening (or not happening) during the attempted induction, the circumstances were such that Mrs Keh should have been offered a change of plan before the early hours of the 18th September. In oral evidence Professor Steer was not asked to comment on this potential allegation

102. In his report Mr Tufnell commented: "..I have not seen the foetal heart traces from labour but the baby clearly has done well so I do not think that there were significant abnormalities that would have led to earlier intervention…..I think there may be an argument that caesarean section should have been performed at a slightly earlier point….I think that overall the care prior to the birth was in keeping with accepted practice, notwithstanding that some obstetricians (probably including myself) would have considered it appropriate to have performed a caesarean section rather earlier, given the lack of progress.." In these comments Mr Tufnell was referring to the morning of 18th September. This point was referred to in the joint statement and subsequently pleaded by way of amendment to the particulars of claim.

103. Mr Mooney contended in the alternative that Mrs Keh should have been offered a C-section between 03:10 am and 04:02 when the call was made. The experts agreed that many obstetricians would have made the decision to move to C-section at that point. Professor Steer did not suggest this was a breach of duty[29]. Mr Tufnell said that to make a decision at 03:10 would have been within a range of reasonable practice and what he probably would have done himself. He did not think that what they did was so outside reasonable practice as to be unreasonable. He was asked whether Mrs Keh should have been offered a caesarean at 03:10 and he said he thought it was within the range of reasonable practice, and would have been the behaviour of reasonable obstetricians, to have given it a little bit longer. I accept that evidence.

104. Looking at the notes, the Specialist Registrar Dr Nattey recorded, after findings on examination, at 02:58: "Plan: Allow further 4 hour of syntocinon and review".

105. On reviewing the evidence set out above, I do not find that there was any breach of duty (after Mr Dorman's consultation) in not offering or performing a caesarean section at any point earlier than when the decision was made at 04:02 on 18th September.

106. Returning to the pleadings, it is alleged that the Defendant "Failed to carry out the CS within 75 minutes having categorised it as a Grade 2 emergency".

107. In his report Professor Steer had said: "I also have concerns about the delay in carrying out the caesarean section, which was initially categorised as a Grade 2 emergency requiring delivery within 75 min, and this timing was exceeded with subsequent re-categorisation of the case as a grade 3".

108. A selection from the notes at the time records:

[29] Indeed I believe I am correct in saying that Professor Steer did not raise this point in his report. Mr Tufnell raised it.

(i) At 03:44 "late decelerations persisting with reduced variability….Obs Reg dealing with an emergency at the moment. Advised to discontinue syntocinon for now and to prepare for CS". (This note is by Pek Chin ["PC"] midwife)

(ii) At 03:57 "…seen by obs reg now. For CS within 30-60 mins….." [PC]

(iii) At 04:00 "…prepared for theatre. Now delayed due to another emergency being performed right now. [PC]

(iv) At 04:02 there was a ward round with the Registrar and PC. There is a detailed note finishing with "Proposed Delivery Method: Caesarean section – Grade 2 (urgent) – maternal or foetal compromise not immediately life threatening (within 75 minutes).."

(v) At 04:19 "…ST5 Koniman. Second team for theatre and ODP who can operate cell salvage have been called in from home No further decels for last 15 mins. Reduced variability noted…"

109. Dr Schwiebert, the Consultant anaesthetist, commented in his witness statement: "I…would agree that performing the caesarean section within 75 minutes was a target and not a requirement. Every effort would, however, have been made to perform the caesarean section within 75 minutes." Earlier he said that the decision was made at 04:02, he saw Mrs Keh at 04:33. At 04:41 an epidural block was administered.

110. Professor Steer said the delay did not meet the Guidelines of 75 minutes. He added that the duty is incumbent upon the hospital to have the cell salvage equipment available in an emergency. Not to have it so available was not reasonable practice.

111. Mr Tufnell was not asked to enlarge in oral evidence on what he had said in writing. He had said in his report: "In a situation where the procedure is being performed for a non-urgent indication then a target of 75 minutes is reasonable but is not mandatory. In this case it was 93 minutes. It seems that this was in part waiting for cell salvage which, given the level of urgency was appropriate. The time taken in this case was not unreasonable. Also, from an obstetric perspective, a potential saving of 20 minutes would be irrelevant to the likelihood or severity of a subsequent infection".[30]

112. In my judgment the evidence is insufficient to prove a breach of duty based on the difference between the target of 75 minutes and the actual time taken of 93 minutes.

Summary to 18th September 2013

113. The above findings mean that the claim brought on allegations up to and including 18th September 2013 must fail as:

(i) There was a breach of duty on 16th September but Mrs Keh's decision would probably have been to opt for IOL in any event.

(ii) There was no breach of duty thereafter.

[30] Professor Steer agreed on this. When asked whether he was suggesting it affected the outcome, he replied: "I think it very unlikely."

114. As to what Mrs Keh would have done had she been offered a caesarean at an earlier point during IOL, it seems to me obvious that she would have followed advice had it been offered and recommended earlier on the morning of the 18th September. What she would have done had she been offered a choice without recommendation, or if the suggestion had come on 17th September, is difficult to say. It would have depended on what was said to her in the circumstances obtaining at that time. This possibility was really not explored in evidence – unsurprisingly since it formed no part of the pleaded claim[31], though I do note Mr Keh's evidence that IOL was very uncomfortable for his wife; also that there was not much progress in the induction period.

115. I do not find that she would have opted for caesarean at that stage unless it had been positively recommended. There is no evidence that that was or would have been the case.

116. Nevertheless, I will briefly consider the difficult topic of causation of infection in any event.

Earlier Caesarean section - Causation

117. The expert microbiologists agreed that Mrs Keh had an infection due to PVL producing *Staphylococcus aureus* derived from the patient's own skin, which was implanted into the deep surgical site during the caesarean section. This agreement was based on the evidence of Gram positive bacterial infection in the uterine caesarean wound site at post mortem[32]. In oral evidence Dr Rothburn said that some people carry PVL on their skin for months or years. The infection of the uterus occurred despite proper precautions. All risk factors were the same when the operation took place as if it had taken place previously, save that there is a higher risk statistically if done as an emergency. However, here the caesarean was done by an experienced doctor and he could not say there was probably any difference from it being done earlier. In the end there appeared to be a broad measure of agreement on this point, though it was extremely difficult for the microbiologists to give an opinion. Professor French said that the background risk of infection from surgery was less than 5%. The fact that Mrs Keh had *Staphylococcus aureus* on her skin did not mean she was at a particularly greater risk from infection (though possibly the PVL toxin did put her at higher risk). All sorts of factors are relevant to the risk e.g. experience of surgeon, room temperature, the patient's metabolic state at that point, and many others. Professor French accepted that anything more was speculation, though he did believe that an operation one hour before would have had identical risks. He speculated that a day before the risks would probably have been the same as on 18th September, two days before it might well be the same, but a week earlier Mrs Keh would only have had the background risk of <5%.

