Neutral Citation Number: **[2021] EWHC 2604 (QB)**

Case No: QB-2018-001283

IN THE HIGH COURT OF JUSTICE
QUEEN'S BENCH DIVISION

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 1st October 2021

Before :

MR JUSTICE SOOLE

- -

Between :

GRAHAM LESLIE THORLEY **(by his litigation friend, Susan Thorley)**	**Claimant**
- and –	
SANDWELL & WEST BIRMINGHAM HOSPITALS NHS TRUST	**Defendant**

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Susan Rodway QC (instructed by **Moore Blatch Resolve LLP**) for the **Claimant**
Andrew Post QC (instructed by **Bevan Brittan LLP**) for the **Defendant**

Hearing dates: 11-14 May 2021

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Approved Judgment

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

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MR JUSTICE SOOLE

Mr Justice Soole:

1. This is the trial of the issues of breach of duty and causation in this claim of clinical negligence by Mr Graham Thorley (dob 13.4.53) against the Defendant Trust. In February 2002 he was diagnosed with atrial fibrillation (AF), a condition that carries an increased risk of blood clots and consequent thromboembolic events including stroke. Accordingly his treatment for this condition included a daily 3.5mg dose of warfarin, an anticoagulant. In March 2005 Mr Thorley suffered chest pain. A review at the Trust's Sandwell Hospital concluded that investigation by coronary angiogram was necessary. This was arranged to take place on 27 April 2005. In accordance with the advice given to him because of the bleeding risk in any such procedure, Mr Thorley stopped his daily dose of warfarin for the 6-day period 23-28 April (inclusive) and restarted on 29 April at a reduced dose of 3mg. The angiogram on 27 April was uneventful and he was discharged home that day. However on 30 April he suffered an ischaemic stroke which has resulted in permanent and severe physical and cognitive disability.

2. Mr Thorley alleges that the Trust was in negligent breach of duty in that the cessation of warfarin should have been limited to the 3-day period 24-26 April (inclusive) and restarted at the usual 3.5mg, not 3mg. These breaches caused or materially contributed to the occurrence of the stroke.

3. The Trust denies breach of duty, save to admit that warfarin should have been restarted by no later than the day after the angiogram (i.e. 28 April) and at the previous dose of 3.5mg. As to causation, and whatever the conclusion on breach of duty, it contends that Mr Thorley would have suffered the stroke in any event.

4. The issues in this trial depend on the Court's assessment of the rival expert evidence, together with certain issues of law. Mr Thorley's wife and litigation friend gave uncontested evidence in a witness statement. The Trust called no evidence of fact. As to breach of duty, I heard from the cardiologists Professor Roger Hall and Dr T.R. Cripps; as to causation, from the haematologists Dr Trevor Baglin and Professor K. John Pasi. Contrary to various matters put to them in the course of cross-examination and then advanced in argument, I am quite satisfied that each at all stages carried out his task and gave his evidence impartially and in full accordance with his duties to the Court.

5. Before turning to the narrative of events, I should set out various matters which are uncontroversial as between the experts.

6. AF is a cardiac arrhythmia in which heart rate and rhythm are abnormal. In consequence of unsynchronised atrial contraction there is a pooling of blood in the atria with a risk of formation of blood clots (thrombi). These thrombi can then break off and pass into the circulation (embolise) causing obstruction of a blood vessel elsewhere in the body (thromboembolism). When a blood vessel in the brain is blocked this causes an ischaemic stroke, also known as a cerebrovascular accident (CVA). Accordingly AF carries an increased risk of thromboembolic events including stroke.

7. An objective measurement of thrombosis risk in patients with AF is provided by the $CHADS^2$ score. This scores the risk of stroke on the basis of AF in addition to other risk factors (e.g. cardiac failure, hypertension, age over 65, diabetes or previous stroke). On this measure and with a history of hypertension Mr Thorley had a (low) score of 1. Such a score has an adjusted stroke risk of 2.8% p.a. A score of 0 (AF with no additional risk factors) has an adjusted stroke risk of 1.9% p.a.

8. Warfarin is prescribed for AF patients to reduce the risk of the formation of clots and thereby the risk of thromboembolism including stroke. However, warfarin does not dissolve thrombus which has formed, nor therefore affect the consequent risk of thromboembolism.

9. The effect of stable warfarin treatment is measured by way of INR (International Normalised Ratio) which indicates the time taken for the blood to clot. The target INR for prevention of thromboembolism associated with AF is 2.5 (typical range 2.0 to 3.0); and the average dose required to achieve that target is between 3 and 5 mg. Mr Thorley's target INR was 2.5 and his regular dose was established at 3.5mg. In this case it will be of particular importance to consider what is meant by stable warfarin treatment.

10. Because of its anticoagulant effect, the major complication of treatment with warfarin is an increased risk of bleeding, including excessive or spontaneous bleeding after surgery and other invasive procedures. There is no dispute that this required Mr Thorley's warfarin to be stopped in the perioperative period of the angiogram; the issue on breach of duty is for how long, having regard to the balance of risk between bleeding and thromboembolic events including stroke.

Narrative

11. The essential narrative of events is largely uncontroversial. In February 2002 Mr Thorley, then aged 48, was diagnosed with AF and was prescribed long-term warfarin, taken each evening at about 6 p.m. He attended regular outpatient appointments at the anticoagulation clinic at Sandwell Hospital where his INR was checked and his dose of warfarin adjusted accordingly. By 2004/5 his INR and dose were fairly stable. Thus :

Clinic date	Target INR	Actual INR	Warfarin dose (per day)
22.10.04	2.5	2.4	3.5mg
25.2.05	2.5	2.3	3.5mg
31.3.05	2.5	2.6	3.5mg

12. On 17.3.05 he was admitted to Sandwell Hospital with a history of two days of chest pain and some breathlessness. He was diagnosed with troponin negative acute coronary syndrome. He was started on 75mg aspirin daily; and discharged on 18.3.05 with arrangements for an outpatient coronary angiogram. The medical notes include the observation *'needs to be off warfarin for four days'*. The risk assessment included the

observation that he was obese; with weight of 143Kg, height 1.84m and thus a body mass index of approximately 42.

13. The angiogram was arranged to take place on 27.4.05. On 19.4.05 at a pre-assessment clinic Mr Thorley was advised to stop taking warfarin prior to the angiogram because of the risk of bleeding at the time of cardiac catheterisation. In accordance with the advice received he took his last pre-angiogram dose on 22.4.05, i.e. so that he was off warfarin for 4 days prior to the day of the angiogram.

14. The consent form signed by Mr Thorley for the procedure included the statement *'Serious and frequently occurring risks "See patient information 1/1000 risk of a serious complication which includes heart attack, stroke, bleeding or damage to blood vessels which in very rare cases can be fatal"'.*

15. On attendance for the angiogram on 27.4.05 his INR was measured at 1.3; thus reflecting the 4 days without warfarin. The angiogram proceeded uneventfully and he was discharged at 4.30 pm. Mrs Thorley collected him from the ward. Her unchallenged evidence is that he told her that he had asked about whether he should restart his warfarin but the staff did not know. She then asked the junior doctor who said that he would go and find out. On his return the doctor asked Mr Thorley for the date of his next anticoagulant clinic appointment. On being told that it was in two days' time, i.e. Friday 29.4.05, the doctor told him to hold off restarting warfarin until then. The discharge notes record *'patient to restart Warfarin after appointment on Friday'.*

16. Mr Thorley duly attended the clinic on 29.4.05. His INR was recorded as 1.5. Since he had taken no warfarin since the reading of 1.3 on 27.4.05, the experts agree that this record of 1.5 must be an error. Mr Thorley was restarted on warfarin that day at about 6 p.m, but at a dose of 3mg rather than 3.5mg.

17. On 30.4.05 Mr Thorley suffered an ischaemic stroke. He was admitted to hospital as an emergency. His INR was recorded at 1.2. In consequence of the stroke that he suffers severe physical and cognitive disability.

Breach of duty

18. The duty and standard of care are of course determined by the principles established in Bolam v Friern Hospital Committee [1957] 1 WLR 582, as clarified by the House of Lords in Bolitho v City and Hackney Health Authority [1998] AC 232. Familiar as they are, they deserve repetition in this case. Thus the principal test in Bolam that a doctor *'…is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a reasonable body of medical men skilled in that particular art… Putting it the other way round, a doctor is not negligent, if he is acting in accordance with such a practice, merely because there is a body of opinion that takes a contrary view'* (p.587); and the clarification in Bolitho 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' : pp.241H-242B.

19. In this case it will also be necessary to consider the statement at first instance in Newell v Goldenberg [1995] 6 Med LR (Mantell J) that *'The* Bolam *principle provides a defence for those who lag behind the times. It cannot serve those who know better'* (p.374, col.1).

20. Until the late disclosure of a document by the Trust, the allegation of breach of duty was focused solely on the date of restarting warfarin after completion of the angiogram. Mr Thorley's case was, and in this respect remains, that warfarin should have been restarted (and at 3.5mg) on the evening of the procedure (27.4.05) not on 29.4.05. Professor Hall's report (28.2.20) stated that he was 'extremely critical' of the hospital's conduct in sending him home without restarting warfarin. The Trust denied that this was a breach of duty; but admitted that the dose should have been restarted by no later than the following day (28.4.05) and at a dose of 3.5mg.

