



OUTER HOUSE, COURT OF SESSION

[2018] CSOH 29

A306/13

OPINION OF LADY WOLFFE

In the cause

LT

Pursuer

against

LOTHIAN NHS HEALTH BOARD

Defender

Pursuer: Milligan QC, Bell; Digby Brown LLP

Defender: Ferguson QC, Doherty; NHS Central Legal Office

3 April 2018

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Introduction

[1] This is an action alleging professional negligence against the registrar on duty in the labour ward of St John's Hospital, Livingston in respect of the birth of the pursuer's son, whom I shall refer to as Baby B, in 2005. It is averred that at about the age of three years he was diagnosed with severe cerebral palsy.

[2] The three-week proof was restricted to the issue of negligence. Causation and quantum were left over to later determination. During the proof, the case insofar as directed against the midwife was abandoned, as were some of the grounds of fault directed against the registrar. The grounds of fault maintained against the registrar are that she was negligent in the following respects:

- 1) The registrar interpreted the CGT trace as normal or reassuring at or about 22:30 hours. No ordinarily competent registrar would have interpreted the CTG trace as normal or reassuring at that time ("the CTG interpretation case").
- 2) The registrar did not expedite Baby B's birth by alternative means (eg by ventouse, episiotomy or lift-out forceps). An ordinarily competent registrar would have expedited the child's birth by episiotomy or ventouse or lift-out forceps ("the failure to expedite delivery case").
- 3) The registrar did not inform the pursuer of the risk of fetal compromise or obtain her consent. The medical staff had a duty to inform the pursuer of the risk of fetal compromise and to obtain her consent to the continuation of labour ("the consent case").

There was no differentiation in the evidence between the alternative means of expediting labour, and therefore I will simply refer to these as "the alternative means". The uncontested evidence was that the alternative means posed a low risk.

[3] In response to these allegations the defenders contended that the registrar was not negligent, in that:

- 1) It was reasonable for the registrar to interpret the CTG as reassuring;
- 2) In these circumstances, expedited delivery was not mandated; and
- 3) There was not a known risk of fetal compromise. Accordingly, the pursuer could not be advised of such a risk and, further, there was no need to obtain the pursuer's consent to continuing with labour, or to discuss with her the alternative means of delivery and the risk associated with them.

Witnesses

Witnesses to fact

[4] The factual witnesses led on behalf of the pursuer were the pursuer, the attending midwife (Ms Mary Hearse) and the registrar (Dr Al-Zletni), who attended at 22.20 for about ten minutes. I shall refer to the midwife and the registrar collectively as "the medical witnesses".

Expert witnesses

[5] Three experts in obstetrics were led on behalf of the pursuers. These were as follows:

- 1) Dr Kevin P Hanretty, retired Consultant Obstetrician. He had produced an original report in 2015 and had updated this in 2016. His finalised report (No 6/4 of process) ("Dr Hanretty's Report") and CV (at No 6/19 of process) were agreed.
- 2) Dr Norman C Smith, retired Consultant Obstetrician. Dr Smith produced one report (No 6/7 of process) dated 8 July 2016 ("Dr Smith's Report").

- 3) Mr Stephen Walkingshaw, retired Consultant Obstetrician. His report (No 6/8 of process) ("Mr Walkingshaw's Report") and his CV (No 6/18 of process) were agreed.

In addition, reference was made to the expert report of another Consultant Obstetrician,

- 4) Preliminary report of Dr Roddy Campbell, Consultant Obstetrician (No 6/12 of process) ("Dr Campbell's Report"). This was agreed.

No evidence was led from the medical experts speaking to midwifery. In submissions, it was suggested that I read the reports of the parties' respective experts in midwifery, which were agreed, namely:

- 5) Report of Annette Lobo, Midwife (No 6/3 of process) ("the Lobo Report");
- 6) Report of Dr Julia Sanders, dated 15 May 2017 (No 7/25 of process) ("the Sanders Report").

None of these witnesses was examined or cross-examined, a point Mr Ferguson QC, who appeared for the defenders, made in his submissions.

[6] The defenders led one expert, Professor Deidre J Murphy. She produced two reports: one dated 25 March 2015 (No 7/ 11 of process) ("Professor Murphy's 1st Report") and a later one dated 15 February 2017 (No 7/23 of process) ("Professor Murphy's 2nd Report").

Electronic Fetal Monitoring, CTGs, terminology, the RCOG Guidelines and the algorithm

EFM using CTGs

[7] Electronic fetal monitoring ("EFM") of a woman in labour using a cardiotocograph machine is now common. This is effected by affixing sensors to the mother which are intended to record, among other things, the uterine activity (ie contractions) of the mother and the fetal heart rate ("FHR"). These recordings are printed out in real time in a

continuous manner onto a scroll of paper, which was referred to by witnesses as a fetal trace (“a trace”) or a cardiotocograph (“CTG”).

[8] In appearance, the CTG (No 6/21 of process) is printed on a single roll of paper and it reads from left (ie the start of the trace and the earliest point in time) to right. The CTG contains an upper and lower graph.

- 1) *The upper graph (FHR):* The upper graph shows the FHR. The vertical axis is for the heart rate, with each horizontal line representing an interval of five heartbeats. The horizontal axis contains marking denoting 30-second intervals. Accordingly, each rectangle created by the horizontal and vertical lines (with the longer side of the rectangle being along the horizontal axis) enables one to analyse the FHR within a five-heartbeat range over 30 second intervals. The five-heartbeat range is important, as will be seen, as a means to measure the “variability” of the FHR.
- 2) *The lower graph (uterine activity):* The lower graph is slightly more complex. The vertical lines are at increments of ten. The horizontal lines denote 30-second intervals. (This corresponds to the upper graph, such that one can relate the FHR on the upper graph to uterine activity on the lower graph.) The continuous trace of activity records uterine activity or contractions. A contraction is shown as a peak on the lower graph. The uppermost row of the lower trace records fetal movements. These are depicted as thin or thicker vertical bars.

In interpreting a trace, one of the elements analysed is the relationship of the FHR or a change in the FHR on the upper graph to the uterine activity (eg a contraction) on the lower graph. This might be done, to determine whether a deceleration in the FHR is “late” or “early” in relation to the peak of the mother’s contraction.

Definitions

[9] The Royal College of Obstetricians and Gynaecologists (“RCOG”) provide clinical guidelines on the use and interpretation of CTGs during labour. The guidelines in force at the time of Baby B’s birth were the “Evidence-based Clinical Guideline Number 8 of 2001”, an extract of which was produced (No 7/39 of process) (“the Guidelines”). These have now been superseded.

[10] The Guidelines provide tables for the categorisation of FHR traces (in Table 2.2) and the categorisation of FHR features (Table 2.3). Medical intervention may be indicated, depending on how a trace is categorised. Before setting out the categorisations in these two tables, it is necessary first to understand the definitions used. These are taken from Table 2.1 of the Guidelines and are as follows:

“Table 2.1 Definitions and descriptions of individual features of fetal heart-rate (FHR) traces

Term	Definition
Baseline fetal heart rate	The mean level of the FHR when this is stable, excluding accelerations and decelerations. It is determined over a time period of 5 or 10 minutes and expressed in bpm. Preterm foetuses tend to have values towards the upper end of this range. A trend to a progressive rise in the baseline is important as well as the absolute values
- Normal Baseline FHR	110-160 bpm
- Moderate bradycardia ^a	100-109 bpm
- Moderate tachycardia ^a	161-180 bpm
- Abnormal bradycardia	< 100 bpm
- Abnormal tachycardia	> 180 bpm
Baseline variability	The minor fluctuations in baseline FHR occurring at three to five cycles per minute. It is measured by estimating the difference in beats per minute between the highest peak and lowest trough of fluctuation in a one-minute segment of the trace
Normal baseline variability	Greater than or equal to 5 bpm between contractions
Non-reassuring baseline variability	Less than 5 bpm for 40 minutes or more but less than 90 minutes
Abnormal baseline variability	Less than 5 bpm for 90 minutes or more
Accelerations	Transient increases in FHR of 15 bpm or more and lasting

	15 seconds or more. The significance of no accelerations on an otherwise normal CTG is unclear
Decelerations	Transient episodes of slowing of FHR below the baseline level of more than 15 bpm and lasting 15 seconds or more
Early decelerations	Uniform, repetitive, periodic slowing of FHR with onset early in the contraction and return to baseline at the end of the contraction
Late decelerations	Uniform, repetitive, periodic slowing of FHR with onset mid to end of the contraction and nadir more than 20 seconds after the peak of the contraction and ending after the contraction. In the presence of a non-accelerative trace with baseline variability less than 5 bpm, the definition would include decelerations less than 15 bpm.
Variable decelerations	Variable, intermittent periodic slowing of FHR with rapid onset and recovery. Time relationships with contraction cycle are variable and they may occur in isolation. Sometimes they resemble other types of deceleration patterns in timing and shape
Atypical variable decelerations	Variable decelerations with any of the following additional components: <ul style="list-style-type: none"> – loss of primary or secondary rise in baseline rate – slow return to baseline FHR after the end of the contraction – prolonged secondary rise in baseline rate – biphasic deceleration – loss of variability during deceleration – continuation of baseline rate at lower level
Prolonged deceleration	An abrupt decrease in FHR to levels below the baseline that lasts at least 60-90 seconds. These decelerations become pathological if they cross two contractions, i.e. greater than 3 minutes
Sinusoidal pattern	a regular oscillation of the baseline long-term variability resembling a sine wave. This smooth, undulating pattern, lasting at least 10 minutes, has a relatively fixed period of 3-5 cycles per minute and an amplitude of 5-15 bpm above and below the baseline. Baseline variability is absent

^a These ranges of baseline are not associated with hypoxia in the presence of accelerations, with normal baseline variability and no decelerations”

Categorisation of FHR features (Table 2.3)

[11] Table 2.3 of the Guidelines sets out four features: (1) baseline FHR (expressed in beats per minute (“bpm”)); (2) variability of FHR (expressed in bpm); (3) decelerations;

and (4) accelerations. It sets out the parameters for each of these features to enable them to be categorised as “reassuring”, “non-reassuring” and “abnormal”. The table is as follows:

“Table 2.3 Categorisation of fetal heart rate (FHR) features

Feature	Baseline (bpm)	Variability (bpm)	Decelerations	Accelerations
Reassuring	110-160	≥ 5	None	Present
Non-reassuring	100-109 161-180	< 5 for ≥ 40 but less than 90 minutes	Early deceleration Variable deceleration Single prolonged deceleration up to 3 minutes	The absence of accelerations with an otherwise normal cardiotocograph is of uncertain significance”
Abnormal	< 100 > 180 Sinusoidal pattern ≥ 10 minutes	< 5 for ≥ 90 minutes	Atypical variable decelerations Late decelerations Single prolonged deceleration > 3 minutes	

Categorisation of FHR traces (Table 2.2)

[12] The definitions for normal, suspicious and pathological FHR traces are as follows:

“Table 2.2 Categorisation of fetal heart rate traces

Category	Definition
Normal	A cardiotocograph where all four features fall into the reassuring category
Suspicious	A cardiotocograph whose features fall into one of the non-reassuring categories and the remainder of the features are reassuring
Pathological	A cardiotocograph whose features fall into two or more non-reassuring categories or one or more abnormal categories”

[13] After Table 2.3, the Guidelines contain the following bullet points:

- In cases where the CTG falls into the suspicious category, conservative measures should be used.

- In cases where the CTG falls into the pathological category, conservative measures should be used and fetal blood sampling (“FBS”) where appropriate/feasible. In situations where fetal blood sampling is not possible or appropriate then delivery should be expedited.

Reference is made to an algorithm for the definition of “conservative measures”.

[14] It is important to note the following:

- 1) the Guidelines do not draw a distinction between the first and second stages of labour;
- 2) the Guidelines do not highlight accelerations in the second stage of labour as a cause for concern; and
- 3) the Guidelines do not state what is to be done in the event the baseline FHR is indeterminate.

As will be seen, the pursuer’s case was predicated not so much on a departure by the registrar from the Guidelines, so much as a failure (it was said) to act in a particular way in relation to an unusual CTG notwithstanding the Guidelines. This explains the chapters of evidence relative to the occurrence of accelerations, particularly regular accelerations, in the second stage of labour; as to what was the method (and what were the criteria) to determine a baseline FHR, and what was to be done if the FHR was indeterminate. As it developed, the pursuer’s case was in essence the failure to recognise a CTG that was so unusual that the only non-negligent course was to intervene to expedite delivery.

[15] A trace was said to be “reactive” if there were accelerations. Accelerations were often associated with fetal movement. It is, perhaps, a mark of the challenges in the interpretation of CTGs that the parties were unable to agree a set of propositions representing a consensus of medical opinion on the subject.

The algorithm

[16] Produced separately from the extract of the Guidelines just set out was a further two-page extract (No 7/12 of process) (“the algorithm”). This contained a flow chart on page 1, relating to admission, auscultation (ie listening to the FHR with a stethoscope) and recommendations for continuous EFM. The top of the second page contained notations, to ensure adequate quality recording of the FHR and the contraction pattern and to “[e]nsure the mother is informed of concerns and included in the management plan”. The second page set out separate panels with flow charts for suspicious and for pathological CTGs.

- 1) *Suspicious CTG*: None of the individual boxes (“Inadequate quality CTG”, “Uterine hypercontractility”, “Maternal tachycardia/pyrexia” or “Other maternal factors”) appeared to be relevant to the circumstances of this case. However, the notation below these individual boxes stated “If trace remains suspicious continue to observe for further suspicious FHR features and taking into consideration other clinical factors”.
- 2) *Pathological CTG*: This was divided into two flow charts: where fetal blood sampling (“FBS”) was indicated and where it was inappropriate. Where FBS was indicated, one of the intermediate steps was to encourage the mother to adopt the left lateral position (the other was to check maternal blood pressure). The subsequent action depended on the result of the FBS. Delivery was mandated only in the event of a pH of 7.20 or less. Where FBS was inappropriate, the same intermediate steps were suggested, but the flow chart also indicated “expedite delivery”.

[17] There was no evidence in this case about the inappropriateness (or otherwise) of FBS. It was simply assumed that if the CTG should have been classified as pathological, delivery had to be expedited. When put to them, the pursuer’s experts each accepted that an

expedited delivery was not mandated in terms of the Guidelines or this algorithm, if the CTG were classified as suspicious.

The critical importance of determining the baseline FHR

[18] As will be apparent from the definitions and the characterisations in Tables 2.2 and 2.3 of the Guidelines, it is critical to determine the baseline FHR. It is only once the baseline is determined that one can characterise an excursion from it as an acceleration (ie a rise in the FHR in relation to the baseline) or a deceleration (ie a drop of the FHR in relation to the baseline). In terms of the Guidelines, the determination of the baseline FHR presupposes a relatively settled pattern over an interval of five or ten minutes. Where the FHR does not contain a relatively settled pattern for such periods this can prove problematic in the interpretation of such a trace.

[19] There was a dispute amongst the experts as to how the baseline was determined. Professor Murphy referred to the requirement, derived from a paper of the National Institute for Child Health and Human Development (“NICHD”), noted below, that one required the heart rate to be relatively constant (ie between contractions) for a period of at least two minutes before one could say that that was the baseline. Some of the pursuers’ experts referred to just “eyeballing” the trace, or using a ruler to draw a line through those portions that appeared to be the baseline. The Guidelines referred to when the baseline was “stable, excluding accelerations and decelerations.” These are not necessarily inconsistent approaches, but there was a degree of uncertainty in the evidence in circumstances where the baseline was itself unclear, as to what factors one considered in determining the baseline. There was greater consensus as to how, as a matter of analysis, one determined that there had been a change in the baseline, and which required persistence of the baseline at the (presumed) new rate for ten minutes.

Description and possible interpretations of the FHR on the CTG from 22:20 to 22:26

[20] While this is to simplify to some extent what is a complex matter (and leaving to one side the issue of variability of the FHR), the essence of the dispute between the parties on the CTG interpretation issue was as to the ascertainment of the correct baseline at the material time. This may be illustrated by reference to the trace between 22:20 and 22:30. (I use the correct timing, with the vertical axis coinciding with the “sun” symbol preceding the figure “22:20” between the upper and lower graphs as indicating 22:00. That this was the correct way to read the time on the graphs only became apparent two-thirds of the way through the proof, in the course of Mr Walkingshaw’s evidence. All timings given by witnesses prior to then are therefore out by 30 seconds. This does not affect the analysis of the CTG, which focuses on the pattern of the heart rate over lengths of time, not knowledge of its precise rate at any single point in time.) At 22:20 the FHR had just risen to c 158 bpm and over the next thirty seconds it peaked at just over 160 bpm. It then dropped abruptly to just over 110 bpm and hovered at about that range for about 30 seconds. The FHR then increased during the next thirty seconds to nearly 170 bpm (at 22:21:30) before dropping over the following 30 seconds to 125 bpm (at 22:22). Over the next four minutes (from 22:22 to 22:26) the FHR peaked at about 165 (and once at 170 bpm) for 30 seconds and dropped down to c 115 to 120 bpm. During the six minutes just described, the FHR hovered at the peak rates for no more than about 30 seconds. The duration of the lowest points was no more than 30 seconds (on four occasions) or 60 seconds (on two occasions). At no point in the six minutes just described (from 22:20 to 22:26), did the FHR ever hover at the same level for more than 60 seconds, and in that period, it generally hovered at a high or low point for only around 30 seconds. There are several possible analyses of this pattern to ascertain the baseline FHR:

- 1) If, in order to determine the FHR baseline, one took a ruler and drew it through the points where the FHR was hovering at the peak rates, then that was the baseline FHR. If that were the correct baseline, the other movements are decelerations (and which may be concerning or deeply concerning depending on whether they were late, early or variable). This reflects the position of the experts for the pursuer.
- 2) On the other hand, if one took a ruler and drew it through the points where the FHR was hovering at its lowest rate, then the baseline FHR was c 120 to 125 bpm. On that analysis, the subsequent movements of the FHR were accelerations. In terms of the Guidelines, just noted, these would be regarded as a “reassuring” feature. This reflects the position of the expert for the defenders.

However, on neither of these interpretations was the criterion in the Guidelines met, in terms of the requisite period of stability for the purpose of establishing the baseline FHR or for establishing a change in the baseline FHR.

Description of the FHR on the CTG between 22:26 and 22:33

[21] At 22:26 the FHR had dropped from a peak of 172 bpm to 140 bpm, where it hovered for 15 seconds or so before dropping to c 130 bpm for another 15 or 30 seconds, and then climbed through 150 bpm (at 22:27) to 170 bpm (at 22:27:30). From the peak at 22:27:30 at 170 bpm it dropped to 110 bpm. Thirty seconds later (at 22:28) it recovered to 130 bpm, and peaked at 22:28:30 at 170 bpm. The manuscript notation of this part of the CTG has the word “pushing” and an arrow pointing to this peak. This was within a contraction recorded on the lower graph.

[22] By 22:29 the FHR decreased to between c 130 to 140 bpm, for about 45 seconds, and then dropped to about 120 bpm a few seconds before 22:30pm. A sharp rise occurred over the

next 30 seconds and the FHR peaked at 22:30:30 at 170 bpm. Again, there is a notation of the peak with an arrow and the word “pushing”. The peak of a contraction recorded on the lower graph preceded this by about 30 seconds. The notation “head on perineum” also begins at this point (and is written across the timings, to c 22:34).

[23] From the peak at 170 bpm at 22:30:30, there are three more similar peaks in the next three minutes, spaced out at about one minute between each peak. Between the peaks the FHR drops down to between 130 and 140 bpm.

Other features of the CTG trace between 20:10 and 22:34

[24] *Variability:* The variability of the FHR is also recorded on the trace. Given the five-second increments of the vertical axis of the upper graph, the (minimal) optimal variability of 5 bpm should fill the rectangle (representing a 30-second segment of time), in the sense of bumping up against the top and bottoms of the rectangle. Good variability will be indicated by lots of lines in close proximity to each other and bumping into the top and bottom of the rectangle, as if scribbled by a child in a hurry trying to colour in the box. Variability below the rate of 5 bpm will appear as a thinner line with far fewer scribbles.

[25] There is a section of the trace, from about 22:12:30 to 22:16, where the lines of the FHR have this thinner appearance, in comparison with the greater variability recorded elsewhere on the trace. One of the pursuer’s experts, Dr Smith, was of the view that there was no variability and that Baby B was hypoxic at this point. On the other hand, Mr Walkingshaw regarded variability as a neutral factor. The other experts otherwise regarded it as a positive or reassuring feature.

[26] *Hypertonic uterine activity:* More than five contractions in any ten-minute period is regarded as excessive or hypertonic uterine activity and not good for the fetus, as a contraction puts it under stress. In this case, one period of excessive uterine activity was

identified, between 22:12 and 22:22, in which there were six or seven contractions. This coincided with the period of low variability just noted. There was no other similar period of excessive uterine activity over the rest of the trace.

The categorisation of decelerations

[27] A careful reading of the definitions of decelerations in Table 2.1 and the categorisations in Table 2.3 of the Guidelines discloses that not all decelerations are categorised in the same way. Decelerations constitute a transient slowing of the FHR by 15 (or more) bpm below the baseline, lasting 15 or more seconds. Whether a deceleration is “late” or “early” or “variable” is defined in relation to a maternal contraction. On the evidence it is a generally recognised phenomenon that a uterine contraction may cause a slowing (ie a deceleration) of the FHR. In normal presentation, the peak of the contraction will rise (on the lower graph) and there will be a mirroring deceleration or trough in the FHR on the upper graph.

[28] There was evidence that FHR might be reactive, in the sense that there may be an association between, for example, a movement of the FHR away from the baseline by reason of something done to the mother, such as a vaginal examination (as occurred at about 20:54, and at which time there was a coincident single deceleration in the FHR to 70 bpm) or the movement of the mother into a different position (as occurred c 21:26 to 21:28, and at which time there was a deceleration from c 120 bpm to 90 bpm between 21:27 and 21:28). Equally, movement by the fetus in utero could result in an acceleration of the FHR. It was also not unusual for a baby in utero to have cycles of sleep, and during which little or no fetal activity would be recorded on the top row of the lower graph of the CTG.

The significance of accelerations in the first and second stages of labour

[29] A further issue that divided the experts was the significance of accelerations in the second stage of labour, which the pursuer was noted as having reached at 22:15.

[30] The Guidelines indicate that the presence of accelerations is a reassuring feature whereas they acknowledged that the absence of accelerations within an otherwise normal CTG was of “unknown significance”. The Guidelines did not draw a distinction between the first and second stages of labour. On the evidence of the experts, it was their common position that the presence of accelerations in the first stage of labour was a reassuring or normal sign. (This also reflects the Guidelines.) However, there was a significant dispute in the expert evidence regarding the significance of accelerations in the second stage.

Accelerations in the second stage might occur, but persistent accelerations at this stage very uncommon. What divided the experts was whether persistent accelerations in the second stage were a cause for concern. It was in this context that the Murphy & Turnbull paper (defined below) was referred to.

Academic literature referred to in the expert evidence

[31] A considerable amount of expert evidence was led in this case, and the medical experts referred to a number of academic papers. A paper might be relied on by one expert, but challenged or commented on by another. To avoid repetition of these passages and for ease of reference, I note the papers and provide a précis of the points parties sought to take from them. In the next sections I set out the significant passages relied on in the expert evidence. The academic papers included:

- 1) “Fetal heart rate accelerations in second-stage labour; two case reports” by Karl W Murphy and Sir Alexander Turnbull in the *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 32 (1989) 163-168 (No 6/5 of process) (“the

Murphy & Turnbull Paper"). The authors, no relation to the defenders' expert, were highly regarded. The paper addressed two cases of marked periodic accelerations in the FHR during the second stage of labour. This was because it was regarded as uncommon to have accelerations in the second stage of labour, rather than the norm of having accelerations in the early stage and which progressed to decelerations in the second stage. The pursuers' experts founded on the paper as signalling how unusual it was to have accelerations in the second-stage, especially a "prolonged and florid pattern of periodic accelerations". The defenders' expert founded on the fact that the authors did not conclude that this was non-reassuring.

- 2) "A Review of NICHD Standardized Nomenclature for Cardiotocography: The Importance of Speaking a Common Language When Describing Electronic Fetal Monitoring", by Barrett Robinson (*Reviews in Obstetrics & Gynecology*, Vol 1 No 2, 2008) ("the NICHD paper") (No 7/15 of process). The defenders' expert, Professor Murphy, referred to this paper in her report. This paper reviewed the NICHD's standardized nomenclature, used in the United States. The NICHD paper had a more sophisticated system for definitions of FHR patterns.
- 3) "Knowledge of adverse neonatal outcome alters clinician's interpretation of the intrapartum cardiotocograph" by D Ayres-de-Campos and others in *BJOG* 2011; 118:978-984 (No 7/37 of process) ("the 1st BJOG paper"). This was the first study to look at the impact of knowledge of an adverse outcome on the retrospective analysis of traces in a medico-legal context. The paper concluded that knowledge of an adverse outcome led to a more severe classification of the traces.

- 4) “Does knowledge of fetal outcome influence the interpretation of intrapartum cardiotocography and subsequent clinical management? A multicentre European Study” by P Reif and others in *BJOG* 2016; 123:2208-2217 (No 7/38 of process) (“the 2nd BJOG paper”). This paper revisited the subject matter of the 1st BJOG paper and confirmed its findings using a larger sample of clinicians.
- 5) ACOG Practice Bulletin No 62, “Intrapartum Fetal Heart Rate Monitoring”, Vol. 105, No 5, May 2005 (“The ACOG Bulletin”) (No 7/19 of process).

[32] As passages in these papers were referred to repeatedly in the evidence of the expert witnesses, it may assist to set out the key passages at this point. I exclude the foot notes and references.

The Murphy & Turnbull Paper

[33] The paper explained its scope, as follows:

“Introduction

During the antenatal period the occurrence of fetal heart rate (FHR) accelerations in response to fetal movements has long been considered to indicate good fetal reserve... Although the same may be said of accelerations in response to fetal movements in labour, many authors have recognised the association between periodic FHR accelerations (accelerations which are related to uterine contractions) and various degrees of umbilical cord compression and have described the typical progression during the course labour from periodic accelerations to variable decelerations... In this paper we present two cases of cord compression in which typical variable decelerations appeared in the first stage of labour and progressed to periodic accelerations in the second stage, a reversal of the usual pattern of changes. Both infants demonstrated a respiratory acidosis at delivery.”

The paper then set out the two cases in detail. In both cases the babies were born with respiratory acidosis; both had oxygen provided for the first three minutes of life and both were described as vigorous at ten minutes. The second case concerned a 22 year old primigravida who delivered at 23 weeks’ gestation. The descent of the vertex in the second stage of labour was described as slow and the CTG showed “marked accelerations” in the

FHR during expulsive contractions. In respect of this the paper stated: "This pattern was considered reassuring and labour was allowed to continue until spontaneous vertex delivery occurred 1 hour and 55 minutes later."

[34] The discussion of these two cases at the end of this paper was as follows:

"Discussion

Both of these cases demonstrated markedly accelerative fetal heart rate patterns in second-stage labour. Accelerations with an amplitude of more than 40 beats per minute were recorded on the cardiotocograph and confirmed by auscultation with a Pinard's stethoscope during expulsive uterine contractions (Figs 2, 4 and 5). Decelerations accompanied the accelerations early in the second stage in case 1 but not in case 2 where the pattern was purely accelerative. An end-stage tachycardia was observed in both cases. These fetal heart rate patterns represent selective umbilical venous occlusion and the cord acid-base information supports this impression. At delivery there was a large arteriovenous pH and PCO₂ difference associated with chest cord compression in the first case and nuchal cord encirclement in the second. The mainly respiratory acidosis observed in the cord bloods of the two infants would account for the low Apgar scores at 1 minute, the rapid response to resuscitation and the normal postnatal course. Maternal acidaemia caused by a prolonged expulsive phase may have contributed to the fetal acidosis in Case 2.

Transient accelerations in the fetal heart rate resulting from selective compression of the umbilical vein can be due to reduced venous return and hypotension in the fetus... The fact that in experimental hypoxia and acidosis, in subhuman primates, this sympathetically mediated response is not seen has led to the belief that accelerations are indicative of good fetal reserve. It is generally agreed that while partial cord occlusion may initially cause a variety of heart rate responses it eventually leads to decelerations when significant fetal hypoxia occurs. The vigorous condition of both infants within 10 minutes of delivery supports this hypothesis. *However, an unusual feature of these two cases was the progression of variable decelerations in the first stage of labour to periodic accelerations in the second stage, rather than the reverse. Accelerations are uncommon in second-stage labour and it has been suggested that they are not as reassuring as when observed during first-stage labour. The fetal heart rate data, as represented by these accelerations and a rising baseline, indicate that these foetuses were being stressed. We have not previously seen this prolonged and very florid pattern of periodic accelerations in second-stage labour (Case 2) and, while it is probably compatible with a normal outcome, the observer should at least be prepared for an infant which is initially slow to breathe.*" (Emphasis added.)

The defenders' relied on this paper, as providing reassurance, or at least no warning against, the occurrence of accelerations in second-stage labour. The pursuer relied on it as noting how unusual it was to have accelerations in the 2nd stage of labour. The passages relied on

by the pursuers' experts are in italics; the passage relied on by the defenders' expert is in bold.

The BJOG Papers

[35] The two BJOG papers addressed the issue of the potentially skewing effect of knowledge of the adverse outcome of a birth on the retrospective interpretation of a fetal trace in a medico-legal context.

[36] *The first BJOG paper:* The purpose of the 1st BJOG paper was to evaluate the impact of prior knowledge of neonatal outcome on clinicians' interpretation and classification of intrapartum CTGs. Five experienced obstetricians from five maternity hospitals were asked to analyse 20 normal traces and 20 where the pH was suboptimal (ie acidemic). For the first analysis, they were provided with no information about the neonatal outcomes or the pH levels of the babies. Two months later, the same clinicians received the same traces (albeit in a randomised order) for analysis, but they were also provided with the information about the outcome or adverse pH levels. The second round of analysis produced more negative or severe characterisations of the traces. This was principally on the basis of evaluations of decelerations and variability. The paper noted at the outset that "poor intra- and inter-observed agreement on interpretation" of CTGs had been "consistently demonstrated in the past". It was noted that the knowledge of a low umbilical artery pH led to a "significantly increased identification of abnormal CTG features, such as repetitive decelerations and reduced variability, as well as to a significantly larger number of tracings being classified as pathological". The opposite effect was not found with the normal pH traces.

[37] *The 2nd BJOG paper:* This paper also investigated whether knowledge of fetal outcome influenced retrospective interpretation of CTG traces and subsequent management recommendations. This was based on 42 intrapartum CTG traces sent to seven university

hospitals in five European countries. The approach was the same, namely to have the traces analysed without knowledge of the outcomes, and then several months later, to have the same traces (but re-ordered) analysed. A total of 123 clinicians participated in the first round and 93 participated in the second round. This study also concluded that knowledge of the outcome (or pH levels) led to “significant changes in the evaluation of all basic tracing features”. Indeed, classification of “normal” tracings decreased by 76 % and “pathological” classifications increased by 51%. Overall, knowledge led to more pessimistic evaluations.

The NICHD Paper

[38] This paper reviewed the NICHD standardized nomenclature for CTGs. The paper noted that 85% of the live births in the US in 2002 were assessed with continuous CTG. It was also noted that, despite the widespread use of EFM, “its ability to identify the fetus that may be becoming asphyxiated... is limited, and its use has failed to lead to reduced rates of cerebral palsy and neurological injury”. The paper stressed the importance of standardized terminology if clinicians were to communicate effectively in respect of EFM.

[39] The definitions considered in the NICHD paper relating to FHR patterns were as follows. (For ease of reference I have inserted paragraph numbering, in parentheses. These do not appear in the original text.)

“Definitions of Fetal Heart Rate Patterns

- (1) *Baseline* fetal heart rate is the average fetal heart rate (FHR) rounded to increments of 5 beats per minute during a 10-minute segment, excluding periodic or episodic changes, periods of marked variability, or baseline segments that differ by more than 25 beats per minute.
- (2) In any given 10-minute window, the minimum baseline duration must be at least 2 minutes, or else the baseline is considered indeterminate. In cases where the baseline is indeterminate, the previous 10-minute window should be reviewed and utilized in order to determine the baseline.

- (3) A normal FHR baseline rate ranges from 110 to 160 beats per minute. If the baseline FHR is less than 110 beats per minute, it is termed *bradycardia*. If the baseline FHR is more than 160 beats per minute, it is termed *tachycardia*.
- (4) Baseline FHR *variability* is based on visual assessment and excludes sinusoidal patterns. Variability is defined as fluctuations in the FHR baseline of 2 cycles per minute or greater, with irregular amplitude and inconstant frequency. These fluctuations are visually quantitated as the amplitude of the peak to trough in beats per minute, as shown in Table 1.
- (5) The sinusoidal pattern differs from variability in that it demonstrates a smooth, sine wave-like pattern of regular frequency and amplitude and is incompatible with the definition of variability.
- (6) By visual assessment, *acceleration* is defined as an apparent abrupt increase in FHR above baseline, with the time from the onset of the acceleration to the acme of less than 30 seconds. The increase is measured from the most recently determined portion of the baseline. The peak is 15 beats per minute or more above the baseline, and the acceleration lasts 15 seconds or more, but less than 2 minutes from the onset to the return to the previously determined baseline. In pregnancies of fewer than 32 weeks of gestation, accelerations are defined as having a peak 10 beats per minute or more above the baseline and duration of 10 seconds or longer.
- (7) *Prolonged acceleration* is 2 minutes or longer and less than 10 minutes in duration, with any acceleration lasting 10 minutes or longer constituting a change in baseline.
- (8) By visual assessment, *late deceleration* is defined as an apparent gradual decrease and return to baseline FHR in association with a uterine contraction, with the time from onset of the deceleration to its nadir as 30 seconds or longer. The decrease is measured from the most recently determined portion of the baseline. The deceleration's timing is delayed, with the nadir of the deceleration occurring after the peak of the uterine contraction. In general, the onset, nadir, and recovery of a late deceleration occur after the beginning, acme, and end of the associated contraction, respectively.
- (9) Based on visual assessment, *early deceleration* is defined as an apparent gradual decrease and return to the baseline FHR in association with a uterine contraction, with the time from onset of the deceleration to its nadir as 30 seconds or longer. The decrease is measured from the most recently determined portion of the baseline. Early decelerations are coincident in timing with uterine contractions, with the nadir of the deceleration occurring simultaneously with the peak of the uterine contraction. In general, the onset, nadir, and recovery of a late deceleration occur in a coincident fashion with the beginning, acme, and end of the associated contraction, respectively.
- (10) By visual assessment, *variable deceleration* is defined as an apparent abrupt decrease in FHR below the baseline, with the time from the onset of the

deceleration to the nadir of the deceleration as less than 30 seconds. The decrease is measured from the most recently determined portion of the baseline. Variable decelerations may or may not be associated with the uterine contractions. The decrease from baseline is 15 beats per minute or higher and lasts less than 2 minutes from onset to return to baseline. When variable decelerations occur in conjunction with uterine contractions, their onset, depth, and duration may vary with each successive uterine contraction.

- (11) Finally, *prolonged deceleration* is defined as an apparent decrease in FHR below the baseline, measured from the most recently determined portion of the baseline. The decrease in the FHR is 15 beats per minute or more and lasts at least 2 minutes but less than 10 minutes from onset to return to baseline. A prolonged deceleration that is sustained for 10 minutes constitutes a change in baseline.”

It will be noted that there is a more precise definition of the baseline FHR, requiring *inter alia* a ten-minute segment (para (1), above). This definition also required that there be a minimum duration of the baseline of two minutes within that ten minute segment (see para (2), above), which failing it was considered “indeterminate”. The definitions of accelerations, decelerations and variability are more detailed than those in the Guidelines. A “prolonged acceleration” lasting ten minutes or more constituted a change in the baseline FHR (*per* para (7)).

[40] Having set out the definitions, the paper discussed the characteristics of reassuring and nonreassuring FHR traces. Again I have inserted paragraph numbering for ease of reference.

“Characteristics of Reassuring and Nonreassuring FHR Tracings

- (1) Although the NICHD workshop did not address interpretation of FHR patterns, clinicians must determine whether the FHR pattern on the CTG is reassuring or nonreassuring. With a high degree of certainty, a reassuring pattern indicates that there is no fetal acidemia at the time of testing. On the other hand, the nonreassuring pattern is suggestive of potential fetal acidemia, worsening fetal status, and the need for further measures to be taken to reassure the provider of the fetus’s health. Due to the low prevalence of intrapartum fetal asphyxia, a nonreassuring tracing has a well-recognized false-positive rate of greater than 90%.
- (2) Despite numerous studies having demonstrated that inter- and intraobserver variability is high when CTG tracings are reviewed, there is a common consensus

that reassuring FHR patterns include each of the following: (1) a baseline fetal heart rate of 110 to 160 beats per minute, (2) moderate variability, (3) gestational age-appropriate FHR accelerations, and (4) absence of FHR decelerations. When all 4 of these criteria are present, the provider can be reassured that no fetal acidemia is present.