118. The net result of the evidence, doing the best I can, is that had the operation taken place an hour or two before with the same surgeon and anaesthetist, the outcome would probably, though by no means necessarily, have been the same. Although there

[31] Indeed it was no part of Mr Mooney's opening skeleton. He put the case pre 18th September (as pleaded) squarely on two bases: Mrs Keh was not warned of the risks and not offered a C-Section at the outset i.e. 16th September; alternatively a decision to move to C-section could have occurred an hour earlier than it did on 18th September. In fact he did not found the case at that point on exceeding the 75 minute Guideline] – See Opening note para 5(a) and (b).

[32] The post-mortem report findings are set out in more detail later in this judgment

would always be random elements and lack of medical knowledge, many of the risk factors would have been constant. Therefore, after an operation done following a recommendation at 03:10 am or within the 75 minute guideline period from 04:02, Mrs Keh would probably have contracted the same infection. However, difficult though it is, my finding is that, had Mrs Keh had the operation on 16th or 17th September, she probably would have avoided that infection.

Miss Ray/Doctor Spiegler – on and after 22nd September 2013

119. Doctor Spiegler, the GP trainee, was first involved with Mrs Keh at 14:40 on 22nd September 2013. A midwife asked him to review the patient in relation to pyrexia. He noticed her history of emergency caesarean section and Pre-Eclamptic Toxaemia. She had been reviewed three times that day by colleagues for pyrexia. His note continues "mastitis ruled out/unlikely but commenced empirically on IV Augmentin for post-natal sepsis. Has had one dose so far." He noted that other than Mrs Keh's white cell count (WCC) having mildly increased from 14.4 to 15, her recent blood tests were improving. A urine sample had been sent for analysis. The patient was complaining of feeling clammy and intermittently hot/cold. She had no cough or shortness of breath. Her temperature was 39.4°C, her heartbeat regular at 115bpm and her blood pressure slightly raised at 147/94. There was a slightly increased frequency of urine but no dysuria.

120. Doctor Spiegler recorded a diagnosis of "post-natal sepsis - ? cause." The cause of her pyrexia remained unclear, based on the observation that she was tachycardic, pyrexical and hypertensive. He recorded a management plan of regular paracetamol, continued IV Augmentin, awaiting the mid-stream urine sample and blood cultures, laxatives (Mrs Keh had not opened her bowels), stopping codeine and adding diclofenac, encouraging oral intake, IV fluids, repeat bloods tomorrow. He noted that if Mrs Keh was not improving after 24 hours of intravenous antibiotics, consider adding gentamicin or discussing with microbiology. He said that she could be moved to the delivery suite. When a patient was unwell on the post-natal ward, it was a common request for a doctor to review the suitability of a transfer back to the delivery suite. The environment was safer; also it was better staffed and better equipped to manage unwell patients who required more active care such as hourly observations.

121. Despite having made a diagnosis of post-natal sepsis, Doctor Spiegler did not seek consultant review, as Mrs Keh had already been reviewed that morning by a senior doctor (Doctor Patel) and her condition had not changed on his review at 14:40. Treatment with antibiotics had only just commenced. Blood cultures, urine sample and a womb swab had all been requested in order to identify the cause. Doctor Spiegler was satisfied that the management plan devised by the senior doctor earlier that day, and added to by himself, was adequate.

122. Doctor Spiegler accepted that his examination was four days post caesarean section and most women would have been at home by then. The high temperature was a matter of concern as was the pretty high heart rate. He thought she had sepsis. Nobody else had written this down prior to him[33]. Sepsis is a very serious condition and can lead to death. He did not know the cause. From the notes, Doctor Nicholls

[33] However, it appears from his clinical note that he thought at the time that Doctor Nicholls had prescribed antibiotics for sepsis; hence he recorded "… on IV Augmentin for post-natal sepsis."

the senior registrar had seen Mrs Keh at 08:40. She had thought it was possible mastitis. Doctor Patel at 11 a.m. was not convinced that there was mastitis. Neither had diagnosed sepsis. It was suggested to Doctor Spiegler that his diagnosis was such that there was a significant change. He disagreed with this. He said that the underlying clinical findings of pyrexia and somewhat increased heart rate had not significantly changed. The fact that the patient complained of feeling clammy and intermittently hot/cold was a potential symptom of sepsis not recorded earlier; nevertheless, he said somebody with a temperature, as Mrs Keh had had that day, was likely to be warm and clammy and perhaps the other doctors had not asked about it.

123. For those reasons he remained of the opinion that the consultant review was not indicated at that stage.

124. Miss Ray was cross examined in relation to Doctor Spiegler's evidence. She accepted that Doctor Spiegler's impression of post-natal sepsis with unknown cause was a significant finding and a matter of concern. She then said:

i) she would have expected him to report his opinion to her, or certainly to a registrar;

ii) had it been escalated up the medical hierarchy, once the blood culture was available one would normally speak to the microbiologists;

iii) it would be necessary to see the response to the blood cultures and response to antibiotics.

125. In re-examination she was taken through the fact that, prior to being seen by Doctor Spiegler, Mrs Keh had been seen by the SHO and the registrar overnight. She had also been seen by Doctor Nicholls, a specialist registrar on the morning of 22nd September. Had a more senior doctor attended following a request from Doctor Spiegler, Miss Ray did not think anything else would have been done. They would have had to await the blood tests. She said that no hysterectomy should have been considered or done at this point. Post-partum hysterectomy is very rare and very risky.

126. Miss Ray was asked about obtaining a CT scan at that point, given that it is important to take swift action with sepsis and to understand the source of sepsis. She accepted that it may have been sensible to have a CT scan done. She said she could not comment 100% on that. She was taken to the joint statement of the microbiologists where Professor French said he would have recommended imaging at that stage had he been asked. Miss Ray responded that if that had been the advice from microbiology then she would have had a CT scan done.

127. Miss Ray saw Mrs Keh at 09:20 on 23rd September 2013 during a ward round with a junior doctor. The junior doctor, among other things, noted the diagnosis of puerperal sepsis, and Augmentin having been prescribed the previous day. Mrs Keh was apyrexial, her temperature had fallen from 37.7°C at 01:00 the previous night to 36.2°C by the time of the ward round. Her blood pressure was 112/72, her pulse 79, her respiration rate 18 and oxygen saturation 99%. She was therefore haemodynamically stable. Her caesarean section wound was clean and dry. Her breasts showed no signs of erythema or tenderness. The plan was to remove Mrs

Keh's sutures, repeat test for a full blood count, CRP and PET screen. As for antibiotics, it was to continue with intravenous antibiotics, but if she remained afebrile for the next 24 hours, to change to oral antibiotics and aim to discharge her home the next day.