21. Accordingly, the original Particulars of Claim made no complaint about the length of the period for which warfarin was stopped before the procedure. This reflected the opinion of Professor Hall that it was normal practice to stop warfarin *'some days prior to carrying out the procedure'*, albeit *'the period of time for which it was stopped was slightly longer than I would normally advocate. He seems to have been off for about 5 days whereas most people would take the patient off for 3 days'*. (In fact Mr Thorley had 4 days off warfarin before the day of the procedure, i.e. 23, 24, 25, 26 April). Professor Hall's report added that *'Although warfarin is given to reduce the risk of embolism (particularly to the brain) in patients with atrial fibrillation the absolute risk of embolism is low and certainly it is extremely low over a period of only a few days discontinuation of treatment'*.

Disclosure of 2004 document

22. However the case changed as a result of the Trust's disclosure in July 2020 of a document titled 'Anticoagulation and Surgery (Sandwell)' which it first published on 1.4.04. The Trust's retained expert Dr Cripps had in 2008 considered that document and advised its solicitors that it was not directly applicable to the procedure of angiogram which was not surgery. However when reviewing the papers in answer to a request in June 2020 from Mr Thorley's solicitors as to whether there were in existence any relevant guidelines or protocols, Ms Pearl Mullen of the Trust's solicitors concluded that *'… although…not directly relevant, it could be considered a disclosable document…'* in the light of the specific request.

23. Following consideration of that document, the claim was amended to allege breach of duty in respect of the period for which warfarin was stopped before the angiogram was carried out. With the support of Professor Hall it is contended that this amounted to a Trust policy, protocol or guideline which is applicable to angiography. Absent good reason in the particular circumstances, this required that warfarin be stopped for 3 days before the date of the angiogram, i.e. April 24, 25, 26 only. There was no good reason for any such departure in Mr Thorley's case. Accordingly the advice to stop warfarin for 4 days constituted a breach of duty. Furthermore the document required warfarin to be restarted *'as soon as patient is able to take oral fluids'*, which provided further

support for the existing case that it should have been restarted on the evening of 27 April.

24. The Trust's response, supported by the evidence of Dr Cripps, is that the document (which was a guideline, but however described) had no application to the non-surgical procedure of an angiogram; and in any event there would have been good clinical reason in Mr Thorley's case for departing from its terms. Furthermore, and in any event, its existence did not trump a Bolam/Bolitho defence based upon the practice of a body of competent practitioners.

25. The Trust has called no evidence to explain or interpret this document. In consequence Ms Rodway contends that an adverse inference should be drawn against the Trust on this issue, by application of the well-known principles identified in Wisniewski v. Central Manchester Health Authority [1998] PIQR P324 at P340.

26. Having set out various details from the document, I will consider in turn the rival interpretations of Professor Hall and Dr Cripps and then the issue of possible adverse inferences.

27. At its foot, the 'Document Information' identifies the authors as Dr Y. Hasan and Dr P. Stableforth; and the latter as 'Person Responsible for Guideline'. The 'Published Date' is 1 April 2004 and the 'Review Date' 30 April 2006. The later Trust document headed 'Slow induction of warfarin' identifies Dr Hasan as a consultant haematologist; as I was told is Dr Stableforth.

28. A warning note at the top states *'This document is due to be reviewed, however, it remains valid. Please refer to the person responsible for the guideline for further information'.*

29. The first heading is *'Full Dose Anticoagulation and Surgery'*. Thereunder it states '*These guidelines apply to patients on long term oral anti-coagulant therapy,* ***not*** *to the routine low-dose prophylactic anti-coagulation given to cover moderate and high-risk surgery'*.

30. The next heading is *'Elective Surgery'*. Professor Hall accepts that this section is not applicable to this case; likewise the next section headed *'Minor Procedures'* (*'E.g. day case surgery. For dental extractions see separate guidelines'*).

31. However Professor Hall points to the next section *'Intermediate and Major Surgery'* and its first subheading '*1. Medium Risk of Thromboembolism*'. The latter identifies the patients on such risk as *'**Patients on long-term anticoagulants for: Atrial fibrillation*** [also *Cardiomyopathy; Previous single episode of venous thromboembolism; Mural thrombus; Rheumatic mitral valve to disease.'*] (emphasis supplied). Professor Hall considers that this section is applicable to an AF patient with a $CHADS^2$ score of 1 who is being admitted for angiography. Mr Thorley's $CHADS^2$ score put him at a significant risk in comparison to the general population, but not as high as those with multiple risk factors.

32. The sub-heading then deals in turn with '*Before surgery*' and '*After surgery*'. Under '*Before surgery*', it provides three bullet points: '***Stop Warfarin 3 days prior to surgery****, then admit 2 days prior to surgery*; '*Give LMW Heparin (Clexane) prophylaxis*

40 mg od subcutaneous, last dose night before'; '*Before surgery check that the INR is <1.8 and the APTT <1.5 times control*'. Under '*After surgery*' the three bullet points are : '*Continue subcutaneous Clexane post-operatively as above*'; '***Re-start Warfarin as soon as patient is able to take oral fluids***'; '*When INR >2 for 48 hours stop Clexane*.' (emphasis supplied).

33. Professor Hall's opinion is that the highlighted sections could and should have been applied to Mr Thorley's case; so that warfarin should have been stopped for 3 days (24-26 April) before the procedure and restarted on the evening of the procedure (27 April) when he was evidently able to take oral fluids.

34. As to the rest of the guidance under the heading '*Before surgery*', Professor Hall agreed that '*then admit 2 days prior to surgery*' did not apply, because cardiac catheterisation was always a day case; '*Give LMW Heparin (Clexane)*' did not apply where (as here) the patient was only to be immobilised briefly; and likewise the reference to APTT. As to '*check that the INR is <1.8…*', he would be quite happy if it was between 1.5 and 1.8.

35. Under the heading '*After surgery*', he agreed that the first and third bullets relating to Clexane did not apply. However the second bullet ('*Restart Warfarin as soon as patient is able to take oral fluids*') was the logical way to proceed and reflected every guideline he had come across.

36. As to the next sub-section headed '*2. High risk of thromboembolism*' and the concluding section headed '*Emergency Surgery*', neither of these was applicable.

37. Professor Hall acknowledged that angiography was not surgery '*technically*'; but it was a significant intervention akin to surgery, gave rise to a risk of bleeding, and was usually performed by cardiologists. The risks were small but principally concerned the risk of bleeding from the puncture, either round the catheter (rarely) or after the procedure. He described the process which included the puncture of the (here) femoral artery with a needle; the insertion of the flexible wire through the needle into the artery; the removal of the needle from around the wire; the passing of the sheath (plastic tube with valve) over the wire; the removal of the wire; the feeding of the catheter through the sheath; the injection of the contrast material; and guiding the catheter through the arteries and then the reversal of the process.

38. In further support of his opinion that this procedure was akin to surgery, Professor Hall also pointed to the Douketis study ('Perioperative bridging anticoagulation in patients with atrial fibrillation' : New England Journal of Medicine, 22.6.15) - relied on by the Trust on the issue of causation - which concerns both surgery and invasive procedures such as angiography.

39. Professor Hall denied that he was simply selecting the part of the guideline that matched the facts of Mr Thorley's case. He had selected the parts that applied generally to the procedure of cardiac catheterisation. He agreed that it was more common in 2005 than nowadays for there to be no guidelines for a procedure; that guidelines do not exist for every procedure, nor necessarily cover every situation; and that when guidelines do not exist clinicians apply their experience and judgment, which includes balancing the risks.

40. Professor Hall agreed that the 2004 document was a guideline, but disagreed that a guideline had any less significance than a policy or protocol. A guideline should be followed unless there was a clinical reason to deviate in the particular case. In the present case there was simply no record in the evidence of any such judgment that being made. He agreed that Mr Thorley had been morbidly obese and had high blood pressure, each of which increased the risk of bleeding; also that he had been on aspirin since his admission with chest pain in March 2005. However these factors should not affect normal practice; and warranted neither extending the period of omission before the procedure nor delay in deferring the restart of warfarin on the evening of 27 April when he was able to take oral fluids.

41. Professor Hall made clear that, in the absence of this guideline, he would remain of the view in his first report that a 5-day period of omission of warfarin prior to the procedure would not be contrary to the practice of a reasonable body of practitioners in 2005. His agreement in the Joint Statement that *'stopping Warfarin 5 days before a procedure is not a breach of duty'* was based on such considerations; but was subject to the opinion he had formed once the 2004 guidance document had come to light.

42. Leaving aside the terms of the 2004 guidance, he agreed that a substantial body of material supported the proposition that it was acceptable practice to stop warfarin for a period of 4 or 5 days before surgery or invasive procedure; e.g. Douketis itself ; 2017 ACC Expert Consensus (Journal of the American College of Cardiology); Garcia and others, Risk of Thromboembolism with short-term interruption of warfarin therapy; Wysokinski and others, Periprocedural anticoagulation management of patients with nonvalvular atrial fibrillation (2008).