- (3) Individual components of the CTG should never be interpreted in isolation, but the presence of FHR accelerations generally assures the provider that no fetal acidemia is present. If accelerations cannot be elicited, then variability should be critically evaluated. Moderate FHR variability is strongly associated (98%) with an umbilical pH higher than 7.15. Therefore, in most cases, normal FHR variability provides reassurance about fetal status.
- (4) In the absence of accelerations, either spontaneous or elicited (ie, by techniques such as scalp stimulation, vibroacoustic stimulation, or fetal scalp sampling), a combination of minimal or absent variability with late or variable decelerations typically constitutes a nonreassuring CTG and is the FHR most predictive of acidemia. Acidemia may be present in up to 1 in 4 fetuses with such FHR patterns. Interventions such as maternal position change, discontinuation of labor stimulating agents, vaginal examination to assess cervical dilation and possible presence of cord, blood pressure measurement, examination of uterus for tetanic contraction, oxygen administration, and fluid bolus should be performed in order to generate a more reassuring CTG. If these or additional efforts are unsuccessful in either reassuring the provider or resolving the concerning aspects of the tracing, consideration should be made to move in a more expedited fashion towards delivery.”

The observation that there is a false positive rate of greater than 90% (ie 90% of non-reassuring traces do not result in adverse outcomes), was not put to all of the experts but they all accepted this proposition. The consensus referred to in paragraph (2) is reflected in the Guidelines.

ACOG Practice Bulletin

[41] Two passages of this were put to some of the expert witnesses. The first was under the rubric “How efficacious is electronic fetal heart rate monitoring”:

“There is an unrealistic expectation that a nonreassuring FHR tracing is predictive of cerebral palsy. The positive predictive value of a nonreassuring pattern to predict cerebral palsy among singleton newborns with birth weights of 2,500 g or more is 0.14%, meaning that out of 1,000 fetuses with a nonreassuring FHR pattern, only one or two will develop cerebral palsy (7). The false-positive rate is extremely high, at greater than 99%.

Available data, although limited in size, suggest that EFM does not result in a reduction in cerebral palsy (3). This is consistent with data that suggest that the occurrence of cerebral palsy has been stable over time, despite the widespread introduction of EFM (8). The principal explanation for why the prevalence of cerebral palsy has not diminished despite the use of EFM is that 70% of cases occur before the onset of labor; only 4% of encephalopathies can be attributed solely to intrapartum events."

The second passage appeared under the passage "What findings on an EFM reassure fetal status?", and was as follows:

"The presence of FHR accelerations generally ensures that the fetus is not acidic and provides reassurance of fetal status. The data relating to FHR variability to clinical outcomes, however, are sparse. One study reported that in the presence of late or variable decelerations, the umbilical arterial pH was higher than 7% in 97% of the cases if the FHR tracing had normal variability. *In another retrospective study, most cases of adverse neonatal outcome demonstrated normal FHR variability.* **This study is limited because it did not consider other characteristics of the FHR tracing, such as the presence of accelerations or decelerations**". (The pursuer relied on the passage in italics. The defenders relied on the passage in bold.)

The FHR features at issue in this case

[42] As noted above, the determination of the baseline is critical if one is to identify if a transient variation from it is an acceleration or a deceleration. I have tried to illustrate, in paragraph [20] above, how challenging that can be and the possible interpretations where the FHR is not constant for any significant period of time. One of these interpretations would be reassuring; the other non-reassuring or pathological.

[43] In this case, the experts were divided as to what was the correct baseline and (to a lesser extent) whether there was a loss of variability at the material time. In terms of the Guidelines, the presence of accelerations was reassuring and this was without distinction as to whether these occurred in the first or second stage of labour. However, the experts also disagreed, profoundly, as to the significance of accelerations and persistent accelerations in the second-stage. It was implicit in this evidence that, at least in respect of accelerations, the

criticism of the registrar was not that she followed the Guidelines but that she should have departed from them in respect of what was said to be a highly unusual trace.

The timeline

[44] At the heart of this case is whether the registrar was negligent in her interpretation of the trace at the material time. The trace began at 18:11 and finished when Baby B was born at 23:37. It is not possible to reproduce the trace in this Opinion, nor is it feasible to describe its every feature.

[45] As noted above, the case against the midwife was abandoned. As the proof progressed, the pursuer's challenge focused on a specific time frame on the CTG as the point at which the registrar should have interpreted it in such a way as mandating an expedited delivery. The registrar attended the pursuer only once, from about 22:20 to 22:30. In the light of the narrowing focus of the factual issues underpinning the CTG interpretation case, I do not record all of the detail of the trace for the hours preceding that timeframe, nor all of the expert evidence of these other, preceding hours. While some reference was made to features of the trace after the material time, generally as support for an interpretation adopted by one expert or another, I do not need to record much of the evidence concerning these later elements.

[46] Parties have agreed a joint chronology. It does not include any data as recorded on the CTG, and which I have endeavoured to describe above. The defenders rely on the midwife's manual notations of the FHR as showing that they were all within the normal or reassuring range for a FHR. These are noted below, in paragraphs [47(5)] and [50].

Entries in the medical notes prior to 22:00

[47] It is now accepted that the trace was normal up to about 21:25. The experts focused on the period from 21:25 until 22:30, when the registrar reassured the midwife to maintain the management plan of seeking a spontaneous vaginal delivery. So far as relevant, the medical entries were as follows:-

- 1) An entry was made at 18:10 querying a deceleration of the FHR to 100 bpm with a contraction. A “fleeting early deceleration” was noted (down to 100 bpm) at 18:20 but with good variability. Fetal monitoring was recommended and by 18:35 it was noted that there were no more decelerations.
- 2) At 18:45 the pursuer requested an epidural but the anaesthetist was busy in theatre. An epidural was only administered an hour later, at 19:50. This necessitated a break in recording of the CTG trace.
- 3) At 19:15 midwife Hearse took over the care of the pursuer. The registrar came on duty at 20:30 for a 12-hour shift. The pursuer reported experiencing rectal discomfort at 20:55. The medical notes record that a top-up of the epidural was requested but (at 20:55) the anaesthetist was busy in theatre. It is noted in the medical notes that the pursuer’s position was changed. The notation on the CTG trace indicated that this was onto her right side. (A change of position to alleviate rectal pressure is not uncommon but the preferred side is for the mother to lie on her left side. No separate case is advanced about the fact she was positioned on her right side.)
- 4) Vaginal examinations took place at 16:35, 20:45 and at 22:15. At no point was meconium noted. Liquor was clear. The examination at 22:15 revealed that the cervix was fully dilated indicating that the second stage of labour had been reached.

5) The FHR was recorded as follow:

17:20 115 to 125 bpm.

17:40 112 to 118 bpm.

18:10 100 bpm (coinciding with a contraction).

18:20 130 bpm, albeit the baseline was "hard to establish".

18:35 FHR of 115 bpm with accelerations to 135 bpm.

19:30 FHR 120 to 130 bpm; "reactive" and accelerations to 155 bpm.

Contractions were four in ten minutes.

20:45 FHR 120 to 130 bpm; "reactive" and moderate contractions of four in ten minutes.

21:50 FHR 115 to 135, "reactive" and contractions were "expulsive".

22:00 It was noted that there was good BBV (beat-to-beat variability) but "difficult to determine baseline?? FHR 115 to 120 with accelerations [up to] 135 to 140" bpm.

22:15 FHR 124 bpm.

Entries in the medical notes from 22:15 to 23:00: 2nd stage of labour

[48] The second stage of labour commenced about 22:15. In the medical notes the midwife noted at 22:15 "variable decelerations [down to] 105 recovering to baseline of 120". At 22:20 the midwife recorded in the notes that the vertex "was visible in the distance". Active pushing commenced. It is agreed that the registrar attended 22:30.

[49] At 22:33 the midwife recorded in the medical notes that the FHR went up to "170 whilst pushing?? Baseline 130 with good BBV [beat-to-beat variability]". It was also noted that the registrar was "happy with CTG continue pushing".

[50] In her evidence, the midwife explained that she also recorded the FHR (as recorded on a visible monitor) after each contraction. These figures were not formally agreed as part of the Joint Chronology, although the medical records were agreed by joint minute. There was no challenge to the veracity of these notes. The medical notes contain the midwife's notations of the FHR as follows:

22:35 136

22:37 133

22:40 146

22:43 140

22:46 154

22:50 133 and the notation "head advancing fairly well:

22:53 150

22:56 156

23:00 130 "head not advancing any further up"

Other measures were taken (which I need not record) and Baby B was born 37 minutes later.

Notations on the CTG and other features it disclosed

[51] In addition to recording the data described above, notations were marked on the CTG. These included the following:-

- 1) c 21:26: there is a notation that the pursuer moved "onto R side";
- 2) c 21:51; 21:54 and 21:57: there are arrows drawn from a peak of a contraction (shown on the lower graph of the CTG) to peaks in the FHR (on the upper graph);
- 3) c 22:26 to 22: 29: it records the registrar's name and the notation "22:30 pushing";
- 4) c 22:29 to 22:33: there is a notation "head on the perineum".

In relation to point (2), the evidence was that the registrar drew these arrows in order to show an association between the accelerations and the uterine activity.

In relation to point (4), the tenor of the evidence was that if the head were on the perineum, birth could be expected to be relatively imminent. As will be seen, however, there is a dispute in the evidence of the medical witnesses as to whether birth was imminent.

[52] The nature of the analysis adopted by the experts involved a close focus on sections of the CTG, especially that between 22:10 or 22:15 and 22:33. Stepping back and viewing the CTG more globally, there is a noticeable (to put it neutrally) change in the pattern of the FHR at two points, and which was commented upon by the experts:

- 1) from c. 21:26 or 21:28; and
- 2) from c. 22:12 or 22:16.

The pursuer's factual witnesses

The pursuer

[53] The pursuer had very little recall of the labour. She could recall having an epidural and being asked to turn onto her side. She could not recall who was in the room, apart from her mother. The midwife did not say she had any concerns about the trace. She did not remember the registrar attending or if the registrar said anything. She did not recall that the registrar ever spoke to her. After the registrar left she was pushing. Labour was not progressing. Her mum said the baby was stuck and asked for an episiotomy. She was told that these weren't done any more. She believed labour lasted for another hour. Eventually she did have an episiotomy. When born, her baby was blue and not breathing.

[54] In cross, she was asked whether there was a student midwife. She could not recall this. When her mum had asked about an episiotomy, she had spoken to the midwife. She

confirmed that her mum was told that these were not done. Her baby had had tests in the first year of his life. A diagnosis was made only after the second MRI.

The midwife

[55] Affidavits were lodged for each of the registrar and the midwife. By agreement, these stood as their evidence in chief. The midwife had qualified as a nurse in 1980 and as a midwife in 1983. She has no recall of the events and is entirely dependent on the records, including the CTG. So far as material, the evidence of the midwife was as follows:

- “4. Usually there is a handover from the day shift to the night shift staff. This takes place in the duty room. There is then an oral one to one handover in the delivery room with an update and summary of the care given.

The handover in the delivery room was by the midwife (in this case Jenny Santry) who had been caring for that patient. From the records I see that by the time I came on shift [the pursuer] was in established labour having ruptured her membranes spontaneously at 02.00 that day. Clear liquor was seen at the time and was noted on a number of occasions thereafter. There is no note of any meconium having been seen at any time. The fetal heart rate (FHR) was being monitored by continuous CTG. [The pursuer] had already received intra-muscular diamorphine analgesia at 17.10 and, at 18.45, had requested an epidural. Midwife Santry had been unable to site a Venflon at that time and had requested assistance from the anaesthetist. The anaesthetist was busy in theatre at that time.

5. Shortly after I took over her care, and because an epidural was to be given, I sited a Venflon. The CTG trace was normal at this time. It showed a baseline of 120-130 bpm with good beat-to-beat variability. The CTG trace showed accelerations of the FHR to 155 bpm. [The pursuer] appeared to be contracting 4 times in every 10 minutes.
6. The anaesthetist was in the room at 19.30 and sited an epidural at 19.50.[...]
7. At 20.45 I performed an abdominal examination and a vaginal examination (VE) to assess the progress in labour. The fetal head was at 1/5th palpable on abdominal examination. ... The findings of the examinations showed that good progress was being made. The cervix was noted to be thin, fully effaced and 7cm dilated. The presenting part was well applied and at the level of the ischial spines. The presentation was left occipito transverse and slightly deflexed (which means that the chin is not well tucked in to the chest). No caput (swelling of the fetal head) or moulding (where the bones of the fetal head overlap thereby reducing the size of the fetal head) was felt. Clear

liquor was draining. At no time during my care for [the pursuer] was any meconium seen. The FHR after the VE was 120 bpm. Contractions remained at 4 times in every 10 minutes. The CTG and the findings on examination were reassuring.

8. At around 20.55 [the pursuer] complained of rectal discomfort. The anaesthetist was contacted to top-up the epidural but was unavailable. (The anaesthetist was still in theatre at 21.30.) From 20.55 to 21.25 the CTG was normal. As the anaesthetist was still in theatre at 21.30, [the pursuer's] position was changed to her right side in an attempt to alleviate the rectal discomfort and to make her more comfortable. I annotated 'On to R side' on the CTG trace at this time. Changing the maternal position was in accordance with my usual and normal practice to seek to relieve this kind of discomfort. I continued to observe the CTG.
9. At 21.50, I noted that the contractions were expulsive (this can be seen and felt by the midwife) and that there was a show ++. Show is a bloody mucousy discharge released as the cervix dilates and it not an abnormal finding. The fetal head was not visible at that time. From the CTG, I thought the fetal heart was reactive with normal baseline FHR of 115-135 bpm.
10. At 22.00, I noted that there was involuntary pushing. The FHR had good beat-to-beat variability but it was difficult to determine the baseline FHR. I thought the baseline FHR was 115-120 bpm (which is normal) with accelerations up to 135-140 bpm. I decided to continue to observe the trace for a short time. The clear liquor and the good variability were reassuring signs.
11. At 22.15, I noted the presence of variable decelerations down to 105 bpm recovering to a normal baseline of 120 bpm. [The pursuer] was continuing to push involuntarily. I decided to perform a further VE [vaginal examination] to see if [the pursuer] had entered the second stage of labour. On examination, I found the cervix was fully dilated. This confirms the onset of the second stage of labour. The presenting part was 1cm below the ischial spines and the position was left occipito anterior. This is a more favourable position for a vaginal delivery. The FHR after the VE was 124 bpm (which is normal).
12. At 22.20, the vertex was visible in the distance. I annotated 'Vx' on the CTG trace at this time. Active pushing commenced. I had noted that the baseline FHR was 126 bpm (which is normal).
13. After this VE and before the active pushing commenced, I called for a medical review. I did this because I was having difficulty determining the baseline and thought there were accelerations and variable deceleration on the CTG trace.
14. My next entry in the records is at 22.33. By that time, the on-call obstetric registrar, Dr Al-Zlenti, was in attendance to review the case. She reviewed

the CTG and annotated it. She noted that the patient was pushing and that the fetal head was on the perineum. The arrows marked on the trace indicating that the fetal heart was accelerating with contractions were not put there by myself. Dr Al-Zletni said she was happy with the CTG and to continue pushing with a view to a vaginal delivery. Her reading of the CTG was in accordance with my own. I had no reason to question her interpretation of the CTG of her plan.”

[56] The following points were taken from the midwife in her examination in chief:

- 1) The midwife confirmed that the baseline FHR can go up or down. The important point was that it stayed within normal parameters. It was difficult to generalise, as each trace was individual. The baseline generally stayed the same but a lot could influence the FHR during labour.
- 2) She confirmed her understanding of the definitions of accelerations, decelerations and variability. Accelerations could be associated with fetal movement and were a reassuring sign.
- 3) She accepted that it was unusual to see accelerations in the second stage, and very unusual to see regular accelerations at that stage, but they did occur. One needed to look at the variability and the return to baseline. She had seen accelerations in the second stage in other traces; in more than 1% but less than 10% of traces. She was pressed repeatedly about the appearance of accelerations as an unusual feature, but she maintained her position that she had seen these and that she would focus on good variability and the baseline. She (repeatedly) rejected the proposition that accelerations were not reassuring in the second stage of labour, especially if there was a good baseline and good variability. Accelerations at that stage could occur. They were often associated with fetal movement. She did not accept the proposition that they were necessarily one-offs. They could be associated with fetal movement, contractions in the first stage, umbilical vein compression or fetal scalp stimulation. She was not aware

of anything in the medical literature to the effect that accelerations in the second stage were of concern.

- 4) She accepted that there was a change in the CTG after 21:25, but she related this to the change in maternal position. She described the CTG at that point as showing a baseline of 115 to 120 bpm, with good variability and accelerations present. She would observe until the baseline returned to normal, which it did at 21:45 to 21:50. At 21:50 the baseline was between 110 and 120 bpm. She had not marked the arrows shown on the CTG. Between 21:50 and 22:00 the baseline was 110 to 115 bpm with good variability and accelerations to 140 bpm. It was put to her that there appeared to be a deceleration. She accepted this, but she would have continued to observe the baseline. There were accelerations before and after that point. If she looked at the baseline as a whole, there was good variability. It was again put to her that there was a deceleration (at 21:40). She again replied that she would look at the whole baseline before and after. There was good variability throughout. She determined that the baseline was 110 to 120 bpm with good variability. She accepted that this showed that the baseline had dropped, but she pointed out that the mother had experienced involuntary pushing.
- 5) By 22:00 there were some fluctuations in the baseline. She had interpreted the baseline between 115 and 120 bpm, but it was difficult to determine and she wanted a second opinion. She accepted all the entries in the medical notes put to her (and which I have set out above, at para [47]). When the second stage was reached, which was confirmed at 22:15, she accepted that the baby would have been easy to deliver by forceps or ventouse (but not by episiotomy, as the head wasn't far enough down) if that had been indicated. She had called for a review

just before 22:15. She had queried the baseline and variable decelerations, and she wanted a second opinion to confirm her findings.

- 6) She had no recollection of the registrar's attendance. An attending registrar would normally write something in the medical notes, unless she was wanted elsewhere. She disagreed with the suggestion that birth was imminent at that stage. She could not recall if the registrar had had any conversation with the pursuer. Her interpretation was that the baseline was 120 to 140 bpm, with accelerations. She did not accept that with hindsight her interpretation was wrong. Even now she would not accept that a similar trace would be concerning, so long as she could identify the baseline good variability was present. She understood that the registrar had also interpreted the CTG as reassuring. She did not accept that birth was imminent, as the head had only just become visible.

[57] In cross the following points were made:

- 1) The CTG was produced from a monitor. She explained the parts of a trace (which I have set out above, at paras [7] to [8]). She also confirmed the definitions, the categorisation of traces (*per* the Guidelines) and the treatment options (*per* the algorithm). The Guidance taught one how to interpret a CTG. One could not determine whether there was an acceleration or a deceleration until one determined the baseline. If the trace was normal and reassuring, this entitled one to continue with labour. If pathological, it warranted action. One did not look at single points in a CTG, but at it overall, for patterns. One interpreted it over time.
- 2) In addition to the CTG, she could hear the FHR audibly. It was her practice to keep this on. If distracted, she could always hear the FHR. One also had regard to the wider clinical picture. Here there was no meconium staining; the liquor

was clear. She was again taken through entries in the medical notes, all of which she confirmed, and explaining in more detail the processes of labour and the descent of the baby through the birth canal.

- 3) She had performed a vaginal examination at 22:15 because the mother was pushing involuntarily. The baby had moved down with good speed and its head was in a favourable position.
- 4) When she had called for a medical review by the registrar, between 22:15 and 22:30, she had understood that the baseline FHR was good, as was variability, and there were no decelerations. She wanted a second opinion to ensure she was interpreting the CTG correctly. The registrar indicated that she was happy with the CTG and to keep pushing. She followed this course.
- 5) She confirmed that she took the FHR from the monitor after each contraction. She was also listening for a normal FHR. She would have been able to hear accelerations and decelerations. She would have been able to hear the FHR return to the baseline. She would have heard a difference in the frequency of the heartbeat. Her 20 years of experience would have enabled her to distinguish between an acceleration and a deceleration heard audibly. Here, she had considered that after the contractions the FHR was returning to the baseline.

[58] She was re-examined on the following points:

- 1) It was put to her that one interpretation of the FHR after the change of position (at 21:26) was that there were decelerations and the FHR was trying to get up to the baseline before the change in position. This was not her interpretation. The change in position had altered the trace, but within 20 minutes it was back to where it was. A change in maternal position could affect the FHR. Even if the accelerations did not coincide with fetal movement, they could be present. While

an acceleration could be in response to a stressor, these were common - although regular accelerations were not.

- 2) A drop in the FHR after a construction was the FHR resting. On the part of the CTG (from 22:00) there were periods of between a minute, 90 seconds and two minutes between contractions.
- 3) She did not accept that there was excessive uterine activity. The mother was pushing.
- 4) After 22:00 she did have a question about the baseline. It could be a baseline of 120 bpm with accelerations or a baseline of 160 bpm with decelerations. She had noted a deceleration but she had interpreted the baseline as at 120 bpm and good variability. She maintained her position that accelerations were a reassuring sign, even in the second stage of labour.

The Registrar

[59] The registrar's Affidavit was in the following terms (apart from her personal details, which I have omitted):

- "2. I obtained my medical degree at Alfateh University, Tripoli, Libya, graduating in June 1989. I attach as an appendix to this affidavit my Curriculum Vitae as at August 2014. This sets out my medical qualifications, my professional registration details, the positions I have held and currently hold, my experience in obstetrics and gynaecology and my memberships of learned societies. I refer to this CV and ask for its contents to be treated as repeated here. I am not currently in medical practice.
3. I have been provided with a copy of the obstetric records (including a copy of the CTG trace) from St John's Hospital which relate to [the pursuer's] pregnancy in 2005 and the delivery of [... Baby B]. According to the records, [Baby B] was born by spontaneous vaginal delivery at 2327 hours on 24 October 2005. I do not recall the events of the night of 24/25 October 2005. I am dependant on the medical records. I was the Obstetric Registrar on duty that night. I will have come on duty at 2030 hours for a twelve-hour night shift. As the Obstetric Registrar that night I would have been the most senior doctor on the labour ward responsible for the patients there. The out-of-

hours Consultant would have been at home usually, and contactable if necessary. When I came on duty that evening, I would have received a handover report about the patients from the day shift Obstetric Registrar.

4. From obstetric records, I see that my first involvement with [the pursuer] was at around 2233 hours. I am mentioned in an entry by Midwife Hearse at 2233 hours (page 26). The entry states 'reg Dr Alzletni in room happy with CTG continue pushing.'
5. I have annotated the CTG trace about 2233 hours. Usually when a midwife called me to see a patient, she would tell me the patient's history when I first arrived. I would also review the CTG trace and look at the notes. I would then examine the patient. I must have reviewed the CTG trace prior to annotating it. My annotation is to the effect that at 2230 hours the patient was pushing and the fetal head was on the perineum. I also marked arrows on the CTG trace indicating (at about 2150-2200) that the fetal heart accelerated with contractions. From the obstetric notes, vaginal examination carried out about 2215 had confirmed that the cervix was fully dilated. The presenting part of the fetal head was noted to be 1cm below the ischial spines in the left occipital anterior position. Despite the change in the appearances of the CTG trace at about 2130 when [the pursuer's] position was changed, the baseline fetal heart rate remained normal with good beat-to-beat variability, and accelerations with maternal pushing/contractions. The fetal head had progressed well in the 15 minutes or so prior to my attendance. Given the progress made, I must have expected that delivery would be imminent. I must have felt that no intervention was required. I must have expected there to be a spontaneous vaginal delivery. From the obstetric records at 2045 hours, clear liquor had been observed and there was no meconium.
6. I was not involved again with this patient until after the baby had been born.
7. I see from the obstetric records that I must have been in theatre with another patient earlier that night. The records show that at 2130 hours the anaesthetist was busy in theatre – that must have been in theatre with me. At about 2350, I was contacted by Midwife Hearse as the placenta remained adherent. Syntocinon was commenced. It is noted that I was busy in theatre at 0015 hours on 25 October 2005. I was unable to attend on the patient until 0130 hours when I performed a manual removal of the placenta. I cannot specifically remember that night shift but it is likely that it was a busy night. I would have been the only Registrar on duty that night. I would usually make an entry in the records as well as annotating the CTG trace, after reviewing a patient. I do not know why I did not do so on this occasion, I think it was because it was a very busy night.
8. The pursuer claims that I should not have interpreted the CTG trace as normal or reassuring at or about 2230 hours on 24 October 2005. I dispute this. I was entitled to be reassured by the presence of a normal baseline, good variability and accelerations. The patient was making good progress in labour, with no meconium present.

9. The pursuer claims that I should have expedited the baby's birth by episiotomy or ventouse or lift out forceps, and summoned the neonatal resuscitation team to be in attendance for the birth. I dispute this. My advice to continue pushing with a view to spontaneous vaginal delivery was reasonable and appropriate. There was no indication for instrumental delivery."

[60] The registrar gave evidence over the course of a long day. The principal submission made was that her evidence was confused and difficult to follow. I accept that, at times, this was so. After her evidence was concluded, a further joint minute was entered into to the effect that:

- (1) following assessment at about 22:30 the registrar "did not form a management plan to the effect that if the delivery was not achieved within 10 to 15 minutes, the midwife should call her back"; and
- (2) following assessment the registrar "did not inform the midwife ... to call her back if the delivery was not achieved within 10-15 minutes."

In the light of that agreement, it is not necessary to set out the registrar's evidence in any detail. Much of it was superseded by the agreement just noted.

[61] She was familiar with, and provided the conventional definitions for, the features of a CTG. She disagreed with the proposition that accelerations were unusual in the second stage. She had interpreted the CTG as reassuring, because there were accelerations with good variability. It would be unusual to have good variability with a deceleration. The baseline was normal, though her evidence varied as to whether this was 120 or 135 to 140 bpm at the material time. She was in no doubt at the time that the CTG was normal. She disagreed that there was excessive uterine activity. She understood that birth was imminent. She accepted she should have made notes.

[62] In cross, she was clear that her view at the time was that the CTG was normal. If she had interpreted it as pathological she would have had a different management plan than a

spontaneous vaginal delivery. She confirmed that she had drawn the arrows on to the CTG (see paras [21] and [22], above.) She was broadly consistent that the movements of the FHR, at 21:51, was not a deceleration because the baseline was then 120 bpm (and not the peak, as was being put to her). It was the baseline because there was three minutes between contractions. She would have discussed the midwife's concern when she arrived. She could not reconcile the notations "head at perineum" and "head advancing".

The pursuer's expert witnesses: Dr Hanretty

[63] Dr Hanretty is a fellow of the RCOG. He had been a Consultant Obstetrician and Gynaecologist for 25 years, retiring at the end of 2014. He had also been an academic Sub Dean at the University of Glasgow. He gave his evidence by video link from Qatar.

[64] He had reviewed the CTG before giving his evidence. He did not, or for technical reasons was unable to, review the academic papers or the other reports in advance of his evidence.

Dr Hanretty's Report

[65] Dr Hanretty's Report was based on the pursuer's medical notes and the CTG. He also had regard to the affidavits of the two medical witnesses and to the reports by Dr Smith and Mr Walkingshaw. In his report, he stated that the CTG was "unusual" from 21:26 to 22:15, and could be interpreted in two ways: as a baseline FHR of about 110 bpm with accelerations, or a baseline FHR of 135 bpm with decelerations. "Thus", he stated, "either there was evidence of fetal compromise as evidenced by decelerations or there was an unusual change in the baseline heart rate associated with a particular pattern of accelerations which is extremely unusual in labour. He noted that this pattern continued until 22:15, when "a profoundly different pattern emerges". (He then noted the marked

increase in uterine activity between 22:10 and 22:30 (see para [26], above), although his suggestion that this might raise a suspicion of placental abruption was not developed, nor addressed by any other expert witness.

[66] In the next paragraph of his report, Dr Hanretty acknowledged the problem of retrospective interpretations of CTGs. He accepted that between 21:30 and 22:20 there could be “a valid discussion regarding interpretation”. However, in his opinion, from 22:20 or shortly thereafter, the CTG was such that delivery should have been expedited. He returned to the two possible interpretations he had identified and he expressed the view that the interpretation with the lower baseline was “untenable”. This was because of the frequency of the accelerations in the second stage of labour, which was “almost unheard of”. Under reference to the Murphy & Turnbull Paper, he made two points: the first was that accelerations in the second stage were sufficiently unusual that this merited publication of the Murphy & Turnbull Paper. The second point was that, in rebuff to the defenders, an interpretation of prolonged and florid accelerations was itself not reassuring. In his view, it was wrong to describe the pattern of the CTG from 22:20 until delivery as accelerations.

[67] After noting a paper in 1975 (in which only two traces in fifty had accelerations in the hour before labour), Mr Hanretty reiterated his conclusion that from 22:20 either the CTG disclosed tachycardia with decelerations or “an extremely unusual” second stage CTG. From this Dr Hanretty concluded that no obstetric registrar of ordinary skill would have interpreted the CTG “as anything other than, at best, suspicious and at worse, extremely concerning.” Normal practice would have been to expedite delivery. In respect of the expectation of the imminence of birth, Dr Hanretty criticised the registrar for not following the usual practice of ensuring that clear instructions were given regarding prompt action to deliver the baby within the timescale that she envisaged. The registrar’s advice to continue pushing with a view to spontaneous vaginal delivery was in his view “unreasonable and

inappropriate". Other comments in his report were in support of the case against the midwife (which has now been abandoned) or commenting on the closed record.

[68] His conclusion in respect of the registrar was as follows:

"The Registrar should have recognised the concerning nature of the CTG and that the extremely unusual appearance of the CTG in the 2nd stage mandated delivery. If she had been confident that delivery when she reviewed the patient at about 22:30 was **imminent** then, if other events were occupying her attention on the labour ward, she might reasonably have assumed a satisfactory outcome. However, an ordinarily competent obstetric Registrar would have ensured that clear instructions were given regarding the necessity of expeditious birth and ensured that they had been complied with". (Emphasis in original)

The registrar had deviated from this practice and in so doing was negligent.

Dr Hanretty' evidence in chief

[69] Dr Hanretty had relatively modest experience acting as an expert. He had done a few expert reports. He had experience analysing CTGs forensically for the purposes of teaching. He had mostly acted for defenders. When asked about the interpretation of a CTG generally, and whether this was a tick box exercise or involved understanding the underlying pathology, Dr Hanretty's answer was that it involved both. He accepted that it was complex because medical understanding remained unclear despite the widespread use of CTGs.

21:26 to 21:28

[70] Under reference to the CTG between 21:26 and 21:28, Dr Hanretty confirmed that this showed a deceleration. It followed a contraction. It was a late deceleration, but late decelerations usually followed a consistent pattern and were not one-offs.

[71] In relation to the CTG between 21:28 and 21:40, Dr Hanretty noted that this was a poor quality recording. Variability remained good but the baseline was between 130 and

140 bpm. During this period there were variable decelerations, approximately 12 in number. They were increasing in duration and the recovery was slowing. Atypical variable decelerations may be associated with profound fetal acidemia. In the second stage of labour, these type of decelerations were not necessarily reassuring or non-reassuring, but if they persisted they were concerning and suggested ongoing fetal compromise.

The CTG 22:00 to 22:10

[72] Dr Hanretty readily accepted that this part of the CTG was difficult to interpret. It was similar to the previous section of the CTG. It could be concluded that the baseline had changed, but it would be a significant reduction in the baseline which predominated before 21:22. A reduction in the baseline FHR during the labour was unusual.

[73] In relation to the CTG to 22:10 and from 22:10 to 22:15, the variability remained satisfactory, although there was a small section where it was reduced. In his view, this could indicate a developing fetal tachycardia, if the fetus wasn't coping. If he had reviewed the CTG at this point, he would have felt it was a "funny" trace. It was certainly unusual. The management of an unusual trace would involve seeking assurance or undertaking delivery if this were feasible in order to remove the baby from an unsatisfactory environment. When asked if any registrar could look at this and say that this was unequivocally reassuring, Dr Hanretty replied "not any he would work with". It was not a reassuring CTG.

[74] In response to questions about the presence of accelerations, his evidence was that accelerations do occur, occasionally in accordance with fetal movement, but this was not common in labour. At this stage he would have expected decelerations. While one might see one-off accelerations, accelerations with every contraction were very rare. They did not tend to be persistent.

[75] In relation to the period of the CTG showing increased uterine activity (ie more than five contractions in ten minutes), he gave a long answer. He appeared to direct his comments at Professor Murphy's observation that the excessive number of contractions might have indicated progress in labour. Progress required more than contractions; it required the dilation of the cervix, the descent of the head and its rotation into the proper position. He then mentioned that one might get excessive uterine activity where there was placental abruption, by reason of bleeding. (There was no evidence to support this.) An increase in uterine contractions might result in fetal hypoxia. At a later point, he added that accelerations in the second stage were extremely rare, and that they did not necessarily have the same significance as accelerations of the more classic type in the first stage. Sections of the Murphy & Turnbull Paper were read out to him. He assented to the proposition that accelerations were uncommon in the second stage of labour. In his 37 years as an obstetrician, he had never seen this pattern. Between his experience and the observations in the Murphy & Turnbull Paper, these accelerations were a rare phenomenon. He dissented from the proposition that the Murphy & Turnbull Paper was authority for treating such a trace as reassuring. The point of the paper was that accelerations in the second stage did not have the same significance as more conventional accelerations.

[76] He was asked if he was falling prey to a retrospective interpretation of the CTG. Dr Hanretty accepted that the CTG was acceptable up to 22:10. From that point, however, in his view, it was an unusual trace or one that was suspicious. It was mandatory to obtain reassurance that the baby was not suffering the effects of hypoxia. If there was no reassurance, then the delivery had to be undertaken. (The algorithm was not put to him.) At 22:30, given the position of the baby, birth could have been expedited by forceps or a ventouse with negligible risk. One needed to rescue the baby from the hostile environment.

[77] Various passages at the end of his report were put to him. He was not applying the “retrospectoscope”; this CTG was abnormal. He found it concerning that Professor Murphy thought she was the only one being dispassionate and that all who disagreed with her lacked her talent or skills for retrospectivity. He hoped that this clearly showed his feelings on the matter. It remained his view that the baby should have been rescued.

Dr Hanretty's evidence in cross-examination

[78] The cross examination of Dr Hanretty was robust. The first challenge was to his misunderstanding as to his role as an expert. He rejected the suggestion that he had been influenced by the reports of Mr Walkingshaw and Dr Smith which he had seen.

[79] He accepted that up to 22:10 there may legitimately have been other interpretations of the CTG but that after 22:10 it was abnormal and any other interpretation was “untenable” (the word used in his report). When pressed that if the presence of accelerations in the second stage of labour was an unknown phenomenon, then an interpretation of the CTG as normal or reassuring was arguable. He accepted this. He retracted his use of the word “untenable” as wrong. It was a poor use of terminology. It was still an extremely unusual trace.

[80] The 2nd case in the Murphy & Turnbull Paper was put to him, as an example of the reversal of the usual pattern. Both of the babies that had been the subject of the paper were described as in “vigorous condition” within minutes of birth. The last sentence of the Murphy & Turnbull Paper did not flag up an adverse outcome. Dr Hanretty accepted that the Murphy & Turnbull Paper did not highlight accelerations mirroring contractions as a pathological phenomenon. He also accepted that in none of the guidelines, such as the Guidelines, the National Institute for Clinical Excellence (“NICE”) or the American equivalents, were accelerations mirroring contractions highlighted as pathological. It was also put to Dr Hanretty that in none of the standard obstetric textbooks were accelerations

mirroring contractions flagged as of concern. Dr Hanretty accepted this, under the qualification that textbooks do not deal with “rare or very rare phenomenon”. It was put to him that one would expect a warning if these were harmful. He conceded that this might be the case, but it still came down to a question of interpretation of the fetal trace. In his view, these were not accelerations. However, he accepted that there was no consensus in the medical profession as to what this pattern of accelerations mirroring contractions might herald.

[81] Several questions were put to Dr Hanretty about the necessity of interpreting the CTG in the light of the Guidelines. He cavilled about this, but accepted that the Guidelines/algorithm did not state that a pattern of accelerations mirroring contractions mandated intervention. He also accepted that, having regard to the normal baseline, the absence of decelerations and the presence of good variability, the pursuer’s CTG could be classified as normal and it did not mandate intervention. On this basis, he was pressed as to why his view was that nonetheless intervention was mandated. In his view, it was an unusual fetal trace and that mandated further investigation or delivery. He accepted that the CTG met the criteria for “normal” classification. He backtracked to some extent, acknowledging that an unusual fetal trace required only further investigation but did not mandate immediate intervention. If further investigations were not reassuring, then intervention was mandated.

[82] A passage of his earlier evidence, to the effect that Baby B had to be “rescued”, was put to him as presumptuous. Dr Hanretty’s answer was that the baby was becoming increasingly hypoxic. There were many false positives with CTGs, and it could not be said (as Dr Hanretty had said in chief) that the baby was in a “hostile environment”. Dr Hanretty retreated to the position that the CTG was a “relatively crude tool” with recognised false positive and that it had increased the rate of intervention. He was pressed again as to why

he insisted that intervention was mandated, notwithstanding that this was a normal trace in terms of the Guidelines and they did not prescribe further investigation (which Dr Hanretty accepted). Dr Hanretty responded that the Guidelines were guidelines, not protocols. He was adamant that the knowledge of the outcome did not influence his opinion.