128. Miss Ray was asked about the blood results which came through at 16:30 on 23rd September 2013 and showed *Staphylococcus aureus* and gram-negative rods. She agreed that these were both findings of concern and that they were very significant pathogens requiring consideration of source control. These were the results of the blood cultures ordered on the evening of 21st September i.e. prior to the administration of antibiotics. Miss Ray accepted that having received those results it would be important for clinicians to know the source of infection.

129. On 30th September 2013 Miss Ray and Doctor Spiegler saw Mrs Keh at 09:40 during a ward round. Her history was reviewed. Her antibiotic treatment had been changed to a once daily dose of ceftriaxone on the advice of microbiology. She had five days left to complete the course. Clinically she was well and asymptomatic and her wound was clean. Her blood pressure was 140/91, heart rate 67 and she was apyrexial. Mrs Keh was offered the option of being discharged home but returning daily to complete her course of intravenous antibiotics. She declined this. Miss Ray says this was understandable given the inconvenience.

130. Miss Ray requested that Doctor Spiegler discuss with microbiology the possibility of switching Mrs Keh to an oral antibiotic regime in order to facilitate a full discharge home, if Mrs Keh felt able.

131. After Miss Ray's ward round, Doctor Spiegler reviewed Mrs Keh's medical notes in more detail. He noted that a microbiology consultant had reviewed her on 27th September 2013 and devised a comprehensive plan for intravenous antibiotics. He therefore did not contact microbiology to discuss the change to an oral regime.

132. Miss Ray was cross examined about the period following 30th September 2013, it being accepted that, after the administration of antibiotics, the clinical picture had remained benign until then. It was pointed out that as of 1st October Mrs Keh was still on intravenous antibiotics, the microbiologists having considered a 14-day treatment period to be necessary. She said it was of considerable concern when the temperature spike returned on 1st October. The note of the SHO at 17:04 that day recorded that the patient did not feel well and was shivering. Her appetite was down. He thought there was probably sepsis.

133. Miss Ray accepted that by this stage:

i) on 24th September an ECG had been ordered. This was to rule out heart infection.[34];

ii) a chest x-ray had been ordered on 1st October. That was clear;

[34] It said it could not exclude "SBE" which Miss Ray thought was sub-acute bacteria endocarditis She said she would need medical people to comment on whether any heart infection source could be ruled out. However, nothing turns on this.

iii) a urine dip had also been ordered by the SHO on 1st October. That came back clear, thereby ruling out urinary tract infections.

134. At 02:15 hours on 3rd October the SHO again recorded sepsis. He discussed with the microbiologist who recommended continuing the then antibiotic and considering Tazocin if there was another spike in temperature.

135. Doctor Spiegler next saw Mrs Keh at 08:45 on 3rd October 2013. He reviewed her notes. She had been well but had spiked another temperature on 1st October 2013. Further blood cultures were taken and were negative. She had been apyrexial and had been feeling well until the evening of 2nd October 2013 when she had again become pyrexial and hypertensive. Further blood cultures had been taken at about 3 a.m. Her antibiotic regime had been changed to Tazocin, apparently on microbiology advice. She had had one dose so far.

136. Doctor Spiegler spoke to Mrs Keh. She was tearful and upset but said she felt well. She did not have any breast or respiratory symptoms, a sore throat or any skin conditions. He examined her. Her caesarean section was healing and non-tender. Her temperature was 38.3°C. He proposed regular paracetamol, continuing with Tazocin and discussing with microbiology once the blood tests results were available. Because Mrs Keh had developed another temperature despite antibiotics he sought senior advice, speaking to Doctor Tawade (specialist registrar in obstetrics and gynaecology). It was recommended that Doctor Spiegler request a CT scan of Mrs Keh's abdomen and pelvis to assess whether she may have developed a collection; also to take a high vaginal swab (HVS). An HVS had already been taken on 1st October 2013 but the results were not yet available, so Doctor Spiegler did not repeat the investigation.

137. Doctor Spiegler also attempted to chase up the results on the most recent blood cultures. He noted that he found them on the nurse's desk, having not been sent for processing, despite being taken nearly six hours earlier.

138. Other than the FBC, test results came back later that day. Doctor Spiegler recorded this in the notes at 14:15 on 3rd October 2013. He discussed the results with Doctor Jepson, consultant microbiologist, who recommended continuing with Tazocin for 48 hours. Doctor Spiegler made a note requesting the SHO to consider discharge on Saturday 5th October 2013 and to discuss oral antibiotic cover with the microbiologist specialist registrar on 4th October 2013.

139. Doctor Spiegler's final note was retrospective as he did not have Mrs Keh's records to hand at the time. He noted that she remained apyrexial with a temperature of 39°C; otherwise her observations were normal. The blood culture results identified PVL (panton-valentine leucocidin) positive strain of S*taphylococcus aureus* (PVL – SA). Doctor Spiegler recalls this information being given verbally by an infection nurse to him and the midwife. Mrs Keh was upset and tearful so he had a long discussion with her regarding her treatment and management plan. This seemed to reassure her. The plan was to continue with antibiotics and monitoring. That was Doctor Spiegler's last involvement with Mrs Keh.

140. Miss Ray was next contacted at 18:00 hours on 4th October 2013. Before that, and working from the records, she says:

i) Mrs Keh had been put into isolation on the ward after the laboratory had reported the growth of PVL-SA in Mrs Keh's blood cultures.

ii) On 4th October 2013 the HVS taken on 1st October 2013 had been reported as negative.[35]

iii) On 4th October 2013 the CT scan was showing likely endometritis with no evidence of a collection.

141. At 18:00 hours Miss Ray was contacted by the SHO, Doctor Naderi, to discuss the findings of the CT scan. Having been told of the result[36], she advised to continue with antibiotics and conservative management. She went to review Mrs Keh in the ward but she was not in her room. Miss Ray therefore advised the registrar on call to review her once she was back.

142. Miss Ray was asked a number of questions in relation to the period 3rd - 5th October. Before I deal with that, I record some more general comments in Miss Ray's evidence:

a) after a caesarean section the surgical wound is the most likely source of any infection because of the incision into the skin and into the uterus;

b) most women recover from infections with antibiotics. Sepsis is different because it is the body's response to infection. Most people do not get sepsis. Septicaemia if untreated can cause death. It is a very serious condition;

c) any sepsis has to be taken very seriously indeed;

d) endometritis is inflammation of the lining of the uterus. It is usually caused by infection, but after delivery it is quite common because the uterus has been handled to deliver the baby.