43. Dr Cripps' opinion was that the document had no application to angiography. This was a procedure carried out by a physician in a radiology room and was not surgery. That was patently obvious from its language and did not need anyone from the Trust to affirm it. The document was a guideline, not a protocol or policy; the weakest of that trinity and existing merely to advise and assist in treatment. In the absence of a protocol concerning angiography, it was not reasonable to apply guidance relating to surgery. In 2005 guidelines were much less common. It was unsurprising that there was no guidance in 2005 concerning warfarin and angiography; it would be more surprising if there were such guidance.

44. Dr Cripps also pointed to the Trust's apparent successor guidelines in 2008, where the title was extended to include invasive procedures ('*Guidelines for the management of oral anticoagulant therapy before and after surgery and invasive procedures*') but the only substantive new section was headed 'Regional Anaesthesia'.

45. In any event there were good reasons for departing from any such guidance or advice. First, the established practice of stopping warfarin up to 5 days before. If an operator had applied that practice for years he was not obliged to change. Secondly, in the context of the three particular factors of obesity, high blood pressure and taking aspirin, a responsible body of practitioners would want to keep warfarin low and stop 4 or 5 days before; and to restart warfarin on the day after the procedure.

46. Even if, contrary to his view, this document was applicable to angiography, it was only a guideline. As Professor Hall agreed, any guideline can be departed from on clinical grounds; see likewise the Trust's subsequent document of 2008, which included *'In*

applying the general principles and recommendations within these guidelines, the healthcare professional will need to continue to apply medical knowledge and clinical judgement to the management of individual patients' (para.2.0).

47. As to the restarting of warfarin, a reasonable body in 2005 would have delayed restarting until the day after the procedure. It was his own practice to restart warfarin the day after the procedure in a patient at low risk of stroke such as this, and provided there was no evidence of a bleeding problem. Bleeding may be delayed or not apparent immediately after angiography, particularly in an obese patient, and it may be considered that delaying warfarin until the next day, which carries a minimal risk, provides extra safety should a late bleed occur.

48. The 1998 'Guidelines on oral anticoagulation' (3rd edition), prepared by the Haemostasis and Thrombosis Task Force for the British Committee for Standards in Haematology, lead author Dr Baglin, further demonstrated that restarting the same day was not mandatory. Thus *'The timing for reinstitution of oral anticoagulants will depend on the risk of post-operative haemorrhage. The 48-72 h delay for achievement of anticoagulation with oral vitamin K antagonists will also influence this decision. In many instances oral anticoagulants can be started again as soon as the patient has an oral intake'.* This allowed for a view, even if a minority view, that warfarin may be started the next day. In the Douketis trial the mean time of resumption of warfarin was 1.5 days.

49. Dr Cripps agreed that the procedure appeared to have been completely uneventful; and that there had been no bleeding beyond what would be expected at the entry site. However that was to look at the matter retrospectively. A late bleed could not have been excluded prospectively; and bleeding from the puncture site could be very serious.

50. Professor Hall accepted that there were occasionally circumstances such as ongoing bleeding or the patient being unable to take oral medication when warfarin would not be restarted on the same day. However in all other circumstances it was normal practice to restart on the evening of the procedure. This was the only logical practice because of the time interval before warfarin becomes effective. The effect of the cited extract from the 1998 guideline was that delayed restart beyond the same day was for those with a high risk of haemorrhage. Mr Thorley was not in that category. The Douketis study included patients who had general anaesthesia and a number of these would not have been able to take oral medication until the next day or occasionally for even longer. It did not reflect a policy of delaying warfarin until the next day. Patients who undertake angiography can nearly always eat and drink within a short time after the procedure. There was no reason why Mr Thorley could not take medication on the evening of the procedure.

51. In addition to her reliance on Professor Hall's opinion on the 2004 document, Ms Rodway contends that the Court should draw an adverse inference from the failure of the Trust to call any evidence either from those who are responsible for drafting the document or from those who had clinical responsibility for Mr Thorley. There is no reason to believe that the Trust could not have called the haematologists who were the authors of the document, i.e. Dr Hasan and Dr Stableforth; or those concerned with Mr Thorley's care and the withdrawal of warfarin (the cardiologist Dr Ahmad and/or members of his team) .

52. For this purpose, Ms Rodway points to the principles identified by the Court of Appeal in Wisniewski:

> *(1) In certain circumstances a court may be entitled to draw adverse inferences from the absence or silence of a witness who might be expected to have material evidence to give on an issue in an action.*
>
> *(2) If a court is willing to draw such inferences they may go to strengthen the evidence adduced on that issue by the other party or to weaken the evidence, if any, adduced by the party who might reasonably have been expected to call the witness.*
>
> *(3) There must, however, have been some evidence, however weak, adduced by the former on the matter in question before the court is entitled to draw the desired inference: in other words, there must be a case to answer on that issue.*
>
> *(4) If the reason for the witness's absence or silence satisfies the court then no such adverse inference may be drawn. If, on the other hand, there is some credible explanation given, even if it is not wholly satisfactory, the potentially detrimental effect of his/her absence or silence may be reduced or nullified."*

53. She submits that the issues in question are whether the 2004 document was applicable to the procedure of angiography as and in the way that Professor Hall contends; and if so whether there was any clinical reason to depart from its guidance. The evidence of the document together with Professor Hall's opinion provided a case to answer. No good reason or explanation had been given for the failure to call such witnesses who would or might be able to have material evidence on these issues. The appropriate inference was that such evidence would have supported the interpretation and conclusions of Professor Hall not Dr Cripps.

54. Mr Post QC submitted that the Wisniewski principles had no application. As to principle (1), a set of guidelines which on their face applied only to surgery did not give rise to an issue on which a witness might be expected to be called. As to (3), the only evidence adduced by the Claimant was the expert evidence of Professor Hall, which was matched by the expert evidence of Dr Cripps. If the latter did not constitute evidence on the point, then neither did that of Professor Hall. In short, there was no case to answer on the issues. As to (4), there was good reason for the absence of any witnesses. Having considered the clear terms of the document and also taken Dr Cripps' opinion, the Trust's advisers concluded that there was no need for such evidence to be obtained.

55. Since the close of argument in this case, the Supreme Court has commented on adverse inferences and Wisniewski. In Efobi v. Royal Mail Group Ltd [2021] UKSC 33; [2021] 1 WLR 3863 Lord Leggatt JSC (with whom the other JSC agreed) observed at [41]: *'The question of whether an adverse inference may be drawn from the absence of a witness is sometimes treated as a matter governed by legal criteria, for which the decision of the Court of Appeal in* [Wisniewski] *is often cited as authority. Without intending to disparage the sensible statements made in that case, I think there is a risk of making overly legal and technical what really is or ought to be just a matter of ordinary rationality. So far as possible, tribunals should be free to draw, or to decline*

to draw, inferences from the facts of the case before them using their common sense without the need to consult law books when doing so. Whether any positive significance should be attached to the fact that a person has not given evidence depends entirely on the context and particular circumstances. Relevant considerations will naturally include such matters as whether the witness was available to give evidence, what relevant evidence it is reasonable to expect that the witness would have been able to give, what other relevant evidence there was bearing on the point(s) on which the witness could potentially have given relevant evidence, and the significance of those points in the context of the case as a whole. All these matters are inter-related and how these and any other relevant considerations should be assessed cannot be encapsulated in a set of legal rules'.

56. Whilst this was an employment case where the first instance decision was of an employment tribunal, these observations were evidently intended to have the widest application.

Conclusions on the 2004 guidance

57. I am not persuaded that the 2004 guideline has any application to the procedure of angiography; nor that there is any support for that conclusion by inference from the absence of factual evidence called by the Trust on this issue. In my judgment, no such adverse inference can be drawn because neither the document itself nor Professor Hall's opinion provide any basis to do so.

58. As to the language of the document, Professor Hall accepts that the procedure of angiography does not constitute surgery under any of the relevant heads, including the sub-heading of 'minor procedures'. At its highest his evidence is that the procedure is 'akin' to surgery. Conversely, the effect of his opinion evidence is that the guidance could and should have been applied to the procedure of angiography for a patient in Mr Thorley's position, i.e. on long-term anticoagulation for AF. To that opinion evidence, the Trust responds through the contrary opinion of Dr Cripps.

59. Conversely Professor Hall's opinion evidence in my judgment gives no assistance on the question of whether the guidance was in fact treated by the Trust and its practitioners as having application to the invasive procedure of angiography. His opinion that it could and should have been so applied and adapted does not give rise to any such inference of fact.

60. Accordingly, insofar as the question is whether the Trust in fact treated the guidance as applying to angiography, I see no case to answer on that issue; and conclude that no adverse inference can be drawn from the absence of witness evidence from the Trust on that question. This applies to evidence that might have been called both from the treating team and from the authors (Drs Hasan and Stableforth) of the 2004 guideline. As to whether that guideline could and should have been applied, that is a matter for the independent expert evidence of Professor Hall and Dr Cripps.

