

OPUS2

Manchester Arena Inquiry

Day 161

October 12, 2021

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1 Tuesday, 12 October 2021
 2 (9.30 am)
 3 (Delay in proceedings)
 4 (9.40 am)
 5 MR GREANEY: Sir, good morning. I'm sorry we're starting
 6 a few minutes late. It was necessary for me to see each
 7 of the experts that we're calling today.
 8 Sir, it's important at the outset to explain what
 9 the evidence today will deal with and the approach that
 10 we propose to adopt in relation to it.
 11 This morning we'll be addressing the issue of
 12 survivability and the cause of death in respect of 20 of
 13 those who died, that's to say all but John Atkinson and
 14 Saffie—Rose Roussos. The position is that this evidence
 15 needs to be adduced and adduced formally in order that
 16 the inquiry can also fulfil the function of inquests and
 17 provide a medical cause of death.
 18 In doing so, it will not be necessary to descend
 19 into the detail of the injuries suffered by any of the
 20 20. Instead, what we propose today is to adduce
 21 specific and limited information in relation to each.
 22 We will deliberately avoid identifying the location of
 23 injuries, save where that location forms an integral
 24 part of the cause of death such as, for example, where
 25 the cause of death is specified as head injury.

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1 We will deal with each of the 20 in the order in
 2 which their case was addressed in chapter 12 and,
 3 in relation to each, we'll first ask Professor Bull to
 4 express the view of the blast wave panel on
 5 survivability and then we'll ask Dr Lumb and/or
 6 Professor Crane to confirm the cause of death.
 7 Sir, as you'll recall, both Professor Bull and
 8 Dr Lumb have already given evidence and it will not be
 9 necessary for them to be re-sworn, but Professor Crane
 10 will need to be sworn and I'll ask, completes, that that
 11 happen at this stage.
 12 PROFESSOR JACK CRANE (sworn)
 13 PROFESSOR ANTHONY BULL (recalled)
 14 DR PHILIP LUMB (recalled)
 15 Questions from MR GREANEY
 16 MR GREANEY: Professor Crane, are you a medical doctor and
 17 a forensic pathologist?
 18 PROFESSOR CRANE: I am, sir.
 19 Q. Were you the state pathologist for Northern Ireland
 20 between 1990 and 2014?
 21 PROFESSOR CRANE: I was.
 22 Q. Are you a professor of forensic medicine at the Queen's
 23 University Belfast?
 24 PROFESSOR CRANE: That's correct.
 25 Q. Before we turn to deal with the 20, I'm going to deal

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1 with some preliminary issues and my first questions are
 2 directed to Professor Bull. Professor, there are two
 3 issues that I would like you to help us with in relation
 4 to survivability, which obviously we're going to be
 5 focusing upon this morning.
 6 The first of those is the meaning of survivability
 7 in the context of your evidence and by "your evidence" I
 8 mean the evidence of the blast wave panel. To remind
 9 you, not that you will need reminding, you address that
 10 issue at paragraph 6.5 of your first report, so that's
 11 to say the September 2019 report. I will read out so
 12 that everyone has it in mind the relevant part of that
 13 report.
 14 The panel state as follows:
 15 "In this expert opinion we use the terms
 16 'unsurvivable', 'unlikely to be survivable' and
 17 'potentially survivable'. We define 'unsurvivable' as
 18 injuries so severe that even if the most comprehensive
 19 and advanced medical treatment was initiated immediately
 20 after injury, survival was still deemed impossible.
 21 "We define 'unlikely to be survivable' as injuries
 22 so severe that even if in the most comprehensive and
 23 advanced medical treatment was initiated immediately
 24 after injury, survival would not be expected; we could
 25 not, how far, deem survival impossible.

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1 "We define 'potentially survivable injuries' as
 2 those injuries that could prove fatal. We are aware or
 3 have direct experience of individuals who have survived
 4 such injuries."
 5 Professor, the question is this: are you therefore
 6 examining and have you examined the issue of
 7 survivability on the basis that the most comprehensive
 8 and advanced medical treatment was initiated immediately
 9 after injury?
 10 PROFESSOR BULL: Yes, that's correct.
 11 Q. I hope this isn't a way of oversimplifying it, but does
 12 that involve assuming that the casualty is admitted
 13 immediately to hospital so that hospital-level treatment
 14 is available?
 15 PROFESSOR BULL: It's assuming that the most advanced
 16 treatment is available at the point, which could be
 17 people with the right skills, the right facilities, the
 18 right capabilities, so that could be in hospital but it
 19 could be outside hospital as well.
 20 Q. So it's assuming that the right people with the right
 21 skills and the right equipment are available immediately
 22 after the injury is sustained?
 23 PROFESSOR BULL: Yes.
 24 Q. Thank you, that's very clear.
 25 Secondly, during the course of your evidence, you

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1 are going to be using the phrase, and again I quote,
 2 "unsurvivable with current (2019) advanced medical
 3 treatment".
 4 2019 has been chosen by the panel, I know, because
 5 that was the year of the first report. However, at the
 6 risk of stating the obvious, the year of the deaths was
 7 of course 2017, and now of course is 2021, and should we
 8 understand that your answer would not be different
 9 whether one asks it by reference to what was available
 10 by way of advanced medical treatment in 2017, 2019 or
 11 2021?
 12 PROFESSOR BULL: Yes, that's the case in all cases. We
 13 recognise that the guidance for those treating
 14 individuals may be different now, but we were not
 15 commenting on that; we're just commenting on
 16 survivability .
 17 Q. So the point is that the judgement of the panel is the
 18 same whether one is making the assessment by reference
 19 to the position in 2017, 2019 or indeed as of this very
 20 moment?
 21 PROFESSOR BULL: That's correct.
 22 Q. That's helpful.
 23 Professor Crane, I'm going to direct a small number
 24 of questions to you next. I believe you'll just be able
 25 to say yes in relation to each of them. First of all ,

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1 were you asked to comment, by "you" I mean you and
 2 Dr Lumb, on the original autopsy findings, including
 3 commenting on the mechanism of death?
 4 PROFESSOR CRANE: Yes, that's correct.
 5 Q. Were you, therefore, in essence considering the cause of
 6 death of each of the 20 that we will look at today in
 7 light of everything that is now known, not all of which
 8 was known about at the date of the original post-mortem
 9 examination?
 10 PROFESSOR CRANE: Yes, sir.
 11 Q. Professor, whilst we will consider the cause of death in
 12 each case individually , would it be accurate to say that
 13 the cause of death, at least in general terms, in each
 14 of the 20 cases was injuries due to an explosion?
 15 PROFESSOR CRANE: Yes, that's correct.
 16 Q. Well, gentlemen, we will then turn next to each of the
 17 20.
 18 Before we do so, may I acknowledge that what we are
 19 about to do may seem formulaic, will certainly seem
 20 formal to all of those who are watching, but we would
 21 want to recognise that behind this evidence is a life
 22 lived and an enduring loss to the families .
 23 SIR JOHN SAUNDERS: Thank you.
 24 MR GREANEY: So we'll deal first of all with Marcin and
 25 Angelika Klis.

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1 Professor Bull, was it the view of the panel that
 2 Marcin sustained injuries in the explosion which were
 3 unsurvivable with current advanced medical treatment?
 4 PROFESSOR BULL: It was.
 5 Q. Was it also the assessment of the panel that Angelika
 6 sustained injuries which were unsurvivable with current
 7 advanced medical treatment?
 8 PROFESSOR BULL: Yes, it was.
 9 Q. Dr Lumb, next, please. Is it the position that your
 10 Home Office colleague, Dr Michael Parsons, and by
 11 "Home Office" I mean Home Office pathologist, conducted
 12 the original post-mortem examination of Marcin?
 13 DR LUMB: Yes, that's correct.
 14 Q. Did Dr Parsons conclude that death was due to chest
 15 injuries ?
 16 DR LUMB: That's correct.
 17 Q. Did you and Professor Crane describe the mechanism of
 18 death in the following way:
 19 "Death was due to multiple injuries sustained as
 20 a result of a bomb explosion"?
 21 DR LUMB: Yes, that's correct.
 22 Q. But would it be accurate to say that in effect there was
 23 no difference in opinion between the two of you and
 24 Dr Parsons, just a slight difference in expression?
 25 DR LUMB: Yes, that's correct.