[83] Mr Ferguson attempted to put passages of the reports of Professor Murphy and Dr Smith to Dr Hanretty, but while he acknowledged that he must have seen these, he had no recall. He had not downloaded these reports or reviewed them for the purposes of his evidence in the case. It was put to him that if a midwife or registrar interpreted the CTG as normal and reassuring, then they had got it badly wrong. Dr Hanretty's position was, yes. When Professor Murphy's position was put, Dr Hanretty affected "astonishment" at her interpretation of events. Dr Hanretty conceded that there were many false positives in CTGs and that some parts of the CTG were open to different interpretations. He maintained his position that it had become "markedly abnormal" by 22:30.

[84] In relation to the use of CTGs generally, he readily accepted that these were fundamentally disappointing as a tool to prevent acidosis. Although widely used, he accepted it was not a foolproof method. He accepted that one had to look at the wider clinical picture. He was asked to describe what he did upon receiving instructions from the pursuers' agents. He said that he had been asked to provide a further opinion in a case that might be controversial. He said he was not particularly interested in acting for pursuer's but review of the CTG made him sufficiently "involved". He was pressed that this "involvement" led to his use of language such as "untenable" and his hostility to Professor Murphy. He maintained that what he had done was as objective as the approach by Professor Murphy. When pressed as to which guidelines he would follow, Dr Hanretty reverted to his position that guidelines were just guidelines; they were not foolproof and could not deal with all situations. When presented with a fetal trace that was unusual, it

warranted further investigation. Professor Murphy's observation that immediate intervention (as Dr Hanretty suggested) was an excessive response, was put to Dr Hanretty. Dr Hanretty's answer was that the excessive response may have delivered a baby in a better condition. He was pressed: how could he know if a response was "excessive" unless he knew the outcome. Dr Hanretty responded that it was a question of judgement, it was a challenging technique and he did not deny there were a variety of opinions. It was put to him that some obstetricians could reasonably and responsibly hold a different position than Dr Hanretty about the need to intervene by fetal blood sampling or operative delivery. Dr Hanretty conceded this, grudgingly, on the basis that anyone who thought this "was in a small minority".

[85] He was asked again about how he went about examining the CTG. He conceded that he did not do many, though he had analysed these in his teaching. To review it, he spread it across two tables. The first time he examined the CTG he spent maybe an hour or two. He had reviewed it maybe a total of 12 times. It was put to him that this was very different from the clinical circumstances facing the registrar. Dr Hanretty agreed. That was, he said, why his sympathy was with hard-working doctors and why he did not often work for pursuers.

[86] Features of the wider clinical picture were put: the absence of any antenatal concerns, the absence of meconium or infection, the fact that the liquor was clear and that the baby's position was good. He accepted that the wider clinical picture did not flag up any concerns. The BJOG papers were put. Dr Hanretty was "vaguely" aware of these. He believed that he wasn't falling into the trap of a retrospective interpretation.

[87] In his view, the baseline FHR from 22:20 was trying to achieve a baseline of 170 bpm. (This would represent the peaks of the FHR, described above, at paragraph [20]). He believed that this was the case because accelerations were extremely rare in the second stage

of labour. Mr Ferguson sought to put the NICHD paper to Dr Hanretty, but he did not have a copy of this either. He accepted the proposed definitions (1) to (4) and (6), which I have set out at paragraph [39] above. (Proposed definition (5), about sinusoidal patterns has no application to this case.) These definitions were broadly consistent with the Guidelines, but were more precise in requiring a minimum baseline duration of two minutes, in any 10-minute window, in order to identify that as a baseline. In the absence of the persistence of the baseline for that duration, it is said to be “indeterminate”. Dr Hanretty accepted all of this. He accepted that these definitions provided an objective standard in a medical-legal context. He also accepted that, applying those criteria, as Professor Murphy had done, it could not be said that the baseline was 170 bpm from 22:20. He volunteered that this highlighted the difficulty of applying terminology, even if objective. He also countered, on the basis that the baseline had not subsisted for two minutes’ duration at the lower level, either. He maintained that these definitions did not apply in the circumstances here. He accepted that none of the accelerations lasted more than ten minutes, and therefore did not constitute a new baseline. As Dr Hanretty did not have Professor Murphy’s 2nd Report to hand, Dr Hanretty could not be readily cross-examined on it.

[88] Mr Ferguson turned to the topic of variability. Dr Hanretty accepted that, apart from one small area of reduced variability, the CTG showed good variability throughout. He accepted that if there were late decelerations which were progressive in nature, one would expect the variability to be reduced. Dr Hanretty’s response was that this was an unusual trace. It was put to him that the presence of good variability was inconsistent with his analysis. Dr Hanretty said that this was just the recognition of the reality of the CTG and he was trying to be objective.

[89] In relation to later parts of the CTG, Dr Hanretty accepted that looking at the CTG between 23:16 and 23:21 the baseline could be interpreted as 130 to 135 bpm. He also

accepted that it would be very unlikely for a previously pathological trace to return to normality. It was put to him that this militated against an interpretation of the earlier part of the trace as pathological. Dr Hanretty resisted this, on the basis that CTGs were a dynamic process. One had to look at it over a length of time. These were decelerations. He accepted that if he took a ruler to establish the baseline, that for the majority of the CTG the baseline would be between 130 to 140 bpm. He was asked to look back to the period from 22:56 to see that the baseline was also at c 130 to 140 bpm, but Dr Hanretty interjected that the baby would have been delivered by then.

[90] Under reference to para 4.3(iii) of Professor Murphy's 2nd Report, which was read out to him, Dr Hanretty accepted that in the last 30 minutes of the pursuer's CTG, the baseline was easy to define (at 130 bpm) and showed normal variability. It was very similar to the CTG recording between 22:15 and 22:30. He also accepted Professor Murphy's observation in this passage that if a pathological trace persisted for two hours, it would typically show progressive deterioration with a loss of variability and either a sustained bradycardia or tachycardia, but in this case the CTG was largely unchanged: variability remained good and the FHR never fell below 120 bpm. Dr Hanretty's reply was that this was an unusual trace. He did accept that up to about 22:10 the CTG could be interpreted as normal.

[91] Looking at the CTG from 22:21 or 22:22, there were two closely-spaced contractions. Dr Hanretty accepted that the FHR had recovered by the onset of the second contraction. Dr Hanretty accepted this, but argued that this is not how one would look at the CTG in clinical practice. On that approach there were the two changes in patterns at 21:26 and at 22:30. Up to 21:26 the CTG was normal and from 21:26 to c 22:10. Dr Hanretty accepted that it was capable of being interpreted as normal. It became abnormal at 22:30. He was asked if he could "stretch" the period (up to which he had conceded it was normal) from 22:20 to 22:30. He replied, after looking at the CTG again, "if you want, yes." The midwife's recordings of

the FHR in the medical notes was put to Dr Hanretty. He was not sure why these had been taken. All but one of these (at 23:35) was within the normal range. It was put to him that a midwife listening to the FHR being transmitted audibly would be able to distinguish between an acceleration and a deceleration, coupled with her watching the CTG and feeling the contractions. Dr Hanretty resisted this, arguing that the palpitation of the uterus to ascertain a contraction was subjective. CTGs were, he said, introduced to get around the subjectivity of intermittent listening to the FHR. It was put to him that the midwife had an advantage in that she had three sources of information to her: the CTG, her listening to the audible transmission of the FHR, and the visual display of the actual FHR. Dr Hanretty cavilled with the proposition, on the basis that the student midwife might have been the one palpating the uterus. If not, he accepted that the midwife would be better placed than he was. However, he wondered if there were research that showed whether this changed the outcome. He ultimately conceded that it might be “possible” that the midwife had a more advantageous position to assess the situation by reason of the multiple sources of information available to her, and of which the CTG was only one source.

Re-examination of Dr Hanretty

[92] Mr Milligan QC, who appeared on behalf of the pursuer, re-examined Dr Hanretty on six topics:

- 1) The NICHD paper was dated 2008 and so this system of classification did not apply at the time of Baby B’s birth. At that point in time, there were no guidelines as to how long the FHR had to endure (eg one, two or ten minutes) before one could say it was the baseline. In any event, guidelines did not apply to unusual trace. Even on the application of NICHD, requiring two or ten minutes’ duration to establish the baseline or a change in baseline, this

was not met in the period from 22:15 to 22:30. No one could say with any confidence what the baseline was. Dr Hanretty said that was why the midwife asked for an opinion but the registrar got it wrong.

- 2) It was impermissible to look at sections of the CTG post-dating the registrar's review, as that was also a form of retrospectivity.
- 3) Dr Hanretty reiterated his evidence that accelerations in the second stage of labour were unusual and that that was the point of the Murphy & Turnbull Paper. By contrast, it was common to see decelerations. Physiologically, a deceleration represented a degree of cord compression.
- 4) In relation to fetal movement as an explanation for accelerations, Dr Hanretty acknowledged that he hadn't considered this but in his view one did not hear of fetal movement in the second stage of labour.
- 5) At 22:30 the registrar had two possible interpretations: a low baseline with regular accelerations or a higher baseline with decelerations. In respect of the first interpretation, Dr Hanretty confirmed that this could be classified as reassuring, even though uncommon. It was "theoretically" reassuring but, he said, it was highlighted in the Murphy & Turnbull Paper as not necessarily the case. The second interpretation was more likely, and hence more logical. Dr Hanretty accepted that if there were two competing interpretations, one reassuring and one pathological, then one had to err on the side of caution. The registrar could not confidently exclude the possibility that this CTG showed fetal compromise. (This line of questions was objected to, but allowed subject to relevancy and competency.) Failure to act on a suspicious trace was not good clinical practice.

6) In relation to the retraction of his characterisation of the alternative view as “untenable” in cross and his concession that other clinicians could hold this view, he was asked whether no obstetrician could hold that view.

Dr Hanretty stated that if his answer had been a “small” number, he would say it was “tiny”. Similarly, it was “tenable” to some people that the world was flat. In his view, Professor Murphy believed the world was flat because she did not think that this CTG disclosed fetal hypoxia. Dr Hanretty was asked if Professor Murphy’s interpretation was a logical and responsible interpretation of the trace. Dr Hanretty answered that the interpretation must be objective. Professor Murphy had a reputation for defending clinicians and he suggested that this may have influenced her interpretation of this CTG. When pressed, Dr Hanretty stated that Professor Murphy’s interpretation was not a logical or reasonable interpretation.

The pursuer’s medical expert: Dr Smith

Dr Smith’s Report

[93] Dr Smith had been a Consultant Obstetrician for 27 years and had retired in 2013.

He also taught post-graduates at the RCOG. He had considerable medical-legal experience.

[94] Dr Smith structured his report by quoting from the medical notes and then providing his comments. In paragraphs 6 to 9 he dealt, respectively, with the time frames from 21:25 to 22:15, from 22:15 to 22:25 and what the registrar should have concluded at 22:30.

“6. At 2055 the epidural block was good but the patient was experiencing rectal discomfort and the anaesthetist was contacted to give a top up. At 2130 it was noted that the anaesthetist was busy in theatre. At 2150 the contractions were expulsive and there was show ++ but nil visible. FH reactive 115-135. At 2200 hours the patient was involuntary pushing. The FH was described as ‘good BBV (beat to beat variability), difficult to determine baseline, ?? 115-120 with acceleration to 135-140.’

Comment

This relates to the time period from 2125 to 2210 hours. At 2125 hours a deceleration appears that occurs after the contraction and returns to a slightly higher baseline of 140 (previously 120-130). The deceleration lasts 2 minutes and has the appearance of an atypical variable deceleration. There are 6 contractions in the 10-minute (2115 to 2125) period prior to this declaration. This is evidence of idiopathic hypertonic uterine activity. The contractions in established labour are normally 3-5 in 10 minutes, each lasting 40-60 seconds. The fetal heart rate pattern from 2125 to 2210 hours has a baseline rate of 140bpm, the variability is reduced compared to the previous section and there are atypical variable and late decelerations. Such decelerations are an abnormal feature and so the tracing is categorised as pathological. The contraction pattern from 2128 to 2138 shows 5 contractions. Another interpretation that could be made of this section of tracing is that the baseline is 120 and that there are accelerations. This interpretation is much less likely as the variability is reduced from previously. The attending midwife notes at 2200 hours that 'difficult to determine baseline, ?? 115-120 with acceleration to 135-140'. It is normal and usual practice to seek a second opinion if there is concern about the pattern.

7. At 2215 'Variable decelerations to 105 recovering to baseline of 120. Continues to push involuntarily.' The next entry was also at 2215 and vaginal examination was undertaken revealing the cervix to be fully dilated, the presenting part 1cm below the ischial spines in the LOA (left occipito anterior) position. FH was noted to be 124. At 2200 hours the vertex was visible in the distance and active pushing was commenced. The FH was 126.

Comment

From 2210 until 2225 hours there is a significant deterioration in the fetal heart rate pattern. The baseline rate rises progressively to 160 bpm, the variability is significantly reduced and there are atypical variable decelerations. This section is pathological. There is evidence of hypertonic uterine activity during this time and during the time frame from 2215 to 2225 hours there are 7 contractions. This hypertonicity is contributing to or causing the fetal distress. There is a hand written note on the CTG at 2220 hours - 'Vx'. This is taken to mean that the vertex is visible. This means that the head of the fetus is visible at the perineum. The normal and usual practice in these circumstances would be for the midwife to seek medical review.

8. At 2233 hours it is noted 'FH increased to 170 whilst pushing ?? baseline 130 with good BBV – reg Dr Alzletni in room happy with CTG. Continue pushing.'

Comment

The CTG is pathological when seen by the registrar Dr Alzletni at 2230 hours. At that time there had been an increase in the fetal heart rate baseline to 170

with reduced variability and the occurrence of atypical variable decelerations. The head was on the perineum and the registrar should have ensured that delivery occurred soon in the presence of a pathological tracing. If spontaneous delivery was not going to happen after a couple of pushes with contraction then assisted delivery would be necessary. In the presence of a pathological tracing in second stage of labour, it is normal practice to expedite delivery with the assistance of a vacuum extractor or forceps to avoid further hypoxia. The head was on the perineum so the assisted delivery would be straightforward and take only 10 minutes. An episiotomy alone may be enough to expedite delivery in these circumstances. The registrar makes no entry relating to the interpretation of the CTG.

9. The fetal heart rate is subsequently recorded in the case record as follows 2235 FH 136; 2237 FH133; 2240 FH 146 head advancing; 2243 FH140; 2246 FH 154; 2250 FH 133 head advancing fairly well; 2253 FH150; 2256 FH156; 2300 FH 130 – head no advancing any further – up to lithotomy. 2305 FH133; 2308 FH 126; 2310 FH 140. Perineum not yielding – no further advance of head – pushing well. 2315 FH132. Perineum infiltrated. 2318 FH 130. 2320 FH 160. Episiotomy performed. 2322 FH170; 2325 FH140, increasing to 180. SVD live [baby] – to resus.

Comment

From 2235 until 2240 hours the baseline rate rises to 170 then to 180 bpm at 2253 hours and remains around 180 until the end of the tracing when the baby delivers at 2327 hours. The decelerations persist and become more prolonged towards the end of the tracing. The tracing remains pathological. The last section of the tracing could be misinterpreted as having a baseline rate of 130-140 bpm with accelerations. However, this is most unlikely as the section between 2210 and 2225 hours is obviously pathological and a sudden change to normality is unlikely.”

[95] His conclusion was as follows:

“Conclusion

A registrar of ordinary skill would have recognised that the CTG was pathological at 2230 hours and ensured that delivery would have occurred within 15 minutes. There was a departure from normal and usual practice that no registrar of ordinary skill would have taken when acting with ordinary care. The baby ultimately delivered spontaneously at 23.27 hours.”

[96] No case of fault is now directed against the midwife. At the end of his comments on paragraphs 6 and 7, Dr Smith stated that the midwife should have sought medical review. She did. What is important to note, in respect of the case directed against the registrar, are

his conclusions. Among the pursuer's experts, he identifies the CTG as pathological from the earliest point in time, namely from about 21:25. He did so on the basis that there had been a deceleration at that point, followed by reduced variability. He identified the (single) period of idiopathic hypertonic uterine activity. He also stated that the baseline FHR between 21:25 to 22:10 hours was 140bpm. In this period, he also identified reduced variability (compared to the previous section) and atypical variable and late decelerations. He characterised the CTG as pathological. He did accept that there could be an alternative interpretation to this section of trace, namely that the baseline was 120 and that there were accelerations. However, he expressed the view that this interpretation is much less likely, as the variability is reduced from previously.

Dr Smith's examination chief

[97] Dr Smith had seen many hundreds of fetal traces in his years as a consultant. He had produced over 200 medical-legal reports and appeared in court for both pursuers and defenders.

[98] Commenting in general terms on the CTG, the second half differed from the first, from about 21:26. Prior to then it was normal and the accelerations were a reassuring sign, typically reflecting fetal movement. At 21:26 there was a late deceleration, which was the most serious type of deceleration. After defining a late deceleration, he confirmed that atypical decelerations were of concern. A deceleration was atypical if there was a slow drop and a quick rise. The point was that the recovery was slow. These were due to cord compressions. It can be difficult to distinguish between late deceleration and an atypical deceleration but both were concerning.

[99] From 21:26 it was difficult to ascertain the baseline FHR. Prior to then it was about 140 bpm. Then there was drop in the FHR for several minutes. At this point the CTG could

be interpreted as a low baseline with accelerations. But one also had to consider if there was any event to cause the sudden change in the pattern, such as excessive uterine activity or a change in maternal position. Here, there had been a change of position of the pursuer onto her right side. At this point, between 21:25 and 22:10 there was also a change in the variability. It was slightly reduced.

[100] He classified the CTG as pathological at 21:26 and at 22:20. He did not accept the alternative interpretation, that this was a low baseline with accelerations. This was less likely. Accelerations were produced by fetal movement, not contractions. Frequent accelerations were not explicable in physiological terms. It was unusual to see accelerations in the second stage of labour. On his estimate, this occurred in less than 1% of cases. Persistent accelerations in the second stage were very rare.

[101] In terms of the CGT between 22:10 and 22:25, he described this as showing a significant decline in the FHR. He assumed the baseline FHR was 140 bpm and it climbed to 170 bpm over several contractions. Between 22:10 and 22:15 there was no variability in the FHR. This was a very serious thing. The baseline was rising. There were atypical and variability decelerations. These three features made the CTG pathological.

[102] What the registrar should have done was to review the whole of the CTG on her arrival (Mr Ferguson objected to the question of whether the registrar should take into account the size of the fetus. The answer, which I allowed under the usual reservations, was yes and that a smaller baby may be less likely to sustain a hypoxia insult). She should have seen an evolving pattern in the FHR; that there was excessive uterine activity (at 22:11) immediately prior to the pathological event. By 22:30 the CTG was pathological with decelerations. The absence of variability indicated a hypoxic event at 22:13. There was a progressive rise in the baseline to 160 and to 170 bpm. The movements were decelerations not accelerations. It was highly unlikely that these were accelerations, as it was unlikely

there would be fetal movements at this time. Even if the variability was good, this did not entitle one to ignore a deceleration.

[103] Dr Smith explained some of the terminology. "Hypoxia" meant a lack of oxygen due to a reduction in the transfer of oxygen across from the placenta to the fetus. At the same time CO₂ accumulated as well as lactic acid. These accumulated because of impaired infusion. The accumulation of lactic and other acids caused a decrease in the pH and this was known as "acidosis". The normal pH of a fetus was 7.25 or higher. A lower pH was associated with acidosis. At this stage, the registrar was in a position where she could have delivered. The availability of additional information to the midwife, such as hearing the FHR over a loud speaker, did not change his view.

[104] Under reference to the NICHD he accepted that there was a false positive rate of CTGs of greater than 90%.

[105] The two pathological events, or pinch points, were at 21:26 (involving a deceleration) and at 22:11 (a loss of variability). The recurrent decelerations and reduced variability rendered the CTG pathological. The conclusions from Dr Walkingshaw's Report and some of those from Dr Campbell's Report were put to him, which he accepted.

Dr Smith's cross examination

[106] Dr Smith had retired as a consultant in Obstetrics and Gynecology in 2013 and had had no clinical practice since then. He had ceased teaching at the RCOG about 12 months ago. In terms of keeping abreast of developments, he occasionally read the journals that came through his letter box for the subscriptions he had forgotten to cancel. He was not familiar with the NICHD paper.

[107] Dr Smith confirmed his view that up to 21:25 the CTG was normal and that between 21:25 and 22:10 there was scope for an alternative interpretation (than his own, of

pathological). He accepted that there was a body of medical opinion that could hold a different view, even if he felt it was unlikely. Dr Campbell's Report was put to him. He did not accept that it stated that a body of medical opinion would have an alternative view.

Dr Campbell had expressed the view that the fetal baseline remained at 140 bpm throughout and that variability appeared to have been preserved, but Dr Smith did not accept either of these propositions.

[108] Dr Smith had seen Professor Murphy's two reports, though he had not read them recently. He had not looked at the NICHD paper, referred to by Professor Murphy, because there was no need to complicate matters. Professor Murphy represented the alternative view, that there were no decelerations and that everything was normal up to 22:15.

Dr Smith disagreed profoundly with this. Professor Murphy was wrong. He maintained that there was reduced variability between 22:10 and 22:16, although he accepted there may have been a short loss of contact (of the CTG sensor) with the first deceleration at 22:13. He went so far as to state that there was absent variability for a period of more than three minutes, for up to five or six minutes. He was pressed as to why he hadn't mentioned this in his own report. His response was that absent variability was a more extreme term. This did not necessarily constitute a pathological trace. There had been some knock out event that caused fetal hypoxia but the fetus had recovered slightly. Variability picked up, but not back to normal. Three factors rendered this CTG pathological: the rising baseline, atypical decelerations (22:10 to 22:15) and variability. In this part of the CTG the variability was absent, then it improved slightly but it was still significantly reduced.

[109] The conclusion of Dr Sanders' Report, which Dr Smith had not seen, was put to him, that this could be interpreted as a normal CTG. Dr Smith maintained that she would be wrong, as were the midwife, the registrar, and Professor Murphy. When asked how they all

got it wrong, he suggested that they were perhaps not viewing the CTG from an independent point of view.

[110] Dr Smith was asked if he had been influenced by the fact that this was a problematic birth. He accepted that this was a subtle matter, and that he tried to forget about the fact that this was a baby with cerebral palsy. He accepted that one needed to look without hindsight at the CTG. It was put to him that one also had to interpret the trace in accordance with the guidelines used to teach midwives and registrars. Dr Smith accepted this, though seemed unsure as to which guidelines were concerned (he mentioned FIGO, NICE or RCOG). He accepted that one also had to have regard to the wider clinical picture. On that matter, he had initially been sent only the CTG. It was only subsequent to that, that he had been given the medical notes. Between the preparation of his first and final report, he had looked at the CTG in excess of 20 times. It had taken him eight hours to compile the report, looking at the CTG all the time, for a considerable period of time. He spent about two hours on his first examination of the CTG. He backtracked on this slightly to suggest that he could eyeball the CTG in about five or ten minutes.

[111] Dr Smith's evidence could not be concluded in one day. Several witnesses were interposed, and his cross examination was resumed five days later.

[112] The Guidelines were put to him. He accepted that these had the same definitions as in the NICE guidelines in 2001. The bullet points after Table 2.3 (recorded at the end of paragraphs [13], above) were put to him, that conservative measures were called for in the case of a suspicious trace and a pathological one. In the latter case, intervention was only mandated if fetal blood sampling was not appropriate or feasible. He accepted this.

[113] He revisited his evidence that there were abrupt changes in the CTG at 21:26 (he agreed with Mr Walkingsaw on this) and at about 22:10, and the factors that led him to classify the CTG as pathological. From 21:21 the CTG was pathological and the FHR

showed tachycardia with atypical variable decelerations or late decelerations. In commenting on Professor Murphy's view that these were accelerations, he introduced the possibility that there could be false accelerations produced by the tachograph machine. He reiterated his analysis that from about 22:10 there was a rising baseline in the FHR. The excursions from the baseline were not accelerations. He accepted that this was all predicated on the correct identification of the baseline. He retracted his suggestion that Professor Murphy or the others lacked independence. He had no basis for that suggestion.

[114] He was asked about the difference of opinion between him and Professor Murphy. It was a difference of opinion. When asked if Professor Murphy's opinion was one he rejected or if it represented a reasonable body of medical opinion, Dr Smith accepted that it was the latter but he strongly disagreed with it. He was pressed that, his disagreement notwithstanding, Professor Murphy's view was one that a reasonable body of obstetricians could be entitled to hold, he said that this was difficult to answer. A "very small minority of obstetricians could hold that view", that these were true accelerations and that the key feature in the CTG was the excessive uterine activity to explain the changes in the CTG. He accepted that this small minority would represent reasonable and responsible clinicians.

[115] Dr Smith accepted that there was nothing in the wider clinical picture (apart from fetal size) that pointed to any concern about fetal wellbeing. He rejected the suggestion that his conclusion, that the CTG was pathological, was not in accordance with the Guidelines.

[116] Paragraph 9.6 iii of Professor Murphy's 1st Report (quoted below, at para [159]) was put to him. Her interpretation of accelerations coincident with contractions was one that a small minority of obstetricians could responsibly hold. He accepted her conclusion, that if the CTG were normal, a forceps intervention would have been an excessive response. He qualified this by saying that the clinicians had to be entirely convinced.

[117] Passages from the medical notes about the head being on the perineum and the head being well descended were put to him. It would be very quick progress to get from the vertex being visible to the head on the perineum. This was possible, if there were excessive uterine contractions. The head could descend and retract in the birth canal with contractions. He did not find it difficult to reconcile the medical notes about this, and the expectation of the imminence of birth.

[118] He accepted that there was considerable inter-observer variation in the interpretation of CTGs. This case was an example of that. He was pressed on his evidence on the last occasion, that knowledge of the outcome had a subtle influence on him. He said it was important to look at the CTG independently. He had been known to go back to say that a case could not be made. In terms of the subtle influence of the knowledge of the adverse outcome, he explained that when reviewing the CTG he was trying work out if the CTG could explain why Baby B had an adverse outcome. He accepted that he took into account the outcome. The BJOG papers were put to him, but he was not aware of these or the research they represented. He started with the knowledge of an acidotic baby and looked at the CTG to confirm this. He accepted that subconsciously he took into account the adverse outcome and that, in the light of the BJOG papers, this might lead to a more pessimistic assessment of the CTG. He had not looked solely at the CTG but took into account the clinical episodes, of the pursuer's change of position to her right side and the episode of excessive uterine activity.

[119] His report was put to him. Up to 19:56 all was normal. He had concluded that the CTG was pathological at 21:25 and at 22:10. In his interpretation of the CTG between these two points, he had used the peaks as representing the baseline, not the troughs. He accepted that the dip in the FHR at 21:40 was transient and did not represent the FHR baseline.

[120] The NICHD paper, and its requirement that there be a minimum of two minutes' duration before one could say that that was the baseline, was put to Dr Smith. He was not familiar with the NICHD. If the FHR was uncertain, one went back to the previous FHR baseline. This is what the Guidelines suggested, albeit without reference to the requirement for two minutes' duration. Dr Smith accepted that none of the peaks lasted for two minutes. In his view, if the baseline FHR was uncertain, one went back to the last known FHR baseline. Dr Smith accepted that this meant going back to 21:30 and that one could properly interpret the FHR baseline of 120 to 130 bpm. On this approach, he accepted that the baseline was normal up to 22:15. He also accepted, *per* the Guidelines, that if none of the peaks lasted for ten minutes, then this was not a new baseline FHR.

[121] Dr Smith assessed variability as reduced from about 22:12 to about 22:30. It improved thereafter and remained normal until the birth. There was a period of reduced variability but it picked up thereafter. A passage from Professor Murphy's report, about transient reduced variability during a sleep cycle, was put to him. He rejected that that was the explanation here, as he did not see sleep cycles. It was an episode of reduced variability in response to hypoxia. As the excessive uterine contractions ceased, the hypoxic insult disappeared. But the CTG did not return to normal. He rejected the proposition that if variability returned, one could say that these were not atypical variability decelerations. One could not extrapolate like this. He did not accept that the return of variability militated against his interpretation. The variability at the top-line was less than elsewhere on the CTG. He acknowledged that the assessment of variability was subjective. If others assessed the variability as good or did not mention it being reduced, they were wrong. He accepted that there was relative improvement in the variability as the contractions became less frequent and that there were no other periods of excessive uterine activity on the pursuer's CTG.

[122] A later section of the CTG was put to him (c 23:16) showing the FHR enduring for more than two minutes. Dr Smith resisted this, on the basis that it was unlikely for a tachycardic CTG to return to normal. He was questioned about the CTG and the absence of any recording in the lower graph, between about 21:47 and 21:49. Since this showed no contractions, it was not possible to say whether or not this was a deceleration or to class it as early or late (as there was no tracing of a contraction to relate it to). Dr Smith suggested that this was pedantic and that the pattern was of late decelerations.

[123] As to the wider clinical picture, and the additional information available to the midwife (palpitations of the mother, the audible FHR and the digital readings) he accepted that this could supplement the CTG, but he wasn't sure if the midwife had the volume turned up the whole time. He acknowledged that she would be able to hear a deceleration.

[124] Under reference to the Murphy & Turnbull Paper he accepted that it was not well recognised that accelerations mirroring contractions could be a pathological phenomenon. This was not highlighted in the Murphy & Turnbull Paper nor in any of the guidelines, and there was in fact no consensus of medical opinion as to what this pattern might herald. The Guidelines did not state what accelerations in the second stage might herald. They did not state that these should be treated with such suspicion that intervention was mandated. If the CTG was normal in terms of the Guidelines, then it was assumed that it was safe to continue with labour. The conclusion of case 2 in the Murphy & Turnbull Paper had been a baby born and described as "vigorous" within ten minutes of birth, notwithstanding a CTG with florid accelerations. If the CTG were normal at 22:30, there was a reasonable and responsible body of obstetricians that would not have intervened. Dr Smith accepted this, if they were convinced that it was normal and reassuring.

Re-examination of Dr Smith

[125] Mr Milligan clarified with Dr Smith that one would not look at the variability at a peak or trough, as that did not represent the variability at the baseline.

[126] As regards his examination of the CTG when first instructed, Dr Smith explained that it did not take him long to note the two clinical episodes that affected the trace: the change in maternal position (at 21:26) and the excessive uterine activity (from 22:11). He assented to the proposition that if one could not establish a baseline one could not regard the CTG as reassuring. If the baseline were 120 bpm at 22:16 this would have meant that the baseline had dropped from its earlier rate. This would be unusual. He had never seen a pattern such as this in his 27 years of clinical practice. He accepted that in order to adopt the defenders' interpretation one had to accept that these were accelerations synchronised with every contraction, together with a drop in the FHR.

[127] Dr Smith confirmed that his conclusion, as expressed in his report, remained unchanged. Mr Milligan also revisited the issue of whether a reasonable body of opinion could support the defenders' position. Dr Smith stated that he would regard an individual holding that opinion to be incompetent. It was not a logical position. He had identified two clinical events that caused changes to the CTG and which rendered the CTG pathological. If the registrar came to the view that this was an accelerative trace, the alternative should have been considered and to recognise the possibility of fetal compromise. In his view, at 22:30 an ordinarily competent registrar could not be absolutely sure that the CTG was normal.

The pursuer's expert witnesses: Mr Walkingshaw

Mr Walkingshaw's Report

[128] Mr Walkingshaw had been a Consultant Obstetrician for about 23 years, retiring in 2012. He had been involved in national committees, including in relation to clinical

standards. He had published a large number of papers and book chapters and had considerable experience acting as an expert.

[129] He set out the standard definitions of the four features (baseline, variability, accelerations and decelerations) in his Report, although he was challenged in cross on his statement that conventionally three to five minutes were required to establish a baseline rate. He also referred to the Guidelines, being the RCOG's "attempt to unify definitions of reassuring features...and non-reassuring features" and to attempt a system of classification. He stated that the second stage of labour can be a difficult time to interpret the CTG, as decelerations, including variable ones, were common and that early decelerations can become deeper. Such patterns, which might trigger intervention in the first stage of labour, could be tolerated so long as there was progress being made in the labour and the decelerations were brief and followed by a return to the baseline. However, he also stated that "[w]here the pattern changes, either with an increasing baseline, change in variability or an increasingly late component to the decelerations[,] these should be regarded as signs of hypoxia and birth expedited unless imminent". He accepted that there can be technical challenges both in monitoring and interpretation of CTGs, particularly where external monitoring was being used (para 6.5).

[130] In respect of the CTG, in his view, this was normal up to 21:25. Thereafter, in his view, it was pathological from that point until birth. In coming to this view, he identified the following features:

- 1) the "abrupt change in the pattern" of the FHR at 21:25 (see para 5.1), which he later described as "abrupt and spectacular" (at para 7.6). He accepted that between 21:25 and 22:15 the CTG was difficult to interpret, but expressed the view that the FHR was most likely to be 140 bpm, having been 135 to 140 bpm before the maternal change of position. In his view variability was just within

normal, but “appeared different”. In this period, there were recurrent prolonged decelerations, which he characterised as atypical and variable;

- 2) He also identified this as a downward change in the FHR. He said he had never seen a case with an abrupt downward shift in the baseline in late labour (except for a bradycardia). He formed the view that this was a downward shift on the basis that prior to the change in maternal position, the FHR was 135 to 140 bpm. He then referred to the midwife’s notation in the medical notes that after 21:25 the midwife was having difficulty in deciding what the baseline FHR was, and had determined that it was between 115 to 120 bpm: see para 7.3 of his Report. (It should be noted that the assessment of the baseline at 135 to 140 bpm is his own assessment. The notes in the medical records do not record a baseline this high prior to 21:25);
- 3) The five-minute segment, from 22:15 to 22:20, showed another change in the FHR pattern and involved a gradual rise of the baseline FHR to 165 bpm and then to 170 bpm, with recurrent decelerations;
- 4) He also referred to the “sudden appearance of accelerations coincident with contractions that were prolonged in nature”, under reference to the CTG from about 21:40 to 22:00: see para 7.4 of his Report.
- 5) By the time of the registrar’s attendance, at c 22:30, Mr Walkingshaw was of the view that there was another “step change” in the pattern disclosed on the CTG from c 22:20 to 22:30: see para 7.8 of his Report.

[131] In respect of these features, Mr Walkingshaw suggested that there were three possible interpretations. One interpretation was that there was an inadvertent recording of the maternal heart rate. (There is no evidence for this in this case. No other expert has

suggested this and this was not pursued in evidence.) The other two interpretations are as follows:-

- 1) The baseline FHR was normal (110 rising to 140 bpm); variability was normal (which Mr Walkingshaw said it was, until 22:15) and there were marked accelerations.
- 2) The change in maternal position altered the FHR. While the baseline remained at 135 to 140 bpm, decelerations “likely caused by cord compression from the relative change in the relationship of the cord, pelvis and fetus, began” see: paragraph 7.13 of his report. These decelerations persisted and were prolonged. In his view, just before the registrar’s review, the baseline FHR had increased to a tachycardia, “usually an ominous sign that fetal hypoxia was likely”.

[132] Mr Walkingshaw believed the second interpretation was the correct one. In relation to interpretation (1), Mr Walkingshaw commented that the registrar would have had to reconcile the following:

- 1) a lowering of the baseline FHR in the second stage of labour (which was unusual),
- 2) two abrupt alterations to the pattern of the FHR, and
- 3) the odd appearances of accelerations and their change in appearance, coincident with maternal effort, when the opposite was usually the case.

In addition, the registrar would have needed to factor in how imminent birth was and how easily an operative birth could have been achieved. As he put it, if the registrar “considered the trace pathological and it was not the consequences would have been an unnecessary fairly easy forceps or ventouse birth with few risks but not risk free, particularly to the woman. If [the registrar] considered it normal but it was not then the consequences of

prolongation of fetal distress and hypoxia with possible catastrophic consequences”:

paragraph 7.14.

[133] He accepted that the CTG was “not a straightforward trace” until the second change, at around 22:15, but it was capable of logical analysis. However, from 22:15 he stated that:

“7.16 In my view no ordinarily competent registrar should have been reassured by the trace at 22:30. Unequivocally interpreting the trace as reassuring was not a reasonable interpretation. Operative birth or preparing for operative birth whilst active pushing continued was a straightforward option and in my view the only competent option.

7.17 It is my opinion that the registrar should have expedited birth at 22:33. The head was on the perineum at this point and birth should have been easily achieved either by episiotomy or lift out forceps.”

At paragraph 7.19 he also criticises the prolonged second stage of labour thereafter, but no case is made on record about this.

Mr Walkingshaw’s examination in chief

[134] In terms of his experience, Mr Walkingshaw had produced several hundreds of reports in his career, in a ratio of about 60/40 for claimants and defendants. Mr Milligan was brief in examination in chief. He put a series of propositions to Mr Walkingshaw, which Mr Walkingshaw accepted, with some minor qualifications or corrections. These were generally reflected in Mr Walkingshaw’s report, so I do not record this evidence.

Cross examination of Mr Walkingshaw

[135] In terms of experience, Mr Walkingshaw had retired from medical practice in December 2012. He had done some teaching. He read the professional literature.

[136] Mr Walkingshaw’s position in his report was that the CTG was normal up to 21:26 and pathological thereafter. Mr Ferguson’s first topic was variability. In that part of his report dealing with the CTG from 21:25 to 22:15, Mr Walkingshaw had described variability

(at paragraph 5.2) as “just” within normal. Mr Walkingshaw pointed out that the rest of the sentence was that it “appears different”. He explained that to him variability appeared less variable than the part immediately preceding it, and for the remainder of the CTG. There was a reduction of the variability but it was within the normal range.