61. As to that issue, I prefer the opinion of Dr Cripps.

62. First, the guideline concerns anticoagulation and surgery. That is clear from its title and content.

63. Secondly, angiography is not surgery; as Professor Hall effectively acknowledged, through his opinion that it was to be treated as 'akin' to surgery.

64. Thirdly, it is unsurprising that in 2005 there was no guideline for anticoagulation and angiography. As Professor Hall accepted, guidelines do not exist for every procedure, and this was more common in 2005; and when guidelines do not exist clinicians apply their experience and judgment which includes balancing the risks.

65. Fourthly, I am not persuaded that it would have been appropriate to apply the guidance in the way suggested by Professor Hall. In particular, and leaving aside the general point about 'surgery', the sub-heading of 'Medium risk of Thromboembolism' lies uneasily with Mr Thorley's low $CHADS^2$ score; and the focus on the stopping and restarting of warfarin is in my judgment weakened by those parts, e.g. '*admit 2 days prior to surgery*' and the references to LMWH/Clexane, which admittedly have no application to his situation.

66. Fifthly, the advice to '*stop warfarin 3 days prior to surgery*' is at odds with the ample cited material which supports the omission of warfarin for 4 or 5 days before angiography and the experts' agreement (in Professor Hall's case, subject to the document) that this accords with responsible practice.

67. I therefore reject the case that those advising and treating Mr Thorley should have applied the identified or any provisions of the 2004 document; nor therefore that there was any 'breach of duty' in failing to do so.

The Bolam/Bolitho defence

68. If that conclusion is wrong, the next question is whether nonetheless the Trust can defeat liability on the basis of the Bolam/Bolitho test.

69. Mr Thorley's case is pleaded and argued on the basis that the failure to follow the 2004 guidance in each respect constitutes a breach of the duty of care, both as to stopping and restarting warfarin. Ms Rodway submits that that duty required those advising and treating Mr Thorley to comply with the 2004 guidance unless there were good clinical reason to do otherwise. In the event of breach of that duty, it was immaterial that a responsible body of practitioners who were not subject to the obligations of that guidance would have acted differently. Thus the agreed evidence that a body of competent practitioners would have stopped for 4 or 5 days was irrelevant; and equally so the disputed evidence that a body of competent practitioners would have deferred restarting until the following day, i.e. the 28th. She pointed to the evidence of Professor Hall that the failure to follow the guidance was a 'breach of duty'; and to Dr Cripps' acceptance in cross-examination that (at least if it had constituted a protocol) it should be followed unless there were good clinical reason to do so.

70. Mr Post submitted that this was to misidentify the relevant duty of care, which the law imposes. Medical practitioners are required to comply with the Bolam/Bolitho duty, with the consequence that they are not liable if they have acted in accordance with practice accepted as proper by a responsible body of practitioners in that field; and provided that such opinion has a logical basis. In each case the established practice of a body of competent practitioners satisfied that requirement.

71. Citing Bolitho, Ms Rodway's riposte was that, in circumstances where a hospital had a relevant and applicable protocol or guidance and there was no good clinical reason to depart therefrom, there was no logical basis for the adoption of the alternative practice.

72. Neither party citing any further authority on this point, I asked them to consider the observation of Mantell J in Newell to which I have already referred. Ms Rodway submitted that it supported her argument, in that this was a case where this particular Trust through the 2004 protocol 'knew better' than the practices relied on by the Trust in this action; and thus could not rely on the Bolam/Bolitho defence. In addition to his general proposition, Mr Post contended that in any event this was not a case where it could be said that the Trust 'knew better'; rather on the evidence (if accepted, contrary to its case) its practice was simply 'different'.

73. In my judgment, Mr Post's primary contention on this point is correct as a matter of law. True it is that the claim is now pleaded advanced and supported by the evidence of Professor Hall on the basis that the duty of care requires medical practitioners to comply with an applicable protocol or guidance unless in the particular circumstances there is good clinical reason not to do so. However the nature of the duty of care of medical practitioners is a question of law, determined by authority at the highest level. This requires them to act in accordance with a practice accepted as proper by responsible body of practitioners in that field and which has a logical basis. If the practitioner complies with that duty he or she is not liable to the patient in question.

74. If the observation of Mantell J in Newell is to be read to the contrary, then I would respectfully disagree. However in my judgment the statement made in that case is better to be understood in the context of a 'warnings' case where the allegation is that the practitioner failed to give appropriate advice of the risks in the proposed medical treatment. Mr Goldenberg's practice was to warn his patients that the operation of vasectomy could reverse itself; but by oversight he failed to do so on this occasion. As the subsequent decision of the Supreme Court in Montgomery v Lanarkshire Health Board [2015] UKSC 11 has established, the Bolam test (and hence the 'Bolam defence') does not apply in such cases. By contrast, the present is not a 'warnings' case; and the Bolam test has full application.

75. In any event, I consider that Mr Post is right to distinguish a practice which is 'better' from one which is simply 'different'. The expert evidence provides no basis to conclude that a 3-day omission of warfarin would have constituted 'better' practice than 4 or 5 days.

76. Further, I do not accept that the existence of the 2004 guidance (if applicable to Mr Thorley's case) means that it is 'illogical' to apply the alternative and responsible practice of a body of competent practitioners; nor does it deprive that practice of its logical basis.

77. Accordingly I conclude that in advising Mr Thorley to stop warfarin for a period of 4 days before the procedure, the Trust was not in breach of its duty of care to him.

78. As to restarting warfarin, the dispute on the Bolam/Bolitho standard is whether there was a body of responsible practitioners who would have delayed until the day after the procedure i.e. until 28 April. If so, for the reasons already given, this would provide to that extent a Bolam defence notwithstanding the terms of the 2004 guidance.

79. On this issue, I prefer the evidence of Dr Cripps to that of Professor Hall. I am satisfied that there was a body of competent responsible practitioners, including himself, who would have deferred the restart of warfarin until the day after the procedure. His evidence was not confined to his own practice, significant evidence as that is, but reflected a wider body of responsible practitioners. In my judgment this is consistent with the 1998 guidelines and the qualifying terms of its statement that *'In many instances oral anticoagulant can be started again as soon as the patient has an oral intake'.* I acknowledge that this has to be read in the context of an assessment which depends on the risk of post-operative haemorrhage; together with the agreed expert evidence of the cardiologists that the risk of bleeding with angiography is low. However I accept Dr Cripps' evidence that bleeding may be delayed or not apparent immediately after angiography particularly in an obese patient; and that delay until the next day carries a minimal risk but may provide extra safety should a late bleed occur. This all supports the conclusion that such a practice by those including Dr Cripps was responsible and had a logical basis.

80. Accordingly my conclusion is that the Trust would not have been in breach of its duty of care if it had restarted warfarin on 28 April; and in consequence was not in breach of duty beyond the extent which the Trust has admitted.

Causation

81. Mr Thorley's case on causation is put on two alternative bases, namely by reference to the tests commonly described as (i) 'but for' and (ii) material contribution. Conversely, it is (rightly) not submitted that the case falls within the narrow 'Fairchild exception', i.e. where causation is established on the exceptional basis that the negligence materially increased the *risk* of the occurrence of the injury : Fairchild v. Glenhaven Funeral Services Ltd [2003] 1 AC 32.

82. In the light of my findings on breach of duty and the terms of Dr Baglin's opinion, resolution of the 'but for' case on causation is academic. The alternative case of 'material contribution' remains live, but only to the extent of the admitted breaches. However, in each case I consider the causation issues in full.

83. As revised in the Amended Particulars of Claim and supported by Dr Baglin's ultimate evidence, the first case is that, 'but for' the alleged failure to comply with the 2004 guidelines i.e. so as to omit warfarin for three days (24, 25, 26 April) rather than six days (23, 24, 25, 26, 27, 28 April) and to restart at the correct dose on 27 April, the stroke would probably not have occurred.

84. The alternative case is that any breach of duty as to the stopping/restarting of warfarin made a material contribution to the occurrence of the relevant injury, i.e. the stroke.

The 'but for' case

Dr Baglin

85. Dr Baglin, like his counterpart Professor Pasi, is a haematologist of great distinction. As has been noted, he is the lead author of the 1998 guidelines on oral anticoagulation. His opinion has developed over the course of the litigation, in particular following the disclosure in July 2020 of the Trust's 2004 guideline.

86. Before that disclosure, his initial report dated December 2019 was – like the pleaded case on breach of duty – focused only on the alleged delay in restarting warfarin after the procedure. He concluded that the delayed reintroduction of warfarin, i.e. from 27 to 29 April, *'made a more than negligible contribution to the occurrence of stroke on a balance of probability'* (para.4.16). In reaching that conclusion, he took account of the material which demonstrates that in the state of stable warfarin treatment, the relative incidence of stroke is on a steep gradient between an INR of 2.0 (the base of the target range for prevention of thromboembolism) and 1.0 (when there is no anticoagulant effect). In Mr Thorley's case, his INR on the morning of 27 April had fallen to 1.3. His opinion was that it would have fallen further on that day; and that if it had been restarted that evening at the previous dose, it would have been about 1.5 by 30 April; rather than the actual 1.2. This would have been a large difference in dose and exposure.