143. I now set out a synthesis of Miss Ray's evidence in relation to the period 3rd - 5th October:

i) as of 3rd October, with the knowledge that Mrs Keh was infected with *Staphylococcus aureus* and gram negative, her temperature having been high on 22nd September, then recovering and then spiking between 1st - 3rd October and infections of the chest and urinary tract infection and heart probably ruled out, Miss Ray said that most probably the source of infection was in the uterus. That is why the CT scan had been ordered;[37]

ii) as at 3rd October, the blood cultures were negative and bloods were improving which suggested that Mrs Keh was responding to antibiotic treatment;

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[35] The report form refers to it as a low vaginal swab. Miss Ray says she does not know whether this was an error in the report form or if a low vaginal swab was what had been taken.
[36] She did not herself see the CT scan report.
[37] Miss Ray was asked about the finding of PVL on 3rd October. She said that at the time she had no experience of treating PVL. She was not aware it was a dangerous toxin. She would have relied on the microbiologist. She now knows that it can kill tissue.

iii) Doctor Spiegler had spoken to Doctor Jepson the consultant microbiologist on 3rd October 2013. Miss Ray said there was no reason to think that a more senior doctor would have been told anything different;

iv) looking at the report of the CT scan which she had not actually seen on 4th October, Miss Ray said that endometritis is powerful evidence of infection in the lining of the uterus. If there had been a discussion with microbiologists, and they had asked Miss Ray whether the endometritis seen on the scan could represent a deep-seated persistent focus of infection, she would have said 'Yes'. Miss Ray added that Mrs Keh had improved on 3rd - 4th October, her temperature and heart rate had become normal, there was no drainable collection, the wound site was clean, there was no discharge and the swabs were clear. Therefore, she would have continued conservative management;

v) the report of the CT scan said that the uterus was bulky. Miss Ray said it would still be bulky after caesarean section although bulkiness can indicate infection. Had she asked radiology and been told that bulkiness was greater than expected[38], that would not have added any extra decision-making point to the mere fact of endometritis;

vi) the CT scan showed 1-1.5cm hypodense areas within the endometrium. Miss Ray said that these could be the result of the surgery. Hypodense areas are where the area is not well picked up on the scan. Possible explanations are liquid/pus in the area or necrotic tissue. If there had been necrotic tissue then antibiotics cannot get to the source of infection. However, Mrs Keh had improved until 5th October, after which she went downhill. Before then she had had some high temperatures and hypotension when she was normally hypertensive;[39]

vii) when shown the registrar review at 18:40 on 4th October 2013, in which the plan was to continue gentamicin until Monday as planned by microbiologists[40], Miss Ray said that if she had seen Miss Keh herself she would not have done anything different. Further, had she seen the CT scan report in its entirety she would not have done anything different;

viii) Miss Ray would not have considered a hysterectomy because Mrs Keh was already high risk. She was a Jehovah's Witness. She had responded to antibiotics. Taking her to theatre at that point would be very, very dangerous. It was necessary to stabilise her first. The decision would not have been any different had Mrs Keh not been a Jehovah's Witness; that was an additional factor. A hysterectomy can cause massive blood loss and the necessity for transfusion.

ix) When asked about the confidential review[41], which, when referring to Mrs Keh's case said there was sub-standard care in that there had been "no consideration for surgical management of swinging pyrexia", Miss Ray said

[38] But see below Doctor Weston's evidence as to what a radiologist would actually have said, if asked.
[39] Doctor Rothburn (see below) did not attach any significance to the hypotension.
[40] Monday would have been 7th October 2013.
[41] "A confidential review of maternal death on behalf of the Homerton University Hospital (NHS) Foundation Trust".

that had she been consulted she would have talked to other people about the risks of hysterectomy. Nevertheless her final position in re-examination was that she would not have considered a hysterectomy.

144. Miss Ray's statement dealt with the period from 6th October 2013 onwards. However, I do not include that period in this judgment as it is agreed that by that date it was too late to save Mrs Keh.

Mrs. Keh's Infection - Preliminary

The post-mortem findings

145. At the post-mortem the following findings were made:

• the uterus was "slightly enlarged and bulky".

• "no definite source of sepsis is identified however she had been on prolonged antibiotics with some necrotic areas … in the sutured lower segment of the uterus".

• from the histology of the uterus: "the caesarean site shows areas of necrosis, neutrophil infiltration and abscess formation" with "clusters of Gram positive organisms in the necrotic tissue" of infection.

• The cause of death was recorded as:

"1a Acute respiratory distress syndrome;

1b Staphylococcal sepsis;

1c Caesarean section

2 Pre-eclampsia

Refusal of transfusion on religious grounds."

Joint statement of microbiologists

146. It is helpful to set out initially a number of matters of agreement. They agreed:

i) It was a matter for the obstetric experts to determine whether there was a failure to identify uterine sepsis in relation to the caesarean scar by scanning.

ii) As part of any multidisciplinary review, as microbiologists they would have reported growth of *Staphylococcus aureus* PVL from blood cultures when this was confirmed. They would have advised on antibiotic therapy. At all stages they would have emphasised the need to search for and eliminate the infectious source. This would have included hysterectomy if indicated. Whether a hysterectomy would have been performed would ultimately have been decided by a consultant obstetrician and gynaecologist.

iii) During Mrs Keh's life there was systemic sepsis with growth of *Staphylococcus aureus* from blood cultures, in a patient who had recently undergone caesarean section, from an unconfirmed source.

iv) The differential diagnosis of *Staphylococcus aureus* septicaemia in a patient who has recently become febrile following caesarean section, and no source found, should include deep-seated infection associated with the uterus.

v) From a Microbiologist's perspective, in order to determine the source of infection, the treating clinicians in a Multi-Disciplinary Team (MDT) setting would have taken into account: clinical findings on examination, the results of investigations, including chest X-ray, CT scan of pelvis and relevant microbiological cultures, including urine, sputum and vaginal culture & blood culture. When *Staphylococcus aureus* was isolated from blood culture, a microbiologist would have advised a search for deep-seated sites of infection in bone and heart, with further investigations including an echocardiogram and repeat blood cultures. All these things were done during Mrs Keh's investigation;

vi) Since all other investigations undertaken were negative, the surgical site would have been considered to be the most likely source and, had there been an MDT review, a microbiologist would have asked the obstetrician to review the wound and uterus. If clinicians identified uterine sepsis, a microbiologist would have advised hysterectomy but would have deferred to the obstetricians;

vii) The most likely source of the infection was a continuing focus in the uterine CS wound. However, there was no evidence of this during life. Repeated clinical examinations did not find any abnormality of the uterus, wound site or lochia. CT scan suggested endometritis, but this is a common post-mortem inflammation/infection due to other vaginal orgasms that usually respond to antimicrobials without hysterectomy.[42] A *Staphylococcus aureus* infection of the uterus is usually a serious and variant infection that is associated with systemic upset, severe pain, uterine tenderness and vaginal discharge of pus. The Claimant had none of these things and at post-mortem there was no infection of the uterine cavity wall, except for moderate infection of the CS wound sites. This is despite the fact that the post-mortem was performed some three weeks after the likely start date of the infection. This is unusual and suggests the surgical site infection had been supressed but not eradicated by the antibiotic therapy, and had not spread beyond the wound site. Equally unusual is that this restricted infection focus was subsequently the source of a sudden onset of septic shock. This surgical site source never produced the usual signs and symptoms of uterine staphylococcal sepsis before the sudden collapse because the infection was suppressed and the uterus as a whole was never involved.[43]