[137] In his report he had posited three interpretations: coinciding with the pursuer’s and defenders’ interpretations, and the third was an inadvertent recording of the maternal heart rate (“MHR”). The latter was discounted in this case. He did not accept that the two remaining interpretations were “legitimate” alternatives. The defenders’ interpretation was an incorrect one. Mr Walkingshaw accepted that the change in maternal position at 21:26 provided a reasonable explanation for the change in the FHR. He didn’t accept that the onset of expulsive contractions (at 22:10) provided an explanation for the second change in the pattern of the CTG. That would not normally occur, albeit it might be an explanation. He agreed that there was brief loss of contact in the lower graph (showing the maternal trace) between 22:14 and 22:16.

[138] Turning to the issue of the baseline for the FHR, Mr Walkingshaw accepted that the dip of the FHR below 100 bpm was transient. In relation to the CTG from 21:26 to 22:10, Mr Walkingshaw’s view was that at no point was the FHR baseline capable of determination. (He accepted that it was critical to determine the baseline before one could identify movements as accelerations or decelerations.) At no point during this part of the CTG was the FHR stable for three minutes or more. It was not permissible to add together disparate 30-second windows, as Professor Murphy appeared to have done. If one could not ascertain a baseline FHR, the conventional approach was to revert to the last known one. In this case, that was the baseline FHR of c 135 to 140 bpm prior to 21:25. He did not accept Professor Murphy’s position, that the baseline FHR from 21:25 could be ascribed to 120 bpm.

She appears to have selected a new baseline FHR. This was her primary error. Even if that were the baseline, the occurrence of accelerations was odd.

[139] Turning to the question of what approach Mr Walkingshaw took when he was first instructed, he explained that he had been sent the medical notes and the CTG. He began by reading the medical notes in order to understand what went on and what the clinical staff thought. In terms of the wider clinical picture, he would check the CTG when these appeared. From the medical notes, there were no concerns. The pursuer was a young primigravida. There had been anxiety about the fetal size but that had been dispelled. After reading the medical notes, he would spread the CTG onto a table. At this point, he did not review the whole CTG. He tried to mimic what a midwife or registrar at the time would have done. For that reason, he did not seek an overview before he started. He would roll up the CTG. He would determine whether or not the CTG presented to him was a normal CTG within about 15 minutes. If he thought something was wrong he would go back and analyse it. In this case, there was an abrupt change and an alteration to the pattern. This was unusual. This process of analysis took not less than an hour and he had looked at it dozens of times since. He accepted that this was not the same as the registrar.

[140] Mr Walkingshaw also accepted the propositions that there was considerable inter-observer variation in the interpretation of CTGs and also that they had a very high false positive rate. In relation to the issue of any predisposition based on knowledge of the adverse outcome, he accepted that his working assumption when asked to review the CTG was that something had gone wrong. Baby B had required resuscitation and was acidotic. This had not influenced his interpretation. He was aware of the BJOG papers (and others); he had been an editor of the journal. He did not dispute that those involved in medical-legal cases were aware of this effect. To avoid the trap of a retrospective interpretation he had looked at the CTG as it would have appeared to a clinician. Although he knew there was an

adverse outcome, he did not initially look at the CTG to see what happened next. He rejected Professor Murphy's observation that he saw what he expected to see rather than what was there.

[141] Mr Walkingshaw had looked at the CTG for two purposes: causation and negligence. For the purposes of the latter examination, he did not find this difficult. It was such a normal trace and there was such an abrupt change in pattern. It was so unusual that he had never seen it before. As he went through the CTG the first few times, he kept wondering why no one had called the registrar. Something had changed dramatically. Rarely would one have such an abrupt change without an obvious cause. The only change in his thinking, on subsequent reviews of the CTG, was to consider how long it would be reasonable for the midwife to take before she asked for help. This was always difficult in real time. In his view this was five to ten or 15 minutes, which was generous. There was no clinical note so he did not know what the registrar was thinking but, in his view, it was a fetal trace that was so clearly abnormal it compelled the question: what's gone on? He had no difficulty at the time thinking that different action should have been taken.

[142] Under reference to the Guidelines, Mr Walkingshaw agreed that determination of the baseline was critical. He was pressed as to the source of his statement that one needed a stable FHR for three to five minutes to establish the baseline. He wasn't sure. In his report he had transcribed the Guidelines. Maybe this came from the NICE guidelines of 2007. In relation to the NICHD paper, these guidelines were different from those in the UK. He accepted that this was a nomenclature and a method to determine an indeterminate baseline; he did dispute that this was the way it was done in the UK. He did not agree that the NICHD paper offered a way to interpret the CTG objectively and avoid being influenced by knowledge of the outcome. For the purposes of practice in the UK, he accepted that one

needed a minimum of two minutes to establish a baseline and persistence for ten minutes to constitute a new baseline.

[143] He was asked about Professor Murphy's 2nd Report. He accepted that if the CTG had been interpreted as normal, then her description of the clinical pathway, of expectant management and spontaneous vaginal delivery, was appropriate. In relation to Professor Murphy's comment that the baseline FHR between 23:16 and 23:21 was "very clear", Mr Walkingshaw disagreed. Professor Murphy had appeared to add two different segments together. If one looked for a minimum two-minute segment, or a sustained change for ten minutes (to say that here had been a change in the baseline FHR) it was equally difficult to do this for this part of the CTG. In her description of scenario 1 (of a normal baseline with accelerations) at page 16, he believed she had already made up her mind in her description of the movement as an acceleration. Her first scenario was not a logical or reasonable or competent interpretation. He did not accept that his own interpretation (of pathological tachycardia) was achieved retrospectively.

[144] On the topic of variability, Mr Walkingshaw accepted that generally one might expect variability to be absent in a deceleration from a high baseline, but this was not always the case. If variability was absent this was more concerning but its presence was not reassuring. Variability was, in his view, a neutral factor.

[145] Turning to consider in detail the CTG from 21:40 to 22:00, Mr Walkingshaw did not accept Professor Murphy's observation (at para 4.31 of her 2nd Report) that the baseline FHR was 130 bpm. He did not understand where she got this figure. There was simply no window during that period where there was a two - minute period of stability. Nor was any peak of this length. In the event of an indeterminate baseline, the conventional approach was to return to the previous baseline. One didn't make it up. Professor Murphy was wrong in her identification of a baseline of 120 bpm at this point, even on the application of

the American (ie the NICHD) criteria. Mr Walkingshaw accepted that in this same time frame there was no peak of 3 minutes' duration. The correct approach was to go back to the last stable baseline FHR, that was, before 21:25. That disclosed a fairly clear baseline FHR of 130 to 135 bpm. If one used this baseline, then the peaks shown between 21:26 and 22:00 were peaks. The CTG became tachycardic at 22:00, when the FHR exceeded 160 bpm. In the period from 22:10 to 22:15 the baseline was at the peaks. He also disagreed with Professor Murphy's observation that the decelerations between 21:26 to 22:00 were transitory. In his view, they were recurrent and prolonged. That rendered the CTG pathological. The recovery of the FHR to baseline was not for any length of time. The baby's heart rate was not getting back to the baseline for any length of time.

[146] He was questioned about the midwife's recordings in the medical notes that the baseline was 115 to 120 bpm. He could understand how the midwife had reached this view, although in his view it was wrong. He could not understand how Professor Murphy could identify the baseline at 130 bpm for any of this period. There was no period when it was at 130 bpm, even for one minute. In his view, at 22:00 the baseline FHR was still c 135- 140 bpm but it was rising. By 22:30 the baseline was at 165 bpm. Between 22:15 and 22:30, while there was no duration at a peak for two, three or five minutes, it was above 135 to 140 bpm. One did not break the CTG down didactically into segments.

[147] He justified his interpretation of a higher baseline on the basis that from 22:00 there was a progression with an appearance he recognised from seeing other traces. Any clinician would have seen that what was being shown was compressive cord progression, a rising baseline with classic decelerations and very little recovery to the baseline. This is what preceded baby cardiac collapse.

[148] In terms of the two changes he had identified, he accepted that after the first event (of maternal change in position) the CTG showed a trace that the literature subsequently

recognised as one of inadvertent recording of the maternal heart rate. But the second change, from 22:15 was a recognisable pathological fetal trace. What the registrar should have done was to examine the whole of the CTG. It was normal until the change of maternal position at 21:25. This led to an abrupt change of pattern with no new baseline. So she should have assumed that the baseline had not altered. This meant there was a period of frequent accelerations. By the time she was called the CTG had progressed because of the degree of cord compression. He rejected the interpretation of these as accelerations coincident with contractions, as referred to in the Murphy & Turnbull Paper. The CTG here did not resemble that in the Murphy & Turnbull Paper. He did not accept Professor Murphy's statement that the baseline remained the same between 22:00 and 22:30 or that it was not likely that variability could remain good in an otherwise pathological trace. When a fetus was acidotic, it would be unable to achieve its baseline for anything like two minutes. She said that what this CTG showed was recovery for maybe 30 seconds before the FHR went down. It was not necessarily the case that the decelerations lengthened and deepened. There was no absolute rule and the fact that they did not could not provide reassurance. Tachycardia started at 22:20, as the peaks were by then 175 bpm. It remained tachycardic until birth. He did not accept Professor Murphy's interpretation, eg at 21:46, that these were accelerations mirroring contractions.

[149] Mr Ferguson put a series of questions about the additional information (eg the digital readings of the FHR and the audible transmission of it over a speaker), available to the midwife, on the premise that she was in a more advantageous position. While he accepted that these were additional source of information, they did not provide a better indication than the CTG. He doubted whether the midwife could have detected a noticeable increase to 175 bpm if she assumed that the baseline was at 130 to 140 bpm. He rejected the suggestion that she could hear and detect changes in the baseline. She was not in a better

position to detect the baseline. We had the information about the contractions (on the lower graph of the CTG).

[150] In her 1st Report Professor Murphy had analysed an earlier portion of the trace from 16:30 to 16:50. Professor Murphy had described this as illustrating three pronounced contractions mirroring accelerations. Mr Walkingshaw did not accept that this was correct, because there were also non-synchronous accelerations. Rather, in his view, this showed what a completely normal trace looked like: some accelerations were in sync with contractions, others were not. There might be the odd little deceleration that sometimes comes with a normal CTG. By contrast, if one compared these earlier parts with that under consideration, one had bizarre-looking excursions. He struggled to find a polite word, but what Professor Murphy had done was “nonsense”. She was trying to fit something that did not fit. It was “contrived” and her reference to these earlier parts of the CTG did not support her hypothesis in any shape or form. One could not interpret the end part of the CTG in the way that she had done. Professor Murphy was wrong.

[151] In relation to the Murphy & Turnbull Paper, Mr Walkingshaw did not agree with the suggestion that there was nothing in it to suggest a criticism, eg of care provided in case 2 in that paper, of interpreting repetitive accelerations as reassuring or for allowing the labour to continue. His own view was that the recording might have been an inadvertent recording of the MHR, which had passed everyone by in the 1980s, at the time of this paper. He disagreed with an interpretation of the Murphy & Turnbull Paper as not warning clinicians that this kind of pattern could herald an adverse outcome. It gave a warning that this could be continuous cord compression. He did not interpret this paper as giving an “ok” to this pattern.

[152] Lastly, Mr Ferguson turned to the Guidelines. Mr Walkingshaw readily accepted that there was nothing in them to provide a red flag for this pattern or to require

intervention in the event of such a pattern. While it provided guidance as to when to intervene, it was not a “recipe”. If an interpretation was that the CTG was normal, then he accepted that the algorithm directed no intervention, but that interpretation had to be logical, reasonable and competent. The CTG was, in his view, pathological. On the assumption the CTG was normal, then he accepted that some doctors would intervene and others would not, depending on how well the mother was coping.

Re-examination

[153] Some minor points were put to Mr Walkingshaw to clarify (eg to explain variability and the preference for the mother to lie on the left side).

- 1) He confirmed that it had not taken him long, on his first examination, to spot the abnormality of this CTG. It was instantaneous; it changed so quickly. He did not need to agonise. In his view, no one could look at this CTG and say it was normal or unequivocally reassuring. He confirmed that he had done hundreds of medical-legal reports for court cases. He was aware of the need to guard against a retrospective interpretation. He had examined upwards of 10,000 CTGs. He had never seen a CTG like this before.
- 2) In the event that a CTG was no more than suspicious, he would expect the mother to be observed for a time even in the second stage of labour.
- 3) He reiterated his view that there was no settled or determinate baseline FHR between 21:26 and 22:20. He confirmed that, in his view, variability was not always reassuring. One could have adverse outcomes where there was good variability and also the reverse.
- 4) One would not be able to hear audibly something that wasn't recorded on the CTG.

- 5) He did not regard Professor Murphy's "case A" CTG (in her 2nd Report) to be comparable to the CTG in this case. In the former, the accelerations had differing timings in relation to the contractions; some were coincident others were not. There were variable decelerations, some with contractions and some not. It was the usual type of second stage CTG where accelerations were sprinkled around with a few decelerations. This was a normal CTG.
- 6) He did not regard the Murphy & Turnbull Paper as reassuring. That was the whole point of its publication.
- 7) It remained his view that no ordinarily competent registrar exercising ordinary skill and care would have interpreted the CTG as not pathological.

Defenders' expert: Professor Murphy

[154] Professor Murphy had been a Consultant Obstetrician for about 17 years. Her current positions included being the Head Clinician for the Labour Ward, at the University Hospital in Dublin, and Professor of Obstetrics and Head of the Department at Trinity College, Dublin. She had been chairman of the Guideline and Audit Committee of the RCOG from 2004 to 2007. She had published extensively.

[155] Professor Murphy provided two reports. Professor Murphy's 1st Report introduced the reference to the NICHD standardised nomenclature, in order to allow more detailed description of the component features of a CTG. The NICHD paper is otherwise consistent with the Guidelines. She also analysed the CTG by sections and provided her view. In her second report she responded to the pursuers' expert reports and also provided three case studies of accelerations in the second-stage of labour. (Case A, case B and case C. Case C was the pursuer's CTG.)

Professor Murphy's 1st Report

[156] In relation to the CTG trace, in Professor Murphy's view up to 20:20 the CTG was normal. Her comment on sections thereafter were as follows:-

- 1) *20:50 to 21:00*: In the period from 20:50 to 21:00 she noted that there was a "short sharp deceleration during the vaginal examination", but this was followed by an acceleration, a normal baseline FHR of 125 bpm as before and good variability.
- 2) *21:00 to 21:30*: For the period from 21:00 to 21:20 she noted contractions at the rate of 4-5 in 10, good variability and the baseline FHR of 135 to 140 bpm. There were acceleration, not decelerations. She noted a deceleration just before 21:30, "coinciding with a change in maternal position" to the right side. However, the FHR "recovers to 140 bpm": paragraph 5.5.
- 3) *21:30 to 22:00*: This section of the CTG showed contractions at the rate of 4 in 10. The baseline FHR was 120 bpm with good variability. There were regular accelerations lasting 60 seconds or more and which appeared to coincide with the peak of the contraction. This was highlighted by the two arrows drawn from the peak of a contraction to the peak of the acceleration just after 21:50. There were no accelerations. The CTG continued in this fashion until 22:15. Professor Murphy commented on this section as "very accelerative" but one that "should be interpreted as normal". She also stated that this type of recording is often seen in response to fetal movement.
- 4) *22:10 to 22:30*: Professor Murphy described this section of the CTG as showing a marked increase in uterine activity with contractions at a rate of approximately 6 in 10. She inferred that this was likely to reflect rapid progress and the onset of the second stage of labour, which was reinforced by the notation that the vertex was visible. Between 22:10 and 22:20 she stated that the baseline FHR continued

at 120 bpm and that there were marked accelerations coinciding with the contractions. There were no obvious decelerations. She noted that the peak of the acceleration was recorded during pushing (this was the midwife's notation on the CTG). Professor Murphy's comments on this section of the CTG were, first, that if the uterine activity persisted it would constitute uterine hyperstimulation. (There was no suggestion in the evidence that any other section of the CTG before or after this point disclosed another passage of such activity.) Secondly, she noted that the CTG appeared "very accelerative" and had an unusual appearance. Notwithstanding this, in keeping with the standard nomenclature and the classification systems. The CTG would be classified as normal. This was specifically because there was a normal baseline, normal variability, accelerations and no decelerations.

- 5) 22:30 to 23:00: In respect of the next section of the CTG, Professor Murphy noted that the uterine activity had settled to a regular rate of 5 in 10; the baseline FHR was clearly recorded at a rate of 130 to 145 bpm with good variability of at least 5 to 10 bpm. Accelerations continued to occur with each contraction, but there was a clear return to normal baseline and no decelerations. Her comment was that the CTG continued to be very accelerative but otherwise normal.

Professor Murphy's comments on the interpretation of the CTG

[157] At section 8 of Professor Murphy's 1st Report, she dealt with the interpretation of the CTG by the registrar. She began by noting that it was important not to be unduly influenced by knowledge of the outcome. Accordingly, the safest approach was to read and interpret the CTG using standard nomenclature and classification systems. She approached this task

by putting the known outcome to the back of her mind and interpreting it in her usual manner of her normal daily practice.

[158] She noted that the midwife made appropriate entries in the medical notes relative to the four features by which CTGs are categorised. She observed that it was apparent from 16:20 to 16:30 that the accelerations were contemporaneous with the contractions. The midwife was careful to note the exact FHR every three to four minutes, after the contractions. Professor Murphy noted that the CTG settled down and that during the last half hour of the CTG (ie from about 23:00 to delivery) the baseline FHR was much cleaner and continued at a normal rate. Normal variability continued, as did the accelerations. There were no decelerations. Her conclusion was that the CTG was interpreted as she would have interpreted it. She also believed that most clinicians would have interpreted it this way if blinded to neonatal outcome.

[159] In relation to the critical question of whether the registrar responded appropriately to the request for a review, in her opinion she did. She observed that the registrar was very busy that night- though she was challenged in cross on this. Accelerations were not a typical finding in late labour and the midwife had sought reassurance about the interpretation of the CTG. At that time it was noted that the pursuer was fully dilated and that the vertex was visible at the perineum. While ideally the registrar should have recorded her assessment and the management plan, this had not been done. However, in the context of a busy ward, it was acceptable to sign the CTG and to rely on the midwife to document what had been discussed. This had been done here. The registrar's conduct was acceptable.

Her conclusion stated:

“9.6.iii One could argue that any CTG that appears unusual, as in this case, warrants intervention by fetal blood sampling or operative delivery. It is well recognised that the use of CTG has increased rates of intervention, particularly caesarean section, without evidence of benefit. The role of FBS as a gold standard has also been questioned. (ref 910) ACOG guidance recommends scalp stimulation ‘which is less

invasive and provides similar information about the likelihood of fetal acidaemia as does fetal scalp pH'. (ref 8) In this case there were frequent accelerations, which would be interpreted as a positive and reassuring response to fetal scalp stimulation or FBS. It is my view that there was no indication to perform an FBS given the normal baseline, good variability and accelerations (that had been present since 16.20). It is also my view that a decision to proceed to a vacuum or forceps delivery at 22.30 when the registrar attended to review the CTG would have been an excessive response, given the reassuring features of the CTG and the good progress that was being made, with anticipation of a timely spontaneous vaginal delivery. "

Professor Murphy's 2nd Report

[160] By the time of Professor Murphy's 2nd Report, the reports from Consultant Obstetricians Dr Smith, Dr Hanretty and Mr Walkingshaw had been produced. In her 2nd Report Professor Murphy presented three similar CTGs, and which included the one at issue in this case (as "case C"). The point was to demonstrate that other cases with late accelerations did not lead to adverse neonatal outcomes.

[161] In respect of the CTG, she identified four possible interpretations. This included the suggestion of inadvertent recording of the maternal heart rate, but she discounted this as unsupported by the evidence. The three remaining possible interpretations were as follows:

- 1) A normal baseline FHR with periodic accelerations and good variability;
- 2) Baseline fetal tachycardia with late decelerations; and
- 3) An indeterminate baseline FHR with accelerations and decelerations.

[162] Before turning to these, Professor Murphy noted that the Guidelines were less prescriptive as to the definition of baseline FHR and accelerations than the NICHD nomenclature, especially when the baseline was indeterminate.

[163] A baseline FHR was the average FHR rounded to increments of 5 bpm during a ten-minute segment, excluding periodic or episodic changes, periods of marked variability or baseline segments that differ by more than 25 bpm (normal is 110 to 160). She also stated that the minimum baseline duration must be at least two minutes or else the baseline was

considered indeterminate. The three case studies all had intervals of at least two minutes' duration within a ten-minute period that allowed the baseline to be defined. In case C, which was the pursuer's CTG, she stated that the FHR was clearly determined at a rate of 130 to 140 bpm, particularly in the last 20 minutes of labour.

[164] In relation to accelerations, these were defined as an apparent abrupt increase in the FHR above the baseline, with the time from the onset of the acceleration to its acme of less than 30 seconds. The peak was 15 bpm more above the baseline, the acceleration lasted for 15 seconds or more, but for less than two minutes from the onset to the return of the previously determined baseline. A prolonged acceleration was two minutes or longer but less than 10 minutes. An acceleration lasting longer than ten minutes was a change in the baseline.

[165] The three cases she considered in her 2nd Report had accelerations that were abrupt and lasted less than two minutes. The only case with an acceleration lasting longer than two minutes was in case B, where it appeared to continue into a tachycardia immediately prior to delivery. The baby in that case was normal. In case C, being the pursuer's trace, none of the accelerations in the last hour lasted more than one minute. There were no accelerations lasting more than ten minutes constituting a change of baseline to fetal tachycardia.

[166] She then considered the three interpretations (ie other than that of an inadvertent recording of the MHR: see para [165], above). The first was that the CTG at the material time was a normal baseline with accelerations:

"4.2 Interpretation – Normal baseline with accelerations

Based on the criteria described above both myself and Prof Sir Alex Turnbull, two very experienced obstetricians with a research interest in intrapartum care, have described the CTGs presented in terms of a normal baseline heart rate and periodic accelerations. Prof Turnbull did not criticise the staff for their interpretation of the CTG in case B; he merely highlighted the possibility that

periodic accelerations in late labour could represent cord compression, resulting in respiratory acidosis and the need for early resuscitation of the neonate with an anticipated good outcome. In all three cases the midwives interpreted the features as a normal baseline with accelerations and therefore normal or reassuring. In case C, the midwife recognised that the baseline was initially difficult to determine and that the accelerations were coinciding with contractions (marked clearly with arrows on the trace and with specific recording of the FHR immediately after a contraction when the woman was actively pushing). She sought a second opinion from the on-call registrar who was happy to sign the CTG and allow the labour to continue. In Case A managed on my own labour ward, the midwife was reassured by the presence of accelerations and interpreted the CTG as normal, or no more than suspicious based on the occasional decelerations."

[167] Her discussion of the interpretation of the pursuer's interpretation of the CTG was as follows:

"4.3 Fetal tachycardia with decelerations

Several expert reports have expressed a clear view that the CTG in the [pursuer's] case represents a fetal tachycardia with late/prolonged decelerations and that it should have been classified as a pathological CTG, warranting emergency operative delivery and that delivery would have occurred sooner as a result. The detailed explanation in the NICHD guideline on how baseline heart rate and accelerations are defined does not support this interpretation, neither does the interpretation of this and similar CTGs by myself (Case A) and Prof Sir Alexander Turnbull (Case B) – several of the obstetricians cite the textbook by Gibb & Arulkumaran who presented a similar CTG (Fig 11.18) which was described in terms of a change from decelerations to one of accelerations with contractions. The explanation for this marked change was erroneous recording of the maternal heart rate. Prof Sir Arulkumaran went on to challenge his own hypothesis in a more recent publication that confirms this unusual pattern to be fetal in origin (Examples 1 and 2). Dr Steve Walkingshaw at least acknowledges that an alternative interpretation is possible but he does not adequately justify why the CTG should have been interpreted as unequivocally pathological. He states that the CTG allows logical analysis and recognises that he is applying this process retrospectively with knowledge of the outcome. However, neither he nor the other obstetricians appear to accept that this could in fact be a very unusual CTG with the complete inverse of what one expects to see in hypoxia.

4.3.i Between 21.40 and 22.00 the baseline is varying and more difficult to interpret, however there are intervals exceeding 2 minutes duration within a 10 minute period that allow a baseline of approximately 130bpm to be defined. In contrast the high periods of 140-150bpm are transitory lasting less than 1 minute and are more accurately defined as accelerations. At 21.50 the midwife highlights the association between periodic rises in the FHR coinciding with contractions. Of note there is normal variability 5-10bpm throughout which is a very reassuring feature.

4.3.ii Between 22.00 and 22.30 the baseline is easier to define with intervals of 120-130bpm and periodic accelerations to 160-170bpm which are abrupt in start and finish and last less than 1 minute. Again, they coincide with contractions and normal variability is maintained. [The pursuer] is now in the second stage of labour actively pushing with the vertex visible and the CTG is signed and annotated by the registrar. The same pattern continues between 22.30 and 23.00 with a baseline of 140bpm and periodic accelerations. Each acceleration is of barely 1 minute duration (1 cm, 2 small boxes) and the baseline intervals are longer with some sections greater than 2 minutes duration. Normal variability is maintained which would be very unusual for a pathological CTG of more than 1 hour duration. The accelerative phase coincides with each contraction and stops abruptly. A tachycardic CTG with decelerations would have a baseline tachycardia present for at least two minutes duration between the contractions (in order to define the baseline) and the decelerations would occur during some part of the contractions. In this CTG there is no baseline tachycardia between the contractions, and the lower heart rate recording occurs immediately after the contraction.

4.3.iii The fetal heart rate baseline is much easier to define in the final 30 minutes of recording as marked on my copy above (Case C) with a clearly defined baseline of 130bpm, ongoing accelerations during contractions/pushing and normal variability. The CTG recording between 22.10 and 22.30 is almost identical to the recording between 23.10 and 23.27, if anything the later CTG appears more normal. A pathological CTG that persists for two hours typically shows progressive deterioration with loss of variability and ultimately either a sustained tachycardia or a bradycardia. In this case the CTG is largely unchanged in the two intervals an hour apart, normal variability is maintained, and the fetal heart rate never falls below 120bpm.

4.3.iv When an adverse perinatal outcome occurs, obstetricians return to the CTG to try to interpret it in the context of the neonatal condition and the cord blood results. In this case the retrospective interpretation has been that the CTG must have represented a fetal tachycardia with decelerations (albeit unrecognised) as this is a pattern of CTG that obstetricians are familiar with in association with poor condition of the baby at birth. The reverse phenomenon in this case of a normal baseline heart rate, marked periodic accelerations with contractions, and normal variability right up until the moment of birth is not a pattern that is readily recognisable as hypoxic to the average midwife or obstetrician, or indeed to most of the experts who have provided opinions on the case. The obstetricians are seeing what they would expect to see rather than what is actually in front of them.

In summary, using standard classification criteria (applied logically as suggested by Dr Walkingshaw) the interpretation of the final two hours of CTG is not consistent with a baseline fetal tachycardia and late decelerations. In addition the experts who have expressed this opinion have not justified precisely how they have made this interpretation, why there is no baseline tachycardia demonstrated at any time between the contractions, and why normal baseline variability was maintained throughout."

[168] Professor Murphy's comments on the interpretation of the FHR as indeterminate

were as follows:

"4.4 Indeterminate baseline with accelerations/decelerations

Some of the experts have stated that the CTG from 22.30 onwards was difficult to interpret or that the baseline heart rate was indeterminate and as such should have been considered abnormal or pathological. I have addressed this possibility in my previous report of 15 March 2016.

4.4.i An indeterminate baseline heart rate is one where there is no consistent recording of at least 2 minutes duration in a 10 minute interval excluding periodic accelerations or decelerations. It is certainly the case that the baseline varies or wanders between 21.30 and 21.40 but it is relatively easy to define between 21.40 and 22.00. The midwife observes the CTG closely and notes with arrows the timing of the accelerations. While initially confusing or indeterminate, it is my view that the baseline can be defined without difficulty between 21.40 and 22.10. It is a normal baseline heart rate.

4.4.ii The midwife examines the patient shortly following this and then asks the registrar to attend and review the CTG in order to secure a second opinion. The vaginal examination is performed at 22.15 and this coincides with a further accelerative phase which is usually interpreted as a positive or healthy feature in response to fetal scalp stimulation. In the US this would be the preferred test of fetal well-being rather than a fetal blood sample (FBS). Full dilation was confirmed by the midwife with the vertex 1cm below the spines in an optimal position. Active pushing was commenced at 22.20 and from this point forward we have a second stage CTG with active pushing. Second stage CTGs are more difficult to interpret due to expulsive contractions and maternal pushing efforts. The contractions are clearly recorded and the accelerations occur with each contraction reverting to a lower (normal) heart rate before and after each contraction, as before. The baseline heart rate between the contractions is predominantly 140bpm for the remainder of the CTG. It is not indeterminate and is particularly clear in the last 30 minutes of recording. The obstetric registrar is happy to sign off on the CTG anticipating a spontaneous vaginal delivery.

In summary, it is my view that the CTG has an unusual appearance for the late first and second stage of labour. The presence of accelerations with contractions in the second stage of labour is uncommon. The baseline heart rate, however, is relatively easy to define. The midwife paid close attention to the timing of the contractions and accelerations. She questioned her own interpretation of the CTG and sought a second opinion from the registrar who expressed no concerns and confirmed that the vertex was visible. Having confirmed that the CTG was normal, reassuring or no more than suspicious, the midwife continued to manage the patient in a standard way for a nulliparous woman who was showing steady progress with pushing. In addition to annotating the CTG, she noted the normal fetal heart rate immediately after each contraction in the hand written records. She proceeded to cut an episiotomy after an hour of pushing when progress was arrested by a tight perineum. Spontaneous vaginal delivery was achieved

7 minutes later. Neither the midwife nor the registrar considered that this might be a very unusual CTG pattern with a reversal of the usual features of hypoxia. This is not surprising given that such a pattern is not highlighted in standard teaching materials or practice guidelines, nor has it been recognised as such by most of the experts who have expressed an opinion on this case.”

[169] Her comments on the standard of care and her conclusion in respect of the standard of care were as follows:

“5. Standard of care

5.1 [Baby B] was born in poor condition with low Apgar scores and acidotic paired cord blood results. [Baby B] required resuscitation, intubation and ventilation. [Baby B] developed seizures and renal impairment. [Baby B] has been diagnosed with microcephaly, epilepsy, developmental delay and four-limbed spastic cerebral palsy.

5.2 I do not agree with the experts who state that there was a two hour interval of pathological CTG that should and could have been recognised by the staff nor do I agree that there was a clearly identifiable sentinel event at any point in the second stage of labour. I do not believe that the condition of the neonate at birth could have been anticipated.

5.3 Unfortunately in this case there was a very unusual but not entirely unknown CTG pattern with a reverse of the usual features of hypoxia. Instead of a rising baseline or tachycardia, later decelerations or bradycardia, and reduced or absent variability, there was a CTG with a normal baseline heart rate, marked accelerations with each contraction and ongoing normal variability. Any midwife or obstetrician of ordinary skill and competence was entitled to interpret these features as normal, reassuring or no more than suspicious. As can be seen from the discussion in sections 3) and 4) above, even experienced obstetricians struggle to interpret this type of CTG in a consistent manner.

5.4 The next question that arises is why does this happen, why is it not more common, and why is it not recognised and highlighted in practice guidelines. Currently we have no animal or human model as yet that precisely replicates what happens during labour in response to the very variable dynamic of contraction strength and frequency, length of the first and second stages of labour, interventions such as oxytocin and epidural, and most importantly the fetal and placental reserve at the outset of labour. I share the view of others however, that on a physiological basis, the marked accelerations during contractions are likely to reflect either cord compression or reduced placental perfusion or central effects to the fetus as it is pushed further down the birth canal. The reason why this pattern of compromise is not highlighted in guidelines is that it is uncommon and poorly understood and therefore not amenable to precise recommendations.

6. Conclusions

[Baby B] is likely to have sustained significant cerebral injury in the peripartum period that has resulted in [Baby B’s] disabilities. It has been suggested by several

experts that the intrapartum CTG was unequivocally pathological in the final two hours of labour and that delivery should have been expedited earlier. The cerebral damage has been attributed to this time period. It is my opinion that the CTG was unusual but technically the features entitled the midwife and obstetrician to interpret it as normal, or not more than suspicious. There are likely to be some midwives and obstetricians who would have been uncertain or concerned about the CTG, and in such circumstances, had they made the decision to deliver by vacuum or forceps this would be entirely justified. We will never know what the outcome might have been in those circumstances. Equally, there are likely to be obstetricians and midwives who would have interpreted the CTG as no more than suspicious, particularly where a second opinion confirmed the interpretation, and in such circumstances, had they made the decision to aim for a spontaneous vaginal delivery this would also be justified. I am not at all convinced that I would have taken the interventionist route if interpreting this CTG as a junior registrar, and consider it entirely possible that I may have opted for expectancy with the vertex visible near the perineum. On that basis, I do not consider the care [the pursuer] received in labour to be negligent, although clearly the outcome is highly regrettable.”

[170] Her assessment was that the vaginal examination at 22:15 coincided with a further accelerative phase. This would normally be interpreted as healthy in response to fetal stimulation and, indeed in the US, this was the preferred test of fetal wellbeing rather than a FBS. Active pushing commenced from 22:20. Second-stage CTGs were more difficult to interpret because of the effect of expulsive contractions and maternal pushing efforts. Here the contractions were carefully recorded as were the FHR before and after each contraction. The baseline FHR remained at 140 bpm for the remainder of the CTG.

[171] Her critical conclusion was that the CTG had an unusual appearance. The presence of accelerations in the second stage was uncommon. The baseline FHR was relatively easy to define. After review, the decision of the attending clinicians was that the CTG was reassuring or no more than suspicious. The management thereafter was consistent with that. She noted that neither the midwife nor the registrar considered that this might be a very unusual CTG pattern with a reversal of the usual features of hypoxia. This was not surprising given that, as Professor Murphy observed, “such a pattern is not highlighted in the standard teaching materials or practice guidelines, nor has it been recognised as such by most of the experts who expressed an opinion this case”: para 4. 4.ii of her 2nd Report.

Professor Murphy's Examination in chief

[172] After questions about her experience, Mr Ferguson asked Professor Murphy about her description of the CTG for the period from 22:10 to 22:30 as "very accelerative" and with "an unusual appearance". She confirmed that, in her opinion, this description would be one held not just by her but by a reasonable body of obstetricians, but she also accepted that a reasonable body of obstetricians would also find this unusual. It was a little unusual to see the number of accelerations on this portion of the CTG.

[173] She explained that she had used the NICHD terminology, notwithstanding that it post-dated the date of Baby B's birth, because in her view it offered greater precision in the ability to describe a CTG. All of the guidance, whether NICHD or the Guidelines in force at the time, referred to the same four components (baseline, variability, accelerations and decelerations). She used the NICHD to supplement her discussion of the case.

[174] Under reference to the CTG for the period from 21:30 to 22:00, she rejected the description of the change at 21:26 as "abrupt and spectacular". It was a "distinct" change. It was a common kind of change found every day in a high proportion of labours. She explained that this change was explained by the event of the pursuer moving onto her right side.

[175] The period from 22:15, the time of the vaginal examination, disclosed that the second stage had been reached. It had probably been reached before this but the examination had confirmed it. It was put to her that a drop in the FHR baseline might be a cause for concern. The CTG she had in court was of a better quality than the one she had previously seen. If there was a drop in the baseline FHR at this stage, it was only of the order of 10 bpm, which was normal in the course of labour. At 21:35 (point "O" on the marked CTG produced) the baseline was 110 bpm for a period of two minutes. At 21:45 (letter H on the marked CTG),

the baseline FHR was 120 bpm. This did not cause her any concern at all. The baseline was never the same throughout labour. Variation was inherent in labour. Looking at the CTG, and analysing the baseline between the contractions, one could see (from 21:50 to 21:55) that the baseline was about 110 or 120 bpm. The movement between 21:52 to 21:54 was not a deceleration. Between 21:50 and 22:00 (letters I to K) there was an acceleration contemporaneous with the start and finish of a contraction. Between 21:55 and 22:00 (letters J to K) the baseline was stable for three minutes or the length of 6 boxes. There was an acceleration at 22:00. These matched the contractions, so one took the baseline between the contractions. Contractions distorted the baseline. One would not take the baseline reading during a contraction. Accordingly, in her view, for the 30-minute period from 21:40 to 22:10, and excluding the FHR during contractions, a stable pattern was emerging with the FHR stable for two to three minutes at 110 to 120 bpm. This was a normal baseline. The increases during the contractions lasted 90 seconds but not more than two minutes. By definition, therefore, there were accelerations between the contractions.

[176] The CTG at 22:10 (letter M on the marked copy) showed two decelerations. They might be variable or late. At this point the midwife should seek a second opinion, which she had done. The reviewing registrar would need to look at the CTG after that (to the point P) when she arrived, at 22:25. She would need to look at the totality of the CTG and the period before 22:10, too.

[177] In analysing the period from 22:10 to 22:30, the registrar would need to take into account the clinical circumstances. The first striking feature, between 22:10 and 22:20 was the excessive uterine activity (6 in 10 contractions). This would influence the FHR. Typically, excessive contractions follow from an infusion, but there was none here. These quickly resolved, by 22:26 and the rate remained about 4 in 10 for the rest of the labour. The

excessive uterine activity could be the adjustment of responding to the progression in labour. This was transient and was resolving by the time the registrar arrived.