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1 Q. So far as Angelika is concerned, was the original
 2 post-mortem examination conducted by Dr Charles Wilson?
 3 DR LUMB: Yes, it was.
 4 Q. Did and you Professor Crane conclude in Angelika's
 5 case --- forgive me, first of all did Dr Wilson conclude
 6 in her case that the cause of death was multiple
 7 injuries caused by the explosion?
 8 DR LUMB: Yes, he did.
 9 Q. And do you and Professor Crane agree?
 10 DR LUMB: Yes, we do.
 11 Q. Next, Courtney Boyle. Professor Bull, was it the
 12 assessment of the panel that Courtney sustained injuries
 13 which were unsurvivable with current advanced medical
 14 treatment?
 15 PROFESSOR BULL: Yes, it was.
 16 Q. Dr Lumb, did Dr Charles Wilson also conduct the original
 17 post-mortem examination in respect of Courtney?
 18 DR LUMB: Yes, he did.
 19 Q. Did he conclude that the cause of her death was multiple
 20 injuries caused by the explosion?
 21 DR LUMB: Yes, he did.
 22 Q. And in considering the mechanism of death in light of
 23 everything now known, did you and Professor Crane agree?
 24 DR LUMB: Yes, we did.
 25 Q. Next, Philip Tron. Professor Bull, was it the view of

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1 the panel that Philip sustained injuries which were
 2 unsurvivable with current advanced medical treatment?
 3 PROFESSOR BULL: It was.
 4 Q. Dr Lumb, did Dr Wilson also conduct the original
 5 post-mortem examination in respect of Philip?
 6 DR LUMB: Yes, he did.
 7 Q. In his case, did Dr Wilson conclude that the cause of
 8 death was multiple injuries caused by the explosion?
 9 DR LUMB: Yes, that's correct.
 10 Q. And again, did you and Professor Crane agree?
 11 DR LUMB: Yes, we agreed.
 12 Q. Next, Olivia Campbell-Hardy. Professor Bull, did Olivia
 13 sustain injuries which were unsurvivable with current
 14 advanced medical treatment?
 15 PROFESSOR BULL: She did.
 16 Q. Dr Lumb, did Dr Parsons conduct the original post-mortem
 17 examination?
 18 DR LUMB: Yes, he did.
 19 Q. In respect of Olivia, did he conclude that the cause of
 20 death was head and neck injuries, caused by the
 21 explosion?
 22 DR LUMB: Yes, that's correct.
 23 Q. And once again, did you and Professor Crane agree?
 24 DR LUMB: Yes, we agreed.
 25 Q. Next, Michelle Kiss. Professor Bull, did Michelle

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1 sustain injuries which were unsurvivable with current
 2 advanced medical treatment?
 3 PROFESSOR BULL: She did.
 4 Q. Professor Crane, next, please. Is it the position that
 5 Dr Lumb in fact conducted the original post-mortem
 6 examination in respect of Michelle?
 7 PROFESSOR CRANE: Yes, he did.
 8 Q. Did he conclude that the cause of death was a head
 9 injury caused by the explosion?
 10 PROFESSOR CRANE: Yes, that's correct.
 11 Q. And on review of all material now available, did the two
 12 of you maintain the view that a head injury caused
 13 Michelle's death?
 14 PROFESSOR CRANE: Yes, we did.
 15 Q. Next, Jane Tweddle. Professor Bull, did Jane sustain an
 16 injury which was unsurvivable with current advanced
 17 medical treatment?
 18 PROFESSOR BULL: She did.
 19 Q. Dr Lumb, did Dr Wilson carry out the original
 20 post-mortem examination in respect of Jane?
 21 DR LUMB: Yes, he did.
 22 Q. Did he conclude, following that examination, that the
 23 cause of Jane's death was a neck injury resulting from
 24 the explosion?
 25 DR LUMB: Yes, that's correct.

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1 Q. And in considering the mechanism of her death, did you
 2 and Professor Crane agree?
 3 DR LUMB: Yes, we agreed.
 4 Q. Lisa Lees next. Professor Bull, did Lisa also sustain
 5 injuries which were unsurvivable with current advanced
 6 medical treatment?
 7 PROFESSOR BULL: She did.
 8 Q. Professor Crane, did Dr Lumb carry out the original
 9 post-mortem examination?
 10 PROFESSOR CRANE: Yes, he did.
 11 Q. Did he conclude that the cause of Lisa's death was
 12 injuries sustained in the explosion?
 13 PROFESSOR CRANE: Yes, that's correct.
 14 Q. And did the two of you, in reviewing that conclusion in
 15 light of all material now available, agree?
 16 PROFESSOR CRANE: Yes, we did.
 17 Q. Next, Alison Howe. Professor Bull, did Alison sustain
 18 injuries which were unsurvivable with current advanced
 19 medical treatment?
 20 PROFESSOR BULL: She did.
 21 Q. Dr Lumb, did Dr Naomi Carter, another of your
 22 Home Office colleagues, carry out the original
 23 post-mortem examination?
 24 DR LUMB: Yes, she did.
 25 Q. Did she conclude that death was caused by a head injury

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1 sustained in the explosion?
 2 DR LUMB: Yes, that's correct.
 3 Q. In reviewing the mechanism of death, did you and
 4 Professor Crane agree?
 5 DR LUMB: Yes, we agreed.
 6 Q. Next, Wendy Fawell. Professor Bull, was it the
 7 conclusion of the blast wave panel that Wendy sustained
 8 injuries which were unsurvivable with current advanced
 9 medical treatment?
 10 PROFESSOR BULL: It was.
 11 Q. Dr Lumb, did Dr Carter also carry out the original
 12 post-mortem examination in Wendy's case?
 13 DR LUMB: Yes, she did.
 14 Q. Did she conclude that death was caused by a head injury,
 15 sustained in the explosion?
 16 DR LUMB: Yes, she did.
 17 Q. And in considering the mechanism of death, did you and
 18 Professor Crane, on consideration of all material now
 19 available, agree?
 20 DR LUMB: Yes, we agreed.
 21 Q. Next, Nell Jones. Professor Bull, did Nell sustain
 22 injuries which were unsurvivable with current advanced
 23 medical treatment?
 24 PROFESSOR BULL: She did.
 25 Q. Dr Lumb, was the original post-mortem examination

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1 carried out by Dr Wilson?
 2 DR LUMB: Yes, it was.
 3 Q. Did he conclude that Nell’s death was due to multiple
 4 injuries caused by the explosion?
 5 DR LUMB: Yes, that’s correct.
 6 Q. In considering the mechanism of death, did you and
 7 Professor Crane agree that conclusion?
 8 DR LUMB: Yes, we agreed.
 9 Q. Next, Megan Hurley. Professor Bull, did Megan sustain
 10 injuries which were unsurvivable with current advanced
 11 medical treatment?
 12 PROFESSOR BULL: She did.
 13 Q. Professor Crane, was the original post–mortem
 14 examination of Megan carried out by Dr Lumb?
 15 PROFESSOR CRANE: Yes, it was.
 16 Q. Did Dr Lumb conclude that Megan’s death was due to
 17 multiple injuries caused by the explosion?
 18 PROFESSOR CRANE: He did.
 19 Q. On review of all material now available, did you and
 20 Dr Lumb conclude that that original conclusion as to
 21 Megan’s death was correct?
 22 PROFESSOR CRANE: Yes, that’s correct.
 23 Q. Next, Eilidh MacLeod. Professor Bull, did Eilidh
 24 sustain injuries which were unsurvivable with current
 25 advanced medical treatment?

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1 PROFESSOR BULL: She did.
 2 Q. Professor Crane, was the original post–mortem
 3 examination carried out by Dr Lumb?
 4 PROFESSOR CRANE: Yes, it was.
 5 Q. Did he conclude that death was due to injuries sustained
 6 in the explosion?
 7 PROFESSOR CRANE: He did.
 8 Q. And on the review of the type that we have described
 9 already, and in considering the mechanism of death, did
 10 you and Dr Lumb conclude that that original conclusion
 11 remained sound?
 12 PROFESSOR CRANE: Yes, we did.
 13 Q. Next, Sorrell Leczkowski. Professor Bull, did Sorrell
 14 sustain injuries which were unsurvivable with current
 15 advanced medical treatment?
 16 PROFESSOR BULL: That’s correct.
 17 Q. Professor Crane, was the original post–mortem
 18 examination of Sorrell carried out by Dr Lumb?
 19 PROFESSOR CRANE: It was.
 20 Q. Did he conclude that death was due to a neck injury
 21 sustained in the bombing?
 22 PROFESSOR CRANE: That’s correct.
 23 Q. In considering the mechanism of death following your
 24 review, did the two of you agree?
 25 PROFESSOR CRANE: Yes, we did.