[42] On this last sentence Doctor Rothburn said that he personally would have left this matter to the obstetricians.
[43] Doctor Rothburn said in oral evidence that if there had been an MDT review then he would have emphasised to the treating clinicians that negative blood culture tests did not mean that there was no on-going infection. The patients had been on antibiotics.

viii) Since the post-mortem findings showed evidence of a continuing Gram positive infection in the CS uterine wound site and this was probably the source of the severe sepsis, a hysterectomy performed on/before 5th October 2013, would have prevented the deceased's death.

22nd - 23rd September 2013

Joint Statement obstetricians

147. Professor Steer said that Mrs Keh had been noted to have had a very high temperature (39.1°) the night before. It was 38.3° at 03:00 on 22nd September, 39.2° at 10:00 and 39.4° at 10:40 when Doctor Spiegler saw her. The notes at 14:25 said: "As observations continue to be unstable (temperature 38.7°C, respiratory rate 26, BP 115/73, pulse 96) asked SHO to review again". Professor Steer said that the situation as so revealed and as shown in Doctor Spiegler's note, was potentially life-threatening. It mandated full review at a senior level including a consultant obstetrician and a senior microbiologist. Such a review would have included the possibility of genital tract sepsis including uterine endometritis.

148. Mr Tufnell said that this was the morning after the first significant spike in temperature. It was appropriate to chase up the bloods and commence antibiotics[44]. Optimally a senior obstetrician or consultant should have been made aware of the case at that time, though a registrar had been involved that morning.[45]

149. Working on the mistaken time of Doctor Spiegler's examination being 10:40[46], Professor Steer's view was that he could not say that a decision to perform a hysterectomy would necessarily have been taken at this time; however, in the light of what subsequently transpired, it is likely that a detailed consultant review would have concluded that uterine endomyometritis was the most likely cause. Therefore the safest course would be for the recommendation to have been that the potential focus for infection, the uterus, to be removed. A review in the mid-afternoon was likely to have resulted in a recommendation for Mrs Keh to have a hysterectomy. He added that the report on 23rd September of gram positive cocci and gram-negative rods in the blood culture, and a CRP of 223, would have increased the probability of a recommendation for hysterectomy.

150. Mr Tufnell disagreed. He said that Mrs Keh was seen by a consultant on 23rd September. Recommending hysterectomy at that point would have been substandard practice. In the UKOSS of hysterectomy around the time of birth study, only 16 women a year had a hysterectomy (in over 700,000 women) but the rate of infection after birth, and particularly after caesarean section is greater than 1 in 100. Suggesting hysterectomy after only a short trial of antibiotics would be poor practice. The usual management would be to treat with antibiotics for at least 48 hours to see if there was improvement. Only if there was a failure to respond would you consider imaging[47]. The purpose of a CT scan would be to look for collections or abscesses that need draining. If there were no collections or abscesses then you would usually persist with

[44] They had been commenced at 11:30 before Doctor Spiegler saw Mrs Keh
[45] The joint statement said 'the evening before'; Mr Tufnell corrected this in oral evidence
[46] Professor Steer had not read Doctor Spiegler's statement and, working from the records, the photocopy of which was unclear as to time, based his opinion until cross examination on the erroneous time.
[47] Hence why a CT scan would have been appropriate on 3rd October

antibiotics. Hysterectomy would not reasonably be considered at such an early point. Mr Tufnell pointed out that Mrs Keh was apyrexial on 24th September.

151. Mr Tufnell also said that on his hospital unit they have a woman with pyrexia every week and do a hysterectomy for infection every few years. To recommend caesarean section at this point would have been very poor practice.

Joint statement microbiologists

152. The expert microbiologists agreed that on the basis of the clinical picture at 23rd September, the differential diagnosis of *Staphylococcus aureus*, septicaemia, in a patient who has continued fever following caesarean section and no other source confirmed, should include deep-seated infection associated with the uterus.

153. Professor French added that from the notes on examination, though pyrexial and tachycardic and with a grossly raised CRP, Mr Keh was generally well. Her abdomen was soft, uterus well contracted, lochia normal, wound clean and dry but gaping. Her WCC was normal. The most likely source of her infection was thought to be her breasts, though they were not typical of mastitis. He would, as a microbiologist, have been concerned about the tachycardia and raised CRP, and would have recommended imaging of the abdomen and pelvis and a change to more broad-spectrum antibiotics.

154. However, in the light of subsequent developments Professor French said he did not believe this would have changed the outcome. On 23rd September Mrs Keh felt much better, was started on more broad-spectrum antibiotics[48]. Deep MSSA sepsis was correctly looked for, but there was no evidence of cardiac or bone/joint infection. At this stage Mrs Keh did not have evidence of severe sepsis[49] and, as a microbiologist, Professor French would have been happy with the management.

155. Doctor Rothburn, in oral evidence, agreed with those comments of Professor French.

22nd - 23rd September: Discussion

156. It would have been optimal to have had a review by a consultant or a more senior doctor than Doctor Spiegler later on 22nd September 2013. However, I accept Mr Tufnell's evidence that it was not below a reasonable standard not to do so. Although Mrs Keh had a high temperature, antibiotics had only been prescribed that morning, blood tests had been ordered and there had been no real change in Mrs Keh's condition since the Registrar had seen her in the morning, albeit Doctor Spiegler thought she had sepsis.

157. In any event, any review by a senior doctor would not have altered treatment. Professor Steer said he thought a consultant review should have taken place by 17:00 at the latest. By that stage observations at 16:20 were that Mrs Keh was now stable and her temperature had dropped to 37.9°.[50]

158. Professor Steer's oral evidence can be summarised as follows:

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[48] teicoplanin, flucloxacillin and gentamicin
[49] immune dysregulation and organ dysfunction
[50] By 18.25 she was recorded as "Feeling much better"

(i) It was necessary to examine Mrs Keh at that stage with specific reference to the possibility that she had endometritis. Given the CT scan report[51] and the post-mortem report, he believes there would have been some evidence of endometritis at that time. It was perfectly possible that the endometritis and the wound infection were co-existing at that time, though it was the wound infection that caused the death.