[178] In relation to the marking on the CTG that the “head on perineum” with the later notations that the head was “advancing”, Professor Murphy was comfortable reconciling these. As the mother pushed during a contraction, the head would move down and then recede up the birth canal.

[179] In assessing the CTG as normal or reassuring as at 22:30, Professor Murphy referred to the two arrows drawn on the CTG (between 21:50 and 22:00) and showing a peak in the FHR coinciding with the peak in a contraction. The peak could not be the baseline FHR because this was during a period of pushing. The more stable FHR was between the contractions. The baseline between the contractions was between 120 and 130 bpm. The variability was within normal range. After the peaks, the FHR returned to the baseline. The lower FHR did not have the appearance of a deceleration; it did not have its onset during a contraction. It was not a deceleration. The registrar was absolutely entitled to interpret it this way and to note “continue pushing”.

[180] She accepted that the baseline was difficult to read between 22:15 and 22:30 and why the experts disagreed vociferously. She had no difficulty, from 22:30 to the birth, in interpreting the baseline, as the contractions were more spaced out. She found it hard to believe that the other experts could not even consider the possibility that this was a normal baseline with accelerations.

[181] Up to 22:15 one could identify the baseline. There was good variability, accelerations and no decelerations. That was followed by ten minutes of excessive uterine activity. If interpreting the CTG prospectively, she would have had some concerns having regard to the CTG between 22:10 and 22:30. If it were pathological, she would have expected the CTG to worsen as labour progressed. Here, it had all of the appearances of improving. The last

30 minutes of the CTG showed it to be normal. If one went back to the CTG at 16:20, one would be hard-pressed to tell the difference between these two sections of the note.

Similarly, for the period from 23:10 to 23:20 the baseline was very clear. It was permissible to add sections of the CTG together to determine the baseline, if the contractions were frequent. In relation to the CTG at 22:30 the contractions were frequent with about one minute between them. That meant there was one minute, at most, to determine the baseline. The contractions were lasting almost a minute so there was less strong information to be confident about the baseline. If it were suggested that this did not meet the Guidelines, her position was that one observed the baseline both before and after it was indeterminate, it was 120 to 130 bpm both before and after.

[182] She was referred to her 2nd Report and the four possible interpretations she identified. She discounted the possibility of inadvertent MHR recording. She accepted that between 22:10 and 22:30 the baseline was difficult, so one had an indeterminate baseline as one of the interpretations. Her interpretation was that this was normal. She was not critical of the other experts for not recognising that the low baseline and accelerations here might have represented a complete reversal of the normal features of hypoxia. She could not explain what caused this, but nor could the rest of the medical profession. She referred to a single study of cord compression which, instead of showing the physiological features of a decrease, showed an increase in the FHR. It was a process of the FHR increasing to meet the compromise rather than the more recognised process of a drop in the FHR. The Murphy & Turnbull Paper was the first to address this and she believed was below the radar in UK obstetrics. She had in fact been unaware of that paper until this case, which had been referenced by Dr Hanretty in his report.

[183] When she had seen this pattern in case A (in her 2nd Report) and at which she had been called to attend by the midwife, she had moderated her management of that case. She

had seen this pattern subsequently in two or three cases resulting in cerebral palsy and appreciated that this was more common.

[184] In 2005, however, there was nothing that would have warned an ordinarily competent obstetrician that this pattern was a cause for concern or alarm. It was not flagged anywhere in the Guidelines, which was the standard on which hospital practice was based. In the more detailed textbooks, this was alluded to as a possible inadvertent recording of the MHR. The standard resources in the UK, even to the present day, did not warn that persistent accelerations might be a worrying matter. When asked whether this was flagged as a concern in the Murphy & Turnbull Paper, she said it was described more in terms of two very unusual cases that they wished to bring to public attention. It was not taken any further. When asked whether, if she had been familiar with this paper in 2005, would it have caused her concern, Professor Murphy's answer was that it would have made her think twice, but it was much less important than the Guidelines that one used and applied daily.

Cross examination of Professor Murphy

[185] Her medico-legal experience began shortly after she became a consultant in 2000. She was selective, taking only four or five cases a year. The basis for selection was if the outcome was cerebral palsy, which was her area of expertise. The majority of her work as an expert was for defenders, instructed through the Central Legal Office (who were instructing in this case). In the UK, she did work mostly in Scotland, not England.

[186] Mr Milligan put to her his list of propositions. She fine-tuned a number of the definitions, as indeed Mr Walkingshaw had done. She did not accept that late decelerations indicated that the baby was suffering stress and hypoxia. It was known in practice that a baby might suffer stress, with marked decelerations, but a FBS was nonetheless normal and the baby was delivered in perfect condition. Further, she did not accept that normal

variability was “often seen” even in a case with an adverse outcome. She would not rely on a single factor. When pressed, under reference to a passage in the ACOG Bulletin (see para [41], above), that most cases of adverse neonatal outcome demonstrated normal variability, she pointed out that the next sentence indicated that this study was “limited” because it did not consider other characteristics of the FHR tracing. She also qualified the proposition that a reviewing clinician should look at a minimum of one hour of the CTG and, ideally, should review the whole CTG. This was completely impractical. One needed to look at a minimum of 20 minutes, to look at a representative period, and to look at the onset of labour to get an idea of the baseline FHR.

[187] When asked to explain what the registrar should have done on coming into the room, Professor Murphy explained that she would see the patient, the midwife’s view, the medical records and the CTG in progress. She should start by reviewing the CTG which caused concern. She should look at the preceding 30 minutes and any other part of the trace the midwife might highlight. In an ideal world, one would look at other parts and a good registrar would look back to the beginning. If she was under pressure, eg about to be called back to theatre, then she had to be pragmatic as to how she reviewed the CTG. She might note that accelerations were contemporaneous with contractions, but she may not focus on them because that was not part of the training. She would note that the earlier baseline was 120 to 130 bpm with good variability, accelerations and no decelerations. She accepted that the three accelerations at 16:20 to 16:30 (which she had highlighted in her first report (at para 5.2)) would not have been picked up by the registrar. She had highlighted these to assist the court in understanding the identification of an acceleration. The registrar would not have had the depth of understanding that she had. The registrar would take a more superficial view of the CTG.

[188] In relation to the CTG from 21:26, she began by noting that the baseline between 21:15 and 21:25 was between 130 and 135 bpm. In her report she had noted that the baseline FHR had “recovered to 140 bpm” at 21:30. She explained that this was correct, but she was not saying that it had recovered to that level as *the baseline*. She was asked why she had characterised the CTG at this point as “at most suspicious”. This was because there had been a deceleration. But it was only one on its own and one could consider this a normal trace because the baseline recovered.

[189] She was pressed as to the requirement for a minimum period of two minutes’ stability in order to ascertain a baseline. She clarified: she had said to establish a baseline over 20 minutes, one needed intervals of at least two minutes between the contractions. She was asked if there was such a presentation between 21:25 and 21:35. She identified a period of 60 to almost 90 seconds, just before 21:35 (this was at 110 bpm). One might think the baseline was 120 bpm but one would want to wait longer. She was pressed that at 21:25 the baseline FHR was higher, at 130 to 135 bpm. Her response was that in the 30 minutes before that it was lower and that throughout the labour the baseline FHR will vary. What one had to be concerned about was a gradual rise in the baseline. She regarded the baseline as very stable between 21:10 and 21:15. In her view, at 20:55 and 21:05 the baseline was 120 bpm; at 22:10 it was 130 bpm and from 21:25 to 21:40 it was 120 bpm. She was asked to identify a two-minute period of stability to justify this. Her position was that the intervals were 60 to 90 seconds. This was the best one had. If one looked at this in isolation, this would be insufficient information. One would continue to track it and to look at the baseline before and after. She was looking for tachycardia but did not find it. She rejected the suggestion that at 21:26 the CTG showed two decelerations. If that were so, the high points would be the baseline but that was during a contraction and not when one would ascertain the baseline FHR. She was asked where in the Guidelines it was stated that one disregarded the

contractions. Her reply was that they stated that one ascertained the baseline FHR when it was stable. Mr Milligan put to her that at no point in the ten minutes from 21:25 to 21:35 was there sufficient stability. Professor Murphy said that one could see much less unequivocally what the baseline was.

[190] Mr Milligan turned to consider her reliance on the last 30 minutes of the trace to bolster her interpretation. She would have had difficulty between 22:10 and 22:30 but less so between 21:26 and 21:46. The CTG was “challenging” to interpret between 22:10 and 22:30. It was very difficult. It was explored with her that the practice, when the CTG was unclear, was to start with the known baseline of a preceding section. She disagreed with this. She said one could not use this to decide if there were a deceleration for a later point. One needed to use the baseline for that part of the trace under consideration. She accepted that during this section there was no period of a minimum of two minutes’ duration. She accepted that the baseline FHR was indeterminate at this stage. The baseline between 21:25 and 21:35 varied between 110 and 140 bpm, one could argue. However, the 140 bpm reading was during a contraction, so that was not tenable. It was at 140 bpm for a short period of time, for much shorter than it was at 120 bpm. She had no difficulty in preferring the interpretation that this was a normal baseline with accelerations. Yes, the baseline between 21:00 and 21:20 was between 130 and 140 bpm, but variations during labour were normal. She maintained her position that one did not ascertain the baseline during a contraction. Under reference to the Guidelines, she explained that they referred to intermittent oscillations and that the baseline should be determined after that. This reflected what the midwife had done, which was to record the actual FHR after the contractions.

[191] She was taken to paragraph 4.3.i of her 2nd Report, commenting on the CTG between 21:40 and 22:00 and her identification there of the baseline FHR at 130 bpm. In her evidence, and with a clearer CTG, she changed that to 120 bpm. She maintained her position that there

was no deceleration at 21:26. She resisted the proposition that, if the baseline were indeterminate, one looked to the previous section to ascertain the baseline. She was adamant that one had to set the baseline from within the section of the CTG one was examining. One could not use the preceding period. For the period from 21:40 the FHR was varying but it permitted a baseline of 130 bpm; with the better quality CTG, she revised this down to 120 bpm. One had to work out the baseline for the part of the CTG that one was examining for decelerations. She maintained that there was no deceleration at 21:40, but a fall in the FHR relative to a contraction. During the contraction the FHR increased: one had an acceleration. This pattern became more established and more exaggerated. These were accelerations not decelerations. The baseline was 120 bpm; there was good variability and accelerations were contemporaneous with contractions.

[192] After further questioning, she accepted that the CTG at 21:40 showed a deceleration, though it was difficult to say whether it was late or variable. The baseline at this point might be 110 bpm. This was a change to her report but only in relation to a single point. One had to look at the whole of the CTG. The baseline will vary during labour. If this was a deceleration or a fall in the baseline it was transitory, lasting less than 60 seconds. It was a single event. This was not how one interpreted a CTG. She accepted that there was a drop in the baseline between 21:40 and 22:00 but not that this was a significant drop. At this point the pursuer was having expulsive contractions. She was bearing down. The FHR will go up. These were peaks, not decelerations.

[193] Mr Milligan moved on to consider the CTG from 22:00. After 22:15 there were two decelerations. There were two very marked accelerations and which were unusual in appearance. The frequency of the contractions meant that there was very little down time between them. The accelerations were unusual. A "marked" acceleration meant that there was a greater than normal increase, of between 20 to 40 bpm. Between 22:10 and 22:20 the

baseline was at 120 bpm. There was a deceleration c 22:16 and c 22:26. This was viable. It did not warrant classification of the CTG as pathological. It did not require intervention. It did indicate a need for close monitoring. This would have been the correct response in the context of the clinical circumstances at that time.

[194] Asked about variability, Professor Murphy was of the view that the variability was normal. There was reduced variability for two minutes in relation to the late or variable deceleration at about 22:10 or 22:12, but that was the only episode of reduced variability. The excessive uterine activity normalised very quickly. The classification of the CTG should have been suspicious. That would have been the cautious approach. That is what she suspected the registrar had done. She inferred this from notation of the arrows and the knowledge that the head was at the perineum. She maintained that this was an acceptable review by a registrar.

[195] She was asked if it was a reasonable assumption to make that birth was imminent. Professor Murphy cavilled to an extent at this, arguing that it depended on the meaning. Some women made good progress. It was normal for first-time mothers to take longer. What the registrar should have told the mother, bearing in mind that the registrar was busy and the mother was actively pushing, was that she had reviewed the CTG and the pursuer was making good progress; that her progress would be kept under review, and that the midwife would call the registrar back if she was needed. She assumed that the registrar was busy. She inferred this from the fact that it had taken two hours to get the mother to theatre to remove the placenta and the delay in the arrival of the anaesthetist in siting the epidural. It was not necessary for the registrar to have the expectation that the mother would deliver within ten to 15 minutes. She had to have the expectation that the midwife would call her back if needed.

[196] Turning to the issue of whether accelerations were unusual in the second stage of labour, Professor Murphy said it was impossible to give an educated answer to this as there had not been the requisite population studies. In the Murphy & Turnbull Paper, two of the 50 labours had them, which equated to 4%. She herself would see 25 to 30 women on a labour ward every day and so would expect to see accelerations every day. This did not just relate to occasional accelerations. Case A in her 2nd Report had also had regular accelerations. It was not uncommon. She had not seen the Murphy & Turnbull Paper at the time of her 1st Report. At that time, her impression was that these were very uncommon. Now that she was aware of this, she did not believe that these were vanishingly rare. As for evidence of Dr Hanretty, Dr Smith and Mr Walkingshaw that they had never seen these, in her view, she thought that they had seen it but it was under their radar. They had focused on what they believed to be abnormal, like tachycardia and bradycardia, and they put accelerations into the background, as we were told to do. In the Guidelines, accelerations only warranted three or four sentences. She accepted that florid or pronounced accelerations were very uncommon in the second stage of labour.

[197] Professor Murphy rejected the proposition that the CTG was difficult to interpret after 21:26. In her view, it was difficult between 22:10 and 22:30, but otherwise she had no difficulty determining the baseline overall. It was relatively straightforward. Between 22:10 and 22:30 it was very difficult. The midwife had sought a second opinion. The registrar said that it was normal, with good variability and that was a reasonable conclusion to draw. As time evolved, the CTG became easier to interpret and her opinion was supported by the greater clarity about the baseline and the accelerations. When pressed, she eventually accepted that at 22:30 the registrar could not with reasonable confidence have classified this CTG as reassuring. It was no more than suspicious and required ongoing observation. She accepted that if it were pathological, the registrar needed to stay in the room and deliver the

baby. She concluded that the registrar must have ruled out a pathological interpretation with confidence, because she had left, which it was acceptable for her to do. It would not have been acceptable for her to go and never come back; the plan was watchful waiting and returning if the midwife called her back or if the midwife became concerned about poor progress. She did not accept that, in order to do that, she would need to obtain the mother's consent. One needed the patient's consent for intervening. It sufficed for the registrar just to say hello, that the pursuer was making good progress and that the registrar would be called back if there were any concerns. There was no need for consent to continue. Consent to that was inherent, given that she was on a labour ward with staff helping her to achieve a vaginal delivery. If intervention were called for, then that would need to be explained and the options and risks discussed at that time. It was not correct that the obstetricians carried the risk. This was delegated to the midwife looking after the woman in normal labour. If the midwife had a concern, and the registrar signed off on the CTG, then the responsibility was delegated back to the midwife. If the registrar thought it was suspicious the treatment was watchful waiting.

[198] In relation to her observation, in her 2nd Report at paragraph 4.3, that Mr Walkingshaw did not adequately justify why the CTG was unequivocally pathological, she expanded on this. He had acknowledged that a possible interpretation was normal, but he did not explain why he rejected this. She had described the CTG independently in her 1st Report, and before she had seen the Murphy & Turnbull Paper, which she regarded as confirmatory. Mr Walkingshaw did not include as a possibility that this was a highly unusual case with a highly unusual trace. His opinion was that this was tachycardia with decelerations but he never challenged his own view. He set the baseline exclusively during the accelerations and contractions. None of his baseline was between the contractions. It was not logical. He was not prepared to challenge his assumptions that accelerations were a good thing and so could not lead to a hypoxic event, even

though the Murphy & Turnbull Paper had highlighted this. He only gave his reasons as to why this was a tachycardia because that was how he interpreted it, but he did not explain, why this was a deceleration and not an acceleration. It was an acceleration of greater than 15 bpm, exactly as described in the Murphy & Turnbull Paper.

[199] She did not agree with Mr Walkingshaw's observation, that it was highly unusual to have a lowering of the baseline at the start of the second stage. He was referring to a pathological trace, where there was a rising baseline. In that circumstance, it would be unusual for the baseline to go lower, when one was expecting it to increase. If one looked at the Guidelines, there was absolutely nothing about a lowering baseline. This might be Mr Walkingshaw's opinion, but it would not have been flagged as a point of concern for the registrar. In relation to his other observations at this point, she accepted that there were changes, which he described as abrupt, but these were entirely explicable in terms of the events in labour. She accepted that there was an odd appearance to the accelerations. While he assumed that the acceleration was coincident with maternal effort, nowhere in the clinical training or the Guidelines is that flagged other than to query whether one had picked up the MHR. She did not accept that the midwife would see this as unusual. Clearly not, if she had never seen it before, if she was taught that accelerations were a good thing, and that in any event not all of the pursuer's experts saw this.

[200] She was asked how a midwife should interpret a CTG, if it showed something she had never seen before, but Professor Murphy said that a midwife would have been taught that accelerations were a good thing and provided reassurance of fetal wellbeing. Looking prospectively, the registrar saw accelerations; she had correctly interpreted the baseline. Even though this was the second stage, accelerations were a good thing. She could entirely understand why the registrar signed off on the CTG.

[201] Professor Murphy did not accept that assisted delivery would necessarily have been easy at this stage. One could never say that. It was not something one would undertake lightly.

[202] Mr Milligan explored with Professor Murphy what was to be done if there were an indeterminate baseline. In that circumstance there were several choices:

- 1) To observe the CTG until it became determinate. This may take ten or 15 minutes, as this CTG did;
- 2) The registrar would stay in the room with the midwife to observe, but this was not feasible if the registrar was busy;
- 3) If the mother was making good progress, then possibly to obtain more information with a FBS; and
- 4) If it was the second stage and it was indeterminate, one could intervene. But there were risks in intervention.

[203] She accepted that this case was a warning to others. Her own view was that the next set of RCOG guidelines should carry a warning about persistent accelerations in the second stage of labour, even if rare, and that they should not be assumed to be reassuring but may reflect a pathological finding.

[204] Mr Milligan then proceeded to challenge Professor Murphy's own conduct of her case A, contained in her 2nd Report, as irresponsible. Professor Murphy rebuffed this.

(There is, of course, no report addressing Professor Murphy's own treatment in her case A.

Nor were the other experts asked to comment. As there is no way to determine the legitimacy of any criticism, I do not record this chapter of cross examination.)

[205] Mr Milligan revisited the issue of interpretation of the CTG. He put to her that with the pursuer's experts' interpretation, there were no anomalies (such as a falling baseline).

She did not accept that. On their interpretation, there were decelerations but where

variability remained good throughout. If this were pathological, the CTG was on her interpretation normal at the end. (Other aspects of his cross examination appeared to stray into issues of causation.)

[206] On the issue of classification, a suspicious trace was very common in the second stage of labour. Very few CTGs have all three or four features in the second stage. One always got a deceleration or a variability deceleration. These were really common. It was normal for the last hour. Before that there were some decelerations, so it was suspicious. Mr Milligan returned again to the question of classification of this CTG. Professor Murphy would have expected the CTG to be classed as suspicious. If it had been interpreted as Mr Walkingshaw did, as pathological, then she accepted that no ordinary registrar would have failed to expedite labour. At 22:30 the registrar could not treat this as unreservedly reassuring. Professor Murphy was not sure she would have concluded it was indeterminate. She would not have expected the registrar to consider it tachycardic with late decelerations. She rejected the proposition that the registrar would have had to consider the possibility that the CTG was pathological or abnormal. If she considered it indeterminate, then the registrar would require further information. Of course she had to consider the risk of fetal compromise, but that was a risk in every second stage of labour. The midwife would call if there were a heightened concern. She accepted that the registrar should have had a management plan and to have discussed that with the mother. It was permissible for her to leave and never return, if there were no further complications.

Re-examination of Professor Murphy

[207] In relation to Professor Murphy's evidence that if the CTG were indeterminate there was a risk of fetal compromise, this was correct. But if the registrar were called in that circumstance, and the CTG classified as no more than suspicious, that did not entail a

change in the management plan if it was to continue with the labour. Even if the CTG were suspicious, this did not require intervention there and then. The plan would be watchful waiting. The midwife would not leave the mother alone.

[208] Mr Ferguson revisited the issue of the high rate of false positives, of being in excess of 90%. The majority of babies with interpartum asphyxia were ok.

[209] In relation to the anomalies that Mr Walkingshaw identified as affecting Professor Murphy's interpretation, her position was that in relation to the changes, these were explicable by an event in labour (the change of position and when the labour was progressing the excessive number of contractions). These changes were explicable by clinical events and were entirely reconcilable with her interpretation. She confirmed that where a pattern presented that was outwith the classification, the whole point of a classification system was to assist staff at all levels faced with CTGs which were difficult to interpret. One applied the known nomenclature; one classified it. Here, the registrar had four normal features (good variability, a good baseline, accelerations and no decelerations). She classified it as normal, or as suspicious if she identified the occasional deceleration. This was how one was trained to behave. To eyeball it. If normal, it was ok. If not, one applied the features to have a standard classification.

[210] She was asked about the importance of variability to her interpretation. She explained the physiological relationship of the brain, when it was well oxygenated and the signals to the heart. In her view, variability was one of the most important features to reflect good oxygen brain infusion. So the presence of ongoing and good variability provided additional support to the interpretation of the CTG as normal or as no more than suspicious.

[211] In relation to her comment that almost all CTGs were suspicious, she explained that there were almost always second stage decelerations with pushing. She confirmed that her reports were prospective, but looked at the later stages just to confirm her interpretation.

The Law

The pursuer's cases

[212] The parties produced a Joint Bundle of Authorities although, in the usual way, additional cases were produced during submissions. While they did not agree a set of legal propositions, there was no real dispute between them. They emphasised different features of the case law, but they did not take issue with the cases cited by the other. It suffices to summarise their submissions on the law, which were as follows.

[213] For his part, Mr Milligan referred to the following:

- 1) The test in *Hunter v Hanley* 1955 SC 200 at 206. The key passage is the observation that:

“To establish liability by a doctor where deviation from normal practice is alleged, three facts require to be established. First of all it must be proved that there is a usual and normal practice; secondly it must be proved that the defender has not adopted that practice; and thirdly (and this is of crucial importance) it must be established that the course the doctor adopted is one which **no professional man of ordinary skill would have taken if he had been acting with ordinary care.**” (Emphasis added.)

- 2) Mr Milligan argued that where the defenders seek to establish that the doctor was acting in accordance with normal practice, they must also establish that the practice was reasonable, responsible and logical in the circumstances. It is not enough to say that they have found one doctor who will support the view: see Lord Browne-Wilkinson in *Bolitho v City and Hackney Health Authority* [1998] AC 232 at 241E-242B. The key passages from that case were:

“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." (at 241); and

"These decisions demonstrate that in cases of diagnosis and treatment there are cases where, despite a body of professional opinion sanctioning the defendant's conduct, the defendant can properly be held liable for negligence (I am not here considering questions of disclosure of risk). In my judgment that is because, in some cases, it cannot be demonstrated to the judge's satisfaction that the body of opinion relied upon is reasonable or responsible. **In the vast majority of cases the fact that distinguished experts in the field are of a particular opinion will demonstrate the reasonableness of that opinion.** In particular, where there are questions of assessment of the relative risks and benefits of adopting a particular medical practice, a reasonable view necessarily presupposes that the relative risks and benefits have been weighed by the experts in forming their opinions. **But 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.**

I emphasise that in my view it will very seldom be right for a judge to reach the conclusion that views genuinely held by a competent medical expert are unreasonable. The assessment of medical risks and benefits is a matter of clinical judgment which a judge would not normally be able to make without expert evidence. As the quotation from Lord Scarman makes clear, it would be wrong to allow such assessment to deteriorate into seeking to persuade the judge to prefer one of two views both of which are capable of being logically supported. **It is only where a judge can be satisfied that the body of expert opinion cannot be logically supported at all that such opinion will not provide the benchmark by reference to which the defendant's conduct falls to be assessed."** (at 243). (Emphasis added.)

- 3) Mr Milligan also cited cases that governed the proper approach where there were two opposing schools of thought amongst the relevant medical practitioners. He referred to Lord Hodge's decision in the Outer House in *Honisz v Lothian Health Board* [2006] CSOH 24 at paragraphs 39 and 40, which were in the following terms:

"[39] First, as a general rule, where there are two opposing schools of thought among the relevant group of responsible medical practitioners as to the appropriateness of a particular practice, it is not the function of the court to prefer one school over the other (*Maynard v West Midlands Regional Health Authority*, Lord Scarman at p.639F-G). Secondly, however, the court does not defer to the opinions of the relevant professionals to the extent that, if a defender lead evidence that other responsible professionals among the relevant group of medical practitioners would have done what the impugned medical practitioner

did, the judge must in all cases conclude that there has been no negligence. This is because, thirdly, in exceptional cases the court may conclude that a practice which responsible medical practitioners have perpetuated does not stand up to rational analysis (*Bolitho v City and Hackney Health Authority*, Lord Browne-Wilkinson at pp.241G-242F, 243A-E). Where a judge is satisfied that the body of professional opinion, on which a defender relies, is not reasonable or responsible he may find the medical practitioner guilty of negligence, despite that body of opinion sanctioning his conduct. This will rarely occur as the assessment and balancing of risks and benefits are matters of clinical judgment. Thus it will normally require compelling expert evidence to demonstrate that an opinion held by another medical expert is one which that other expert could not have held if he had taken care to analyse the basis of the practice. Where experts have applied their minds to the comparative risks and benefits of a course of action and have reached a defensible conclusion, the court will have no basis for rejecting their view and concluding that the pursuer has proved negligence in terms of *Hunter v Hanley*... As Lord Browne-Wilkinson said in *Bolitho* (at p.243D-E), 'it is only where the judge can be satisfied that the body of expert opinion cannot logically be supported at all that such opinion will not provide the benchmark by which the defendant's conduct falls to be assessed.'

[40] An example of such a rare case is that of *Hucks v Cole* [1993] 4 Med L R 393, which Lord Browne-Wilkinson discussed in *Bolitho*. In that case a general practitioner failed to give penicillin to a lady in a maternity ward who had a septic spot and as a result she developed fulminating septicaemia. The defendant knowingly took the risk that the lady could develop puerperal fever because the risk was small and he was supported in his decision by distinguished expert witnesses. Nevertheless the judge concluded that he was negligent and the Court of Appeal upheld his decision, Sachs LJ holding that there was a lacuna in professional practice and that the defendant knowingly took an easily avoidable risk which elementary training had instructed him to avoid. As, in the court's judgment, there was no proper basis for the practice of not giving penicillin it was not reasonable for the medical practitioner to expose his patient to that risk."

- 4) Finally, he noted that there was a more recent discussion of this issue. In *McGuinn v Lewisham and Greenwich NHS Trust* [2017] EWHC 88 (QB). Under reference to *Bolitho* (at paragraph 10), it was noted that it was for the court to be satisfied that the body of medical opinion relied on by a clinician had a sufficiently logical basis. Baker J in *McGuinn* then noted with approval (at paragraph 11) the extended observations of Green J. in *C v North Cumbria University Hospitals NHS Trust* [2014] EWHC 61 at paragraph 25:

“25. In the present case I have received evidence from 4 experts, 2 on each side. 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 conclusion that a Court does not accept, ultimately, as “logical”. Nonetheless these are material considerations. In the course of my discussions with Counsel, both of whom are hugely experienced in matters of clinical negligence, I queried the sorts of matters that might fall within these headings. The following are illustrations which arose from that discussion. “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. Such a person expressing an opinion about normal clinical conditions will be doing so with first hand

knowledge of the environment that medical professionals work under within the NHS and with a broad range of experience of the issue in dispute. 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. "Respectability" is also a matter to be taken into account. Its absence might be a rare occurrence, but many judges and litigators have come across so called experts who can "talk the talk" but who veer towards the eccentric or unacceptable end of the spectrum. Regrettably there are, in many fields of law, individuals who profess expertise but who, on true analysis, must be categorised as "fringe". A "responsible" expert is one who does not adopt 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 CPR 35 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. For example, a judge will consider whether the expert opinion accords with the inferences properly to be drawn from the Clinical Notes or the CTG. A judge will ask whether the expert has addressed all the relevant considerations which applied at the time of the alleged negligent act or omission. If there are manufacturer's or clinical guidelines, a Court will consider whether the expert has addressed these and placed the defendant's conduct in their context. 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, a further issue arising in the present case emerges from the trenchant criticisms that Mr Spencer QC, for the Claimant, made of the Defendant's two experts due to the incomplete and sometimes inaccurate nature of the summaries of the relevant facts (and in particular the Clinical Notes) that were contained within their reports. It seems to me that it is good practice for experts to ensure that when they are reciting critical

matters, such as Clinical Notes, they do so with precision. These notes represent short documents (in the present case two sides only) but form the basis for an important part of the analytical task of the Court. If an expert is giving a précis then that should be expressly stated in the body of the opinion and, ideally, the Notes should be annexed and accurately cross-referred to by the expert. If, however, the account from within the body of the expert opinion is intended to constitute the bedrock for the subsequent opinion then accuracy is a virtue. 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."

[214] In relation to the issue of consent, Mr Milligan cited three cases starting, of course with *Montgomery v Lanarkshire Health Board* 2015 SC (UKSC) 63.

- 1) The passage he cited in *Montgomery* was:

"[87] The correct position, in relation to the risks of injury involved in treatment, can now be seen to be substantially that adopted in *Sidaway* by Lord Scarman, and by Lord Woolf MR in *Pearce v United Bristol Healthcare NHS Trust*, subject to the refinement made by the High Court of Australia in *Rogers v Whitaker*, which we have discussed at paras 70 to 73. 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."

- 2) He next referred to the comments of the Court of Appeal in *Webster v Burton Hospitals NHS Trust* [2017] Med. LR 113 on two themes emerging from *Montgomery*. The first of these was the change in the nature of the doctor and patient relationship. (I do not set out the paras 81 and 82 of *Montgomery*, which the Court of Appeal quoted at para 26 of its opinion.) The second theme the Court of Appeal noted (under reference to paras 83 and 87 of *Montgomery*)

concerned the patient's right to information and her entitlement to decide on the risks to her health she was willing to run. The Court of Appeal observed:

"29 Three further points may be noted. First, the assessment of whether a risk is material cannot be reduced to percentages, see [89]:

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 upon 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.

30. Secondly, the judgment also set out the importance of the dialogue between doctor and patient as part of the doctor's advisory role, see [90].

...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.

31. Thirdly, it is clear that the *Bolam* approach, see *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 582, which decided that a doctor was not negligent if he or she acted in accordance with a practice accepted as proper by a responsible body of medical practitioners skilled in that particular art, is no longer appropriate. This is implicit from [84], [85] and [87], and explicit from Lady Hale's judgment at [115] in the context of the doctor's personal belief in the *Montgomery* case that it was not in the mother's interest to have a caesarean section:

'In any event, once the argument departs from purely medical considerations and involves value judgments of this sort, it becomes clear, as Lord Kerr and Lord Reed conclude at para 85, that the *Bolam* test, of conduct supported by a responsible body of medical opinion, becomes quite inapposite. A patient is entitled to take into account her own values [2015] UKSC 11 paragraph 15 her own assessment of the comparative merits of giving birth in the 'natural' and traditional way and of giving birth by caesarean section, whatever medical opinion may say, alongside the medical evaluation of the risks to herself and her baby. She may place great value on giving birth in the natural way and be prepared to take the risks to herself and her baby which this entails. The medical profession must respect her choice, unless she lacks the legal capacity to decide (*St George's Healthcare NHS Trust v S* [1999] Fam 26). **There is no good reason why the same should not apply in reverse, if she is prepared to forgo the joys of natural childbirth in order to avoid some not**

insignificant risks to herself or her baby. She cannot force her doctor to offer treatment which he or she considers futile or inappropriate. But she is at least entitled to the information which will enable her to take a proper part in that decision’.

[...]

[40]. What then should Mr Hollingworth have told Ms Butler on 27 December 2002? In my view, the answer is to be found in the last words of the judgment at §86[G]: namely, that there was ‘an emerging but recent and incomplete material showing increased risks of delaying labour in cases with this combination of features.’” (Emphasis added).

- 3) Lastly, Mr Milligan referred to the Outer House case of *KR v North Lanarkshire*

[2016] CSOH 133, in which Lord Brailsford said:

“133. The position is, in my view, different in relation to the period following 1818. At that stage, as already discussed, the sudden bradycardia and prolonged deceleration made the case one where in terms of both the NICE and RCOG guidelines there was evidence of "acute foetal compromise". As explained by Dr Smith, and not as I understand it challenged by doctors Owen and Cooper, that gave rise to a risk of the foetus developing hypoxia. I accept that the degree of that risk might be a matter for divergent clinical opinion, but no clinician who gave evidence demurred from the proposition that there was a risk. Moreover, there is no dispute that by this stage the foetus was in a position where an assisted vaginal delivery by forceps was a feasible clinical alternative to simply, as was done by Dr Oniya, instructing foetal blood sampling and thereafter proceeding to stage two of labour. **It accordingly seems plain to me that at this stage there were two alternative approaches to the management of KR's labour, first to proceed to immediate assisted vaginal delivery or, second, to obtain foetal blood samples and, providing these were satisfactory, proceed to stage two of delivery. In my view these alternatives should have been explained to KR and the risks associated with each also explained. Had this been done KR would have been provided with sufficient information to permit her to make an informed choice as to which course she opted to take.** The fact that this approach was not taken renders this case, in my opinion, fairly within the ratio of *Montgomery* (*supra*). I am accordingly satisfied that the pursuer has established this part of her case.” (Emphasis added.)

[215] Finally, Mr Milligan cited two cases on the approach to be taken in the event that there was a gap in the records (in the second case, the lack of clinical notes by the registrar) for which one of the parties to the litigation was responsible:

- 1) In the case of *Keefe v Isle of Man Steam Packet Co* [2010] EWCA Civ 683, it was noted:

“19. If it is a defendant's duty to measure noise levels in places where his employees work and he does not do so, it hardly lies in his mouth to assert that the noise levels were not, in fact, excessive. In such circumstances the court should judge a claimant's evidence benevolently and the defendant's evidence critically. If a defendant fails to call witnesses at his disposal who could have evidence relevant to an issue in the case, that defendant runs the risk of relevant adverse findings see *British Railway Board v Herrington* [1972] AC 877, 930G. **Similarly a defendant who has, in breach of duty, made it difficult or impossible for a claimant to adduce relevant evidence must run the risk of adverse factual findings.** To my mind this is just such a case.

20. This has been accepted law since *Armory v Delamirie* (1721) 1 Strange 505 the famous case in which a chimney sweep found a jewel in a chimney and left it with a pawnbroker for valuation. The pawnbroker, in breach of duty, failed to return it and could not be heard, when sued, to assert that the chimney sweep could not prove its value. The court awarded the highest sum realistically possible. A bailee's duty towards his bailor is, of course, different from an employer's duty to his employee but breach of the latter duty is not necessarily less serious than breach of the former.” (Emphasis added.)

2) And the passage from *Raggett v Kings College Hospital NHS Trust* 2016 EWHC 1604

(QB) was as follows:

“131 Having decided that the leg could be saved, I am not prepared to hold that there would have been an early amputation. To begin with, I note that it is now agreed that Mr Raggett did not suffer from anti-phospholid syndrome as had originally been reported. This makes Professor Beard's change of heart even more difficult to understand, given that he took this as an important factor in the assessment. I also adopt the approach of Longmore LJ in *Keefe v Isle of Man Steam Packet Co* [2010] EWCA Civ 683. **Where the lack of important evidence is a consequence of the Defendants' breaches of duty the court should judge the Claimant's case benevolently and the Defendants' case critically.**” (Emphasis added.)

In submissions, he produced a more recent case (*TW v Royal Bolton Hospital NHS Foundation Trust* [2017] EWHC 3139 (QB)), but it did not add to the passages just quoted.

The defenders' cases

[216] Mr Ferguson also referred to the same passages as Mr Milligan in *Hunter v Hanley* and to *Montgomery*. He referred to the observations in *Morrison's Associated Companies Limited v James Rome & Sons Limited* 1964 SC 160 (*per* Lord President Clyde at 182 and *per*

Lord Guthrie at 190) to the effect that a defender cannot be held liable upon a ground not contained on Record.