87. As to that gradient, he pointed in particular to the study of Hylek et al (1996 : 'An analysis of the lowest effective intensity of prophylactic anticoagulation for patients with nonrheumatic [AF])'. The purpose of this study was to establish the lowest intensity of anticoagulation that was effective in patients with AF. It considered 74 such patients who were admitted to the subject hospital between 1989 and 1994 after having an ischaemic stroke while taking warfarin; and measured their INR at admission. For each such patient they took 3 'controls', i.e. AF outpatients on warfarin, measuring their INR at the date closest to the admission date of the matched stroke patient.

88. The study showed that the risk rose very steeply as INR levels fell below 2.0. When adjusted for other correlates of stroke, e.g. previous stroke, current smoking etc, the 'odds ratio' comparing patients with INR 2.0 and lower INR showed a steep gradient: e.g. at INR 1.8, a ratio of 1.5; at 1.5, a ratio of 3.3; at 1.2, a ratio of 8.3. Thus the relative incidence of stroke at an INR of 1.5 as compared to 1.2 was 3.3:8.3, i.e. 0.39 or 39%.

89. However Dr Baglin in his report acknowledged the difference between a stable and unstable state of anticoagulation and the consequence for the significance of the INR measure. In patients with a relatively stable intensity of anticoagulation the INR correlates with both risk of thromboembolism and risk of bleeding, with an increasing risk of thromboembolism as the INR falls below 2.0 and an increasing risk of bleeding as it rises above 3.0. However, when warfarin is stopped and restarted the INR is not stable and the association between INR and the likelihood of thrombosis or bleeding may be different.

90. This is because of the different response to warfarin of the various clotting factors. The anti-thrombotic action of warfarin arises from its inhibition of vitamin K in the liver, which vitamin is an essential component of the clotting factors II, VII, IX and X. However these clotting factors all decay in response to warfarin, and recover following its removal, at different rates.

91. This reflects the different 'half-life' of each factor, i.e. the time taken for the concentration of a factor to change by 50%. The half-lives of the four identified factors are respectively >60 hours, <6 hours, 18 and 36 hours. The shorter the half-life the faster the change in level and vice versa. Thus when warfarin is commenced, or restarted after a 5 day interruption, factor VII falls the fastest; and the INR increases because it is very sensitive to the factor VII level. However the effect of factor VII on thrombosis risk is less than other factors. The main determinant of risk of thrombosis is the level of factor II; and after that factor IX. In consequence, when warfarin is

introduced the INR increases - mainly due to the fall in factor VII - but the thrombosis risk does not reduce as fast; because the level of factor II falls more slowly.

92. Thus, as Dr Baglin states in his first report *'...when warfarin is stopped and restarted the INR is not stable and the association between INR and likelihood of thrombosis or bleeding may be different.'*

93. However, whilst acknowledging this difference between the stable and unstable state as it affects the significance of the INR, his opinion was that there was also a gradient of the incidence of stroke risk in the unstable state. Thus: *'Nevertheless, it is still likely that there is a gradient effect of intensity of anticoagulation on ischaemic stroke risk with a decreasing risk as the INR rises from 1.0 to 2.0 and above when warfarin is started. It is possible that this gradient is shallower than the gradient that is present during stable anticoagulation with warfarin but nonetheless there is a gradient in both situations… Even accepting that the risk of stroke might be underestimated to some extent by the INR when warfarin is started or reintroduced I think most experts will accept that there is a gradient of risk and that the likelihood of stroke at different INRs is likely to be different.'*

94. Having taken due account of this qualification and its effect on the conclusions to be drawn from the Hylek study, Dr Baglin concluded that it was likely that there was a material contribution of under-anticoagulation to stroke with INR of 1.2 as compared with 1.5, i.e. when comparing a restart of warfarin on 27 rather than 29 April.

95. Accordingly in his report Dr Baglin agreed with the averment in the existing Particulars of Claim (2.8.18) that *'...the absence of Warfarin therapy between 27/04/05 and 29/04/05 (combined with the fact that the Warfarin was started at too low a dose of 29/04/05) and the consequent reduction in anticoagulation effect (reflected by the Claimant's reduced INR on 30/04/05) made a contribution (which was more than negligible) to the formation of the clot and the consequent stroke, and/or materially increased the risk of clot formation and of a stroke occurring'* (para.14).

96. Conversely, he agreed with its averment (para.11) that it was not possible to state whether the 'but for' test was satisfied : *'It is impossible to say whether the stroke which occurred on 30/04/05 would have occurred even had the Claimant's Warfarin therapy had been restarted at the correct dose (3.5mg) on the evening 27/04/05.'*

97. As a result of the disclosure of the 2004 guideline, Dr Baglin was asked to review his opinion. This first reference to this appears in the haematologists' Joint Statement dated 17.8.20. The experts agreed that the rate of stroke risk increases as the INR falls below 2.0; that the Hylek study showed a gradient of stroke rate in relation to INR at a steady state; that in the setting of reintroduction of warfarin the gradient would be less steep; that when anticoagulation with warfarin is stopped the longer the period before reintroduction the more likely it is that stroke will occur; and that stroke was an all or nothing phenomenon - either embolus breaks off and lodges in the arterial tree or it does not.

98. In answer to the Joint Statement question 11 on 'but for' causation (*'If the claimant had been treated as he contends he should would he, on the balance of probabilities, have suffered a stroke?'*) the agreed answer is recorded as *'Had warfarin been reintroduced at his usual maintenance dose on the day of the procedure then he would still have*

suffered a stroke on the balance of probability'; likewise the answer to the following question 12. On the face of it, this was a concession by Dr Baglin which went beyond his previous evidence that it was not possible to say either way. There was no direct consideration of causation in the event that there was a breach of duty in respect of stopping warfarin before the procedure.

99. I accept Dr Baglin's evidence that these answers did not in fact represent his true opinion which remained that, in respect of the restarting date of warfarin, it was not possible to say on the balance of probabilities whether or not the stroke would have been avoided. On reviewing the Joint Statement and his report, Dr Baglin had indeed noted that his recorded answer to question 11 did not express his true opinion. In consequence, by letter of 9 September he stated that his opinion was unchanged that it was not possible to say either way. He added that at the experts meeting *'It is my recollection that I focused primarily on the concept of material contribution and not balance of probability as I had never claimed before the meeting that the stroke would or would not have happened on a balance of probability'*.

100. This still left open the question of causation in respect of the new case that warfarin should have been omitted for no more than 3 days before the procedure. In consequence the Claimant's solicitors sent questions to the experts which include whether the stroke would have been avoided on the balance of probabilities if warfarin had only been stopped for three days and restarted on the evening of the procedure at the usual dose of 3.5mg.

101. Dr Baglin's answer came in a letter dated 19 September 2020. In this he expressed the opinion that on the balance of probability the stroke on 30 April would have been avoided if warfarin had been stopped for three days and restarted on the evening of the procedure at the usual dose, i.e. missing warfarin for 3 days rather than the actual 6 days.

102. He considered that, in the 3-day scenario, he would expect Mr Thorley's INR on 27 April to have been around 1.5; and that as a result of restarting that evening his INR on 30 April (after 3 doses at 3.5mg) would have been risen by 0.3 to at least 1.8. Returning to the Hylek study and its calculation of 'odds ratios', this was 8.3 at an INR of 1.2; and 1.5 at an INR of 1.8. This produced a relative incidence of stroke of 1.5:8.3, i.e. 0.18 or 18%.

103. Dr Baglin then referred back to the *'view that the Hylek data are relevant only to patients on stable anticoagulant therapy'*. He added *'(and that is my opinion also)'*, whereas his initial report had accepted that this view *'may be a possibility'* (para.5.03). However he concluded that on the hypothesis of missing 3 days of warfarin, rather than 6 days, the situation began to reflect a relatively more stable level of anticoagulation; so that the Hylek ratios became a better indicator of the relative rate of stroke for a given INR. Thus where the Hylek comparison between INR of 1.8 and 1.2 showed a 18% relative incidence of stroke, this supported the conclusion that omission of warfarin for 3 days rather than 6 would have avoided the occurrence of the stroke. He emphasised that this was taking a conservative and cautious approach. By contrast, he did not feel able to reach that conclusion where the omission was 4 days and the Hylek relative incidence of stroke 39%, i.e. less than 50%.

104. In cross-examination he defined a stable or steady state as when the patient reaches the point in anticoagulation where the INR is relatively stable, i.e. has reached the target INR between 2 and 3. Patients in Hylek with low INRs had deviated from that steady state, for all sorts of reasons.

105. Dr Baglin acknowledged that in Mr Thorley's case there had been an intentional stoppage, so as to lower the INR; but in effect contended that there was no difference between this and an unintentional deviation as had occurred in those Hylek patients who had suffered a stroke. He acknowledged the point about the 50% of patients who had previously had a stroke and the consequent substantially increased risk of a further stroke. However, all in all, the Hylek study was the best indicator of relative risk, albeit to be applied in the very cautious way he had.