(ii) Hysterectomy would not have occurred on 22nd September but after a consultant review on 23rd September. This was when gram positive cocci were reported, these being unusual in relation to just endometritis and suggestive of a wound infection. The fact that the temperature had come down after commencing antibiotics would not necessarily change his opinion, as this can happen and then little showers of bacteria can escape, especially if there is necrotic tissue. The next time the temperature shot up he would then probably be seriously considering hysterectomy. He then accepted, given the temperatures on 22nd September and 23rd September, that there would not have been hysterectomy on those dates.

(iii) Professor Steer then introduced in evidence that he would not go straight from the tests to a hysterectomy. He said that there should be a vaginal examination, and potentially an examination under anaesthetic, to investigate the state of the uterus, i.e to see if it is soft and boggy. On examination under anaesthetic a curette could be used to remove some of the endometrium and send it off for examination. Sometimes the curette can even go through the necrotic and damaged tissues and that immediately is an indication you need to proceed to hysterectomy.

(iv) As to what a vaginal examination would have shown on 23rd September, Professor Steer initially said he could not say. When it was put to him that if he could not then say, then there probably would not have been a hysterectomy, he said it would have been unusual to have an infection that has killed someone with no clinical evidence of it beforehand. Therefore the likelihood is that they would have found something, though he could not be sure of that.

159. My comments, following the same numbering, are:

(i) The post mortem report did not show evidence of endometritis. Professor Steer said that it may have been that, because of all the antibiotics she had had, that particular source of infection had resolved. The CT scan, according to Doctor Weston, the Claimant's expert showed:

> "……a uterus that has not involuted as expected with the poor enhancement of the myometrium as a non-specific sign of uterine pathology. The haematoma/low density material in the caesarean section site in the uterine body is within the wide normal variation seen in the post-operative period and there are no specific CT features that allow one to say it is infected."

Professor Steer had seen Doctor Weston's report previously, but it was not until cross examination that he accepted that that pillar of his opinion was unfounded. He said that the CT scan did not rule out or rule in infection. He accepted that on the basis of what is

[51] The CT scan was not done till 4th October, but it was common ground that it is likely not to have been materially different if done earlier.

in the records, he would not have been advising hysterectomy at any stage; hence his emphasis on examination, to which I now turn.

(ii)/(iii) Professor Steer had never mentioned before his oral evidence the suggestion that a vaginal examination/examination under anaesthetic should have been done at any stage post natally. However he described it in his evidence as the key thing that needed to have been done; also that it was substandard practice not to have done it.

(iv) Macroscopically the post mortem report showed no signs of infection. There were some minor necrotic areas associated with the incision. Professor Steer said he had seen such areas when performing hysterectomy but they are very, very rare. He added: "This whole case is very rare, and this is part of the difficulty".
Professor French said that the necrotic areas shown were consistent with the caesarean surgery. Dr Goddard, the pathologist from Papworth Hospital, gave evidence at the inquest. He said: "Her uterus…was enlarged and somewhat bulky, in keeping with her recent pregnancy…she had a lower segment scar, which is the site through which the caesarean section was done. The tissues there were softened, there were macroscopic areas of necrosis around there." Later he said: "…the small areas of necrosis would be a few millimetres across."

(v) Mr Tufnell said that on the basis of the CT scan he would not have thought that there was endometritis as there was no bleeding and no discharge. He said that the idea of doing a vaginal examination to be more precise and effective with the diagnosis than the CT scan was quite remarkable, though ultimately he said that he would not criticise someone who did it. He said that he did not think there was anything of sufficient abnormality that would have been picked up on a vaginal examination. He accepted that Professor Steer had said that if the vaginal examination had been normal, he would have stopped there. Nevertheless, in relation to the suggestion that one would perform an examination under anaesthesia and start curetting the uterus to make a diagnosis of endometritis, he said it was "beyond extraordinary." He said he had had a very painful lesson at an early age when he took a woman with endometritis to theatre to perform a curette and ended up with her bleeding very substantially. He thought that curetting a recently pregnant uterus to make a diagnosis of endometritis is not something he had ever seen done, written or described, so it was a surprise to him.

(vi) I accept Mr Tufnell's evidence. It was not negligent to fail to do a vaginal examination. In any event, on the basis of the evidence I am wholly unconvinced that, even if a vaginal examination had taken place, it would have revealed anything which would have indicated continuing infection. If that had been the case then Professor Steer said he would not have proceeded to examination under anaesthesia, so that matter does not arise.

3rd October 2013

Joint statement microbiologists

160. On the basis of the clinical picture on 3rd October, taking into account the microbiology input that had already been given, the microbiologists agreed that a microbiologist would have advised repeat cultures, review again possible sources of sepsis and review the antibiotic treatment to increase the spectrum of cover. In this regard:

i) Professor French noted that Mrs Keh had been apyrexial on 2nd October but was again pyrexial on 3rd October. After consultation with the microbiologists her antibiotics were changed to Tazocin. There were no localising signs, CRP was 22 and WCC 5.5. Repeat blood cultures were sent which later came back negative. A LVS[52] taken on 1st October was reported negative for common pathogens. Although Mrs Keh had become pyrexial, her CRP had greatly improved, which was encouraging. A microbiologist would have advised reculturing, reviewing possible sources of sepsis and probably changing antibiotics to cover anerobes. This was all done.

ii) Doctor Rothburn agreed with the above. He had noted that Mrs Keh was pyrexial on antibiotic treatment targeting *Staphylococcus aureus* bacteraemia, and no source had been found for the infection. This meant that there should have been continued concern about a deep-seated infection.

Joint statement obstetricians

161. As to the obstetricians:

i) in the light of Mrs Keh's temperature of 38.8° and the clinical picture on 3rd October, both experts agreed that the decision to cancel the CT scan was a breach of duty. Had there been a consultant/MDT review the CT scan would probably have gone ahead rather than being cancelled on the advice of Mr Nyarko.

ii) Their opinions diverged in terms of hysterectomy. Professor Steer said that a hysterectomy would have been considered and recommended. The lack of an obvious site of infection outside the uterus would have left removal of the uterus as the only remaining option to get infection under control. Mr Tufnell said he did not think a hysterectomy would have been recommended. The bleeding had settled and the cardinal symptom of endometritis is increased bleeding[53]. There was no significant pain and Mrs Keh was described as being well. Her CRP had dropped significantly to 39 and her WCC was normal at 7.6. It was reasonable on 3rd October, and after the CT scan on 4th October, to continue treatment with antibiotics. The purpose of the scan was to identify collections/abscesses that would benefit from drainage. The absence of collections meant that to continue with antibiotics was reasonable at this stage.