[217] In relation to a case where the court was faced with competing bodies of expert opinion, he noted the case of *Honisz*, referred to by Mr Milligan, but he preferred

Lord Hodge's formulation of that issue in the later case of *Dineley v Lothian Health Board*

[2007] CSOH 154. He submitted that *Dineley* went further, as Lord Hodge had accepted

Lord Reed's statement in *McConnell v Ayrshire & Arran HB* (unreported, 14 February 2001)

and also referred to Stuart Smith LJ in *Loveday v Renton* [1989] Med LR 117 at p 125. He

referred to the following:

"[36] Parties were agreed as to the approach of the law where there was conflicting expert testimony on what was acceptable medical practice. I was referred to the leading cases of *Hunter v Hanley* 1950 SC 200, *Bolam v Friern Hospital Management Committee* [1957] 2 All ER 118, *Maynard v West Midlands Regional Health Authority* [1984] 1 WLR 634 and *Bolitho v City and Hackney Health Authority* [1998] AC 232. I was also referred to Lord Reed's opinion in *McConnell v Ayrshire and Arran Health Board* 14 February 2001 (unreported) and to my opinions in *Honisz v Lothian Health Board* [2006] CSOH 24 and *Scott v Lothian University Hospitals NHS Trust* [2006] CSOH 92. In relation to the way in which the court should assess the evidence of expert witnesses I was referred to the judgment of Stuart Smith LJ in *Loveday v Renton* [1989] 1 Med LR 117 at 125.

[37] As parties had agreed that my opinion in *Honisz* was an accurate summary of the relevant law where there was a conflict between experts on acceptable medical practice, I refer to what I said in that case. [After quoting paragraphs 39 and 40, which are set out above, Lord Hodge continued].

[...]

[38] In *McConnell* (at paragraph 29) Lord Reed similarly stated that where there were conflicting bodies of evidence from credible and reliable experts of appropriate professional standing the pursuer could succeed "only if the opinion supportive of the treatment [could] be demonstrated to be untenable, for example because it [was] based on a mistaken or incomplete understanding of the relevant facts or [had] no logical basis".

[39] Stuart Smith LJ in *Loveday* set out (at p.125) the following approach to the evidence of expert witnesses (in the context of a dispute about causation):

"The mere expression of opinion or belief by a witness, however eminent, ... cannot suffice. The court has to evaluate the witness and the soundness of his opinion. Most

importantly this involves an examination of the reasons given for his opinions and the extent to which they are supported by the evidence. The judge also has to decide what weight to attach to a witness's opinion by examining the internal consistency and logic of his evidence; the care with which he has considered the subject and presented his evidence; his precision and accuracy of thought as demonstrated by his answers; how he responds to a searching and informed cross-examination and in particular the extent to which a witness faces up to and accepts the logic of a proposition put in cross-examination or is prepared to concede points that are seen to be correct; the extent to which a witness has conceived an opinion and is reluctant to re-examine it in the light of later evidence, or demonstrates a flexibility of mind which may involve changing or modifying opinions previously held; whether or not a witness is biased or lacks independence."

Stuart Smith LJ went on to say that the demeanour of a witness in the witness-box could be important when the court was evaluating expert evidence, particularly if a witness had been criticised for bias or lack of independence.

[40] Thus, using the forensic tools described by Stuart Smith LJ and having regard to the evidence as a whole, the court has to assess at least three things where there is conflicting expert evidence on the propriety of a course of action adopted by a medical practitioner. First, the judge must consider whether an expert has reached his or her view on a mistaken or incomplete understanding of the relevant facts of the particular case. Secondly, the judge must examine whether there has been a proper assessment of the risks and benefits of the course of action which was adopted compared with another course of action advocated by a pursuer. Thirdly, and more generally, the court must satisfy itself whether or not there is a logical basis for the opinion supporting the course of action which was adopted."

From this case, he emphasised that it was only in exceptional or rare cases that the Court will find itself able to reject the testimony of an expert led by the defender and that a pursuer could only succeed when that expert's approach can be said to be demonstrated to be untenable, for example because it is based on a mistaken or incomplete understanding of the facts, or was otherwise illogical.

[218] Mr Ferguson submitted that in this case it was not a question of preferring one interpretation of the CTG trace to the other. That is perhaps unsurprising when, as was readily accepted by all the pursuer's experts, CTG monitoring was not a foolproof means of measuring fetal well-being; there was a high "false positive" rate; and considerable inter-observer variation in the interpretation of CTG traces, something which Dr Smith agreed was illustrated by the diverging views in this case. Dr Smith had also accepted that an

assessment of variability was subjective (and Mr Ferguson noted that he was out of step with the other experts on this.) Further, Mr Ferguson submitted, it is not sufficient to have been impressed by all or any of the pursuer's experts. Nor was it a question of the number of experts led for the pursuer who hold the opposite view to Professor Murphy and who interpreted the CTG differently from her. It was not a question of how forcefully those experts expressed their views. For the pursuer to succeed, one needed to go as far as to find Professor Murphy's interpretation to be untenable, illogical, indefensible, or impermissible. (He noted Dr Hanretty's retraction of the use of the word "untenable" to describe an interpretation of the CTG after 2220 as having a baseline of 110-120bpm with accelerations.)

Parties' Submissions

Submissions on behalf of the pursuer

Outline of the pursuer's legal cases

[219] Mr Milligan identified three failings by the registrar:

- 1) She interpreted the CTG trace as normal or reassuring at or about 2230 hours.
- 2) She did not expedite Baby B's birth by episiotomy or ventouse or "lift-out" forceps.
- 3) She did not inform the pursuer of the risk of fetal compromise or obtain her consent to the continuation of labour. This case has a different factual foundation (he referred to the Closed Record at pp 8E to 9A). It does not require the pursuer to establish that the trace was pathological/abnormal, merely that it was unusual.

[220] Mr Milligan summarised the pursuer's legal cases, as follows:

"5.1 The trace case

All concerned agreed that this was a highly unusual trace and difficult to read. On one reading it was suspicious, on the other it was pathological. Nobody could read it as unequivocally reassuring. Given that degree of uncertainty and given the position of the baby at about 22.30, there was no logical explanation for not proceeding to a simple assisted delivery with forceps or ventouse... the evidence of Professor Murphy should be rejected and the evidence of Drs Hanretty, Smith, Campbell and Walkinshaw preferred.

5.2 The consent case

The case on record is that the mere fact that this trace was on any view very unusual was enough to warrant intervention. In fact, the evidence came to be that the trace was at least suspicious (on the defenders' analysis) and pathological/abnormal on the pursuer's analysis. Even if failure to expedite delivery at that stage could be justified, failure to obtain informed consent could not. There was a small risk of injury but the potential consequences were enormous. There was a simple way of avoiding that risk. Any mother would consider that risk material. She should have been offered the choice. She wasn't. That is a breach of duty."

[221] It should be noted that in this presentation of the CTG interpretation case the pursuer no longer focused on a finding of the trace as being pathological as at 21:26. Rather, if it could not be characterised as reassuring, then there should have been intervention. The relative finding he proposed (numbered 38 in the next para) was that the registrar was under a duty to err on the side of caution.

Pursuer's proposed findings in fact

[222] In his written submission, Mr Milligan set out detailed proposed findings in fact.

(The emphasis is in the original.) The critical ones were:

"30. At 22.15 (just before section N) Midwife Hearse noted "variable decelerations [down to] 105 recovering to baseline of 120". The pursuer was noted to be continuing to push involuntary. A vaginal examination was performed which revealed that the cervical os was fully dilated. The presenting part was 1cm below the ischial spines and in the left occipito-anterior position. See 6/2 pages 25-26.

This marks the second stage of labour. At this point it would have been very easy to expedite vaginal delivery without the need for surgery. An episiotomy alone may have been sufficient (6/7 of process, page 6).

Midwife Hearse: The first stage of labour is the onset of regular contractions. The second stage from full dilatation to delivery. The third stage is from delivery of baby to delivery of placenta.

The FHR was noted as 124bpm.

31. In fact, at this time there was a gradual rise in the baseline rate to 160bpm then 175bpm with recurrent variable decelerations whose base was 130 – 140 bpm with late decelerations to 100 bpm.

32. Variability from 22.12 to 22.26 (section N to P) is significantly reduced.

At 22.20 (section O) the vertex was recorded by Midwife Hearse as “visible in the distance”. Active pushing was commenced. There is also evidence of hypertonic uterine activity or uterine tachysystole (more than 5 contractions in 10 minutes – Professor Murphy and Dr Smith agree on this point). The fetal heart rate achieves a tachycardia (>160bpm) at about this time.

33. At some point ?about this time, Midwife Hearse called for medical review because she was having difficulty determining the baseline (affidavit 6/24 of process, paragraphs 13 and 21).
34. At about 22.30 (section Q) Dr Al-Zletni attended. She had difficulty in determining the baseline rate. However, she assumed that the delivery would occur within a few pushes (about 10 minutes) and did not want to interfere. See affidavit 6/22 para 5. She did not discuss any of the options with the pursuer or the midwife. See the most recent joint minute. She did not record her interpretation of the features of the trace nor her classification of it. She did not record any plan for the remainder of the birth. She did not attend the pursuer again until after the delivery.
35. At 22.30 the CTG was annotated to the effect that the head was on the perineum. Birth could have been easily achieved either by episiotomy, ventouse or lift out forceps. 6/8 of process, section 7.16-7.17.
36. By this time (22.30) the baseline had risen to 170 – 180 beats per minute with late decelerations to 130 beats per minute. Such a trace was pathological and delivery should have been expedited. At the very least, the position should have been explained to the pursuer so that she could make the appropriate decision as to further treatment. It was a breach of duty not to so inform the pursuer.
37. The defenders’ interpretation is illogical and highly unlikely. It would require a number of rare events to coincide – a drop in the baseline rate and sudden regular accelerations (described by Professor Murphy as “very marked”) coinciding with contractions in the second stage of labour, combined with a reduction in variability at that time(see 6/8 at section 7.12 on page 15; 6/4 at the bottom of page 3). Accelerations in the FHR with contractions are not a typical finding in late labour, as even Professor Murphy conceded (see 7/11 page 19 paragraph 8.4 and 7/23 page 25 para 5.3).
38. At the very least, the midwife and the registrar should have considered the possibility that the trace showed decelerations rather than accelerations. If that was a reasonable possibility, they should have erred on the side of caution. As Dr Hanretty said, why should that even be considered erring?an error? The safety of the mother and baby is paramount.

39. Even if the trace showed, or could reasonably be interpreted as showing, accelerations with every contraction rather than decelerations, such a trace was at best suspicious and not reassuring. The pursuer should have been advised accordingly. She should have been actively involved in the decision as how to proceed. It was up to her to decide which was more important – as natural a birth as possible or the least risk possible to her and her baby. Even on this hypothesis, it was still a breach of duty in terms of *Montgomery* to proceed with the labour without obtaining the pursuer's fully informed consent.
40. At this time Dr Al-Zletni should have discussed the birth plan with the pursuer and Midwife Hearse, in order to obtain the pursuer's consent to the continuation of labour in face of the possibility that the fetus was suffering hypoxia. In particular, she should have discussed whether, if the birth did not proceed as quickly as anticipated, it should be expedited. Whether this was a breach of duty is a matter for the court and not expert witnesses. See legal analysis above. What would have happened thereafter is for the subsequent proof on causation and quantum."

[223] The proposed findings relative to the consent case are those numbered 36 (last sentence) and 39 to 40.

Pursuer's submissions on the witnesses

[224] Mr Milligan's submissions on the pursuer's witnesses were as follows:

- 1) *The pursuer*: She was a credible and reliable witness who was very clear in what she could and could not remember. Her evidence was that the registrar did not at any stage discuss the trace with her, nor discuss a management plan for the remainder of labour. Most importantly, she did not obtain the pursuer's consent to continuation of labour.
- 2) *The registrar*: She was not a credible or reliable witness. She had no recollection of the events and her own notes are virtually non-existent. She was a very difficult witness to follow. Her answers were rambling, unfocussed and often impossible to understand. She did not give the impression of being a competent registrar, even allowing for the fact that she has not practiced for four years

(something on which she relied when unable to answer some questions). It was important to note that at the time of these events she was sufficiently senior to be eligible for a consultant post. Much of her evidence was internally inconsistent e.g. she maintained that she was certain that the trace was reassuring yet also maintained that she would have had a management plan for the delivery to be within a few contractions (ten to at most 15 minutes), which failing she should be called back. This is inconsistent with the notes, which simply record “carry on pushing” at 22.33. She did not make any notes of her own, or record her plan, which she accepted was poor practice. As a result we don’t know what her interpretation was of the features of the trace or her classification of the trace. In light of the other expert evidence, it must be assumed that the trace was at least “suspicious” at the time she reviewed it. When she looked at the trace again in evidence, she identified decelerations after the change in maternal position at 21.25. There is no reason that she would have seen them differently at the time. She accepted that the baseline was difficult to determine between 21.30 and the time of her review. She accepted that she could not explain the cause of the perceived accelerations. This demonstrates that she did not have an understanding of the underlying pathology and physiology, which is an essential requirement in interpreting a trace. Most importantly, she accepted that she should have discussed the management plan with the pursuer and obtained her consent to continuing with labour. Indeed, at one point her evidence was that she would have discussed such a plan with the pursuer and the midwife, although in the end she accepted that she probably did not and there is a joint minute to this effect.

- 3) *The midwife*: She had no recollection at all of the events and so was restricted to what was in the notes. She was very resistant to answering any hypothetical questions. She talked about the variability being “so good” but ultimately accepted that it was only 5-8 bpm, which is only just within the normal range, which is 5-25 bpm. At times, it was not even that high e.g. between about 21.12 and 21.17. Although the defenders argued that she was happy with the trace, that is not reflected in the notes, which indicate that she was struggling to ascertain the baseline and called in medical review at 22.30. Crucially, she said that she would have been very reassured by what she was told by the registrar, as she was a very senior registrar at this stage. She also denied that delivery was imminent, as the registrar seems to have assumed. This indicates a breakdown in communication and illustrates the need for informed consent.
- 4) *Dr Smith*: He was a highly impressive, well qualified and objective witness who routinely provides opinions for both pursuers and defenders. His opinion was well reasoned and he made appropriate concessions, particularly in relation to the early part of the trace. In his clinical practice, from 1996 to 2013, he saw thousands of traces. After 22.10 there was no room for dispute that the trace was pathological (even Professor Murphy accepted that the trace from 22.10 was very difficult to interpret). There were atypical decelerations, a rising baseline and reduced variability (no variability from 22.12 to 22.26). There was also excessive uterine activity, which would explain rising baseline. By 22.30 the baby was easily deliverable and so there was no point in FBS. The only option was to expedite delivery with forceps, ventouse or possibly even just episiotomy. Like all of the experts, he noted that accelerations synchronous with contractions were

very unlikely. Indeed, nobody has been able to offer a physiological explanation of how it is ever possible.

- 5) *Dr Hanretty*: He was the least experienced in medico-legal terms and often the more authoritative because of that. His terminology was often more illuminating than recitation of dry legal formulae eg when asked whether an ordinarily competent registrar acting with reasonable care would have made such an interpretation, he said that he would not want to work with a registrar who made such mistakes. This brought home the true flavour of the *Hunter v Hanley* test. He made no secret of the fact that his natural sympathy was for what he termed the clinician at the coal face and would not have hesitated to say if he did not think there was a good case. As he said, he would not have got involved. He explained why it is more normal to get decelerations than accelerations in second stage. One was more likely to get cord compression, which causes decelerations, and less likely to get fetal movement, which causes accelerations. He also explained why, if there is a normal baseline in the last half hour of trace, that is consistent with earlier hypoxia – the baby has become so hypoxic that it cannot achieve tachycardia any more. It is trying to reach a higher baseline but could not.
- 6) *Mr Walkingshaw*: He was a hugely impressive witness who was clear, authoritative, measured and reasonable. His first involvement was back in 2009 and he has not changed his mind since. It did not take him long to recognize the change in the trace at 21.26 and the problems with the trace thereafter. He has never seen a pattern like this before and thought that it was unlikely that the midwife would have seen such an abrupt change without a disaster as an explanation. He estimated that he had seen over 10,000 traces in his career. He

could not see any 2 minute period between 21.26 and 22.30 where there was a settled FHR at the levels suggested by Professor Murphy. That can be objectively tested by looking for four consecutive boxes at the same level. There were none. Where one can't determine the baseline, the only point of reference was the last stable section of trace, which is 130-140 bpm before 21.26. He said that the presence or absence of reduced variability was a neutral factor in the face of decelerations, although he did accept that it was more normal to see a reduction in variability. He explained that the hypoxia was caused by cord compression (with which proposition Professor Murphy agreed in her 2nd Report). Cord compression was known to cause decelerations. It was not known to cause accelerations, which were normally caused by fetal movement. He said that a solely accelerative trace, without decelerations, was extremely rare. He contrasted the earlier trace (6/38), which shows some accelerations synchronous with contractions but others with different timings, length and height and also minor decelerations, with the later trace, which shows bizarre "excursions" with every contraction, all looking much the same.

Mr Milligan submitted that a striking feature of this case is that each of the pursuer's experts gave the same interpretation completely independently of each other.

[225] He next turned to address the evidence of Professor Murphy. In his submission, her evidence did not provide the court with the necessary body of responsible expert opinion, for the following reasons:

- 1) She was not an independent, impartial expert. Unlike the other experts, she provided reports predominantly for defenders. Ninety percent of her work in Scotland was for the CLO. Why should this be? Was it, he wondered, because she is like Dr Hanretty and has a natural sympathy for the clinician at the

coalface? Or was it pure coincidence? Either way, it was clear, he submitted, that she had lost her objectivity as demonstrated by her reports, in which factors favourable to the defenders were highlighted whereas none of the obvious contrary factors are. In her evidence she was defensive and dogmatic.

- 2) She had an unusual and unrepresentative approach to unassisted birth. As demonstrated by her own example of her delivery in February 2015. (This was case A of her 2nd Report). Despite knowing of the catastrophic outcome of the present case, she was prepared to allow the birth to proceed naturally. It appears that she did not even obtain the mother's informed consent, in clear breach of her duties as stated in *Montgomery*. Indeed, just like Dr McClelland in *Montgomery*, she deliberately concealed from the mother the extent of the risks involved. It should be noted that none of the other experts thought that her trace was similar – there are clearly variable decelerations as well as accelerations, we don't know what the earlier baseline rate was, the accelerations are of a completely different shape and the existing baseline rate is much easier to identify.
- 3) Her approach was at total odds with all of the other experts in the case, including no fewer than four other consultant obstetricians. Even the defenders' other expert, Dr Sanders, accepted that the trace was not normal, to the extent that she suggested it must be the maternal trace. Nobody could explain what would or could cause these accelerations.
- 4) She relied heavily on the NICHD nomenclature. However, when one applied her own criteria to the baseline between 21.30 and 22.30, there was no 2-minute period of stable FHR. Accordingly, by her own definitions she had to accept that a stable baseline cannot be established for the hour before 22.30 when the registrar reviewed the trace.

- 5) She was a dogmatic and defensive witness who was not prepared to consider alternative scenarios and hypotheses. Her answers were long, rambling and often unrelated to the question. Much of her evidence must have been of little or no assistance to the court. An illustration was her response to her misrecording of the baseline heart rate after 21.30 as 130bpm. What should have been a simple acceptance of an understandable error turned into a protracted and confusing chapter of evidence. It was a clear example of her refusal to make even the most basic of concessions. This should be contrasted with the evidence of the experts instructed by the pursuer, particularly Dr Smith. The position was even more blatant in relation to the trace before the change in maternal position. In her reports she agreed with everyone else that the rate was 130-140bpm but in evidence she tried to change that to 120bpm to make it more consistent with the subsequent trace.
- 6) A key foundation of her evidence was that she maintained that the baseline for the FHR can only be measured between contractions, as that is the only time it is stable. This assertion is not mentioned in either of her reports. It was not put to any of the defenders' experts. It is not supported in any of the literature. It is not supported by the parts of the trace that show stable heart rate during contractions for most of labour. It is also inherently unlikely – if contractions are normally three to five in each ten minute spell, how could one ever get a two-minute period of stable heart rate between them?
- 7) She was very reluctant to consider hypothetical propositions and in particular the interpretation placed on the trace by the experts instructed by the pursuer. She repeatedly said that the interpretation was just wrong, rather than answering the question as hypothetical.

- 8) Although she was only asked to give evidence in court in relation to the acts of the registrar at 22.30, Professor Murphy continually referred to aspects of the trace that would have been irrelevant to the registrar. The most obvious example was the section of trace right at the end of labour, which she said most clearly illustrated a stable baseline. However, she also referred to the initial section of trace, which she accepted would not have been considered by the registrar. In so doing, she was guilty of exactly the kind of retrospective analysis she was so critical of for the other doctors.
- 9) Professor Murphy's assessment of liability was predicated upon the assumption that the registrar was very busy with other cases at 22.30. There is no evidence at all to support that hypothesis. Just because she was busy before and afterwards does not mean she was busy at this particular point. It would have been easy enough for the defenders to produce ward records if they wanted to argue this line.
- 10) Ultimately, even Professor Murphy had to accept that the trace was not reassuring at 22.30. On any view, at that time it was suspicious (although it may have been considered normal over the following hour). If that was the case then she accepted that the registrar should have relayed her concerns to the pursuer (he also noted the algorithm, at the top of page 2: see paragraph [16] above). This accords with the registrar's own evidence. However, bizarrely, Professor Murphy did not consider that she would require the consent of the pursuer to continue with labour. She considered that she would only require consent if she was proposing intervention. This is both illogical and contrary to *Webster* (see above).

Other reports Mr Milligan referred to

[226] Finally, although Dr Sanders had not been called to give evidence, Mr Milligan invited me to take her report into account. Her report is agreed as part of her (untested) examination in chief. Although it was repeatedly suggested that she agreed with the interpretation of the registrar and the midwife, in fact her own primary interpretation was that this was the maternal heart rate. This, he submitted, demonstrated how unusual this trace was (as she noted in both of her reports). He also referred to the report of Roddy Campbell (No 6/12 of process), which he accepted had not been spoken to directly but was consistent with all other reports apart from Professor Murphy's.

[227] He moved for decree finding that the defenders were liable to make reparation to the pursuer and to fix a proof in relation to quantum and causation.

*Submissions on behalf of the defenders**The two issues for determination*

[228] Mr Ferguson submitted that there were two key issues for determination:

- 1) Whether, by not undertaking operative delivery at 22:30, the registrar failed to do something that no obstetrician of ordinary skill would have failed to do if acting with ordinary care. This question was intimately related to whether the CTG could reasonably have been interpreted as other than pathological (whether normal or suspicious). These two matters were inextricably linked; and
- 2) Whether the registrar should at 22:30 have informed the pursuer of the risk of fetal compromise (ie brain damage) and obtained her consent to continue with labour. This question is also wrapped up with whether the CTG could reasonably have been interpreted as other than pathological.

The cases on record which the defenders had to meet

[229] Mr Ferguson noted that there were only four cases made against the registrar on Record, albeit one of these could be ignored. These were:

- 1) that when the registrar reviewed the CTG at about 22:30, she wrongly interpreted the CTG. This duty was expressed two ways: by interpreting then CTG as normal or reassuring (Record at page 19) and by interpreting the CTG as other than "clearly pathological" (Record, page 8 C-D);
- 2) the failure (at that time) to expedite delivery by episiotomy, ventouse, or lift-out forceps;
- 3) while there was a case on Record about an alleged failure to summon the neonatal resuscitation team to attend the delivery, this can be ignored. No evidence had been led in support of it; and
- 4) for the consent case, the failure to inform the pursuer of the risk of "fetal compromise", and to obtain her consent to the continuation of labour. "Fetal compromise" meant: "that the baby might experience a period of hypoxia-ischaemia resulting in brain damage" (*per* the Record at page 9A). Put simply, Mr Ferguson submitted that this meant that that her baby was at risk of brain damage if she continued in labour.

The matters not on record and which the defenders did not have to meet

[230] Mr Ferguson submitted that it was important to note the cases that had not been made against the registrar. (None, he noted, was mentioned in the Agreed Summary of Background Facts and Issues.) In particular:

- 1) First, he noted that there was no "stand-alone" case of a failure to respond to the small fundal height. Such averments as there were (at page 5 A-B on Record)

were not mirrored with averments of fault and were, in any event, said to be a normal practice of midwives (cf. obstetricians). In any event, neither Mr Walkingshaw nor Professor Murphy was concerned about the size of the baby, and Dr Smith accepted that the size of the baby would have led to continuous CTG monitoring which was what was done anyway. Accordingly, he renewed the objection made during Dr Smith's evidence-in-chief. It was not put to the registrar that she should have taken the fundal height into account when she was reviewing the CTG at 22:30.

- 2) Secondly, there was no case made that tests (and in particular FBS) should have been undertaken at or following the review at 22:30. Mr Ferguson objected to this line when questions were put to the midwife and to Dr Hanretty.

Mr Milligan had given an assurance that it was not his intention to open up another basis for a finding in negligence and the question was withdrawn (when put to the midwife). Mr Ferguson founded on this. In any event, as he had it noted, Dr Hanretty's evidence had been that "If the CTG was unusual or suspicious I believe it mandatory to seek reassurance that the baby is not suffering hypoxia, and if not reassured that delivery is undertaken". However, this belief was not the test in *Hunter v Hanley*. He was not asked whether, nor did he state that, a failure to seek reassurance was a failure that no obstetrician of ordinary skill would be guilty of if acting with ordinary care. That is the relevant test in law. Accordingly, whatever Dr Hanretty's belief, and no matter how strongly held, this not the same thing.

- 3) Thirdly, there was no Record for a failure to "have ensured that clear instructions were given regarding the necessity of expeditious birth and ensured that they had

been complied with." (*Per* Dr H'anretty's report, 6/4, page 5). He renewed his objection to this evidence.

- 4) Fourthly, there were no averments to the effect that the registrar should have erred on the side of caution when deciding the management plan. He renewed the objection he had made at the end of the re-examination of Dr Hanretty (see paragraph [92(5)], above).
- 5) Fifthly, there were no averments to the effect that the registrar should have made a note of her findings and plan when she reviewed matters at 2230. He renewed the objection made during her examination-in-chief. Again, Mr Milligan had given an undertaking that he was not making a freestanding case about making a note. Rather he submitted it was part of the consent case.
- 6) Lastly, while Mr Walkingshaw had referred to possible recordings of the MHR, there were no averments about this.

[231] Under reference to *Hunter v Hanley*, Mr Ferguson also submitted that there were features of the evidence that fell outwith the correct legal test. *Hunter v Hanley* was, he submitted, a stringent test that places an onerous burden on a pursuer: "no doctor would be guilty of..." This fell to be considered in the context of Dr Hanretty's evidence about FBS. It can also be illustrated by Dr Hanretty's use of the phrase "erring on the side of caution/safety". A failure to err on the side of caution was not negligent unless no doctor would have failed to err on the side of caution. Mr Ferguson stressed that that was not his evidence. He noted that towards the end of his re-examination, Dr Hanretty was asked a leading question about erring on the side of caution. He answered to the effect that one would err on the side of safety of the mother and child, if one could call it erring. He was not asked if all obstetricians would have erred on the side of caution in those circumstances.

[232] More importantly, Dr Hanretty had, he submitted made two concessions that fundamentally undermined the Pursuer's case that when the registrar reviewed the CTG it could only properly have been interpreted as pathological, and that operative delivery was mandated at 22:30.

- 1) In his report (at p 2) and in oral evidence (at the beginning of cross)

Dr Hanretty had accepted that some obstetricians could interpret the trace as normal/reassuring in the period up to 22:20. Also in cross, he accepted that 22:20 could be "stretched" to 22:30 (see paragraph [91], above). The corollary of this is that he accepted the trace could be legitimately interpreted as normal at the very time the registrar reviewed the CTG. In other words, at 22:30 to interpret the CTG as normal/reassuring was not negligent; and

- 2) Earlier in cross, of his own volition, Dr Hanretty had referred to Professor

Murphy's 1st Report (at page 25, paragraph 9.6 (iii)) where she stated: *"One could argue that any CTG that appears unusual, as in this case, warrants intervention by fetal blood sampling or operative delivery."* Mr Ferguson pointed out that he had read to him the whole of paragraph 9.6 (iii), in particular Professor Murphy's opinion that to intervene in these ways would have been *"an excessive response"*. In response to a question, *"Do you accept that some obstetricians could reasonably and responsibly hold an alternative view to the one expressed by you as regards the need to intervene by blood sampling or operative delivery?"*, Dr Hanretty had said: *"I suggest that Professor Murphy is in a very small minority"*. When Mr Ferguson had asked, *"So the answer to my question is yes is it, albeit that it is a very small minority?"* Dr Hanretty had replied *"yes"*. In other words, an obstetrician who did not intervene by FBS or operative delivery at 22:30 was not negligent.

Mr Ferguson submitted that neither of these concessions was the subject of adequate rehabilitative re-examination. The making of these concessions was sufficient to dispose of the first critical question for determination he had identified.

[233] The same issues were taken up with Dr Smith. In cross and at the end of cross he had conceded on more than one occasion that if the trace could be interpreted as normal some reasonable and responsible obstetricians would not intervene to deliver operatively. In broad terms he agreed with the concessions made by Dr Hanretty. In re-examination, Dr Smith was taken back to the conclusion of his report. He said his opinion had not changed since writing the report and, when it was put to him that a very small minority might hold a different view and asked to reconcile his conclusion with the concessions made, he replied that he would regard an individual who reached that conclusion as incompetent. Mr Ferguson submitted that the court should be slow to accept what was said in re-examination as a final and definitive position. If Dr Smith genuinely considered those obstetricians who were in the "very small minority" as incompetent he could easily have said so instead of making the concessions he did. He suggested that his position in re-examination lacked conviction and might be thought to be little more than a recognition on his part that that was what he was expected to say.

[234] In the light of these matters, Mr Ferguson submitted that there was not a proper basis to permit the court to reject Professor Murphy's interpretation of the trace or her opinion that intervention to deliver operatively was not mandated. Her understanding of the facts was neither mistaken nor incomplete. Despite guidance, the interpretation of CTGs was not an exact science that can yield only one "correct" interpretation. Inter-observer variation amplified the "ample scope for genuine difference of opinion" making it harder to reject Professor Murphy's opinion. She had given a reasoned explanation for her interpretation under reference to the NICHD with objective criteria that helped to "blind" her to the knowledge of the adverse outcome. Drs Hanretty and Smith had made concessions that were

in line with Professor Murphy's opinion. If anything, it is Mr Walkingshaw who was "out on a limb".

[235] Just as compelling expert evidence is required to demonstrate that an opinion held by another expert as to a practice is one that the expert could not have held if he had taken care to analyse the basis of the practice, so too if an interpretation of the CTG trace is to be rejected as untenable or illogical. There was no such compelling evidence in this case. The alternative interpretation (classifying the trace as pathological) was not a watertight explanation. There was at least a question mark over the independence of Dr Hanretty and Mr Walkingshaw (see below), and the pursuer's experts did not all speak with a single voice. For example: Dr Smith and Dr Hanretty had accepted the CTG could be interpreted as normal until 22:10/22:15 and 22:30, respectively. Mr Walkingshaw, on the other hand, would not accept that the trace could legitimately be interpreted as normal after 21:26. Only Dr Smith spoke of reduced variability, which in oral evidence became absent variability, a distinction he sought rather unconvincingly to deny.

[236] Mr Ferguson went so far as to contend that there were good reasons to question the "pathological" interpretation. Dr Smith was influenced by knowledge of the adverse outcome. None of the pursuer's experts took any positive steps to avoid unconscious bias. The interpretation of the trace as pathological was dependent on establishing the baseline FHR as "high". The pursuer's experts' explanation of why the baseline was to be considered to be high was unsatisfactory and amounted to little more than assertion. The ruler measure to identify the baseline might be a convenient/useful means of doing this in clinical practice, but it did not provide the Court with a proper or reasoned explanation of why the baseline should be considered to be "high". It was little more than the experts saying: "This is where I consider the baseline to be." (On the other hand Professor Murphy had provided reasons for her interpretation of where the baseline lay: she had identified sections of the trace where the

duration of the baseline was at least two minutes, as required by the NICHD guidelines.

Mr Wakingshaw had accepted that the “peaks” of the FHR trace (the upper of the two traces) where he said the baseline lay, did not last at least two minutes. It followed that his convention of three to five minutes is not met either.) Finally, the expectation that prolonged decelerations would lead to reduced or absent variability was not met (cf Mr Walkingshaw who considered this to be a neutral feature).

General comments on the expert evidence

[237] Mr Ferguson had four chapters by way of general comments about the expert evidence: (1) the issue of independence; (2) the influence of knowledge of an adverse outcome; (3) general observations on the expert evidence, and (4) other aspects of it.

[238] In relation to (1), he referred to the recent restatement of the duty of impartiality by the Supreme Court in *Kennedy v Cordia* 2016 SC (UKSC) 59, at paragraphs 52 to 53. He took two points from this: first, that expert evidence presented to the Court should be, and should be seen to be, the independent product of the expert uninfluenced as to form or content by the exigencies of litigation. Secondly, an expert witness should provide independent assistance to the court by way of objective unbiased opinion in relation to matters within his expertise. An expert witness should never assume the role of an advocate. Accordingly, the evidence of an expert who lacks independence may be inadmissible or cannot bear any weight - in other words weight cannot be placed on it (*per Kennedy*, at para 51). He also referred to the comments of Stuart Smith LJ (quoted in *Dineley* at para 39).

[239] After these general comments, he turned to consider independence of some of the experts:

- 1) *Dr Hanretty*: An independent expert will simply accept instructions. However, Dr Hanretty's decision to become "involved", as he put it, suggested that he has assumed the role of advocate. This view is reinforced by the terms in which he criticised Professor Murphy, saying it was "very alarming that she herself is the only person capable of being dispassionate and apparently all who disagree with her lack her skills". This was further reinforced by his use of the word "untenable". While he withdrew this, it was a word that ought not to have found its way into his report if it could not be substantiated. Its presence was indicative of a bias. There was, moreover, his "colloquial" description of the registrar as "Not any registrar I'd be wanting to work with". This was not language one would expect from a truly independent expert. Furthermore, he had seen the reports by Dr Smith and Mr Walkinshaw. The latter had stated (at para 9.15) that "the duration of the insult is consistent with the cord blood gas results, condition at birth and ultimate outcome." Mr Ferguson suggested it was inherently unlikely that Dr Hanretty would not, at least subconsciously, be influenced by the views of another well-qualified expert obstetrician. He did accept that, unlike Dr Hanretty, he did agree with many of the points being put to him. In the light of what he submitted was Dr Hanretty's apparent lack of independence was that the weight that could be attached to his evidence was diminished, and that weakened the case that might otherwise have formed a foundation for mounting a challenge to the logicity of Professor Murphy's evidence.
- 2) *Dr Smith*: Mr Ferguson focused on Mr Walkingshaw's suggestion (noted above, at para [109]), that the experts and medical witnesses who had said the trace could be interpreted as normal/reassuring had got it wrong, because they were

not viewing it from an independent point of view. He later conceded that he had no basis for saying that Professor Murphy lacked independence. However, a truly independent expert would not be expected to make such an unfounded assertion.

- 3) *Mr Walkingshaw*: He had expressed his opinions forcefully and, unlike Dr Hanretty and Dr Smith, had accepted few, if any, of the points put to him in cross. Mr Ferguson identified three instances: (i) In paragraph 6.3(a) of his report, he had referred to the conventional three to five minute timeframe to establish a baseline. When challenged about the source of this convention, he had stated that it came from the definitions in the Guidelines. He would not accept that there was no such definition. He ought to have conceded the point and explained the true basis of his "convention". A truly independent expert should concede points that have a proper foundation. (ii) He was dismissive of the suggestion that the midwife had an advantage over the experts because she could hear and feel what was happening as well as looking at the trace, and the 16 noted FHR readings taken from the digital display at the end of each contraction were apparently of no significance. This was to be contrasted with Drs Smith and Hanretty. (iii) If anything, he has become more trenchant as cross continued. He was adamant that Professor Murphy's interpretation was wrong - the "normal" interpretation was "incompetent, illogical and unreasonable", and her reference to a pattern of accelerations at about 16:20-16:30 (*per* her 1st Report, at paras 5.2 and 8.3) was "nonsense" and "contrived", none of which is the language one would expect to hear from an expert detached from the case he is being asked to comment upon. From all of this, Mr Ferguson made the same submission he had in relation to Dr Hanretty, that this diminished the weight that can be

attached to this evidence, with a consequent weakening of any case to challenge Professor Murphy's evidence.

- 4) *Professor Murphy*: While she did the majority of her medico-legal work for defenders, and that in Scotland she had been instructed only by the CLO, this did not mean that she lacked independence. She also provided reports for pursuers. It was not, and could not properly have been, suggested that she preferentially accepted instructions from defenders. The decision whether to defend a case in court was a decision for the lawyers in the light of all investigations and taking other factors into account, and not a decision for her. She was willing to make concessions - eg that at 22:30 the trace was properly to be interpreted as suspicious (cf her 1st Report at paragraph 5.7); and that she could not rely on later sections of the trace when interpreting the trace at 22:30.

[240] In relation to (2), concerning the knowledge of the adverse outcome, Mr Ferguson submitted that this was demonstrated by the BJOG papers, and which was accepted by the pursuer's experts. However, the registrar's actions had to be judged in the context of the knowledge available to her, and what she knew or ought to have known. He submitted that the pursuer's experts had, at least subconsciously, been influenced by the knowledge that Baby B was born acidotic at birth and suffered from cerebral palsy.

[241] Dr Smith had accepted in cross that the outcome had been part of his thought process when he came to interpret the trace. Dr Hanretty had claimed to have taken the same steps as Professor Murphy to avoid falling into the trap of being influenced by the knowledge of the adverse outcome. It was, he said, an easy accusation to make. However, he did not in fact take the same steps as Professor Murphy because he did not use the objective criteria offered by use of the NICHD terminology, such as the period of at least 2 minutes to determine the baseline. His description of the "hostile environment" appeared

to be influenced by the knowledge of the poor outcome. Mr Walkingshaw had permissibly looked retrospectively (ie at the outcome) for the purposes of his discussion of causation. However, there remained a clear danger that, when considering negligence, his interpretation of the CTG could be, at least unconsciously, influenced by knowledge of the outcome. Dr Smith had fallen into that trap. In the absence of positive steps to avoid doing so, Mr Ferguson submitted that Mr Walkingshaw did the same.