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1 Q. Next, Kelly Brewster. Professor Bull, did Kelly sustain
 2 injuries which were unsurvivable with current advanced
 3 medical treatment?
 4 PROFESSOR BULL: She did.
 5 Q. Dr Lumb, was the original post–mortem examination of
 6 Kelly carried out by Dr Carter?
 7 DR LUMB: Yes, it was.
 8 Q. Did she conclude that death was due to head and
 9 abdominal injuries sustained in the explosion?
 10 DR LUMB: Yes, that’s correct.
 11 Q. Did you and Professor Crane, in considering the
 12 mechanism of death in light of all now known, agree with
 13 that conclusion?
 14 DR LUMB: Yes, we did.
 15 Q. Next, Liam Curry and Chloe Rutherford. Professor Bull,
 16 did Liam and Chloe sustain injuries which were
 17 unsurvivable with current advanced medical treatment?
 18 PROFESSOR BULL: They did.
 19 Q. Professor Crane, were the original post–mortem
 20 examinations of Liam and Chloe carried out by Dr Lumb?
 21 PROFESSOR CRANE: Yes, they were.
 22 Q. Did he conclude that in the case of each of them, death
 23 was due to multiple injuries sustained in the explosion?
 24 PROFESSOR CRANE: Yes, he did.
 25 Q. And on your review, did the two of you consider that

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1 that conclusion remained sound?
 2 PROFESSOR CRANE: Yes, we did.
 3 Q. Next, Georgina Callander. Professor Bull, did Georgina
 4 sustain injuries which were unsurvivable with current
 5 advanced medical treatment?
 6 PROFESSOR BULL: She did.
 7 Q. Professor Crane, was the original post–mortem
 8 examination carried out by Dr Lumb?
 9 PROFESSOR CRANE: It was.
 10 Q. Did he conclude that death was due to a head injury,
 11 resulting from the explosion?
 12 PROFESSOR CRANE: Yes, that’s correct.
 13 Q. On your review, did the two of you conclude that that
 14 conclusion was correct?
 15 PROFESSOR CRANE: Yes, we did.
 16 Q. Next, Martyn Hett. Professor Bull, did Martyn sustain
 17 injuries which were unsurvivable with current advanced
 18 medical treatment?
 19 PROFESSOR BULL: He did.
 20 Q. Dr Lumb, was the original post–mortem examination of
 21 Martyn carried out by Dr Wilson?
 22 DR LUMB: Yes, it was.
 23 Q. Did he conclude that death was due to multiple injuries
 24 caused in the explosion?
 25 DR LUMB: Yes, he did.

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1 Q. On your review, did you and Professor Crane consider
2 that conclusion correct?
3 DR LUMB: Yes, it was correct.
4 Q. Next and finally of the 20 whose cases we are
5 considering this morning, Elaine McIver.
6 Professor Bull, in your first report, so the 2019
7 report, did you express the view that Elaine sustained
8 injuries which were unlikely to be survivable with
9 current advanced medical treatment?
10 PROFESSOR BULL: That's correct.
11 Q. However, in your second, March 2020 report, based upon
12 the post-mortem photographs, video footage and witness
13 statements that you had seen since the date of your
14 first report, did you then conclude that Elaine's
15 injuries were unsurvivable with current advanced medical
16 treatment, even if speedier admission to hospital had
17 taken place?
18 PROFESSOR BULL: That's correct.
19 Q. So in short, there was a development in the view of the
20 panel, but a development only in view of further
21 information and documentation with which the panel was
22 presented?
23 PROFESSOR BULL: That's right.
24 Q. Dr Lumb, was the original post-mortem examination in
25 respect of Elaine carried out by Dr Parsons?

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1 DR LUMB: Yes, it was.
2 Q. Did he conclude that death was due to chest injuries
3 resulting from the explosion?
4 DR LUMB: Yes, he did.
5 Q. On your more recent review, did you and Professor Crane
6 consider that that conclusion was correct?
7 DR LUMB: Yes, we agreed.
8 MR GREANEY: Sir, that concludes the evidence in relation to
9 20 of the 22. We will need to have a short break at
10 this stage to re-arrange the courtroom and to enable
11 John Atkinson's family to come into the courtroom.
12 SIR JOHN SAUNDERS: Thank you. It is obviously a sombre
13 catalogue that we have heard and a very sad one.
14 Of course, the evidence we have heard was summarised
15 when we dealt with each individual case and I know there
16 has been careful discussion between the family CPs and
17 counsel to the inquiry as to how best to present this
18 evidence.
19 MR GREANEY: And speaking entirely personally, it's a matter
20 of regret that we've had to deal with this so formally
21 for the reasons I have given, but I know that everyone
22 accepts that it has been necessary to do so.
23 SIR JOHN SAUNDERS: Thank you. How long would you like?
24 MR GREANEY: Ten minutes should be sufficient, sir,
25 thank you.

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1 (10.06 am)
2 (A short break)
3 (10.26 am)
4 MR GREANEY: Sir, we're turning next to consider the issues
5 of survivability and cause of death in the case of
6 John Atkinson. The starting point will be to hear
7 evidence of cardiology from Dr Paul Rees. Sir, as you
8 can see, he is joining us over a link.
9 DR PAUL REES (affirmed)
10 Questions from MR GREANEY
11 MR GREANEY: Dr Rees, I'm going to check that you can both
12 see and, more importantly, hear me.
13 A. Yes, loud and clear.
14 Q. Would you begin, please, by telling us your full name?
15 A. Paul Stewart Chadwick Rees.
16 Q. Dr Rees, are you a consultant in cardiology, general
17 internal medicine and pre-hospital emergency medicine?
18 A. Yes, I am.
19 Q. Are you also a surgeon commander in the Royal Navy?
20 A. Yes, I am.
21 Q. In terms of your clinical work, is your clinical
22 hospital work based at the Barts Heart Centre at
23 St Bartholomew's Hospital in London?
24 A. Yes, it is.
25 Q. And whilst there, do you perform interventional

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1 cardiology duties as part of a high-volume 24-hour heart
2 attack centre team?
3 A. Yes, I do.
4 Q. As well as carrying out ward and clinical duties?
5 A. Yes, I do. That's correct.
6 Q. Do you also undertake regular flying duties with the
7 East Anglian air ambulance operating out of Cambridge?
8 A. Yes.
9 Q. And are you the co-lead for the British Cardiovascular
10 Interventional Society Focus group on out-of-hospital
11 cardiac arrest?
12 A. Yes, I am.
13 Q. And you have various other clinical qualifications which
14 anyone with access to your report will be able to read.
15 As for your military and ballistic injury
16 experience, does that include 3 years as a submarine
17 medical officer?
18 A. Yes, it does.
19 Q. A combat deployment with a commando brigade in Iraq?
20 A. Yes, it does.
21 Q. And service in Afghanistan in both the field hospital
22 and as a consultant leading the Medical Emergency
23 Response Team?
24 A. Yes, that's correct.
25 Q. So doctor, just to pull all of that together, as

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1 a result of your experience, would it be fair to say
 2 that you have a singular experience in a combination of
 3 cardiology, military and resuscitation medicine,
 4 including exposure to a high volume of penetrating
 5 trauma and explosive device strike cases?
 6 A. Yes, that's a fair summary, yes.
 7 Q. So in short, singular experience with the sort of cases
 8 that we are dealing with in this inquiry?
 9 A. Yes, correct.
 10 Q. Dr Rees, were you instructed by the chairman to assist
 11 in relation to one of those who died, John Atkinson?
 12 A. Yes, I was.
 13 Q. To that end were you informed that Dr Naomi Carter, the
 14 Home Office pathologist, had conducted the post-mortem
 15 examination of John on 28 May 2017?
 16 A. Yes.
 17 Q. Were you informed, and indeed did you read, that her
 18 opinion as to the cause of death was 1A, leg injuries,
 19 and 2, ischaemic heart disease?
 20 A. Yes.
 21 Q. 1A being the condition in her view leading directly to
 22 death and 2 being a significant condition contributing
 23 to death but unrelated to 1A?
 24 A. Yes, that's what the documentation contained, yes.
 25 Q. What was explained to you in relation to her

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1 conclusion 2 that ischaemic heart disease had made
 2 a contribution to death?
 3 A. The post-mortem findings that included the detection of
 4 some coronary artery disease, specifically some disease
 5 in the systems supplying the back and side wall of the
 6 heart and a small area of scar tissue within the heart
 7 muscle which I understand had led to those conclusions.
 8 Q. Were you asked to consider that specific conclusion,
 9 namely the contribution of ischaemic heart disease to
 10 death?
 11 A. Yes, specifically that, yes.
 12 Q. To that end were you asked to consider a series of
 13 issues, which I'll list? (1) Whether the presence of
 14 ischaemic heart disease in Mr Atkinson contributed to
 15 his blood loss?
 16 A. Yes.
 17 Q. (2) Whether the presence of ischaemic heart disease
 18 contributed to his cardiac arrest at 23.47 hours?
 19 A. Yes, I was asked to consider that.
 20 Q. And (3), whether the presence of ischaemic heart disease
 21 contributed to the inability successfully to resuscitate
 22 John Atkinson?
 23 A. Yes, I was asked to consider that also.
 24 Q. And finally in terms of your instructions, were you
 25 asked for your view on possible, underlining the word