3rd October: Discussion

162. Much of the discussion in relation to 22nd – 23rd September can be repeated. The relevant further matters are

(i) The CT scan cancelled on 3rd October should not have been cancelled. One can assume that the findings of the scan actually done on 4th October would have been the same.

(ii) There should have been a consultant review between 3rd and 5th October. This should have involved (a) according to Professor Steer MDT meeting(s) of the

[52] This may have been a HVS – see above
[53] Professor Steer disputed this.

obstetrician, microbiologist and radiologist, or at least (b) discussion of the case by the obstetrician with the microbiologist (Mr Tuffnell).

(iii) Other sites of infection, apart from the uterus, had been ruled out.

163. As a far as the obstetrician experts were concerned, there was nothing material to add to the views set out above. Professor Steer accepted that, absent a vaginal examination evidencing a continuing infection in the uterus, a hysterectomy would not have been indicated. Mr Tufnell said that in order to consider surgical management you have to identify something that you think surgically is amenable to action. The CT scan did not show anything. It is a big decision to remove a uterus, not just because of the long-term effects, but because it is quite a difficult and risky operation just after birth. Mrs Keh had a temperature, but she was not feeling particularly unwell, she was mobilising, eating, drinking and her inflammatory markers were getting better. He would not have taken the uterus out. It was reasonable that the clinicians did not remove the uterus. The cocktail of antibiotics had recently been changed and that, together with the lack of significant findings on the CT scan, meant that he would not have operated. He has removed uteri on a number of occasions because a woman had a post partum infection. Then the CT scan had shown lots of peritoneal fluid, adhesion of tissues, collections of fluid in the fallopian tubes, such that it was apparent that there was still an ongoing significant infection in that area. His reading of the post mortem was that there was a very small nidus infection that caused the very unusual shock-type response.[54]

164. The overall position on the basis of the above evidence is that there was no breach of duty in failing to remove the uterus. Nevertheless, for completeness, but particular because of a final argument put by Mr Mooney, I shall set out in some detail the remainder of the microbiological evidence.

4th October 2013

Joint statement microbiologists

165. The microbiologists noted that the intermittent pyrexia continued, though Mr Keh was feeling well in herself, mobilising, eating and drinking. At around 14:00 her blood pressure was low and was monitored[55]. By 15:05 she was afebrile and blood pressure and pulse were normal. After consultation with the microbiologists, intravenous gentamicin was added to the microbial regime and a CT scan of pelvis and abdomen requested. The scan was reported as showing appearances most likely representing endometritis but with no radiological drainable pelvic collection. The caesarean section wound remained clean and dry; the perineum was healthy.

166. If asked to interpret the CT findings as microbiologists, the experts would have asked whether the endometritis seen on the scan could represent a deep-seated persistent focus of infection. They deferred to the obstetricians as to how the scan should have been interpreted and what action should have followed. In oral evidence Doctor Rothburn said that a spike in temperature is a feature of an infection process. There

[54] At the inquest, Dr Goddard said: "..I could find no specific source of infection other than a few organisms in the caesarean section site at the time.." His report made it clear that this was on histological examination.
[55] Doctor Rothburn did not attach significance to this low BP finding.

were therefore persistent concerns about temperature, requiring continuing management by antibiotics.

167. Professor French expanded substantially in clarification in his oral evidence in the following way:

i) endometritis is a polymicrobial infection and is usually an ascending infection from the vagina;

ii) expert microbiologists had concentrated on the wound infection caused by *Staphylococcus aureus*;

iii) *Staphylococcus aureus* infection of the blood is serious. It nearly always indicates infection in the wound. The starting point in this case would have been to consider a wound infection. The most likely would have been superficial skin wound. However investigations and examination had taken place by 4th October, making it clear that the superficial skin wound was not infected and other sources e.g heart and lungs had been ruled out. Therefore the source had not been identified and the only realistic source was the uterus. It is therefore necessary to have a CT scan.

iv) Once the CT scan had been available and there had been an MDT meeting or discussion between obstetrician and microbiologist:

a) to Professor French as a microbiologist the radiology did not seem to suggest uterine infection. He would have asked the radiologist. He was shown the report from the Claimant's radiologist, Doctor Weston. His comments (see above) were consistent with Professor French's understanding of the CT scan.

b) in any event, had Professor French been asked about the endometritis on the CT scan, he would have said that he did not consider it likely that there was a staphylococcal infection in the endometrium. *Staphylococcus aureus* in endometritis would cause a severe effect on the uterus;

c) Professor French accepted that in retrospect the wound in the uterus was the likely cause of the problems. There was a small infection in the uterine wall – so small as to be almost unnoticeable. The histology does not say there was an infected necrotic site. Small clusters of gram-positive organisms were in the necrotic tissue. Professor French thought that this did not show progressive *Staphylococcus aureus* infection;

v) on the basis of the CT scan and the history as at 4th and 5th October, Professor French said that his interpretation would be that there had been infection through the superficial wound and that the infection was under control. The only indication was a grumbling temperature. Other possibilities needed to be considered, especially in the presence of diarrhoea. That is why C-difficile was considered and a stool sent for analysis. It would not have been clear

what was going on. Therefore, his advice would have been to keep on with the antibiotics and monitor;

vi) although there had been a grumbling temperature and some increased heart rate which could be associated with the temperature[56], Professor French said that the inflammatory markers were the most important factors for him. The CRP had once been 200 which was very high when Mrs Keh was acutely infected. That had come right down. The WCC was normal. Therefore, the inflammatory markers coming down normally indicates that the infection is under control. The remaining problems with the temperature/heart rate showed there was a problem which still needed to be investigated.

vii) Professor French pointed to the Service Incident Report where Doctor Marina Morgan, an independent microbiologist with extensive experience of PVL-related disease had said:

> "I feel the standard of documentation and care overall in this case by hospital staff was exemplary. The final stages of illness raise more questions than answers as to why she died. Apart from the initial bacteraemia, the patient exhibited few real signs of sepsis until very late in the admission, initially recovering well enough to be considered for home therapy with ceftriaxone. The investigations were less helpful than one would normally have expected in a case of continuing PVL-related sepsis, leading one to wonder if another event supervened e.g. super infection, although there is no evidence for this. The rapid demise from 3rd October … when she developed PUO and then a dry cough only one day before admitted to ICU … suggests a lung pathology. However, the reported PM findings do not fit with necrotizing pneumonia, although perhaps more analysis may be fruitful? The suggestion that a toxin related phenomenon led to ARDS seems to be the best fit given the evidence to date.[57]"

viii) Professor French said that the problems in this case are reflected in Doctor Morgan's puzzlement in the review. His suggestion was that he thought it was compatible with staphylococcal toxic shock syndrome. That can occur without obvious signs. Microscopically seen infection can produce toxin and it can be associated with very small areas of infection. He said that Mrs Keh's clinical picture and the CT report did not present a picture of severe staphylococcal sepsis;

ix) if there had been severe staphylococcal infection of the uterus, as a microbiologist he could have thought that a hysterectomy was indicated, though this would be a matter for obstetricians. It was pointed out to him that Miss Ray had said endometritis would represent the site of deep-seated

[56] There is also some change in the respiratory rate. Professor French said he was not impressed with this as a factor.