Professor Pasi

106. Professor Pasi wholly disagrees with this approach and analysis. He contends that the Hylek study was based upon patients on long-term warfarin in steady state. Steady state was where patients were chronically taking warfarin, with consistent treatment, not stopping and restarting. The reason that patients taking warfarin might present with a stroke was that several factors, e.g. diet, alcohol, drugs, illness, could affect the way warfarin behaves and in consequence the INR.

107. In Hylek, the patients would have been on regular warfarin, not stopping and starting as in Mr Thorley's case. He acknowledged that we do not know how much warfarin the patients were on or for how long, but pointed to its publication in the New England Journal of Medicine which had exceptionally rigorous review processes. The trial would inevitably proceed on the basis of patients on regular warfarin; hence also the largest exclusion factor in the trial (*'the vast majority of those excluded'*) being those who were not taking warfarin at the time of the stroke.

108. He also noted that half the patients in Hylek had had a previous stroke; thus increasing tenfold the risk of a further stroke.

109. Thus Hylek provided no useful basis or model for a patient (such as Mr Thorley) who suffered a stroke at a time when he had been taken off warfarin, i.e. was not on stable anticoagulant therapy. The Hylek paper refers to the relationship between INR and stroke risk in the steady state. For the reasons acknowledged by Dr Baglin, it is only in steady state that there is an equilibrium between all the clotting factors that are influenced by warfarin. Furthermore (as Dr Baglin accepted) there are two other clotting factors involved in coagulation and thrombosis and affected by warfarin, namely the natural anticoagulants protein C and protein S. They are not measured or reflected in INR but will have influence on the overall antithrombotic impact of warfarin. In consequence in Mr Thorley's case there are six different clotting proteins changing at six different rates. With clotting proteins changing at different rates, affecting coagulation in different ways and providing antithrombotic impact to different levels, it is impossible to extrapolate the Hylek results into this situation. In Mr Thorley's case he had recently stopped warfarin and was then restarted, accordingly the steady state relationship was disrupted. He accepted that it was a snapshot, but it was not comparing like with like.

110. Furthermore, on the 3-day scenario, his opinion was that Mr Thorley's INR would have fallen from 1.5 to 1.4 in the course of 27 April (between 9 a.m. measurement and 6 p.m. restart of warfarin); so that, applying the same increase of 0.3 INR from three doses until 30 April, the resulting INR would have been 1.7, not 1.8.

111. In addition to his rejection of Hylek as relevant to Mr Thorley's position, Professor Pasi relies on the Douketis trial – cited above - as support for his positive conclusion that Mr Thorley would have suffered his stroke in any event.

112. The purpose of this study was to consider whether so-called 'bridging' anticoagulation was beneficial for patients with AF who need an interruption in warfarin treatment for an elective operation or other invasive procedure. Bridging anticoagulation in this trial involved the anticoagulant heparin in the form of 'low molecular weight heparin' ('LMWH'), which reaches its therapeutic level much more quickly than warfarin; 2-4 hours rather than 5 days or so. The purpose of such bridging therapy is to minimise the time that patients do not have an adequate level of anticoagulation; and thus to minimise the risk of perioperative arterial thromboembolism, such as stroke.

113. The study involved a placebo-controlled trial in which, after perioperative interruption of warfarin, patients were randomly assigned to receive bridging LMWH or matching placebo twice daily. Warfarin was stopped 5 days before the procedure and restarted on the evening of or the day after the procedure. Heparin was started 3 days before the procedure until about 24 hours before; and resumed 12-24 hours after a minor (low-bleeding-risk) procedure and 48-72 hours after a major (high-bleeding-risk) procedure. Follow-up of patients continued for 30 days. 1844 patients were enrolled, with 950 assigned to receive 'no bridging' and 934 to receive bridging. All had chronic AF. The mean $CHADS^2$ score was 2.3. 69% were considered to have a low-bleeding-risk procedure.

114. In the result, the incidence of arterial thromboembolism was 0.4% in the no-bridging group and 0.3% in the bridging group. The incidence of major bleeding was 1.3% in the no-bridging group and 3.2% in the bridging group. The conclusion was that discontinuing warfarin treatment without such bridging therapy gave no advantage for the prevention of arterial thromboembolism; and by comparison nearly tripled the risk of major bleeding.

115. Professor Pasi acknowledges that the purpose of the trial was not to consider the optimal timing of a warfarin restart. The question was whether it was beneficial or not to bridge with heparin when warfarin is interrupted and managed optimally according to a protocol. However the trial provided important information on the impact of anticoagulation. The slow weaning off and restoration of warfarin's anticoagulant effect in theory exposes patients to a higher risk of thrombotic events in the perioperative period. Heparin bridging therapy was believed to be a solution to provide continuous anticoagulant effect during temporary interruption of warfarin. The degree of anticoagulation provided by heparin can be regarded as therapeutic. The trial demonstrated that such bridging anticoagulation did not reduce the incidence of arterial thromboembolism when compared to no bridging.

116. This all supported his conclusion that Mr Thorley would have suffered the stroke in any event. The risk of stroke in an AF patient in $CHADS^2$ score 1 was 2.8% p.a. or .00767 % per day, i.e. 1 in 13,000. That very rare risk had occurred in his case.

Dr Baglin : Douketis

117. Dr Baglin disputes the relevance of the Douketis study. Its focus was on heparin and whether its administration as bridging therapy is beneficial in circumstances where warfarin management is optimal in accordance with the trial protocol. It provided no useful basis for extrapolation into Mr Thorley's case. In particular:

(i) Mr Thorley had not received heparin. Whilst heparin was a 'very good anticoagulant' it was not, nor to be regarded as equivalent to, warfarin;

(ii) his warfarin management was not optimal or otherwise in accordance with the trial protocol. The inference must be that many, if not the majority, of the 69% of patients who were undergoing a low-risk-bleeding procedure would have been in the cohort who were restarted on heparin on the day of the procedure. By contrast, following the low-risk-bleeding procedure of angiography, Mr Thorley had not been restarted until more than 48 hours after the procedure, and then at a reduced dose;

(iii) the trial gave no useful information about early strokes, i.e. such as Mr Thorley's which occurred 3 days after the procedure. In Douketis the median time to an arterial thromboembolism event was 19 days. The interquartile range, i.e. the middle 50% of the total number of such events, was 6.0 to 23.0 days. Thus the lowest within that range was 6 days. In total there were just 7 such events (of which 5 were strokes and 2 transient ischemic attack). 50% of those 7 events would have been in the interquartile range of 6-23 days; 25% would have been after 23 days; and 25% before 6 days. Thus at most the trial may have involved $7 \div 4 = 1$ stroke before day 6 and 1 stroke at day 6. Furthermore it was quite possible that those two events occurred in those who did not receive heparin; it was not possible to say either way. Thus the very small numbers of early thromboembolism events in this trial did not allow any useful conclusion to be drawn about the effect of heparin in preventing early stroke;

(iv) the trial did not address the comparative risks of stopping and not stopping warfarin or the effect of different warfarin management strategies on the stroke rate. Both the warfarin and the heparin were interrupted. The trial showed no more than that, if warfarin is interrupted, bridging heparin makes no significant difference to the stroke rate.

118. Professor Pasi disagreed with these criticisms. In particular (i) there was no fundamental difference between heparin and warfarin as anticoagulants and as to their antithrombotic effect. Clinicians use heparin because it is an effective antithrombotic; (ii) there was no difference in outcome between the low risk group (69%) and the (31%) high risk group in the study, the latter group being restarted on heparin anticoagulation at a mean time of 51 hours post-procedure; which was well before warfarin (introduced at a mean 1.4-1.5 days post procedure) would have reached therapeutic INR; (iii) the small numbers of early strokes in the trial reflected the lower than expected stroke rate; the fact remained that there were some early strokes; (iv) the trial minimised the period off anticoagulation. It demonstrated that, when anticoagulation at therapeutic level is achieved in a matter of hours after the procedure, it makes no difference to the stroke

rate during the perioperative period. Thus the chance of the stroke occurring would not have been lessened by introducing warfarin at an earlier point. This all provided a sound basis for extrapolation of the study to Mr Thorley's case.

Submissions

119. As her starting point on 'but for', Ms Rodway submitted that Dr Baglin's estimate of INR at least 1.8 on 30 April should be preferred to Professor Pasi's 1.7. He and Professor Pasi agreed that with 3 days omission of warfarin INR would have been 1.5 at 9 a.m. on 27 April; and that 3 days dosage at 3.5 mg (27-29 April) would lead to a rise of 0.3. The Court should reject Professor Pasi's opinion that the starting point would have fallen from 1.5 to 1.4 in the course of 27 April.

120. The Hylek study should be preferred over the Douketis trial for the reasons advanced by Dr Baglin. The steady state was to be defined as the point where the INR was relatively stable. Professor Pasi's rejection of Hylek wrongly focused on the question of how the INR reached the levels identified in the study. What mattered was the snapshot of the INR at the relevant dates, not how they were reached. There was no logical distinction between a deliberate decision to stop warfarin which rendered it ineffective or less effective and an unintentional mechanism (whatever it was) which had that result.