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1 "possible", treatments that might have been provided
 2 to John?
 3 A. Yes, I was asked to provide that information also.
 4 Q. Doctor, before we get on to your opinion in relation to
 5 each of those issues, what I would like to do is to
 6 understand or to seek to understand some of the terms
 7 that we are going to encounter. I would like to try to
 8 understand them in summary and in simple language and
 9 then I'll turn to ask you for your explanation of the
 10 post-mortem findings.
 11 So first of all, I'm at page 2 of your report, the
 12 bottom, a term that I have used a number of times
 13 already, ischaemic heart disease. What, please, in
 14 simple terms is ischaemic heart disease?
 15 A. Ischaemic heart disease is a process whereby the
 16 arteries which supply the heart muscle become damaged by
 17 various causes, and this can lead to build-up of fatty
 18 deposits within the arteries, which can then narrow
 19 them, which reduces the blood supply to the heart muscle
 20 and in some places those areas of narrowings become
 21 inflamed and cause clots, which can then interfere with
 22 blood flow to the heart muscle and cause damage or
 23 scarring of the heart muscle.
 24 Q. Is it the position that ischaemic heart disease is
 25 capable of causing death?

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1 A. It is certainly capable of causing death, yes. It's one
 2 of the global leading killers, yes.
 3 Q. Second term, and I'm now at page 3 of your report,
 4 atheroma, another terms we will come across. What does
 5 that mean, please?
 6 A. Atheroma is the build-up of those fatty materials within
 7 the artery walls, and the arteries we're talking about
 8 here are the arteries which supply the heart muscle with
 9 blood. So atheroma are fatty deposits within artery
 10 walls which could be detected, for example, at
 11 post-mortem examination.
 12 Q. Term 3, fibrotic scar. The meaning of that, please?
 13 A. This is an area of scar tissue where the normal
 14 architecture, the normal heart muscle has been replaced
 15 by fibrous tissue, so indicating that some injury has
 16 happened, usually caused by a restriction in blood flow
 17 or inflammation and that, as part of a healing process,
 18 that area of heart muscle has been replaced with fibrous
 19 tissue, so some cells have moved in and repaired that
 20 area, but replaced it essentially with scar.
 21 Q. So this is quite literally some scarring to the heart?
 22 A. Correct.
 23 Q. Which has obviously had some cause and is the most
 24 common cause of such scarring a previous myocardial
 25 infarction?

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1 A. Yes, it is.
 2 Q. So in other words, in layman's terms, you would most
 3 commonly see such scarring caused by a heart attack?
 4 A. Yes. There are other cautions, conditions such as
 5 myocarditis, inflammation of the heart muscle, which can
 6 result in some scarring, so those would be -- the key
 7 different things to differentiate between would be
 8 myocardial infarction caused by blood supply
 9 interruption and some scarring caused by local
 10 inflammation.
 11 Q. And as we're going to hear when you tell us about the
 12 post-mortem findings, John did have some scarring to his
 13 heart, did he not?
 14 A. Correct.
 15 Q. The likely explanation is that, at some time in the
 16 past, he had experienced a myocardial infarction?
 17 A. Yes, and we believe that because the post-mortem
 18 findings also showed some evidence of atheromatous
 19 deposits in the blood supply to that area.
 20 Q. I'm getting slightly ahead of myself, but that's what
 21 we're going to hear.
 22 There are two further terms I would like your help
 23 with. Term 4, fibrous plaque, please.
 24 A. This is an area of atheromatous tissue that is again
 25 rich in fibrous cells as opposed to a haemorrhagic or

1 ruptured plaque, where you might expect to find a
 2 relatively normal blood vessel but a load of clot around
 3 the area of inflammation. So this is indicating, by the
 4 presence of fibrous cells, fibre cells, that this
 5 happened some time in the past and essentially it's
 6 a stable condition when you find it in the heart
 7 arteries.
 8 Q. Term 5, a term that's been used many times when we heard
 9 the evidence of fact relating to John, hypovolaemic
 10 shock. What does that mean, please?
 11 A. This is a state where the body is struggling for
 12 circulation, essentially, so there is inadequate
 13 circulation to supply the body's needs caused in this
 14 case by low blood volume, so bleeding in this case.
 15 Q. Colonel Clasper is going to give us further help
 16 in relation to this term in due course, but just so
 17 we've got a structure what certainly I have understood
 18 from the evidence is that the stages that this will go
 19 through is: someone sustains blood loss, either
 20 catastrophically or severely, so the blood is leaving
 21 their body; ultimately the body reaches a stage at which
 22 it goes into hypovolaemic shock; is that correct?
 23 A. Correct, yes.
 24 Q. What will commonly, if not inevitably, occur as a result
 25 of hypovolaemic shock is cardiac arrest?

1 A. If hypovolaemic shock is not reversed, then the
 2 circulation will be empty, the ability of the body to
 3 perfuse itself, to supply itself with oxygen will be
 4 impaired and all the organs will fail, and one of those
 5 organs will be the heart. The heart will then stop
 6 pumping effectively and that will cause a cardiac
 7 arrest. So yes, there will be effectively no cardiac
 8 output at that point.
 9 Q. In very simple terms, where a person has a severe bleed,
 10 if you stop that bleed you will prevent hypovolaemic
 11 shock and will prevent cardiac arrest?
 12 A. Yes, that's possible.
 13 Q. If you slow that bleed, would you be likely to delay the
 14 onset of hypovolaemic shock and therefore delay the
 15 occurrence of cardiac arrest?
 16 A. Yes, and that's the mainstay of most of our therapies
 17 for severe haemorrhage.
 18 Q. So, as you will appreciate, that's a very important
 19 issue that we will need to consider in John Atkinson's
 20 case.
 21 Next, before we turn to your opinions on those
 22 issues you were asked to address, I'm going to seek from
 23 you an explanation, again please in simple terms, and
 24 I'm now at page 4 of your report, of the post-mortem
 25 findings of Dr Naomi Carter.

1 Were there two key findings in relation to John's
 2 cardiovascular status?
 3 A. Yes, there were.
 4 Q. The first of those being?
 5 A. The first of those was the presence of detectable
 6 coronary artery disease. So in his circumflex artery,
 7 so that's an artery that supplies the back wall of the
 8 heart, the examining pathologist found a 70% reduction
 9 in the lumen, in the blood vessel, caused by
 10 a fibrous -- we identified this a few moments ago --
 11 plaque, so an area of narrowing full of fibrous tissue,
 12 indicating that this had been present for some time.
 13 Importantly, there were no other significant
 14 narrowings found in the heart arteries reported in the
 15 post-mortem either. So the first finding of note was
 16 this 70% reduction in calibre of the circumflex artery
 17 supplying the back wall and side wall of the heart.
 18 Q. Is it the position that there were no features, just
 19 dealing with this first finding, to suggest an acute
 20 event had occurred?
 21 A. That's correct. So the post-mortem specifically
 22 mentions the lack of any thrombus, any detectable clot
 23 around the area which might suggest it was an acute
 24 finding. So the fact that there's no blood found there
 25 and that this is a fibrous plaque suggests that this is

1 a chronic, so a long-standing, finding yes.
 2 Q. So the significance of that being this was not something
 3 that happened to him as a result of the explosion, it
 4 was something he'd lived with for a substantial period
 5 of time?
 6 A. Yes, I believe that's correct, yes.
 7 Q. And the second finding so far as the heart is concerned
 8 was what, please?
 9 A. So during the post-mortem, a small area of scarring was
 10 found, so documented as being 1 centimetre by
 11 1 centimetre by 1 centimetre in the wall of heart.
 12 Further histology, so tissue examination, later on down
 13 the line confirmed that this was chronic, so old, scar
 14 tissue, so fibrous scar tissue, in the territory of the
 15 muscle that was supplied by that circumflex artery.
 16 Q. As you told me just a few moments ago, the likely
 17 explanation for that scarring is that at some point
 18 in the past, not on 22 May, John had had what I will
 19 call a heart attack?
 20 A. Yes, I think the most likely explanation for that patch
 21 of scarring, coupled with the upstream reduction in
 22 calibre in that blood vessel, is that at some point that
 23 blood vessel has become inflamed and was either
 24 completely blocked off for a short period of time or
 25 some clot has formed and which has showered downstream