[57] Doctor Rothburn agreed with much of this from a microbiological standpoint. He said the investigations were unhelpful but this was not surprising.

infection. Professor French said that had there been an MDT meeting (or discussion between obstetrician and microbiologist) and Miss Ray had said that, he would have asked her whether she was sure, because there was nothing on repeated clinical examination or on the CT scan. Ultimately though it would be a matter for her. Doctor Rothburn had said that if on the CT scan there was no collection or necrotic tissue, as a microbiologist he would say surgery was not indicated, unless and until sepsis became severe.[58] Professor French (in common with Doctor Weston, the Claimant's radiologist) did not consider that there was clear evidence of necrosis. Professor French said that if there had been necrotic tissue he believes Mrs Keh would have been desperately ill; therefore it was most unlikely that there was.[59]

Obstetricians

168. I do not propose to go through the joint statement or oral evidence of the obstetricians in respect of the 4th and 5th October as they add little, if anything, of significance to what has been fully set out above.

5th October 2013

Joint statement microbiologists

169. The microbiologists agree that Mrs Keh's temperature and heart rate became normal on 4th October and rose again on 5th October. However, there were no localising signs. She appeared well but had developed diarrhoea. They would have considered the possibility of C-difficile diarrhoea, repeated the blood tests and requested a stool for microbiological examination[60]. WCC and CRP were not done on 5th October, but the results would have been similar to those on 6th October when the WCC was normal and CRP only moderately raised.

170. Doctor Rothburn noted that Mrs Keh was pyrexial on antibiotic treatment targeting *Staphylococcus aureus* bacteraemia. This meant there should have been continued concern about a deep-seated surgical site infection. He said in oral evidence that, apart from the spikes in temperature from 1st - 5th October he thought the CT scan report showed some filling defects. Although interpretation of the CT scan report was for the obstetricians, he would have raised the matter at an MDT meeting or meeting between obstetrician and microbiologist.

Potential Uterine Infection/Hysterectomy: General

Joint statement microbiologists

171. The microbiologists agreed:

[58] Which it did not until 6th October.
[59] Even if there had been necrosis on the scan, Professor French thought there would be a laparotomy upon which nothing would have been found. He would not have advised an obstetrician to go to hysterectomy on the basis of the CT scan.
[60] In fact a stool sample was sent.

i) At all stages of Mrs Keh's febrile post-operative state the possibility of uterine infection should have been considered by clinical investigation, microbiological investigation and imaging

ii) In this case the source of infection was unclear, though the history and microbiology pointed towards the surgical site. If uterine infection was suspected, then surgical intervention should have been done, though this would be a clinical decision for the obstetricians.

iii) [In answer to questions about the PVL positive result apparently returned from the reference laboratory on 27th/28th September and (a) what would have been the position if a microbiologist had been informed of this on 27th/28th September or 3rd October (b) whether knowledge of a PVL producing MSSA infection would have made any difference to the requirement for source control versus reliance on antibiotic therapy alone] – they would have advised addition of clindamycin in order to help suppress PVL toxin production by bacteria, however gentamicin was given from 23rd 26th September which would also have had this effect. Source control is an important aspect of the treatment of severe sepsis and antibiotics alone are not sufficient. The production of PVL does not change this.

172. Professor French considered that given the overall clinical picture and results of investigations, there was no microbiological reason to have recommended hysterectomy on/before 5th October. Doctor Rothburn deferred to the obstetricians.

Decision on Failure to carry out hysterectomy

173. It follows from my review of the evidence that I accept Mr Tufnell's opinion that it was not negligent to fail to carry out a hysterectomy at any stage.

174. However, in final submissions Mr Mooney put the case in another way. He submitted that the breach of duty conceded by the Defendant in failing to have a MDT consultant review[61] would in fact have led to hysterectomy. Therefore the claim should succeed even if hysterectomy was not in fact indicated. He relied on Miss Ray's evidence. He put it thus:

"24…… It is her evidence that she believed that the endometritis diagnosed by the CT scan on 4th October 2013 was the source of the ongoing deep seated infection….. Further at any review stage she would have known that she was dealing with a staphylococcus aureus infection with PVL toxins. She would have known that PVL led to tissue necrosis and she agreed that the hypodense areas on the scan could be areas of necrosis. Mrs Ray also knew that antibiotics would not penetrate areas of necrosis.

25. It is this information that she would have reported to the microbiologist at the multi disciplinary team meeting that the experts agree should have taken place after the CT scan …...

[61] The concession was only that there should have been review by an obstetrician. See para 9 above.

26. In the face of this information being relayed by Miss Ray it is submitted that the microbiologists would have advised that source control by surgery was required. Indeed that it the agreed evidence in the Joint Statement at questions 7 and 11…. It is accepted that Professor French attempted to qualify this in evidence. The Claimant relies upon his agreed evidence in the Joint Statement."

175. Looking at Miss Ray's evidence, the questions put by Mr Mooney were predicated on her being told that the scan showed endometritis. It is to be recalled that she had not seen the scan, but had been told by the SHO that the scan was showing likely endometritis with no evidence of a collection. She was shown the report which said "The appearances most likely represent endometritis, no radiologically drainable pelvic collection."

176. I have summarised Miss Ray's evidence above. In fact her position was that she would not have considered a hysterectomy. This was after Mr Mooney had put to her the joint statement of the microbiologists where it stated that, if there had been an MDT meeting and uterine infection was suspected, surgical intervention should have been done.

177. Further, although Mr Mooney suggested that he relied on the joint statement of the microbiologists, rather than Professor French's expansion of it in oral evidence[62], I found that oral evidence (as summarised above) to be compelling.

178. Yet further, any MDT meeting should have involved a radiologist to comment on the scan, as Professor French said. We know from Doctor Weston that, among other things, a radiologist would have said that there were no specific CT features that allowed one to say that the uterus was infected. Doctor Weston's evidence was not put to Miss Ray. It is inconceivable, had Miss Ray had an MDT meeting with a radiologist and a microbiologist whose input had been along the lines of the evidence from Doctor Weston and Professor French, that she would have performed a hysterectomy.

179. For those reasons, this submission must also fail.

[62] There was nothing in the expansion which materially conflicted with the joint statement or Dr Rothburn's evidence