121. Thus there could be strong confidence in the Hylek data; but importantly Dr Baglin did not apply the data narrowly or slavishly. It provided him with a benchmark from which he proceeded with great caution; hence only concluding that the stroke would have been avoided when the odds ratio was as low as 18% risk of a stroke. Furthermore, even taking Professor Pasi's INR starting point of 1.4, a consequent figure of 1.7 on 30 April produced a Hylek odds ratio of 24% which was also so far into the 'confidence zone' above 50% that the but for test could equally be established.

122. For the reasons advanced by Dr Baglin, an eminent authority on anticoagulation, the Douketis trial provided no useful basis for Professor Pasi's conclusion. Unlike Hylek, its focus was not the relationship between INR levels and the occurrence of stroke, but the effect of bridging with heparin. Ms Rodway in particular emphasised the very small number who had suffered early post-procedure strokes, together with the lack of any evidence as to whether or not they were within the cohort who had been given heparin.

Conclusion on 'but for'

123. For the reasons largely advanced by Mr Post, I have concluded that the opinion of Professor Pasi should be preferred; and regardless of whether Mr Thorley's INR on 30 April would have been 1.7 or 1.8 on the 3-day scenario.

124. In reaching this conclusion, I emphasise that I do not accept any of his criticisms to the effect that the course of Dr Baglin's evidence indicated that he had in some way lost his impartiality. As he acknowledged, he should have taken more care in setting out his opinion both in the Joint Statement and in his corrective letter dated 9 September 2020; but these were entirely innocent errors of expression. Prior to the disclosure of the 2004 guideline, his opinion was always that it was not possible to demonstrate 'but for' causation on the balance of probabilities. In the light of the guideline, he reconsidered

his opinion and reached the conclusion that omission limited to 3 days would probably have averted the stroke.

125. In listening to the contrasting evidence of these eminent practitioners in their field, I have been struck by the deep thought which each has given to the issues before them; and have noted that they have not found the questions to be easy. It follows that I have not found this an easy assessment to make.

126. The difficulty has been enhanced by the fact that in each case the contrasting Hylek and Douketis studies have features which make them not directly applicable to the particular circumstances of Mr Thorley's case. In each case, the question is whether there is sufficient in the particular study to allow the necessary element of extrapolation.

127. Having considered the arguments advanced, I have concluded that Professor Pasi's opinion is to be preferred.

128. The starting point is the essentially undisputed expert evidence that the relationship between INR and stroke risk is only demonstrable in the steady state when there is an equilibrium between all the clotting factors which are influenced by warfarin, namely factors II, VII, IX and X and also proteins C and S.

129. Next, I accept and prefer Professor Pasi's definition of a steady or stable state as where patients are chronically taking warfarin, with consistent treatment, not stopping and restarting and a steady state of anticoagulation. By contrast, I do not accept Dr Baglin's definition as the point in anticoagulation where the INR has reached the target between 2 and 3. As to the explanation for patients on long-term warfarin who present with a stroke, I accept Professor Pasi's evidence that this reflects several factors, e.g. diet, alcohol drugs, illness, which can affect the way warfarin behaves and in consequence the INR.

130. It follows that I do not accept the submission that it makes no difference to the Hylek study how the INR reached this level; or that what mattered was the snapshot at the date of admission. In my judgment the consequence of the need for equilibrium between all the clotting factors which are influenced by warfarin is that the INR at a time of disequilibrium, i.e. when there has been interruption of warfarin, does not provide a reliable measure or indication of its antithrombotic effect; nor therefore allow a reliable conclusion – however cautious and conservative – to be drawn from the odds ratios produced by Hylek.

131. I also do not accept that Hylek provides support for any suggestion that its study stroke patients had neglected or otherwise failed to maintain their regular dosage of warfarin; and thereby or otherwise were analogous to an AF patient (e.g. Mr Thorley) who had deliberately stopped warfarin before the procedure. I accept Professor Pasi's evidence as to the standing of the journal which published the study and the exceptional rigour of its review processes. Whilst the study does not state for how long or what dosage patients had been on warfarin, the study specifically and principally excluded those who were not taking warfarin at the time of the stroke.

132. I also consider it right to take account of the further distinction from Mr Thorley's case, namely that 50% of the study patients had previously had a stroke, with the consequent substantial increased risk of a further stroke.

133. In reaching these conclusions, I of course give full weight to Dr Baglin's expertise in this field; and to the cautious and conservative approach which he has taken before reaching his conclusion. However, for the reasons given I am persuaded by Professor Pasi that the Hylek study does not provide a reliable basis for the conclusion which Dr Baglin has reached. In the absence of that reliable basis, I am not otherwise able to accept his opinion that the stroke would not have occurred if warfarin had been stopped for a period of only 3 days.

134. I am also persuaded that this conclusion is supported by the Douketis trial; which also supports Professor Pasi's opinion that, whether the period of omission was 3, 4 or 5 days rather than 6 days, on the balance of probability Mr Thorley would have suffered his stroke in any event.

135. I accept of course that the focus of the Douketis study was on heparin (LMWH) which Mr Thorley did not receive; and that its purpose was to test whether it was beneficial to bridge with heparin when warfarin was interrupted. However heparin, as I accept, is an acknowledged and very good anticoagulant and quickly reaches a full therapeutic level. By contrast, warfarin takes several days to achieve full therapeutic anticoagulation. The protocol for the trial administered LMWH to the 'bridging' group shortly after the procedure. The non-bridging group were dependent on the restarted warfarin gradually to increase their INR over a matter of days. The results demonstrated that those quickly and fully anticoagulated with heparin were at the same risk of strokes as the group who were being gradually anticoagulated with warfarin alone.

136. I accept and prefer Professor Pasi's evidence that this provides a sound basis for the conclusion which he reaches. Bridging therapy with a recognised and quickly therapeutic anticoagulant produced no better result in respect of thromboembolic events than in the absence of such bridging and pending the gradual restoration of therapeutic INR levels with warfarin. For the reasons he gives, I accept that extrapolation from the Douketis trial to the causation issue in Mr Thorley's case is not undermined by any of the matters advanced by Dr Baglin.

137. Accordingly, if the omission of warfarin for a period of more than 3 days did constitute a breach of duty, I would reject the case of 'but for' causation and hold that Mr Thorley would have suffered his stroke in any event.

Material contribution

138. The alternative case on material contribution raises two particular issues : (i) whether this modified test of causation can be applied to a case where (as admittedly here) the injury is indivisible; if so, (ii) whether negligent over- omission of warfarin for 1, 2 or 3 days of the total 6 made a material contribution to the occurrence of the stroke.

Indivisible injury

139. In the light of the agreed expert evidence, Ms Rodway accepts that ischaemic stroke is an indivisible injury, i.e. which either happens or does not and whose size or severity is unaffected by the dose of warfarin. However she submits that this is no bar to establishing causation on the basis of 'material contribution'. In support she cited in particular the Privy Council in Williams v. The Bermuda Hospitals Board [2016] UKPC 4; [2016] AC 888.

140. In that decision Lord Toulson stated at [31]: *'As Professor Sarah Green has succinctly observed* (Causation in Negligence, Hart Publishing, 2015, Chapter 5, p 97)*: "It is trite negligence law that, where possible, defendants should only be held liable for that part of the claimant's ultimate damage to which they can be causally linked… It is equally trite that, where a defendant has been found to have caused or contributed to an indivisible injury, she will be held fully liable for it, even though there may well have been other contributing causes…'*. Then at [32] he noted that in Bonnington Castings Ltd v Wardlaw [1956] AC 613 *'…there was no suggestion that the pneumoconiosis was "divisible", meaning that the severity of the disease depended on the quantity of dust inhaled'*; and in a footnote cited Lord Phillips of Worth Matravers in Sienkiewicz v. Greif (UK) Ltd [2011] 2 AC at [90] : *'Where the disease is indivisible, such as lung cancer, a defendant who has tortiously contributed to the cause of the disease will be liable in full. Where the disease is divisible, such as asbestosis, the tortfeasor will be liable in respect of the share of the disease for which he is responsible.'*

141. Thus in effect Ms Rodway's submission was that the divisibility or indivisibility of injury was relevant only to the measure of damages against the contributing tortfeasor, not to the principle of the application of this modified test of causation. She also relied on the detailed consideration of the law on material contribution in the first instance decision of John v. Central Manchester NHS Foundation Trust [2016] EWHC 407 (QB) per Picken J at [82]-[97]

142. By contrast, Mr Post submitted that the indivisibility of injury was a bar to causation based on material contribution; in particular citing the Court of Appeal decisions in both Ministry of Defence v. AB [2010] EWCA Civ 1317 and Heneghan v. Manchester Dry Docks Ltd [2016] EWCA Civ 86.