1 and blocked some smaller blood vessels, which has
 2 resulted in a very small organised scar forming, yes.
 3 Q. The public listening to the evidence that you've just
 4 given might expect therefore that there would be
 5 something in John's medical records to demonstrate that
 6 he had experienced some kind of cardiovascular event
 7 and, as you'll be able to confirm, there is nothing in
 8 John's medical records to indicate such an incident;
 9 is that right?
 10 A. That's correct.
 11 Q. Is that something that should surprise us and, moreover,
 12 is that something which undermines your view that there
 13 was a heart attack at some stage in the past?
 14 A. No, it doesn't undermine my view. In the majority of
 15 cases, patients with a blockage in the heart artery will
 16 present with chest pain and an abnormal electric
 17 cardiogram and will usually seek medical advice.
 18 However, it is not uncommon for patients to mistake
 19 symptoms of heart attack for other things such as
 20 indigestion or indeed to have no symptoms whatsoever.
 21 So those might explain why a patient might not seek
 22 medical advice or might decide to treat themselves at
 23 home or some patients have no symptoms at all and may be
 24 completely unaware this is happening.
 25 So having looked through the medical records there

1 was no indication that he'd had an episode of chest
 2 discomfort that you'd expect to associate with
 3 a myocardial infarction, a heart attack, so the symptoms
 4 could either have been mistake for something else or
 5 been so minimal or trivial that they didn't raise the
 6 need to seek medical attention.
 7 Q. Indeed, is it the position that within your line of
 8 work, there is recognised something described as
 9 a silent heart attack?
 10 A. Yes, that's correct. That's a condition where there is
 11 indeed a heart attack happening, there's muscle being
 12 starved of oxygen, but patients don't get any symptoms
 13 and they might be completely unaware of it and it might
 14 be found later on in their life as an incidental
 15 finding, so undergoing a medical examination for
 16 something else we might turn up some ECG abnormalities
 17 or whilst undergoing a scan for something else we might
 18 detect some evidence of coronary artery disease,
 19 ischaemic heart disease, that we didn't think was there
 20 previously.
 21 Q. And indeed have there been some studies which have
 22 concluded that unrecognised myocardial infarction may be
 23 present in up to 5% of the normal population?
 24 A. Yes. I have put that figure in the report and that is
 25 derived from some magnetic resonance imaging, some MRI

1 studies of general populations, but it is certainly a
 2 phenomenon that we expect to come across, the finding of
 3 incidental heart muscle disease, so heart -- myocardial
 4 infarction patients who -- where we weren't expecting it
 5 initially.
 6 Q. But ultimately the position is that the post-mortem
 7 findings demonstrated, first of all, this fibrous plaque
 8 that you have told us about and, second, the area of
 9 scarring?
 10 A. Yes.
 11 Q. From your perspective, as a cardiologist, would it be
 12 fair to say that those are significant findings?
 13 A. They're certainly significant findings, yes.
 14 Q. I suppose therefore it's unsurprising to you that
 15 Dr Carter both referred to them and attached some
 16 significance to them?
 17 A. Yes, absolutely.
 18 Q. I think it would be fair to say none of the opinion that
 19 you're going to express should be regarded by anyone as
 20 being a criticism of her.
 21 So let's turn then to those first three issues that
 22 you were asked to provide your opinion about.
 23 Issue 1: did the presence of -- I'm going to ask
 24 you, Dr Rees, if you could slow down a little in your
 25 answers. I hadn't detected a particular problem, but

1 the stenographer is excellent and has been struggling to
 2 a limited extent, so I'll keep an eye on that as well.
 3 A. Thank you.
 4 Q. The issues that your opinion has been sought in respect
 5 of. First, whether the presence of ischaemic heart
 6 disease in John contributed to his blood loss? As we
 7 have heard extensive evidence about, John lost very
 8 substantial quantities of blood as a result of his leg
 9 injuries. So did the presence of his IHD contribute to
 10 that?
 11 A. No, I think they're unrelated. I think the blood loss
 12 from traumatic injuries is unrelated to an underlying
 13 pre-existing medical condition -- sorry, that was too
 14 quick, but yes. So I don't think they're related.
 15 Q. I'm sure we could go into an awful lot of detail about
 16 this, but it probably isn't necessary. The answer to
 17 issue or question number 1, did IHD contribute to blood
 18 loss, in your view it did not.
 19 Issue 2: did the presence of ischaemic heart disease
 20 contribute to John's cardiac arrest at 23.47? What is
 21 your opinion, doctor?
 22 A. My opinion is that it did not.
 23 Q. Again, I have no doubt we could go into a lot of detail,
 24 but --
 25 SIR JOHN SAUNDERS: We could, but it's slightly

1 counter-intuitive to a layman, so I may need a bit of
 2 help. This is obviously a serious attack on John's
 3 heart, which took place. The intuitive response of
 4 a layman would be if the heart is in fact damaged, it
 5 may be less capable of dealing with that attack. That's
 6 no doubt really simplistic.
 7 MR GREANEY: Sir, it's obviously important that you should
 8 be satisfied in relation to those issues.
 9 Maybe you're better off giving your open answer, but
 10 let me provide some context. Is the extent of the
 11 cardiovascular findings of relevance to answering the
 12 chairman's question?
 13 A. Yes, it is.
 14 Q. So could you explain in further detail why you've come
 15 to the view that the ischaemic heart disease in John did
 16 not contribute to his cardiac arrest?
 17 A. The extent of disease that we have found is minor, and
 18 I have described it in my report as effectively stable
 19 or bystander disease. So from everything we know from
 20 his medical records, it wasn't causing any interference
 21 in his ability to conduct a normal life. He didn't have
 22 any symptoms such as angina or heart failure that we
 23 know of.
 24 So we also know from the post-mortem that the area
 25 of scarring is very small, so he was left with the vast

1 majority of his heart muscle able to function perfectly
 2 normally.
 3 What we also know from the post-mortem is that his
 4 other major cardiac arteries, his main heart arteries,
 5 were entirely normal and free from disease. So in all
 6 likelihood, they were functioning perfectly well.
 7 So in the context of having a very small area of
 8 scar, a very small area of narrowing in a relatively
 9 unimportant heart artery, I think the relative
 10 contribution of ischaemic heart disease here is actually
 11 very small, and the primary contributor to his very sad
 12 deterioration is the degree of hypovolaemic shock that
 13 we outlined earlier. I think that's by far the most
 14 significant contributor to him ending up in a state of
 15 cardiac arrest, and I think the role of ischaemic heart
 16 disease here is very small or negligible in terms of its
 17 overall contribution to deterioration to the point of
 18 cardiac arrest. Does that assist?
 19 SIR JOHN SAUNDERS: That does. I understand fully now,
 20 thank you, Dr Rees.
 21 MR GREANEY: Issue 3. I will ask you to give the headline
 22 and then we'll similarly go into some detail.
 23 Issue 3: did the presence of ischaemic heart disease
 24 contribute to the inability successfully to resuscitate
 25 John once he was in a state of cardiac arrest? First of

1 all, in your opinion, did it contribute to that problem?
 2 A. It did not contribute to that problem.
 3 Q. Why do you hold that view?
 4 A. So resuscitability here was mostly determined by the
 5 state of hypovolaemic shock and, as I said a few moments
 6 ago, the relative contribution of a very small area of
 7 myocardial scar, which sounds like it was having no
 8 impact on day-to-day life, is very small indeed.
 9 Q. So the answer to each of the three questions I've posed
 10 is no and that leads necessarily to a fourth question,
 11 which is: in your view, did the ischaemic heart disease
 12 that John had contribute to his death?
 13 A. In this context, no.
 14 MR GREANEY: Sir, those are all the questions that I propose
 15 to ask about what might be termed causation, unless
 16 there's anything you wish me to explore further.
 17 SIR JOHN SAUNDERS: No, that was extremely clear, Dr Rees,
 18 thank you.
 19 MR GREANEY: I'm going to ask you about that final topic
 20 that your assistance was sought in respect of, which is
 21 treatments that might possibly have been provided to
 22 John. Does that make sense as an issue?
 23 A. Yes.
 24 SIR JOHN SAUNDERS: For my benefit, is that within the
 25 factual context we're dealing with or is it in general