[242] Mr Ferguson then turned to make general comments on the expert evidence being his chapter (3). He readily accepted that all of the experts were well qualified to comment on all aspects of the case. No issue of a lack of qualifications or experience arose. All the experts agreed that determining the baseline was the critical first step; only once the baseline had been determined could one say whether there were accelerations or decelerations from it. All accepted that there are considerable inter-observer differences when interpreting a CTG. However, in his submission, the pursuer's experts had interpreted that CTG in an artificial environment, over long periods, and on many occasions. This was in stark contrast to the situation in which the registrar interpreted the CTG. It was however fair to say that Dr Smith and Mr Walkingshaw said that they formed the view that the CTG was abnormal quite quickly. However, he submitted that in the knowledge of the adverse outcome, the court should be slow to accept an interpretation of the CTG that was based on an examination of the trace alone and in a very different setting from the labour room.

[243] In relation to (4), Mr Ferguson addressed the evidence of the experts on the CTG interpretation case. He summarised their evidence as follows:

- 1) *Professor Murphy*: The CTG at 22:30 should be interpreted as no more than suspicious. If so, and accepting the CTG was unusual, Professor Murphy considered that intervention to expedite delivery with forceps or ventouse was an “excessive response” - in other words, not all obstetricians would have intervened

in this manner because of the unusual appearances of the CTG trace. In her view, watching and waiting was the appropriate management plan to follow. If the CTG changed thereafter or progress in labour was slow (a much longer period than the pursuer was allowed to continue labouring) the obstetrician should have been called back to review matters. (This did not happen in this case because the CTG did not change and progress in labour was acceptable.)

- 2) *Dr Hanretty*: Mr Ferguson referred to his concession that some obstetricians could reasonably/responsibly interpret it as normal/reassuring up 22:30 (ie when the registrar was reviewing the CTG). He was not re-examined on this. In chief, he had stated that if the CTG was not interpreted as normal/reassuring with accelerations, reassurance needed to be sought and, if that was not forthcoming, intervention was mandated by the fact the appearances of the CTG trace were unusual. In cross, he had also conceded that if at 22:30 the CTG could be interpreted as normal, intervention to deliver operatively was not mandated. He was not re-examined on this. These concessions weakened the CTG interpretation case.
- 3) *Dr Smith*: He had interpreted the CTG as pathological from 21:25, although he accepted that it could be interpreted as normal/reassuring until about 22:10/22:15. In his view, variability was significantly reduced/absent in the period between about 22:10 and 22:30. But he was the only expert who saw reduced or absent variability on the trace. After 22:10 the CTG was to be interpreted as pathological because there was a rising baseline, reduced variability and late or atypical variable decelerations.
- 4) *Mr Walkingshaw*: He had interpreted the CTG as pathological from 21:26 onwards. In any event, intervention to expedite delivery was mandated at

22:30 because the CTG was pathological. He had stated that it was possible to interpret the CTG as normal/reassuring but it was not logical, reasonable or competent to come to that conclusion. If the CTG could be interpreted as normal/reassuring, intervention to expedite delivery at 22:30 was not mandated.

Mr Ferguson observed that none of the pursuer's experts suggested that a suspicious trace mandated intervention to deliver operatively. Dr Hanretty had spoken about unusual traces. The issue of what a suspicious trace required was put to Dr Smith under reference to the Guidelines and the algorithm. The former stated that where a trace is suspicious "conservative measures should be used", the latter recommended intervention only where a CTG was classified as pathological.

Submissions on the experts

[244] Mr Ferguson considered the evidence of the experts individually. I do not repeat the points already made above. The additional points made were as follows.

[245] In respect of Dr Hanretty's evidence, he made the following additional points:

- 1) He could not explain why those who interpreted the CTG as other than pathological got it wrong.
- 2) The evidence about erring on the side of caution was irrelevant, as was his evidence as to what the registrar should have done if she was unsure. There was no evidence that she was unsure about the CTG or considered it unusual. The registrar was sure when she left the room. There was no factual basis for Dr Hanretty's argument that competing interpretations should have been in her mind and which should have led her to intervene. At its highest, his evidence about an unusual or suspicious trace went no further than that it merited investigation to seek reassurance that the baby was not suffering hypoxia. To

intervene when a pattern was not recognised, would be contrary to the Guidelines.

- 3) His view that delivery would have been easy was also influenced by his knowledge of the outcome. He put this another way, if it is correct to say that operative delivery might be anticipated/thought to be relatively easy (and with few or low attendant risks), that was not a sound/logical basis to intervene to deliver operatively where that is not otherwise indicated, because the CTG warranted a wait and see approach. That some more risk-averse obstetricians might intervene is not to say that intervention was mandated, or that any obstetrician who failed to do that would be negligent tested to the standard in *Hunter v Hanley*.
- 4) Dr Hanretty's acceptance that the CTG maintained good variability was difficult to reconcile with an interpretation of a high baseline with decelerations. If there were decelerations, variability would be expected to be absent or significantly reduced. It was definitely a more common association.
- 5) He accepted that if the NICHD criteria were applied in interpretation of the trace, none of the "peaks" (which is where he had interpreted the baseline to be) lasted for at least two minutes and none of them lasted for more than ten minutes. It followed from this that by this method the "peaks" could not be the baseline, rather the peaks had to be accelerations.
- 6) Accepted that, with the possible exception of the size of the fetus, the wider clinical picture was not a cause for concern. (Mr Ferguson made the point that, in respect of such a concern, the recommendation was for fetal monitoring, which had taken place here).

- 7) Dr Hanretty had accepted that the midwife had an advantage when interpreting the CTG because she could feel the uterine contractions with her hand on the maternal abdomen and could hear the FHR. (This was to be contrasted with Mr Walkingshaw).

[246] In relation to Dr Smith, Mr Ferguson made the following additional points:

- 1) Dr Smith accepted that there were no sections of the material part of the CTG where the baseline could be determined to be at the “peaks” of the FHR trace for at least two minutes.
- 2) He said there was a hypoxic insult due to excessive uterine contractions in a ten-minute period between about 22:15 to 22:25, which reduced when the contractions became less frequent. It was difficult to avoid the conclusion that Dr Smith's opinion on the matter was influenced by knowledge of the adverse outcome. He had described: “Trying to work out, can the tracing explain why this baby had adverse outcome.” He accepted that the midwife listening to the trace as well as looking at it supplements the visual appearance, and she would have a general idea overall of what the baseline was likely to be.
- 3) In addition to the concession already noted, Dr Smith had agreed in cross that if the trace was reasonably interpreted as normal, there was no reason to intervene, later qualifying that to when the clinician is entirely convinced that the trace is normal. Yet, he also confirmed that neither the Guidelines nor the algorithm recommended intervention where a trace was suspicious.

[247] Mr Ferguson next turned to Mr Walkingshaw's evidence.

- 1) He had evinced surprise that Professor Murphy had interpreted the CTG as she had.

- 2) He accepted that there were no concerns with the wider clinical picture in which the CTG was to be understood.
- 3) To interpret the CTG as normal/reassuring was possible but was not competent, logical, or responsible - his interpretation was that the CTG was "pathological".
- 4) In his view, the primary error made by Professor Murphy was in re-ascribing the baseline to a lower rate than it had been. In essence, his criticism was that the baseline was never in one place long enough to allow Professor Murphy to say that it was at the rate.
- 5) He accepted that his baseline did not meet the two minute criterion of the NICHD paper. It followed that it did not meet his conventional three to five minute period either. When faced with this he stated that Professor Murphy's baseline didn't meet the two minute criterion, as she had apparently added two periods together, and his explanation of the trace moved to cord compression.
- 6) He alone did not accept that a reduction of variability could be expected if the trace showed a high baseline with decelerations; it could be, but not always. It was a neutral factor.
- 7) He had accepted that variability was normal throughout. In re-examination, Mr Milligan had put a statement from the ACOG to him (see para [41], above) with which Mr Walkinshaw had agreed. Mr Ferguson argued that the Court could not place any weight on his assent to what was being suggested to him, namely that in most cases of adverse neonatal outcome normal FHR variability was demonstrated. This was because Mr Milligan had been very selective in what he put to the witness. When he had put the same point to Professor Murphy in cross, she had replied that one needed to read the next sentence. This stated that the study referred to was "limited because it did not consider other

characteristics of the FHR tracing..." The passage concluded: "Thus, in most cases, normal FHR variability provides reassurance about fetal status". From this Mr Ferguson submitted that maintained good variability should be seen as a reassuring feature.

- 8) Mr Walkingshaw could not reconcile the notations about the "head on perineum" and "head advancing".
- 9) In contrast to the other experts, he was quite dismissive of the suggestion that the midwife had an advantage or a broader understanding of what the FHR was doing.

[248] Finally, in relation to Professor Murphy, he made the following points:

- 1) He commends her evidence. She was highly qualified and experienced, as well as an academic. She presented as authoritative.
- 2) She had taken the conscious step to blind herself to the knowledge of the adverse outcome and approached the interpretation of the trace systematically and thoroughly, recognising the wider clinical picture of no real concerns. She gave cogent and coherent reasons why the trace could and should be interpreted as normal or not more than suspicious, and why it could not properly be classified as pathological.
- 3) It cannot properly be said that her opinions were based on a mistaken or incomplete understanding of the material facts, or were untenable or illogical, or that her conclusion as to how the CTG could be interpreted was indefensible or impermissible.
- 4) She accepted that the CTG was unusual, but that did not mean it should be classified as pathological. On the contrary, the trace met the criteria that allowed it to be classified as a normal/suspicious trace. It followed that the

interpretation/classification of the CTG by the midwife and the registrar was defensible as one that a reasonable and responsible body of medical opinion would reach. It was not negligent tested to the standard of care set out in *Hunter v Hanley*.

- 5) Having identified the baseline, the “peaks” were to be interpreted as accelerations. Accelerations in the second stage mirroring contractions may be unusual, but were not an unknown phenomenon. The Murphy & Turnbull Paper and her own “case A” example were demonstrative of that.
- 6) Importantly, at least in 2005, neither the literature nor the evidence-based Guidelines suggested or warned that the appearance of accelerations mirroring contractions was something that a midwife or obstetrician ought to be wary of or concerned about. There was no criticism of the clinical staff in the Murphy & Turnbull Paper, who observed the florid pattern of accelerations for almost two hours.
- 7) Good variability was maintained throughout, which would not have been expected had there been decelerations as the pursuer's experts contend. (Dr Hanretty had accepted both that good variability was maintained and the argument that this was not what would have been expected had there been decelerations. Cf Mr Walkingshaw who said it was a neutral feature.)

Concluding submission on the evidence of the pursuer and the medical experts

[249] Mr Ferguson's submissions about the pursuer and the medical experts may be summarised as follows:

- 1) *The pursuer*: Apart from noting that the pursuer had very little recall, his only other comment concerned her evidence about an episiotomy. There was no

record for this. This was not put to the midwife and it did not feature in the case thereafter.

- 2) *The midwife*: She was clearly a very experienced midwife, having been in practice for 20 years at the time of events and she was still in practice. Her demeanour strongly suggested she was (and is) competent and knowledgeable, as did her ability to explain a variety of technical terms. Her interpretation of the CTG as normal/reassuring was based on an application of the Guidelines, observing the trace, looking at the digital display of the FHR at the end of each contraction, and listening all the time to what the FHR was doing. As was apparent from her explanation of listening to the FHR, she was, he submitted, uniquely qualified to say what the FHR was doing with/after contractions. Her affidavit explained why she called for medical review and she is not criticised for what she did.
- 3) *The registrar*: It was accepted that she had no recollection of events and could only speak to her usual and normal practice. Her affidavit explained her understanding of what she did and saw when she attended that evening. It explained that she was reassured by a normal baseline, good variability and accelerations with good progress in labour. In her evidence, she explained her arrow markings on the trace as accelerations. She could not explain her note “head on perineum” compared to the midwife’s notes of the head advancing. She agreed that delivery was not in fact imminent. She maintained that she was entitled to reach her interpretation of the trace at the time. She was not in doubt.

The pursuer’s consent case

[250] Mr Ferguson turned to address the pursuer’s consent case. The test to be satisfied is that at paragraph [87] of *Montgomery*. It is axiomatic that if a patient is to be informed of a

risk that the risk be a known risk. Mr Ferguson noted that the only risk which it is said the pursuer should have been told about was that her baby might be born brain damaged if she continued in labour (see Record at p 9A). The management plan at the outset was to labour to a spontaneous vaginal delivery. That plan was not changed at 22:30, nor did it need to be changed.

[251] There was no evidence to suggest an increased risk of brain damage in the circumstances that prevailed at 22:30. He submitted that what risks were involved was a matter for members of the medical profession: *Montgomery*, at paragraph [83]. That being the case, the Court could reasonably have expected some evidence from the Pursuer's experts about the risks of continuing labour when a CTG is classified as suspicious or is unusual. However, there was no evidence to support the argument that that there was an increased risk of brain damage when a trace was normal, suspicious, or unusual.

[252] Alone among the experts, only Professor Murphy mentioned fetal compromise. Fetal compromise was always a risk in the second stage of labour. Here, after the registrar's review, that risk was not increased. It was not explored with Professor Murphy what she meant by fetal compromise and it cannot be assumed that what she meant by that phrase is the same as the Pursuer's plead case (ie brain damage).

[253] In some situations, the Guidelines (or algorithm) recommended or mandated investigation or intervention. Tacit in that is recognition of risk. In these circumstances, consent to intervention would be required. If however, applying the criteria in the Guidelines, a CTG can reasonably/legitimately/properly be interpreted as normal or as suspicious, investigation or intervention was not mandated. Tacit in this is that it was considered safe to continue labour. In these circumstances, where there was no change to the management plan, there was no reason to obtain consent to continue as previously agreed. This is because there is no increased risk. That, he submitted, was the situation here.

[254] He submitted that, perhaps unsurprisingly, there is no evidence that where a trace is normal there were nevertheless risks of which the mother should be informed.

Furthermore, none of the Pursuer's experts suggested that the unusual appearances of the trace should have caused the registrar to inform the pursuer of the risk of brain damage to her baby. Again this is unsurprising, where there was (and is) no consensus as to what this pattern might herald.

[255] There was no support in the teaching materials (Guidelines, textbooks, or other medical literature) for the view that a pattern of accelerations mirroring contractions in the second stage of labour in a CTG that is not a pathological trace, is a pattern that is, or might be, associated with an increased risk of brain damage. On the contrary, the only literature available in 2005 (and indeed now) was the Murphy & Turnbull Paper. The conclusion did not warn that the phenomenon of prolonged and florid accelerations mirroring contractions in the second stage of labour in that case (case two in the paper) heralded an adverse outcome. Rather, that pattern was "probably compatible with a normal outcome". (Both babies in that case study were vigorous by ten minutes of life.) As Dr Hanretty had conceded, the authors of that paper made no criticism of the medical staff caring for the mother/baby in that case - the florid pattern lasted almost two hours before delivery. There was also the anecdotal evidence of Professor Murphy's "case A", in her 2nd Report, which was in keeping with the expectation of a normal outcome.

[256] Given the interpretation of the trace, there was no known material risk to inform the pursuer of, and it was therefore not necessary to obtain the pursuer's consent to continue with labour. At bottom, there was no evidence of increased risks associated with a trace that was at worst, suspicious. There was, therefore, no proper foundation for a finding that the pursuer should have been advised of risks or that her consent should have been obtained to continuing labour.

[257] He renewed his motion that the pursuer's pleas in law should be repelled and the defenders assoilzied.

Discussion

The non-expert evidence

[258] There was little reference in submissions to the non-expert evidence. Most of the relevant evidence concerning liability was comprised of the expert evidence. I can therefore deal with the non-expert evidence shortly.

- 1) *The pursuer*: I found the pursuer to be credible and trying her best to answer the questions put to her. However, not surprisingly, the pursuer had little recall of the details of her labour or her interactions with the registrar. She candidly acknowledged this. Her evidence was (for the purposes of this proof) in short compass. The agreement in the joint minute relative to the registrar's evidence, that she did not discuss the management plan with the pursuer, superseded the pursuer's evidence about this (which she understandably could not recall). That agreement also superseded much of the registrar's evidence.
- 2) *The registrar*: I accept Mr Milligan's submission that her evidence was, at times, confusing and difficult to follow. It does not follow that her evidence lacked credibility. She was obviously under considerable stress in respect of this case. Like the midwife, she had no recollection of the events. She was candid in acknowledging this. The experience of being examined and cross examined in court did not improve her recollection. She was wholly dependent on the medical notes and the CTG. Again, this is not surprising. By the time she came to give her evidence, she had not practiced for four years and the events she was being asked about concerned a night on call 12 years earlier. Her position, which was generally

consistent, was that she had interpreted the CTG as not giving rise to concerns, as normal. There was little utility in asking her repeatedly to interpret the trace or parts of it in the witness box. At most, this demonstrated how she might have approached it. If there were differences, this might go to credibility; equally, it might demonstrate the considerable intra-observer variation that was well recognised in the interpretation of CTGs. The principal feature of her evidence, however, was her consistency regarding the four features of a CTG and, in particular, her understanding that accelerations were a positive sign, not a cause for concern. She also classified variability as good. On that basis, it was likely that she had not identified any cause for concern when she reviewed the CTG and had classified it as normal or reassuring. That is consistent with the midwife's notation, "happy with CTG continue pushing".

- 3) *The midwife*: Like the registrar, she had no positive recall of the events and was wholly reliant on the medical notes and the CTG. She candidly acknowledged that this. None was prompted by giving evidence. I found her entirely credible. She was measured and thoughtful in her answers. She was steadfast, despite repeated questions in cross, about the interpretation she had reached. She was also remarkably consistent in her evidence about her understanding that the presence of accelerations was a reassuring sign and that there was nothing in her training to the contrary. She was demonstrably familiar with the Guidelines and algorithm, and how they fell to be applied in a practical and realistic way in a clinical context. She was meticulous and professional in the medical notes that she took. She had appropriately sought reassurance and received that. In relation to the issue as to what was discussed between her and the registrar and the latter's advice, she had no recollection. The other evidence, especially the notation on the CTG, support the

inference that at about 22:33 the registrar classified the CTG as normal. The midwife was very experienced, even in 2005. Had the registrar advised her that the CTG was suspicious and to adopt a wait and see attitude, I would have expected her to have recorded this and to have acted in the subsequent management of the pursuer's labour accordingly. Such an instruction is likely to have raised a query with her as regards the duration of the second stage. Nothing in the subsequent treatment supports a non-reassuring classification of the CTG. Had she understood that the registrar had had concerns or that there had been a change in the management plan, in my view, she would have recorded this. I accept her evidence.

[259] On the balance of probabilities, having regard to the evidence of the medical witnesses, the terms of the notes in the medical records and the notations on the CTG, I find that it is likely that the registrar concluded that the CTG was normal and that the care provided to the pursuer thereafter proceeded on that basis. In relation to Mr Milligan's reference to the cases of *Keefe* and *Raggett*, these are of no moment in this case. In the light of the other evidence, particularly the notation made by the midwife "happy with CTG keep pushing", that omission did not hinder the making of a material finding nor did it affect my assessment of issues of liability.

Précis of the pursuer's case

[260] Before turning to consider the expert evidence, it is appropriate that I comment on the scope of the pursuer's case. I have set out in paragraph [2], above, the pursuer's legal cases made on Record against the registrar. In submissions, Mr Milligan approached the CTG interpretation case and the failure to expedite delivery case as inextricably linked. As Mr Milligan put it in his written submission, "the registrar failed to interpret the trace correctly **and so** failed to expedite delivery as she should and would have done had she

interpreted it correctly” (emphasis added). Mr Ferguson also treated the CTG interpretation and the treatment cases as inextricably linked. In the main, no distinction was drawn between these two cases in the evidence or in parties’ submissions. I will adopt the same approach.

[261] It is inherent in the pursuer’s approach that the only non-negligent interpretation of the CTG as at 22:30 was as a pathological trace. Putting this another way, the pursuer will only succeed on her first two cases (ie other than the consent case), if it is shown that no registrar of ordinary skill and care would have concluded that the CTG was anything other than pathological. This is understandable because, in terms of the algorithm, intervention was mandated only in the event of a pathological trace. In terms of the algorithm, if the CTG had been classified as “suspicious” immediate intervention to expedite birth was not mandated. For the purposes of the first two cases, it is therefore not necessary to distinguish between a normal and a suspicious interpretation of the CTG. Different considerations might apply in respect of the consent case.

[262] In terms of the consent case, the issue is whether the registrar should have informed the pursuer of the risk of fetal compromise and obtained her consent to continue with labour aiming for a spontaneous vaginal delivery. If the CTG were pathological, then the risk would be obvious and the issue of consent obviously arises. The question of consent is less clear-cut in respect of a suspicious trace.

The defenders’ objections and the scope of the pursuer’s liability cases

[263] I accept Mr Ferguson’s identification of the matters, set out at paragraph [230], above that were not part of the pursuer’s case against the registrar on Record. I uphold his objections on the basis of no Record, where that point was taken (including questions about fundal height or fetal blood sampling). The most important of these, in terms of correctly analysing

the parties' submissions, was that there was no case that the registrar should have erred on the side of caution when determining the management plan. This is important to note, because this contention featured in Mr Milligan's final written submissions. As he had put it, where there were two possible interpretations, one which was common and concerning and another that was unusual but possibly reassuring, it was "illogical" to opt for the latter. (See also no 38 of his proposed findings in fact at para [222] above.) There is no Record for such a case. In any event, notwithstanding that a question was put in these terms to some of the expert witnesses, this is not a relevant legal duty. Even assuming there were the requisite pleadings, the correct question (having regard to the *Hunter v Hanley* test) is whether no reasonably competent registrar acting with ordinary skill and care would have done anything other than err on the side of caution, but would have proceeded on the basis that the CTG was pathological. As Mr Ferguson rightly points out, *this* question was not put to Dr Hanretty. In any event, the weight of the evidence did not support the imposition of a duty in such terms. The algorithm, which guided clinicians in their treatment choices, was fundamentally inconsistent with this approach. Rather, it supported the reverse approach, which was to confine intervention to specific circumstances. "Erring on the side of caution" was not one of these. In the case of a suspicious trace, for example, it counselled conservative measures. Stepping back and considering this contention against the uncontested evidence of the very high rate of false positives, it would be surprising indeed if the algorithm justified intervention in the manner contended on behalf of the pursuer. Even in the case of a "pathological trace", the first intervention was FBS. It was only if that disclosed a particular result, or if FBS was inappropriate, that the algorithm stipulated for an expedited delivery. For these reasons, I accept Mr Ferguson's submission that this was not part of the case against the registrar and that the relative objections to these lines should be upheld.

[264] Mr Milligan fairly accepted that the pursuer's case "was a technically challenging case and is legally difficult ...because she has to prove that the registrar acted as no ordinarily competent registrar acting with reasonable care would have done". He is correct. But the divergence of views among the pursuer's experts rendered an already technically challenging case all the more difficult. Where there was a divergence of views among the pursuer's own experts, an inherent difficulty presents itself: the less favourable view of one expert on a certain feature of her case (eg the concession that the CTG was open to interpretation up to 22:15 or that variability was good) affords a reasonable, responsible and logical basis for not accepting the more favourable view expressed by another (eg the view that the CTG was pathological from 21:26 or that variability was reduced/absent). It is not necessarily a case of levelling down, as it were, to the minimum case of fault. It could be that the pursuer would seek to challenge her own expert on that part of the case where his opinion was more favourable to the defenders than another expert on the same chapter of evidence. However, as the case evolved, I did not understand Mr Milligan to seek to use one of his experts (eg whose view was most favourable to the pursuer's cases) to undermine the evidence of another in respect of a concession.

[265] In practical terms, Mr Milligan may have moderated his presentation of the pursuer's case in the light of this. I did not understand him to seek to prove, for example, his averment of negligence for a failure to expedite delivery as at 21:26. At some points in his proposed findings in fact he did not appear to address that difficulty, ie choosing the most favourable evidence on variability (as in his proposed finding in fact no 32) without expressly reconciling this with the inconsistent evidence of his other experts (which supported an alternative view). As the evidence emerged, Dr Smith and Dr Hanretty modified the position expressed in their reports as to the point in time when the CTG was pathological, or at least as to when, in their view, there was no scope for a reasonable alternative view. They each came to concede that

there might be scope for a reasonable alternative view in the period between 21:26 and about 22:10 or 22:15 (or Dr Hanretty's "stretch" to 22:30). Mr Walkingshaw also accepted that up to 22:15 the CTG was not straightforward. In the light of this evidence, in order to succeed, the pursuer must show that the only non-negligent interpretation of the CTG from about 22:15 onwards was a pathological one.

Matters affecting the interpretation or review of CTGs

[266] Three matters emerged from the evidence and which pose particular challenges in the interpretation of CTGs and the critique of such interpretations.

- 1) The first is that there is a very high rate of false positives for CTGs;
- 2) There is also a high degree of inter- and intra-observer differences in the interpretation of CTGs. The inter-observer differences are amply demonstrated by the sharp differences of opinion among the experts in their interpretation of the CTG in this case (eg, as to the identification of the baseline FHR at the material time and whether or not there was good variability throughout). Intra-observer variability might be demonstrated by the change in view of Dr Smith as to whether the variability shown on the CTG was reduced (*per* his report) or absent (*per* his oral evidence).
- 3) The third matter was the effect of knowledge of an adverse outcome in producing more negative classifications of CTGs.

These three matters were canvassed in the evidence and accepted by all of the experts. So far as I have the submissions noted, though, there was no specific submission as to what impact any of these matters might have on liability issues beyond, perhaps, Mr Ferguson's submission that the pursuer's experts were influenced by the outcome (ie factor (3)).

Accordingly, I assume that these chapters of the evidence (about the challenges in the

interpretation of CTGs) do not affect the assessment of liability against the well-known tests for professional negligence and patient consent, and are not relied on as moderating those tests.

Consideration of the features of a CTG critical to this case

[267] The medical witnesses' interpretation of the CTG and the proper medical understanding of the classic features of a CTG are at the heart of this case. Before turning to consider the experts' evidence individually, I first address those features about which there was such a division of views among the experts, namely the significance of accelerations in the second stage, variability and the proper ascertainment of the baseline.

Accelerations

[268] In relation to accelerations, there was general agreement among the experts that these were a reassuring sign in the first stage of labour. They were also generally agreed that these were unusual in the second stage of labour and, while they differed in their descriptions of how uncommon they were, there was a (rare) consensus that it would be unusual or very unusual to find repeated accelerations (or accelerations coincident with contractions) in the second stage. It was in this context that the Murphy & Turnbull Paper featured. The evidence about this acquired the air of a rarefied dispute among the experts as they could not agree on its import. Dr Hanretty regarded it as supportive of the position that repeated accelerations in the second stage were unusual. Dr Smith was unaware of the paper and had not read it for the purposes of his preparation for the proof. Mr Walkingshaw doubted whether what had been reported really were accelerations but might in fact have been an undetected inadvertent recording of the MHR. Professor Murphy regarded it as supportive of the fact that, rare though they may be, repeated accelerations in the second stage (even

ones described as “florid”) did occur. Indeed, on reading the Murphy & Turnbull Paper Professor Murphy had what she described as a “lightbulb” moment, realising that these might constitute a reversal of the usual signs of hypoxia, albeit that was not the conclusion of the Paper. Professor Murphy was persuaded that the next iteration of the Guidelines should in fact contain a warning about this phenomenon. On a fair reading, the Murphy & Turnbull Paper went no further than to highlight an unusual phenomenon. These arguments about the Murphy & Turnbull Paper may have deflected the experts from considering what knowledge, if any, might be expected of a reasonably competent registrar about all of this. None of them suggested that the midwife or registrar should have been aware of this Paper, which appeared in a specialist journal 16 years before Baby B’s birth.

[269] Furthermore, there was a certain disconnect between the arguments about the Murphy & Turnbull Paper and the ready acceptance by all of the pursuer’s experts to whom the question was put, that there was nothing in the standard textbooks that flagged accelerations in the second stage as a cause for concern. So far as this was addressed in the evidence, the phenomenon (of regular accelerations in the second stage) was not even considered in the more specialist texts, other than as a possible indicator of inadvertent recording of the MHR. More fundamentally, all of the experts agreed that there was nothing in the Guidance that flagged accelerations or repeated accelerations in the second stage as concerning. In terms of the Guidelines, the presence of accelerations was treated as a reassuring sign, without distinction between the first and second stages of labour. The Guidelines were effectively agnostic about the absence of accelerations, again without distinction as to the first or second stages of labour. It follows, of course, that there was nothing in the algorithm directing a course of treatment if this phenomenon was observed. In the light of that evidence, the arguments surrounding the Murphy & Turnbull Paper did

not directly inform the question to be addressed, namely was the registrar negligent in her interpretation of the CTG?

[270] It is not necessary to resolve the dispute amongst the experts about the Murphy & Turnbull Paper. However, that dispute does reveal the experts' attitude to accelerations as a feature of CTGs. The authors of the Murphy & Turnbull Paper were very highly regarded in their field. They reported on two cases in which they observed marked periodic accelerations in the second stage. As noted, Mr Walkingshaw was sceptical that these were in fact accelerations, but he was a minority of one in this respect. The other experts accepted the factual premise of the Murphy & Turnbull Paper and they accepted the possibility of accelerations in the second stage. None suggested that this was physiologically impossible, although Mr Walkingshaw's evidence was that there was no physiological explanation for this. There was other, unchallenged, evidence, that several things might cause accelerations in the FHR, in addition to fetal movement, such as fetal scalp stimulation, maternal movements and contractions. There was also the unchallenged evidence of the midwife. She had seen the phenomenon of accelerations in the second stage both before and after the pursuer's case. While she was pressed to express this in percentage terms, and she estimated that she had seen this in less than 10% but more than 1% of the labours she had attended, it was not put to her that she was mistaken in her interpretation of these as accelerations. Professor Murphy also spoke to seeing this phenomenon. Again, she was not challenged on the basis that she was mistaken. The point of cross examination on this point was to elicit evidence that this was an unusual feature, not an impossible one. This evidence, which I accept, makes all the more striking the position adopted by the pursuer's experts as, in effect, categorical that the FHR movements on the CTG in question could not be accelerations. In my view, this informed these witnesses' approach to the CTG in an important respect. It predisposed them to reject the possibility that the peaks shown on the

CTG at the material time were accelerations. Therefore, so this reasoning process appeared to be, the peaks must be the baseline. This conclusion about the baseline was reached, and defended, notwithstanding that it did not accord with the Guidelines governing the determination of the baseline FHR. I turn next to address that feature.

Determination of the baseline FHR

[271] All of the experts agreed that it was critical first to determine the baseline FHR. Until that was done, one could not determine if the baseline was within the acceptable range or if an excursion was an acceleration or a deceleration. The essential difference between the parties' experts was their determination of what the baseline FHR was at the material time.

[272] The Guidelines provided that the baseline FHR was the "mean level of the FHR when this was stable, excluding accelerations and decelerations. Determined over a time of 5 or 10 minutes and expressed in bpm." (See para [10], above.) No witness suggested that the "mean level" was actually calculated as an average of the values disclosed on the CTG; it indicates that one was looking to see where the baseline subsisted (excluding accelerations and decelerations). The problem in this case is that the interpretation of the CTG, particularly after 22:00 or 22:10, was challenging because this criterion of stability was not met. There was a divergence of views among the experts as to what was to be done in such a circumstance. In his oral evidence Mr Walkingshaw suggested that if the FHR was indeterminate then one went back to the last known baseline. (This led to the subsidiary issue of what was to be inferred, if that showed that the baseline had fallen.) However, the pursuer's experts did not generally adopt this approach in their reports. The primary position of the pursuer's experts was that the baseline FHR from 22:00 was represented by the highest readings on the CTG and that accordingly, there was fetal hypoxia. (As suggested above, they appeared to be driven to the conclusion of a high baseline because

they were predisposed to the view that these were not likely to be, or could not be, accelerations.) They maintained that this was the baseline, notwithstanding that they each accepted that it did not persist at that level for significant periods of time- the longest of which might have been between 30 and 60 seconds. They each also accepted that their determination of the baseline for this part of the trace was not in accordance with the Guidelines. To justify this, they fell back on the assessment as one of judgment, of eyeballing the trace or using the ruler method. In the absence of justification in accordance with the Guidelines, their conclusions amounted to their *ipse dixit* as to the baseline. They may not have expressly put it this way, but their predisposition that these movements were unlikely to be (or could not be) accelerations at the second stage, at least provided a reasoned basis for their conclusion of a high baseline. If the pursuer's experts were right in their identification of the baseline at the high points, then this constituted a change in the baseline FHR. However, none of the pursuer's experts would have been able to justify this as a change persisting for 10 minutes, as the Guidelines required. The pursuer's experts accepted this point, when put to them.

[273] Professor Murphy, at least, acknowledged the limitations of the Guidelines in such circumstances. As I understand it, it was to overcome this lack of precision and to facilitate discussion in the context of this proof, that she had introduced the NICHD nomenclature. This provided a more detailed definition for a baseline, requiring persistence for at least two minutes: see paragraph [39(2)], above. She accepted that the NICHD terminology did not apply at the material time. Professor Murphy was also prepared, in seeming contrast to the other experts, to contemplate that there might be reasonable differences of opinion about the baseline at different points. All of the pursuer's experts conceded at some point that there was scope for argument, meaning a permissible toleration of different interpretations, between 21:26 and about 22:10. If the basis for ascertaining the baseline FHR was to find

where it persisted in periods of stability, there was a coherence to Professor Murphy's approach, at least, because she focused on the periods where it subsisted longest, whereas the pursuer's experts did not. She also sought to do so at a point where the FHR was least affected by external stressors, namely between contractions. So far as the evidence disclosed, none of the pursuer's experts appeared to have had regard to this or to the statement in the Guidelines that the baseline was to be ascertained "excluding accelerations and decelerations".

[274] Much of the evidence appeared to be directed to the question of what was the correct baseline at the material time, and which expert's view was right. This explains, for example, the resort to other parts of the CTG to justify the interpretation at the material time. This, it respectfully seems to me, is to constitute an element of retrospectivity, at least where there was resort to later parts of the CTG (as Professor Murphy sought to do). Mr Milligan's criticism of this as a form of retrospectivity is justified. However, while the determination of the correct reading of the baseline might be highly relevant to the issue of causation, this is not necessary to the determination of liability on the interpretation of the CTG case, namely, whether the registrar's interpretation was non-negligent or was one that no reasonably competent registrar acting with ordinary skill and care could have reached. (I therefore do not take into account the evidence about the earlier or later parts of the CTG where the purpose of that evidence was to establish or attack a definitive value for the baseline FHR.)

[275] In relation to the identification of the baseline FHR, neither the Guidelines nor the algorithm stipulated what was to be done in that event. They were silent on whether there could be an indeterminate baseline FHR, or, if so, how it was to be classified. All that can be concluded is that the algorithm did not mandate intervention in that circumstance.

Variability

[276] In terms of variability as a feature of a CTG, there was a divergence of views among the experts in the assessment of the variability in this case, ie whether or not there was absent or reduced variability (and if so, at what point). Dr Hanretty believed that the variability remained good throughout. Dr Smith was of the view that there was reduced variability (*per* his report) or absent variability (his position in his oral evidence) from 22:12 to 22:16. Mr Walkingshaw accepted that variability was within the normal range but it changed in appearance. That divergence of views renders it highly problematic for a pursuer who seeks to rely on the most favourable opinion (from a pursuer's point of view), given that another of her experts could be said to represent a reasonable body of opinion for the alternative view. This feature of the evidence illustrates the inter-observer variation or the subjectivity in the analysis of CTGs.

[277] The divergence of views about the significance of variability posed a second challenge for the pursuer in this case. Drs Smith and Hanretty were agreed that good variability was a positive feature, even if they differed in their assessment of whether or not parts of this trace had good or reduced or absent variability. By contrast, Mr Walkingshaw regarded variability as a neutral factor, but he was an outlier among the experts. No other expert shared his view of this feature. Further, his view is not consistent with the treatment of variability in Tables 2.2 and 2.3 of the Guidelines where it was a reassuring feature. However, Drs Hanretty and Smith were generally unable to explain how good variability could persist (or return at the end of labour, as Professor Murphy identified) if the fetus was hypoxic. Neither Dr Hanretty nor Dr Smith appeared to be troubled by this feature of the CTG, and which might be seen as inconsistent with their assessment that the CTG was pathological. In their evidence, they could not reconcile the presence of good variability with their conclusion that the CTG was pathological. Dr Hanretty, fell back on his

description of the CTG as “funny”. The fact that they appeared untroubled by this might be indicative of a certain fixity of view.