143. In AB the Court stated that *'…we accept that, at least so far as cancers are concerned, the claimants cannot rely on proving that the radiation exposure has made a material contribution to the disease, as in* Bailey *and* Bonnington Castings. ***This principle applies only where the disease or condition is 'divisible' so that an increased dose of the harmful agent worsens the disease****… In those cases* [Bonnington and Bailey v. Ministry of Defence [2008] EWCA Civ 883] *the pneumoconiosis and the weakness were divisible conditions. Cancer is an indivisible condition; one either gets it all one does not. The condition is not worse because one has been exposed to a greater or smaller amount of the causative agent'*: [150] (emphasis supplied); see also at [134]. When AB went to the Supreme Court, the judgment did not deal with the causation issue in any detail; not least because of the 'realistic concession' made by Leading Counsel for the Claimants that they lacked the evidence to establish a credible case on causation : see Lord Wilson at [25] and [27]. However the Court said nothing which questioned the reasoning of the Court of Appeal on the issue of causation.

144. In Heneghan, the Court stated *'There are three ways of establishing causation in disease cases. The first is by showing that* but for *the defendant's negligence, the claimant would not have suffered disease. Secondly, where the disease is caused by the cumulative effect of an agency part of which is attributable to breach of duty on the part of the defendant and part of which involves no breach of duty, the defendant will be liable on the ground that his breach of duty made a "material contribution" to the disease:* [Bonnington]. *The disease in that case which is a divisible disease (i.e. one whose severity increases with increased exposure to the agency).* ***Thirdly, where causation cannot be proved in either of these ways, for example because the disease***

***is indivisible**, causation may be established if it is proved that the defendant materially increased the risk of the victim contracting the disease: the* Fairchild *exception. Mesothelioma* [the disease in that case] *is an indivisible disease.'*: [23 : emphasis supplied].

145. The appeal in Heneghan was heard shortly before the advice of the Board in Williams; and accordingly without the benefit of consideration of that decision. Conversely, in Williams the Board made specific reference to Bailey; and the authorities cited in argument included the Court of Appeal in AB and the first instance decision in Heneghan [2014] EWHC 4190 (QB).

146. Mr Post submitted that the Court of Appeal decisions in AB and Heneghan bind the Court; and that Williams did not determine otherwise. He also pointed to the recent first instance case of Davies v. Frimley Health NHS Foundation Trust [2021] EWHC 169 (QB) at [168]-[211] where upon a very full survey of these and many other authorities HHJ Auerbach (sitting as a judge of the High Court) concluded, obiter, that material contribution had no application where there was a single tortfeasor and indivisible injury. He distinguished the application of the this modified test of causation where two or more wrongdoers each contributed to a divisible or indivisible injury: [200] and [209]-[210].

Conclusion on law

147. On the face of it, the Court of Appeal decision in AB is binding authority that the test of material contribution has no application to a case where (as here) there is indivisible injury and one tortfeasor. However, given the basis on which the appeal in AB was argued and decided, I do not read the decision of the Supreme Court as an implicit endorsement of the proposition.

148. On the basis of the cited passage, Heneghan is to the same effect; albeit a later passage might suggest that the distinction between divisible and indivisible injury was being viewed through the lens of the comparative difficulty of proof of material contribution. Thus the Bonnington test *'... is to be applied where the court is satisfied on scientific evidence that the exposure for which the defendant is responsible has in fact contributed to the* injury. *This is readily demonstrated in the case of divisible injuries (such as silicosis and pneumoconiosis) whose severity is proportionate to the amount of exposure to the causative agent*: [46].

149. By contrast, the observations of the Privy Council in Williams provide support for the rival contention; in particular through the endorsement of Professor Green's statement of 'trite negligence law'; the treatment of Bonnington as a case where material contribution by a single tortfeasor was established on the basis (at least, as presented to the court) that the injury of pneumoconiosis was indivisible; and the footnote citation of Lord Phillips of Worth Matravers in Sienkiewicz. However whilst evidently highly persuasive, they are not strictly binding even if part of the ratio.

150. As to the very detailed discussion of the law of material contribution in John (Picken J), I do not read it as dealing directly with this particular issue.

151. This is evidently a legal issue which is ripe for authoritative review, at least in a case where it may affect the result. On the basis of strict precedent, I conclude that the

reasoning of the Court of Appeal in AB and Heneghan must be followed. Accordingly the claim of material contribution must fail on the basis that this modified test of causation does not apply when there is a single tortfeasor and an indivisible injury.

Material contribution : in fact

152. If that is wrong, I consider the substance of the case on material contribution.

153. As already noted, before the disclosure of the 2004 guideline, Dr Baglin's opinion was expressed solely in terms of material contribution from post-procedural delay. On the assumption that warfarin had been restarted at the correct dosage on the evening of the procedure (27 April) rather than at the incorrect dosage on 29 April, he concluded that Mr Thorley's INR on 30 April would have reached 1.5 rather than the actual 1.2. Having regard to the Hylek data, this produced a relative incidence of stroke rate at 39%. With due allowance for the necessary qualification in respect of steady-state, he concluded that this delay in restarting warfarin made a material contribution to the stroke. In the light of the 2004 guideline, the same reasoning was applied *a fortiori* to the new case based on the 3-day scenario.

154. In cross-examination Dr Baglin reaffirmed that the original case was formulated on the basis of restarting on 27 April. If it had started on that evening, rather than on 29 April, there was a 'good chance' that he would not have had the stroke. If it should have started on 28 April, the principle was the same; however at that point he would 'struggle' with a conclusion that omission of warfarin for 1 day (and at the lower dose) made a material contribution to the occurrence of the stroke.

155. Furthermore and critically, when pressed as to what he meant by material contribution, Dr Baglin stated that he was referring to a material contribution to the *risk* of occurrence of a stroke.

156. For the reasons already identified in respect of the 'but for' case, Professor Pasi disagrees with Dr Baglin. On the balance of probabilities Mr Thorley would have suffered the stroke in any event. In cross-examination he accepted that 'on the face of it', the longer the period without anticoagulation the more likely the formation of thrombus. However that was not 'absolute or guaranteed'. The formation of thrombus in AF patients was a rare event. As he had noted in the haematologists' Joint Statement, if there were a 'simple two sided relationship' in this respect, thrombus would always be apparent on diagnosis of AF; as prior to diagnosis they would have been without anticoagulation and often for considerable periods of time. However that was not the case; thrombosis at diagnosis of AF was found only in a small minority. He also emphasised the delay of 5 days or so before warfarin 'kicks in' to give antithrombotic effect; and that it does not dissolve thrombus once formed.

157. Ms Rodway of course accepts the distinction between contribution to injury and to the *risk* of injury; thus e.g. *'…there is a fundamental difference between making a material contribution to an injury and materially increasing the risk of an injury'* : Heneghan at [46]. However she submits that this case falls within the former category; see also Bailey per Waller LJ at [46] : *'In a case where medical science cannot establish the probability that 'but for' an act of negligence the injury would not have happened but can establish that the contribution of the negligent cause was more than negligible, the 'but for' test is modified, and the claimant will succeed.'*

158. In addition to reliance on the Hylek study and rejection of the relevance of the Douketis trial, Ms Rodway points in particular to (i) the inability of medical science to identify the precise length of absence of warfarin that would have avoided the occurrence of the stroke; and e.g. to identify the levels of the various clotting factors as at the date of stroke; (ii) the experts' general agreement that the process of reaching full anticoagulation is a gradient; and that the more time on warfarin the greater the antithrombotic effect; and (iii) the lack of any other cause for the stroke than the absence of warfarin during the 6-day period. She submits that material contribution to the occurrence of the stroke is established even if breach of duty is confined to the admitted breach in failing to restart warfarin on 28 April, i.e. 1 day of omission, and at the correct dose.

159. As she put it in her closing oral submissions, that single cause (absence of warfarin) was divided into negligent and non-negligent components, i.e. into days when the omission of warfarin was appropriate and those where it was not. Each day without warfarin materially contributed to the stroke; and therefore any negligent day of omission so contributed.

Conclusion on facts

160. My conclusion is that the omission of warfarin did not make a material contribution to the occurrence of the stroke.

161. First, this alternative case substantially depends, like the 'but for' case, on extrapolation from the Hylek study and on rejection of the Duketis trial as having any relevant application. For the reasons I have given, I prefer Professor Pasi's opinion in each respect.

162. Secondly, I do not accept Ms Rodway's submission to the effect that there is a direct relationship between the passage of time without warfarin and the occurrence of stroke, so that each 'negligent' additional day necessarily contributes to the occurrence of the injury. Amongst other things, any such simple relationship is confounded by the very rarity of eventuation of the risk; the fact that thrombus is found in only a small minority of patients at diagnosis of AF; and the inability of warfarin to dissolve thrombus once formed. As Dr Baglin made clear, his opinion went no further than to contend that the passage of time without warfarin made a material contribution to the risk of the occurrence of a stroke.

163. In any event, his acknowledgment that he struggled to find material contribution if the breach of duty were confined to failure to restart warfarin on 28 April at the correct dosage provides no adequate support for any case which depends on that admitted breach.

Conclusion

164. In considering all these factual and legal issues, I have of course been deeply conscious of the devastation which this stroke has caused to Mr Thorley and by extension to his wife and family. However any claim of clinical negligence has to establish the requisite ingredients of both breach of duty and causation of injury. For the reasons I have given, the claim must be dismissed.