[278] I make one final observation about the pursuer’s experts’ assessment of these features of a CTG. It should be noted that in terms of the Guidelines, “non-reassuring baseline variability” was described as *less than five bpm for 40 minutes or more but less than 90 minutes*. (In terms of Table 2.3, that would be a “non-reassuring” feature and in terms of Table 2.2 it would render the CTG “suspicious”). Baseline variability became “abnormal” if it persisted for *90 minutes or more*. (This would suffice to render a CTG pathological.) Implicit in these timescales is that (absent any of the other three classic features of a CTG being non-reassuring or abnormal) it was permissible to allow a not insignificant period of reduced variability to persist (ie up to 90 minutes). There is a dissonance between this part of the Guidelines and the evidence of some of the pursuer’s experts in which they appeared to interpret any reduced period of variability, even of relatively short duration, in a more severe way. Neither the midwife nor the registrar characterised the variability as anything other than good. Even if there had been reduced variability for a period of ten minutes or so, this appears to have been for a length of time that would have been tolerated under the Guidelines (in the absence of other concerning features). None of the pursuer’s experts made reference to the Guidelines and the relatively generous timeframe for which it appeared to permit a less than optimal variability to persist. This may be suggestive of the knowledge of the outcome leading to a harsher interpretation of the CTG, and which the BJOG papers identified as a phenomenon of retrospective interpretation of CTGs.

Decelerations

[279] The fourth classical feature in the analysis of a CTG are decelerations. The definitions were detailed but parties did not join issue on whether there had been a mischaracterisation of

a movement as an early or late or variable deceleration. They joined issue on the anterior question, of the determination of the baseline.

[280] I turn to consider the expert evidence, starting with pursuer's experts.

Dr Hanretty

[281] Dr Hanretty accepted that he had limited experience in giving expert reports. This was borne out by his occasional use of inappropriate language and his answering of some hypotheses put to him with retorts that on his approach the baby would have already been born. At times, he was argumentative. He acknowledged as a theoretical proposition that a clinician should have regard to the wider clinical picture but he appeared to take no account of that himself, either in the assessment made in his report or in his oral evidence. (He professed not to know why a midwife would take FHR readings after each contraction.)

[282] By and large, it was the appearance of regular accelerations which, in his view, rendered the trace "funny" or "unusual". Dr Hanretty's evidence was, at times, internally inconsistent about the need for intervention or further investigation consequent upon a "funny" or "unusual" trace. His assertions (in chief) to that effect were contrary to the Guidelines, and to which he made no reference. In cross, he accepted that intervention was not mandated, but maybe inquiry was. He accepted that the CTG could be classed as normal if the Guidelines were applied. That is a significant concession. Further, while it is a small point in itself, but given the significance he attached to how unusual accelerations were in the second stage, it is surprising that he had given no thought to their possible cause (eg such as fetal movement). It has to be said, too, that his apparent lack of preparation (eg by not reviewing the other expert reports or the academic materials before giving evidence and not even having these available) did not inspire confidence. Even making allowances for the fact that he was giving evidence by remote link from a different time zone, this was

suggestive of a lack of appreciation of the importance of his role as an expert in a case such as this. His language and manner could not always be characterised as careful or measured.

[283] More problematic was his ready disregard of the Guidelines, in preferring his own view or, more importantly, which he presumed a treating clinician must do. He appeared untroubled that his assessment of the baseline (or a change in the baseline) on or after 22:15 was other than in accordance with the Guidelines. (But he rejected consideration of another methodology identified by Professor Murphy.) No cogent basis for departing from the Guidelines was offered, other than that this was an “unusual” trace. By implication, his approach was that he could disregard the Guidelines and so, too, could a treating clinician. His position appeared to be that if a trace was unusual, that imposed a heightened duty which necessarily merited further investigations (and the failure to do so was, by implication, negligent). However, this is inconsistent with the Guidelines and the algorithm, in which only a pathological trace merited further investigations and/or intervention. However, Dr Hanretty did not explain the thought process that a treating clinician had to follow when faced with an unusual trace and which would necessarily (on his approach) lead her to disregard the Guidelines and the algorithm, and to investigate or to intervene (although he backtracked in cross from advocating intervention). This, it seems to me, is critical in a case such as this, where the clinical Guidelines and algorithm were followed but the pursuer nonetheless contends that the treating clinician was negligent. At times Dr Hanretty’s evidence amounted to little more than assertion. (I accept Mr Ferguson’s submission to this effect.) It was unpersuasive in its paucity of a reasoning process that could be followed (and interrogated).

[284] Features of his evidence also gave the impression of exhibiting a degree of retrospectivity despite his protestations to the contrary (eg becoming “involved” because of the view that he had formed about the unusual character of the CTG.)

[285] Finally, given Mr Ferguson's reliance on it, I must address the concession said to have been extracted from Dr Hanretty. I have recorded the relevant evidence above (at paras [84] and 92(6)). The concession in cross related to the Professor Murphy's evidence that intervention (or even FBS) was an excessive response to an unusual CTG. However, in re-examination, Dr Hanretty appeared to be directing his answer to her interpretation of the CTG at the material time as accelerative with a low baseline, which is a different issue. (The follow up question was also directed to the more general question of the logicity or otherwise of her interpretation of the CTG.) The language of his answer verged on glib, equating (sarcastically) a "tenable" view with a belief that "the world was flat", notwithstanding that an experienced expert would understand the import and gravity of the question he was being asked. This kind of language and expression is unprofessional and unhelpful. In my view, Dr Hanretty understood what he was being asked in cross examination and he gave his unvarnished view. I do not accept that he was being asked about the same matter in re-examination or that that evidence undermined his earlier evidence.

Dr Smith

[286] Dr Smith retired from clinical practice in 2013 and from teaching a year or so after that. In common with Dr Hanretty, he had not reread the other reports, or at least Professor Murphy's reports, in preparation for giving evidence. He had not reviewed the NICHD paper. Nevertheless, he readily disagreed with Professor Murphy's conclusions. In my view, this is not indicative of an expert engaging deeply with all of the relevant materials. The first (and only) explanation he offered for the difference in view between himself and Professor Murphy (or the others whose opinions differed from his own) was the suggestion (which he later retracted) that they lacked independence.

[287] As noted above, Dr Smith identified the CTG as pathological from the earliest point in time (21:26). However, like Dr Hanretty, Dr Smith accepted that there could be a responsibly and reasonably held alternative view on the interpretation of the CTG up to about 22:10. From that point, he maintained that it was pathological. As noted above, he had a view about the reduced (or absent) variability of the CTG at this point which was not shared by the other experts. Having accepted that the assessment of variability was subjective, he was nonetheless content readily to contend that the others were wrong if they did not agree with his assessment. He was also of the view that there were decelerations from a high baseline. In relation to the determination of the baseline for this part of the CTG, he accepted that his determination was not in accordance with the Guidelines, either in terms of minimal duration or to confirm a change in the baseline FHR. He was not unduly troubled by this. In relation to the issue of repetitive accelerations in the second stage, he accepted that the Guidelines did not highlight this as of concern. He also accepted that there was no consensus of view of the profession as to what repetitive accelerations in the second stage of labour might herald. These concessions are difficult to reconcile with his opinion, or perhaps with the certitude with which he expressed it, but he did not perceive the tension between his opinion and the Guidelines. The comment I made in relation to Dr Hanretty's evidence (at the end of para [283], above) applies with equal force here. Other than to assert his conclusion, Dr Smith could not explain a process of reasoning which necessarily compelled the registrar:

- (i) to reach the same view as Dr Smith had on the reduced or absent variability of the CTG from 22:10 (albeit he was in the minority of the experts on this point);
- (ii) to reach a view on the baseline (notwithstanding that that might have to be assessed in a manner that did not accord with the Guidelines);

- (iii) to discount the interpretation of repetitive accelerations as a positive feature (which is inconsistent with the Guidelines) but to interpret these as concerning (notwithstanding the absence of consensus about this in the wider profession and the absence of any warning in the Guidelines); and
- (iv) which failing, constituted negligence in the relevant *Hunter v Hanley* sense.

I did not find this chapter of his evidence cogently reasoned or persuasive.

[288] There are two further points to note regarding his evidence. He was unaware of the BJOG papers and the issue of the impact of adverse knowledge of the outcome on the assessment of CTGs. He acknowledged that he had looked at the CTG to confirm, in effect, what went wrong. That might well explain his identification of the earliest point of the CTG being pathological, his more severe interpretation of variability and the contention (on his approach) about the need for immediate intervention. These features of his evidence may illustrate the very phenomenon of a more severe classification identified in the BJOG papers, whose conclusions he appeared to accept.

[289] The final point concerns the concession he made, to the effect that a body of clinicians (albeit “a very small minority of obstetricians”) could share Professor Murphy’s view about the interpretation of the CTG (at 22:15) as accelerative, with the explanation being the excessive uterine activity. I regard this concession as well made, and consistent with his acceptance that there was no consensus about what repetitive accelerations in the second stage might herald. (He did not suggest that accelerations could not occur in the second stage.) While Mr Milligan revisited this issue in re-examination, I accept Mr Ferguson’s submission that a leading question in re-examination has less persuasive force. Furthermore, the question put in re-examination was the more general one about Professor Murphy’s evidence as supportive of the defenders’ position. This was in effect inviting Dr Smith to

reaffirm the correctness of his own conclusions. I was not persuaded that Dr Smith's position had been rehabilitated from the concession he made in cross.

Mr Walkingshaw

[290] Of the pursuer's three experts, Mr Walkingshaw was the most analytical and had the most experience as an expert witness. He was familiar with the academic literature and the issues, such as retrospectivity and subjectivity, bedevilling the interpretation of CTGs. He provided a full explanation of the careful process that he had used upon first examining the CTG, of reading the medical notes and looking at the CTG prospectively, to guard against a retrospective interpretation. In common with Dr Smith he identified the CTG as first pathological from 21:26. He acknowledged that the interpretation of the trace was not straightforward and was capable of logical analysis in the period leading up to 22:15. In contrast to Dr Smith and Dr Hanretty, he readily acknowledged that the CTG could be regarded as indeterminate from 21:26 to 22:15. He was firm in his view, however, that it was pathological thereafter by reason of the second of the abrupt changes he had identified (at 22:15), and the increase of the FHR above 160 bpm. In his view, the baseline was rising. He differed from the others on the significance of variability, which he regarded as only a neutral factor. The presence of good variability was therefore not necessarily reassuring.

[291] He was highly critical of Professor Murphy's approach in relation to determination of the baseline. Furthermore, he did not accept that she had correctly interpreted the CTG for those other parts of it that she had referred to (in the early part of labour and at the end) to support her own interpretation.

[292] It must be noted that in coming to his view, as to what he said was the correct interpretation of the CTG and as well as to what a registrar should have known or done in the light of his interpretation, he made no reference to the Guidelines. To him, the most

striking feature of the pursuer's CTG was the unusual change in pattern of the FHR coupled with the tachycardia he identified. He described the change as "abrupt and spectacular" and as one which he had never seen before. It was also this feature that had struck him immediately on his first review. Considering the totality of his evidence, it was this feature that was foremost in his conclusion that "no competent registrar should have been reassured by the trace at 22:30" and that "unequivocally" interpreting the trace as "reassuring" was not a reasonable interpretation. In his view, in coming to the view that the trace was reassuring, the registrar would have had to reconcile a lowering baseline, the two abrupt alterations in the FHR and the appearance of accelerations in the second stage of labour.

[293] In concluding that the FHR had increased to a tachycardia just before the registrar's review (see para 7.13 of his report), Dr Walkingshaw assumed that the baseline FHR had by then increased to (or exceeded) 160 bpm. That assumption is central to the question of interpretation at the heart of this case. In terms of the appearance of the FHR on the CTG, this ascribes the baseline to the peaks of the FHR recorded. As described above, at paragraph [20], between about 22:17:30 and 22:30, there are peaks of FHR at about 160 to 165 bpm, but none of these persisted for more than about 30 seconds. By contrast, the FHR persisted in the troughs, at about 120 bpm for marginally longer periods of time. At no point was there a two, three or five-minute period where the FHR was sufficiently stable to enable the FHR to be determined with any certainty.

[294] What Mr Walkingshaw did not explain was how his conclusion was to be reconciled with the Guidelines or the algorithm. It was implicit in his conclusion that the registrar was obliged to discount the accelerations as a reassuring sign, contrary to the Guidelines. It was also implicit that, on the hypothesis that the trace was indeterminate up to 22:15 and that in those circumstances the pre-21:26 baseline should have been used, the unusual lowering of the baseline compelled the registrar to conclude that intervention was required. Again, this

would not be consistent with the Guidelines, which warned only of a rise in the baseline FHR. What is problematic about Mr Walkingshaw's evidence, in common with the that of the pursuer's other experts, is his justification that his opinion be preferred on the basis that the Guidelines were just guidelines, not a "recipe". I would have expected more explanation of the reasoning process a registrar had to follow, to disregard the Guidelines in these two respects, and which (if the pursuer is to succeed) leads ineluctably to the conclusion that no other interpretation (than pathological) or other action (other than to expedite delivery) was open to the registrar.

[295] In my view, among the pursuer's three experts, Mr Walkingshaw's evidence provided the most thorough and coherent foundation for the pursuer's CTG investigation case. I turn to consider the three features he had identified as problematic for the defenders' interpretation.

The features relied on by the pursuer's experts to justify disregard of the Guidelines

[296] This case does not fall within a classic *Hunter v Hanley* case, in the sense that there is no suggestion that the registrar departed from an established practice. None suggested that the registrar had failed to follow the Guidelines or the algorithm. Rather, she was criticised precisely because she had followed the Guidelines and was negligent in not departing from them. Mr Walkingshaw identified three matters that he said compelled this approach: (1) the two abrupt changes in the pattern of the FHR; (2) the apparent lowering of the baseline FHR after 22:00 from the prior baseline, (if the registrar went back to the pre 21:26 baseline) and (3) the appearance of repeated accelerations in the second stage.

[297] In relation to (3), I have already commented on accelerations as a feature (at paras [268] to [270]). On the evidence of the medical witnesses, they appreciated that it was unusual to have accelerations in the second stage. It is clear that the registrar interpreted the

movements as accelerations and she related the accelerations to the contractions, as evidenced by the arrows she drew on the CTG. The consistent position of the registrar and the midwife was that accelerations were a positive feature of the CTG, and which Professor Murphy explained was consistent with their training and the Guidelines. It was not put to the midwife or the registrar that the feature of repeated accelerations in the second stage was so unusual that they should have considered departing from the classification of them (*per* Table 2.3 of the Guidelines, at para [11] above) as a reassuring sign or, going further, that they were obliged to reclassify them as non-reassuring. As noted in the discussion of the evidence about accelerations above (at para [268] to [270]), there is no medical consensus that would support those propositions. Further, the unchallenged evidence was that there was nothing in the standard or specialised textbooks that would have imputed any knowledge to that effect. In the light of this evidence, I was not persuaded that the registrar's interpretation of the peaks on the CTG as accelerations at the material time should nonetheless have been reclassified by her as non-reassuring (ie on direct contradiction of the Guidelines) or that their presence should have led her to reconsider her own interpretation of the CTG.

[298] In relation to (1), the two changes in the FHR on the CTG, viewed in isolation (as, for example, Dr Smith did when first instructed and only had the CTG), these changes called for explanation. However, the registrar would not be viewing this divorced from the clinical context. The wider context and clinical events provided this, and were spoken to by the medical witnesses. While Mr Milligan submitted that the change of position was undocumented (see no 23 of his proposed findings in fact), the pursuer's experts did not appear to dispute that the change at 21:26 coincided with the maternal change of position onto the pursuer's side. The midwife's unchallenged evidence was that the baseline had returned to normal within about 20 minutes. Further, the period of excessive uterine activity coincided with the period of reduced variability and the second step-change identified at

22:15. The medical witnesses referred to other features that supported a non-pathological interpretation: variability was good and the FHR as recorded between the contractions was within the normal range.

[299] In relation to (2), the presumed lowering of the baseline FHR, this aspect was a feature of the expert's evidence. It did not arise from the evidence of the medical witnesses. It would only have arisen, if the midwife or registrar had concluded that some part of the CTG was indeterminate, and that (according to the convention) they therefore needed to go back to the last known baseline (which was presumed to be pre-21:26). It is that circumstance which might have given rise to the feature which the pursuers' experts presume, ie of the earlier baseline being higher than the (later) baseline that was emerging. The fundamental problem is that there is no evidence that the medical witnesses in fact applied this convention. Indeed, this convention was not put to the midwife or the registrar. Further, given the midwife's evidence that she thought the baseline had returned to normal by 21:50, it is not clear what she would have used as the last known baseline for the purposes of the presumed comparison (needed to say that the emerging baseline was lower) had she considered this. Accordingly, there is no evidence to suggest that this could have been a feature of concern. For completeness, even if there had been a relevant factual basis for this matter, I was not persuaded that a lowering of the baseline would have been a factor compelling the registrar to challenge her interpretation and classification of the CTG or compel her to disregard the Guidelines. Dr Hanretty, for example, was unconcerned by this kind of change in the baseline. Professor Murphy's evidence was also supportive of the position that the baseline could go up or down in a normal labour. It is also notable that this was not flagged in the Guidelines.

[300] On the whole evidence, therefore, I am not persuaded that these features, either individually or collectively, should have caused the registrar to reconsider her interpretation

or would have sufficed to compel her positively to disregard the Guidelines for the purposes of interpreting and classifying the CTG. It follows that there is no basis in the evidence for Mr Milligan's proposed findings in fact number 37 (which refers to two of these three features). I therefore turn to consider the evidence of the defenders, and whether it is sufficient to meet the allegation of negligence.

Professor Murphy

[301] Professor Murphy is exceptionally well qualified as well as experienced. She was unique among the experts in combining clinical practice at a very senior level with high academic position. Indeed, she was the only expert who gave evidence who was still in active clinical practice. Dr Hanretty had retired from the NHS in 2014 (to pursue other professional interests); Dr Smith had retired in 2013; and Mr Walkingshaw had retired in 2012. This is not an unimportant point.

[302] In my view, Professor Murphy was best placed to express an opinion about "normal clinical conditions" whereas the others might, by reason of retirement, be "more likely to form an opinion divorced from the current practical reality" (*per C v North Cumbria Hospitals NHS Trust* at para 25(vi): see para [213(4)], above). One small example of that operating in this case, is the omission on the part of the pursuer's experts to acknowledge the other demands that there appear to have been on the registrar's time on the night in question.

While Professor Murphy was challenged on this in cross, she inferred that the registrar had had a busy night having regard to the fact that she was in theatre earlier that evening (it took an hour before the anaesthetist could attend and site the epidural for the pursuer); it took her some time to attend after 22:00 when requested; and it was two hours before she could attend again on the pursuer for the removal of the placenta. In my view, Professor Murphy's inference was not an unreasonable one. The fact that a treating clinician is busy

does not mean a different or lesser professional standard is applied. But in the context of this case, it does inform the issue of how much of the CTG she could responsibly and reasonably review, and whether a notation on the CTG without a corresponding entry in the medical notes was acceptable. Two other examples from the evidence provide further illustrations of what might be considered to reflect the attitudes of a retired clinician “removed from the fray and...divorced from current practical reality”. The first was the pursuer’s experts’ collective disdain for the proposition that the midwife might have been in a more advantageous position (than they were), by reason of other sources of information available to her at the time in the form of the audible heartrate, the digital readings taken after each contraction and the palpitation of contractions. With no basis in the evidence to suggest this, Dr Hanretty’s first response was to query whether the trainee midwife was feeling the palpitations. Dr Hanretty and Dr Smith ultimately, albeit grudgingly, accepted the proposition. Mr Walkinshaw remained sceptical. On the issue of causation, the pursuer’s experts’ attitude might be justified, but the fact that the pursuer’s experts were so resistant is surprising and was generally unexplained.

[303] The other example was their collective disregard of the Guidelines. As noted above, they made scant (or no) reference to these in their reports, whereas the Guidelines (including the algorithm) would have been foremost in the minds of the medical witnesses. (This is borne out by the evidence of the registrar and the midwife when they repeatedly referred to the positive features (in terms of the Guidelines) of accelerations and normal variability.) Only Professor Murphy explained the importance of the Guidelines and the algorithm, and articulated the central role that these played for attending clinicians. This evidence was not challenged. It remains a troubling feature of the pursuer’s case that the basis for (in effect) requiring the registrar to ignore the Guidelines and algorithm governing clinical practice is slight and founded on little more than assertion.

[304] In respect of Mr Milligan's challenge to her qualities as an expert (under reference to *Kennedy*), I do not accept that submission as well founded. While her instructions may have been mainly on behalf of defenders and, in Scotland, she was instructed by the CLO, on a consideration of her whole evidence, I did not detect that this predisposed her to a particular view or, just as importantly, against an alternative view. Alone among the experts, she appears to have challenged the view she had come to, and to address the possibility of an alternative view. Overall, I found Professor Murphy to be an impressive witness by reason of her depth of knowledge and her ability to explain the basis for the views that she expressed. I have no hesitation in describing her as "respectable", "competent" or "responsible" (*per para 25(vi) of C v North Cumbria Hospitals NHS Trust*). None of the pursuer's experts suggested otherwise, although they disagreed profoundly with her opinion in this case.

[305] On the cases cited, it must be shown that Professor Murphy's opinion did not reflect a body of medical opinion that was reasonable, responsible or logical or that she had based her view on a mistaken or incomplete view of the evidence. There was no suggestion that she had proceeded on an incomplete or mistaken view of the evidence. The issue is whether her opinion was irresponsible, unreasonable or illogical. On the authorities, that is a matter for the court to determine and for this purpose I bear in mind the observations of Lord Hodge in *Honisz* and *Dinely* as to the proper approach of a court faced with two bodies of competing medical opinion, and of Green J in *C v North Cumbria University Hospital NHS Trust* (cited with approval by the Court of Appeal in *McGuinn*) on the proper approach to the assessment of the expert medical evidence relied on by the treating clinician.

[306] Professor Murphy gave a reasoned explanation in her reports for what would have been a permissible interpretation of the CTG. While she was criticised for resorting to the NICHD nomenclature (eg because it post-dated Baby B's birth; because it was not British, or

because it complicated matters), she did not fall into the trap of applying retrospectively a different standard than had applied at the time. Rather, as she explained in her 2nd Report, she had used the NICHD terminology to provide some assistance to the court in the discussion and interpretation of CTGs. By and large, the Guidelines and NICHD were consistent; the latter provided more detailed terminology. More importantly, they both used the same four features of the CTG.

[307] She also used the NICHD terminology, in part to help blind her to the risk of retrospective interpretation. This is important, given the unchallenged evidence and the BJOG papers about the effect of knowledge of the adverse outcome in leading to more severe interpretations of the features and classification of CTGs. Neither Dr Smith nor Dr Hanretty appeared to have taken steps to place themselves in the shoes, as it were, of the registrar in their approach to the CTG. Only Mr Walkingshaw appeared to have endeavoured to do this in a serious and methodical way, albeit he also accepted that the time he had taken was not the same as that available to the registrar on the night.

[308] I am persuaded that Professor Murphy did blind herself to a retrospective interpretation. In her evidence, it was apparent that she had immersed herself in the clinical context as it presented to the midwife and registrar. She also took into account other clinical events as explanations for what was shown on the CTG. At the first indication of something unusual in the CTG pattern, she did not presume the worst (as one seeking to confirm the outcome might do). She considered whether there was a corresponding clinical event. She also applied in practice, what the others acknowledged in theory, that labour was dynamic process. So, for example, she recognised that the change in maternal position at 21:26 provided an explanation for the change in the pattern of the FHR. In her view (which also coincided with the midwife's evidence), this had settled after about 20 minutes. (Professor Murphy was not challenged on this.) With the other change in pattern identified, at about

22:15, she related this to the episode of excessive uterine activity - an event that was accepted might put a fetus under stress because it may not permit sufficient time for it to recover from one contraction to the next. In contrast to Mr Walkingshaw, who would have regarded this as a hypoxic event mandating immediate intervention, Professor Murphy's evidence was that by the time of the registrar's attendance this was resolving. Again, she was not challenged on this evidence. Her evidence struck me as more realistically rooted in the realities of clinical practice governed by the Guidelines.

[309] I have found as a matter of fact that the most likely interpretation the registrar reached was that this was a normal trace. Having regard to the interdependence of the CTG interpretation case and the failure to expedite delivery case, the dividing line, for the purposes of liability, is whether the registrar was negligent in not classifying the CTG as pathological. A characterisation of it as only suspicious would not suffice to establish liability, for the purposes of the CTG interpretation case.

[310] Professor Murphy's evidence was that the registrar came to the same view that she would have in the circumstances. Professor Murphy's essential conclusion was that it was open to the registrar to interpret the CTG in question at the material time as a CTG with a normal baseline FHR, with marked accelerations with each contraction and ongoing variability and that, in the light of those factors a registrar of ordinary skill and competence was entitled to classify that as normal or as no more than suspicious. (See, eg, para 5.3 of her 2nd Report.) The challenge to her conclusion was on two fronts: her ascertainment of the baseline and the presence of regular accelerations in the second stage of labour. In relation to the presence of accelerations in the second stage of labour, I have already considered the evidence about the second-stage accelerations (see paras [268] to 270]). It is in my view readily apparent that Professor Murphy had given this aspect of the CTG considerable thought. She sought to test this against other cases known to her, hence her consideration of

cases A and B in her 2nd Report. She readily acknowledged the limitations or challenges in the interpretation of CTGs. She was anything but dogmatic in her opinion about the interpretation of the trace, and which alone among the experts was commensurate with the accepted issue of intra-and inter-variation in the interpretation of traces. All of this was demonstrative of an open mind and a probing, forensic approach.

[311] In relation to the ascertainment of the baseline, all of the experts agreed that this was critical to the determination of other features of the CTG. The differences in approach to that issue between the pursuer's experts, and Professor Murphy, were marked. The pursuer's experts all accepted that, in terms of the Guidelines, the criteria could not be met (of a duration of the baseline for ten minutes) in the period after 21:25 or 22:00 to say that the baseline had changed. They also accepted that there was not the requisite stability, for two, three or five minutes, to say (within the Guidelines) what the baseline was. It is not unfair to say that, when pressed, they maintained that the baseline was high essentially as their *ipse dixit*, based in part on their expertise and in part because they were unable to countenance that the peaks could be accelerations. They appeared to do so, even in disregard of that part of the Guidelines that stated that the baseline should be ascertained when the FHR was stable, ie "excluding accelerations or decelerations". None of the pursuer's experts addressed in any convincing way how his approach was to be reconciled with the Guidelines. None provided a cogent basis to justify disregarding the Guidelines or, critically, to explain why a failure to disregard this part of the Guidelines was necessarily negligent. It is fair to say that the degree of certitude evinced by the pursuer's experts about the baseline strikes a discordant note, given the well-recognised challenges in the interpretation of CTGs in a clinical context (noted above, at para [266]).

[312] By contrast, there was a reasoned basis for Professor Murphy's approach. She sought to identify the points when the FHR was stable, which she identified as between the

contractions. If the subsistence of the FHR at a particular level was at all relevant to ascertaining the baseline, the periods of the FHR at the peaks or highest points from, say, after 22:00 was of the shorter duration when compared to its duration at, say, 120 bpm. She was challenged on this, as being an approach that was nowhere sanctioned. However, this approach was at least consistent with that part of the Guidelines which referred to disregarding accelerations and decelerations. In practical terms, this may not be that different from disregarding contractions (and which were accepted as having an effect on the FHR).

[313] Professor Murphy's opinion also had the merit of taking account of, and being reconcilable with, the medical notes and the other known clinical events. (The same cannot necessarily be said of all the pursuer's experts.) The impression given by the pursuer's experts was that, at the very first signs of concern, they would have intervened and they advocated this as the only non-negligent course. As discussed above, their approach was not consistent with the Guidelines in respect of a non-pathological trace. They advocated for a clinical response that required, in effect, the registrar to depart from the Guidelines and the algorithm. (However, the alacrity with which the pursuer's experts advocated for intervention, when this would have been inconsistent with the algorithm reinforces the impression that they were influenced by their knowledge of the outcome.) As noted above, the midwife recorded the FHR after each contraction. Apart from one instance (after the material time), the FHR recorded at these points was all within the normal range. Professor Murphy accepted that this evidence was part of the clinical picture. While the pursuer's experts may have recorded this as part of the background, they did not address this potentially inconsistent evidence when it came to their own assessments.

[314] Considering the whole evidence in this case, I am not persuaded that this is one of those cases, which on the authorities is expected to be rare, and which Mr Milligan accepted

was difficult, where the medical opinion led on behalf of the treating clinician falls to be rejected as illogical, unreasonable or irresponsible. In my view, in her evidence Professor Murphy provided a reasoned and logical basis for her opinion. Her evidence addressed all of the relevant factors. It was internally consistent. In substance, I found her evidence cogent and persuasive. I accept that her opinion represented a body of respectable and reasonable medical opinion.

[315] It follows that there is no basis in the evidence, for Mr Milligan's proposed findings in fact numbered 24 to 34 and 36 to 37 (insofar as these were directed to the CTG interpretation and the failure to expedite delivery cases and were not otherwise repeating the data in the medical notes). Having regard to the expert evidence I have preferred, I would not have found that the CTG was pathological at the material time. Accordingly, the pursuer's CTG interpretation case fails. On the common approach of the parties (referred to above, at para [259]), the failure to expedite delivery case also fails. No treatment would have been mandated in the event the CTG had been (or should have been) classified as no more than suspicious.

[316] For completeness, I should record that I come to this view without regard to the concessions made by Dr Hanretty and Dr Smith. However, these passages of their evidence reinforce the conclusion that I have come to. I should also record that while I have considered the reports of the experts who did not give evidence, I did not find these of assistance. In any event, I would not have placed much weight on a report that was not spoken to or tested in cross-examination.

The pursuer's consent case

[317] The issue of consent was touched on lightly in evidence and in submissions.

[318] The case on Record is an alleged failure on the part of the registrar to warn the pursuer of the risk of fetal compromise and to obtain her consent to continue with labour. In relation to a CTG classified as no more than suspicious, Mr Milligan's position in submission was that an ordinarily competent registrar acting with reasonable skill and care could not rule out "the material risk that the baby was in danger". In my view, this formulation inverts the test to be applied, by presuming that a material risk existed. The starting point, it seems to me, is the identification by the treating clinician of a treatment or intervention or circumstance that poses a material risk of injury and which gives rise to the duty to obtain the patient's consent to the choices open to her.

[319] As noted above, it was agreed by joint minute that the registrar never discussed the management plan with the pursuer at the material time. The question is, was there a breach of the duty to obtain the pursuer's consent?

[320] The key authority is *Montgomery*. I note that the discussion in *Montgomery* was framed in terms of consent to medical treatment or intervention involving the risk of injury (see paras 82, 83 and 87). The test of materiality of risk is stated at the end of paragraph 87. I also note the observation, at paragraph 83, that what risks of injury are involved (eg in an operation) is a matter falling within the expertise of members of the medical profession.

[321] The only other case cited was that of *KR*. In *KR*, which also concerned a claim in negligence on behalf of a child with cerebral palsy, it was alleged that the registrar had been negligent in not initiating intervention (eg by a C section) as at 16:45, 17:20 and 18:18 hours. Allied to that was an allegation of a failure in the duty to discuss the non-reassuring features with the mother and the options for delivery at each of these points (see para 6 of that case). Causation had been agreed. The features of concern in that case were a high maternal temperature, maternal pyrexia, meconium staining, periods of reduced variability, and at different points, a rising baseline and fetal tachycardia and bradycardia. (Unlike the present

case, there does not appear to have been any dispute in *KR* as to the interpretation of the CTG or the kinds of higher level challenges to the features used in the Guidelines.) The results of FBS at about 16:58 or so were within the normal range. At 17:20 reduced variability for 20 minutes was noted, as were an absence of decelerations and a baseline FHR of 160 bpm. However, in the period between 18:00 and 18:17 the baseline FHR fluctuated between 160 to 170 bpm, with a further rise to 180 bpm for a two minute period followed by a drop in the FHR to 59 bpm (ie bradycardia) and which constituted a prolonged deceleration. On the NICE and RCOG guidelines applicable in that case, these features were recognised as giving rise to acute fetal compromise and they mandated immediate intervention. The registrar did not follow those guidelines. She did not prepare for immediate delivery. Lord Brailsford concluded that negligence was established for the period from 18:18, but not for the two earlier points in time.

[322] It is important to note how that finding informed Lord Brailsford's approach to the pursuer's consent case. In the light of the satisfactory results of the FBS at 16:58, Lord Brailsford rejected the consent case in respect of the two earlier periods as "there was no material risk which necessitated [the registrar] discussing the case further [with the pursuer]": see paragraph 132. In other words, while some feature caused the treating clinician to obtain FBS, that did not give rise to a duty to discuss that concern (or presumably any treatment, if there were any). There was not, at that stage, a material risk. However, he upheld the pursuer's consent case in respect of the period from 18:18. He did so, based on the evidence of several doctors as to the risk of acute fetal compromise at that stage, noting (at para 133) that "no clinician who gave evidence demurred from the proposition that there was risk". The significant point, for present purposes, is that there was a basis in the evidence, spoken to by expert witnesses, for the nature or degree of the risk at different points in *KR*'s labour and, further, that it was only when the risk posed was

of the requisite character that the duty to obtain consent arose. A relevant risk must subsist before the duty arises to obtain consent to any course of treatment potentially available to address that risk. In *KR*'s case there was such evidence.

[323] What then, is the evidence in this case to support a finding that a risk of the requisite character was posed at the material time and such as to give rise to the duty to obtain consent?

[324] The pursuer's experts' opinions were directed to the issue of whether the registrar was negligent in not interpreting the CTG as pathological at the material time. Had I found it established that the registrar had been shown to have been negligent in not classifying the CTG as pathological on her review at about 22:30, I would have been prepared to infer from the other evidence that there was a material risk and that the duty arose to obtain the pursuer's consent to the different treatment options.

[325] The difficulties for this part of the pursuer's case are two-fold. In the first place, I have found on the evidence that the registrar was likely to have classified the CTG as normal. I have also accepted the evidence of Professor Murphy that that classification, or at least one that was no more than suspicious, was an available, non-negligent interpretation. Conversely, I have rejected the pursuer's experts' opinions that the registrar was negligent in not concluding that the CTG was pathological. Mr Milligan recognised this and he did not advance his case of consent based upon a finding of a pathological trace. (In the absence of such a finding, the case of *KR* is readily distinguishable on its facts.) However, the pursuer must have some basis in the evidence about the risk posed (if any) for a suspicious/non-reassuring CTG before it can be said that the duty to obtain consent arises.

[326] The second difficulty for the pursuer is that none of her expert witnesses addressed the issue of consent in their reports or in their oral evidence. They did not, for example, express any view as to what the registrar should have said to the pursuer, much less what

options she should have discussed. Nor did they express any view as to the nature or degree of risk (if any) that could be said to be posed by a CTG categorised as normal or suspicious or unusual.

[327] Mr Milligan's proposed findings in fact (at the end of paras 36 and 39 see para [222], above)) are really no more than assertions. While Professor Murphy accepted that the registrar should have discussed any concerns, it remains the case that there was no evidence to support the proposition that a suspicious trace posed a relevant risk that gave rise to a duty obliging the registrar to obtain the pursuer's consent as to how to proceed. Professor Murphy acknowledged that every labour carried risks, but that is not the same as evidence to the effect that there was a material risk disclosed from the specific features of the pursuer's CTG assessed as at 22:33. (If the general risk in labour referred to by Professor Murphy would have sufficed, in *KR* Lord Brailsford would have found that the duty to obtain *KR*'s consent would have been breached at the earlier points.) Mr Ferguson's submission is, in my view, well made that there was no evidence to support the argument that there was an increased risk of brain damage when a trace was normal, suspicious or unusual. Such evidence as there was would, it seems to me, militate against a finding that there was a risk of the relevant character (ie a material risk) posed in respect of a suspicious trace. I have in mind the evidence about the very high false positive rates (exceeding 90%) and the algorithm. In terms of the latter, no treatment or investigation was mandated for a suspicious trace. There is nothing in the evidence to suggest that an unusual trace would be treated any differently than a suspicious trace.

[328] One might test this by asking: in respect of what choices would the pursuer's opinion be sought, if the CTG had been classified as suspicious? In terms of the algorithm as applied to the features present in this case, no treatment was mandated in respect of a suspicious trace. Such evidence as there was, was suggestive that intervention, even by the alternative

means, would have been excessive. In other words, there were no *treatment* options or alternatives to discuss with the pursuer. There was no evidence, argument or authority in this case to enable any exploration of what the position might have been if a patient would have demanded a treatment regarded by the attending clinician as excessive or unwarranted in terms of the applicable guidance.

[329] The only expert who was asked about the question of patient consent was Professor Murphy. Her evidence about this (recorded in para [197], above) came just after her concession that the CTG might have been classified as (no more than) suspicious, rather than normal. Even in that context, her position was that, given that the management plan was watchful waiting, it sufficed for the registrar to introduce herself, to assure the pursuer that she was making good progress and that the registrar would be called back if there were any concerns. The management plan was for a spontaneous vaginal delivery. Consent to that was inherent in the fact that the pursuer was on a labour ward with staff helping her to achieve that. Given the registrar's interpretation of the CTG, which was not negligent, no intervention was mandated.

[330] For these reasons, I find that at 22:33 there was no breach of the *Montgomery* duty to secure the pursuer's consent to continue with labour. The pursuer's consent case fails.

Decision

[331] For the foregoing reasons, the pursuer's liability case fails on the grounds maintained at proof. The defenders are to be assoilzied from the conclusions of the summons. I shall put the case out By Order to deal with expenses and any other ancillary matters that may arise.

[332] It remains for me to thank Counsel for the work that went into their preparation of their written submissions, and for their careful and responsible presentation of what was a complex and anxious case.