1 terms?
 2 MR GREANEY: Some are, some are not.
 3 SIR JOHN SAUNDERS: Thank you.
 4 MR GREANEY: For example, blood product resuscitation,
 5 an issue I know, sir, you're interested in from the
 6 evidence yesterday. That is something that the doctor
 7 is going to help us with, which does take us away from
 8 our factual scenario.
 9 SIR JOHN SAUNDERS: Thank you.
 10 MR GREANEY: Possible alternative management strategies is
 11 how you put it in the report. Issue 1, something
 12 that is certainly within our factual matrix, page 6,
 13 sir, heading F, early application of bilateral lower
 14 limb medical tourniquets.
 15 Could you explain that to us, please?
 16 A. The primary cause of the cardiac arrest here was
 17 hypovolaemic shock from bleeding and it is possible that
 18 the early application of bilateral, so on both limbs,
 19 lower limb medical tourniquets could have reduced the
 20 amount of blood loss. I have commented in my report
 21 that these usually need to be applied by trained
 22 personnel.
 23 Q. Secondly, the early use of haemostatic dressings.
 24 Please explain.
 25 A. These are specialist dressings which can be packed into

1 cavities or bleeding areas which enhance the blood's
 2 ability to clot. Specifically, could they have reduced
 3 the amount of blood loss in this situation? It is
 4 possible, but again these need to be deployed by trained
 5 personnel.
 6 Q. Thirdly, as I mentioned just a short moment ago in
 7 answer to the chairman's question, blood product
 8 resuscitation. Please explain.
 9 A. The provision of emergency blood products, either at the
 10 scene or in transit, is being discussed here. So this
 11 is usually in the way of replacing lost red blood cells,
 12 lost red blood plasma, and plasma contents. I mentioned
 13 in the report that pre-hospital blood administration is
 14 available in the UK but only usually as part of an
 15 advanced pre-hospital critical care team such as those
 16 deployed by air ambulance and road mobile critical care
 17 medical teams as a potential way of replacing blood loss
 18 and blood product loss.
 19 Q. As you've just said, in your report you state
 20 pre-hospital blood product administration is available
 21 in the UK, usually as part of a pre-hospital critical
 22 care service such as those delivered by air ambulance
 23 organisations?
 24 A. That's correct, yes.
 25 Q. So we're dealing, as we'll all recognise, with possible

1 alternative management strategies for John.
 2 Strategies 1 and 2 are all about stopping or slowing
 3 down the bleeding; is that correct?
 4 A. Correct.
 5 Q. And strategy 3 is about replacing blood that he has
 6 lost?
 7 A. That's correct, yes.
 8 Q. Sir, can I indicate that Colonel Clasper is also going
 9 to give evidence about this particular issue, blood
 10 replacement, about which he has a strong, well-developed
 11 view.
 12 Alternative management strategy 4: resuscitative
 13 endovascular balloon occlusion of the aorta or REBOA.
 14 What is that, please?
 15 A. This is a more complex technique using a balloon to
 16 block the aorta, the main blood vessel, to reduce
 17 downstream bleeding for patients with very severe blood
 18 loss. At the moment, this is a therapy that's only
 19 available pre-hospital to London's air ambulance and
 20 some military organisations and some in-hospital trauma
 21 teams, but it is a way in catastrophic haemorrhage of
 22 controlling lower limb, abdominal and pelvis bleeding.
 23 Q. So again, this is a way of stopping or, if not stopping,
 24 reducing blood loss?
 25 A. Correct.

1 Q. Is it the position that currently this is only available
 2 to pre-hospital teams operating with London's air
 3 ambulance or in-hospital trauma teams in certain
 4 hospitals?
 5 A. Yes, in the civilian setting, that's correct, yes.
 6 Q. 5. Reminding ourselves that we're dealing with possible
 7 strategies, rapid transfer for damage control
 8 resuscitation and surgery. Could you explain that,
 9 please?
 10 A. Yes. Here I've outlined in the report that one strategy
 11 is to very rapidly extract a patient with these injuries
 12 from the scene and deliver them safely to a pre-alerted
 13 trauma team who would have required access to extensive
 14 blood products for resuscitation to allow emergency
 15 damage control surgery to get control of bleeding as a
 16 strategy.
 17 In fact, all of the pre-hospital strategies line up
 18 with delivery to what I have suggested in section 5,
 19 which is emergency damage control resuscitation surgery.
 20 SIR JOHN SAUNDERS: Before we go on to that, there is just
 21 one query I would like to go back to.
 22 Dealing with 1 and 2, which is the early application
 23 of bilateral lower limb medical tourniquets in
 24 particular and also, 2, the early use of haemostatic
 25 dressings, you said in relation to both of those that

1 they need trained personnel to deal with. By trained
 2 personnel, to me that means paramedics, doctors or
 3 experienced first aiders.
 4 We've also heard, and you may be aware and no doubt
 5 are, of Brigadier Hodgetts' training that he wishes to
 6 give to ordinary members of the public.
 7 A. Yes.
 8 SIR JOHN SAUNDERS: Would the sort of training which comes
 9 from using his app qualify people to come within your
 10 category of trained individuals?
 11 A. I think it's likely that the use of haemostatic
 12 dressings and combat application tourniquets could
 13 easily be part of a Stop the Bleed or an emergency
 14 haemorrhage control programme, yes. I think that's one
 15 of the thrusts of it.
 16 SIR JOHN SAUNDERS: Okay, thank you. I'm grateful.
 17 MR GREANEY: Sir, Colonel Clasper is going to explain to us
 18 that you can learn to do this these things in a course
 19 that lasts less than an hour.
 20 SIR JOHN SAUNDERS: Thank you.
 21 MR GREANEY: So management strategy — the first point is
 22 these five strategies, possible strategies you have told
 23 us about, aren't exclusive, it's not one and not the
 24 others, you can use any of these in combination, would
 25 that be fair?

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1 A. Absolutely, yes.
 2 Q. 5, as I've understood it, is getting the patient to
 3 a pre-alerted trauma team as soon as possible?
 4 A. Yes, it is.
 5 Q. One reason for that being that if you can get them into
 6 hospital before cardiac arrest, you might be able to
 7 stop the cardiac arrest, but even if it happens in
 8 a hospital environment, you are more likely to be able
 9 to manage successfully that cardiac arrest?
 10 Have I understood?
 11 A. Yes, that's correct. Yes, certainly rapid extrication
 12 to a pre-alerted team with a large bank of blood
 13 products available and emergency surgery available are
 14 what's going to be required to optimise the outcome
 15 in this situation, but as I said in the report, it still
 16 does not guarantee success.
 17 Q. Indeed, in terms of survivability in John Atkinson's
 18 case, I'm certainly not going to ask you many questions
 19 about that for a reason I will identify, but you express
 20 the view that the level of care required to save John's
 21 life was extremely high; that's your view?
 22 A. Yes.
 23 Q. But I know from short discussions that I had with you
 24 both last Friday and today that you are aware that
 25 a blast wave panel has been instructed to provide its

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1 view on survivability?
 2 A. Yes, I am aware.
 3 Q. You are aware that that panel is able to draw on
 4 a variety of areas of expertise, are you not?
 5 A. Yes. I have seen that, yes.
 6 Q. And also upon many sources of information. I believe
 7 it would be fair to say that in terms of Mr Atkinson's
 8 survivability, you would defer to their view?
 9 A. Yes, I think — yes, correct.
 10 MR GREANEY: Well, Dr Rees, thank you very much indeed for
 11 answering my questions with such clarity.
 12 I'm now going to turn to the questions that others
 13 have. I'm first of all going to ask Ms Roberts, who
 14 represents the North West Ambulance Service, to pose her
 15 questions.
 16 Questions from MS ROBERTS
 17 MS ROBERTS: Dr Rees, can you see and hear me?
 18 A. Yes, I can.
 19 Q. Thank you. Dr Rees, at the beginning of your report,
 20 and I'm referring to your report dated 11 August 2020,
 21 {INQ035350/1} for those who want the reference, you told
 22 us there that you hold the rank of surgeon commander
 23 in the Royal Navy, you have served in Afghanistan, and
 24 you were a consultant in the Medical Emergency Response
 25 Team. It's the Medical Emergency Response Team that

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1 I just want you to remind us, please, what that is and
 2 what you did or do if you still undertake that role.
 3 A. The Medical Emergency Response Team was a way of dealing
 4 with battlefield casualties, which provided a dedicated
 5 helicopter with a medical and protection team on board.
 6 The medical team comprise a consultant,
 7 a Royal Air Force nurse and two Royal Air Force
 8 paramedics to provide advanced pre-hospital care,
 9 including blood product resuscitation, during the flight
 10 back to whichever receiving facility we're taking the
 11 patient to. So it was an advanced forward medical
 12 resuscitation capability.
 13 Q. Dr Rees, we heard evidence yesterday in fact from
 14 a paramedic who had also served in Afghanistan as
 15 a reservist, that that particular team to which you have
 16 referred is ready and waiting and on standby to be
 17 deployed should such an emergency arise; is that your
 18 experience?
 19 A. Yes, that's correct.
 20 Q. Thank you. May I just pick up on something that you
 21 said in answer to questions from Mr Greaney Queen's
 22 Counsel. You were asked this:
 23 "If you stop the bleed, will you stop hypovolaemic
 24 shock and prevent cardiac arrest?"
 25 And your answer was:

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1 "Yes, that's possible."
 2 Could you tell us, please, first of all, why only
 3 possible and what are the other possible outcomes?
 4 A. So the prevention of cardiac arrest by stopping bleeding
 5 is possible because it delays further bleeding and might
 6 allow a patient to retain an effective circulation for
 7 longer.
 8 Q. Yes.
 9 A. There are other injury patterns, so bleeding doesn't
 10 usually occur in isolation, so patients are usually
 11 exposed to other injury processes, such as bowel
 12 injuries or head injuries, at the same time, so there's
 13 usually not just one modality of cardiac arrest
 14 involved. It's usually multiple modality, although we
 15 know in this situation it was primarily hypovolaemia.
 16 So that was my reason for that response.
 17 Q. Thank you very much. I'm going to take you, please, to
 18 your report and I'm at {INQ035350/6} for those who are
 19 following. Under paragraph (f), "Other treatments", you
 20 refer to the early application of bilateral lower limb
 21 medical tourniquets. Just unpicking that for a moment
 22 if I may, please, what do you mean by early?
 23 A. Practically, as early as possible after injury. So
 24 ideally, in the first few minutes, where blood loss
 25 might be at its greatest, so your baseline blood

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1 pressure will be relatively near normal and you might be
 2 expected to lose a large amount of blood, particularly
 3 from an arterial bleed, which is a bleed in the artery
 4 system, early on. So the earlier the application of any
 5 modality to control haemorrhage the better. So early
 6 application would certainly be better than delayed
 7 application, which is why I've highlighted it as such
 8 in the report.
 9 Q. Yes, and you have talked about "within the first few
 10 minutes" and thank you for clarifying that. We have
 11 heard a phrase throughout this inquiry of "the platinum
 12 10 minutes". I suspect you're going to say yes, but is
 13 that a phrase with which you are familiar?
 14 A. It's a phrase with which I'm familiar, yes.
 15 Q. Is that the type of time frame to which you are
 16 referring when you say "early" and "within the first few
 17 minutes"?
 18 A. Yes. As early as practicable, yes.
 19 Q. Thank you. By medical tourniquets, are you referring
 20 to, again a phrase we have heard in this inquiry, CAT or
 21 combat application tourniquets?
 22 A. Yes, that's the most widely used device of this sort.
 23 There are other types of device available and I'm
 24 distinguishing a professionally designed and
 25 manufactured device versus that of an improvised lower

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1 limb medical tourniquet, which we know was used in this
 2 case by a rescuer. So I'm specifically meaning
 3 a manufactured device, yes.
 4 Q. So you are differentiating it from the application of
 5 a belt, a belt that one might ordinarily wear?
 6 A. Yes, correct.
 7 Q. And you are differentiating it, are you, from -- we've
 8 also heard evidence about leg restraints -- a police
 9 officer told us that she had used leg restraints that
 10 might be used during the course of an arrest, for
 11 example, to control or to detain somebody, those were
 12 also used. You are drawing a specific distinction, are
 13 you, between those makeshift tourniquets, that were used
 14 with the very best intention, and a medical tourniquet?
 15 A. Yes, I'm saying the optimal device here would be
 16 a medical tourniquet deployed by someone, and possibly
 17 more than one, and deployed by somebody who knows how to
 18 use it.
 19 Q. In those early stages, as you have told us?
 20 A. Yes.
 21 Q. You go on to say under (i) under paragraph (f):
 22 "This may have resulted in reducing the amount of
 23 blood loss."
 24 Why only "may"?
 25 A. My next line, I think, addresses that. It's obvious

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1 that extensive blood loss occurred in the minutes
 2 following the explosion from what we've seen in some of
 3 the evidential material. But it certainly would have
 4 controlled ongoing bleeding. But yes, that's why I've
 5 highlighted that.
 6 Q. Are you referring to extensive blood loss that --
 7 you have seen the images, have you?
 8 A. Yes, I have.
 9 Q. You have? Thank you. I thought so. Are you referring
 10 therefore to the extensive blood loss that is visible
 11 within those images before the application of the belt?
 12 A. Yes, I am.
 13 SIR JOHN SAUNDERS: Just let me clarify that. There's what
 14 I've found to be a very helpful schedule which the
 15 experts have drawn up by looking at the images and
 16 seeing what's going on. Assuming that is right, there
 17 is extensive blood loss that goes on after the
 18 application of the belt.
 19 MS ROBERTS: Yes. I'm doing it in stages, if I may, sir.
 20 So there is a period of bleeding -- I think you're
 21 referring, sir, to the schedule that's set out, I think,
 22 within the blast wave report.
 23 SIR JOHN SAUNDERS: Yes, absolutely.
 24 MS ROBERTS: Which breaks it down into minute by minute
 25 chunks, as you say, very helpfully, if I may say so.

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1 So before the application of the belt, which is
 2 within minutes, let us be clear about that, I think
 3 Dr Rees is saying that there is visible, his phrase,
 4 extensive blood loss prior to the application of the
 5 belt. Is that what you're saying, Dr Rees?
 6 A. I certainly agree, prior and following, I suppose is
 7 a reasonable --
 8 Q. And following, yes.
 9 SIR JOHN SAUNDERS: That's all I was pointing out,
 10 Ms Roberts, that actually it didn't stop when the belt
 11 went on.
 12 MS ROBERTS: Absolutely.
 13 SIR JOHN SAUNDERS: Of course we're going to need to look,
 14 and I would certainly ask Dr Rees about it, at there
 15 being a partial slowing down caused by the belt going on
 16 and presumably there are any number of degrees along
 17 that path. Is that right, Dr Rees?
 18 A. Yes, I think so. I think it's very hard to determine
 19 what degree of bleeding there would have been without
 20 it. Yes, I think it's very hard to establish that.
 21 SIR JOHN SAUNDERS: Sorry, Ms Roberts, this just seemed to
 22 me to be a really grey area and we need to recognise
 23 that.
 24 MS ROBERTS: A grey area, a continuing area, but one, as
 25 I say, that's helpfully been delineated to a certain

1 extent by the blast wave experts.
 2 So that bleeding continued once the belt was
 3 applied. Were you able to determine, doctor, whether
 4 the bleeding was still visible or continued after the
 5 intervention of PC Johnson at about 11.15?
 6 A. No, I was unable to determine that, and the primary
 7 focus, I suppose, of my instruction was to assess on
 8 balance the role of the contribution of his underlying
 9 cardiovascular disease as well, so rather than a primary
 10 haemorrhage control focus or a blast wave injury focus,
 11 I was very much focused on the role of the intercurrent
 12 coronary artery disease.
 13 Q. I see. I shan't ask you any more about that then save
 14 to say this: you told us, just a moment or so ago, that
 15 the application of that tourniquet, and indeed the early
 16 use of haemostatic dressings, usually requires to be
 17 deployed by trained personnel. Again, you clarified for
 18 the chairman's benefit, and indeed all our benefits,
 19 that that could and indeed would, if trained within
 20 an hour or so, include, well, members of the public,
 21 I suppose, is what you're saying?
 22 A. Yes. Prior to tragic events such as this, public
 23 training has mostly revolved around the provision of
 24 cardiopulmonary resuscitation, so CPR, in the context
 25 of. But there has certainly been a change in emphasis,

1 both in the UK and US, in terms of the provision of Stop
 2 the Bleed programmes to control haemorrhage early.
 3 So there are streams online, some of which I think
 4 you have heard about, about training members of the
 5 public to be able to respond to this kind of thing with
 6 the use of techniques which are designed specifically to
 7 control life-threatening bleeding, so tourniquets,
 8 haemostatic dressings, et cetera, yes, correct.
 9 Q. And it follows from that, that that would also extend to
 10 police officers and fire officers and other people who
 11 would attend the scene and may get there rather quicker
 12 than the medics might get to the scene?
 13 A. Yes, that's correct.
 14 Q. Thank you. One of the things you say, Dr Rees, within
 15 your report, and I'm at {INQ035350/7}, you refer, not
 16 surprisingly, to this being a challenging scene.
 17 A. Yes.
 18 Q. And following on from that, on {INQ035350/8}, just ahead
 19 of your paragraph headed "Conclusions", you say this:
 20 "The level of care required to save life in this
 21 case is extremely high."
 22 You've clarified your position so far as this is
 23 concerned, vis-a-vis the views of the blast wave
 24 experts; you did that a moment ago with Mr Greaney.
 25 But what you say is this:

1 "Survival would not be guaranteed even if this
 2 injury pattern had occurred to one individual alone."
 3 Just leaving to one side for the moment
 4 survivability, you make specific reference there to one
 5 individual alone. We know that this was a mass casualty
 6 incident. So just help us with this: why do you seek to
 7 draw to our attention the difference between one patient
 8 and what we know to be the situation of multiple
 9 patients?
 10 A. So my report just reminds us that even if a single
 11 patient with this injury pattern, so profound
 12 hypovolaemic shock due to severe both-sided lower limb
 13 injuries, with multiple fragmentation wounds, and indeed
 14 bowel perforation, that would have been -- that's a very
 15 high injury burden and that would have required early
 16 aggressive resuscitation, blood products, multiple trips
 17 to the operating theatre, and a stay in intensive care
 18 and probably some bowel surgery. That would have been
 19 an incredibly rocky combination of injuries to survive
 20 occurring as a solo patient being delivered to
 21 a well-resourced trauma centre.
 22 The report also documents the scene and describes it
 23 as:
 24 "A challenging scene with limited access by medical
 25 responders due to potential threats and limited medical

1 and transport equipment.”
 2 So this injury pattern occurring in that context is
 3 what I am drawing attention to by that statement.
 4 SIR JOHN SAUNDERS: Dr Rees, if I may say so, I think
 5 that is all — I’m grateful for the explanation, but
 6 it’s all fairly self-evident in a way. Obviously, if
 7 you have one person who’s injured and a number of
 8 medical people coming to assist and immediately
 9 assisting, the chances of survival are much better than
 10 if you have a whole lot — a large number of people who
 11 are injured, limited number of medics there to help, and
 12 difficulties getting them to hospital.
 13 So it’s all related to the number of people who come
 14 to help, what they do when they get there and how
 15 quickly they get them out. So I need to look at the
 16 whole overall situation, but obviously not lose sight of
 17 the difficulties that rescuers have, which I can assure
 18 everyone I will not. I hope you agree with it. If so,
 19 say yes.
 20 A. Absolutely, yes. I think that’s the primary difficulty
 21 here, yes.
 22 SIR JOHN SAUNDERS: While I’ve stopped Ms Roberts, can
 23 I just go back to one thing? Brigadier Hodgetts, in his
 24 evidence to us, was talking about how, even if there are
 25 not CAT tourniquets available, the best sort of

1 tourniquets, that people can use improvised tourniquets
 2 and one of those suggested was the use of a belt.
 3 Obviously, it needs to be done properly in that
 4 presumably you need to pull it on very tightly to make
 5 it effective.
 6 A. Yes.
 7 SIR JOHN SAUNDERS: Of course in this case we really needed
 8 bilateral tourniquets, which were certainly not there.
 9 But in principle, if someone had two belts and if they
 10 knew how to put it on and put it on tight enough, is
 11 there any reason why those should not have acted
 12 effectively as tourniquets in this case and stopping the
 13 bleeding?
 14 A. I think there’s no reason why they couldn’t have acted
 15 effectively. I would still expect a medical device
 16 deployed by a responder to provide a higher level of
 17 assuredness that effectiveness was there.
 18 SIR JOHN SAUNDERS: Of course. Obviously, if a responder is
 19 there with the right equipment that’s absolutely
 20 preferable to a member of the public improvising, but
 21 those are not normally the two possible alternatives?
 22 A. Absolutely.
 23 SIR JOHN SAUNDERS: Thank you. Ms Roberts, I have finished
 24 interrupting.
 25 MS ROBERTS: I have no more questions!

1 SIR JOHN SAUNDERS: Thank you.
 2 MR GREANEY: Sir, Mr Cooper, please, on behalf of John’s
 3 family.
 4 Questions from MR COOPER
 5 MR COOPER: Thank you, Dr Rees. Can you see me?
 6 A. Yes, I can.
 7 Q. As you know, I ask questions on behalf of John’s family.
 8 I would just like to take you, to begin with,
 9 please, to your report again. Do you have it in front
 10 of you?
 11 A. I do.
 12 Q. It’s just a short reference to again with, please. I’ll
 13 take you to page 7 of that report. If you cast your eye
 14 underneath your (v):
 15 “Rapid transfer for damage control resuscitation and
 16 surgery.”
 17 Let’s just read that in if we can and obviously
 18 develop if you feel you need to. You say this:
 19 “If it had been possible to extract him from the
 20 scene and deliver him safely to a pre-alerted trauma
 21 team with access to extensive blood products before
 22 cardiac arrest ensued...”
 23 So there’s a timeline:
 24 “... before cardiac arrest ensued, then survival
 25 might have been possible.”

1 Is that your view?
 2 A. Yes, it is.
 3 Q. Thank you.
 4 If we look at the top, please, of page 8 of your
 5 report, it’s the first line. To add to that you
 6 clarify, effectively, don’t you, your position on that
 7 by saying:
 8 “Once the cardiac arrest had occurred, survival was
 9 extremely unlikely?”
 10 That’s your view, isn’t it?
 11 A. That is, yes.
 12 Q. So cardiac arrest was the cut-off point as far as
 13 survivability is concerned?
 14 SIR JOHN SAUNDERS: Mr Cooper, I just want to clarify
 15 something about that, which we heard. I’m sure Dr Rees’
 16 answer will be the same, just so everyone understands.
 17 We heard evidence that in the ambulance, when CPR
 18 was taking place, just before arrival at the hospital,
 19 some heart movement returned of some sort. So do we
 20 factor that in at all? Suppose the cardiac arrest had
 21 been stopped and the heart was now beating again, what’s
 22 the position then?
 23 A. If I might answer that, I think in this context cardiac
 24 arrest is a continuum, really, and that the cardiac
 25 output, the circulation has been gradually failing from

1 the moment of injury and has continued to deteriorate
 2 in the face of ongoing bleeding and ongoing inflammation
 3 in the other body systems which have been affected —
 4 don't forget this is not just bleeding, there is all of
 5 the other stuff that we have: a huge inflammatory
 6 response with major trauma happening at the same time.

7 At a point where — and the body continues to
 8 deteriorate to the point where there is no detectable
 9 circulation , so the rescuers would have been unable to
 10 detect a response, they would have been unable to detect
 11 a pulse, and at that point would have started CPR.

12 It is likely or possible that the heart was still
 13 having some activity intermittently at that point and
 14 that may be what was detected during the resuscitation
 15 attempt, but this is unlike a medical cardiac arrest
 16 caused by a heart attack, where your heart is
 17 functioning fine and all of a sudden it isn't
 18 functioning at all . What we are talking about here is a
 19 slow decremental slow reduction in the circulation to
 20 the point where there is no longer a detectable pulse.

21 So we're talking about a slightly different —
 22 apologies.

23 SIR JOHN SAUNDERS: No, no, I'm sorry, I interrupted you, it
 24 is my fault entirely .

25 So the answer is point of no return, and I'm sorry

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1 to use that expression, is the onset of the first
 2 cardiac arrest before CPR started?

3 A. I believe so, yes.

4 SIR JOHN SAUNDERS: Thank you very much.

5 Thank you, Mr Cooper. I thought we ought to clarify
 6 that.

7 MR COOPER: Not at all, sir. That's really where I was
 8 heading anyway.

9 Can I take you, please, just to ask you a few
 10 questions on blood product and I'm totally aware and I'm
 11 grateful to Mr Greaney for helping me in advance of this
 12 that there's another colleague of yours who is going to
 13 deal with this substantially . You raise it and I just
 14 want to clarify what you raise. It's page 6, please, of
 15 your report. Blood product resuscitation. You say
 16 this:

17 "This could have replaced lost blood, lessened the
 18 effects of severe bleeding, and reduced the risk of
 19 traumatic cardiac arrest."

20 You go on to say:

21 "Pre-hospital blood product administration is
 22 available in the UK usually as part of a pre-hospital
 23 critical care service such as those delivered by air
 24 ambulance organisations."

25 Do you know how available this particular service

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1 is, for instance to people outside London?

2 A. I'm aware that the majority of air ambulance services
 3 have some sort of arrangement for carriage of blood, but
 4 usually in relatively small quantities, so usually maybe
 5 4 units of a resuscitative blood product: 2 units
 6 usually contain red blood cells and 2 units usually
 7 contain some form of plasma, whether it is frozen plasma
 8 or freeze-dried plasma, but I'm not aware of the
 9 specifics of the availability of this in the area of the
 10 incident at the time.

11 Q. As I've indicated, there's another expert we can have
 12 clarification from as far as that's concerned.

13 SIR JOHN SAUNDERS: If you're moving on, Dr Rees, just to
 14 use all the expertise we have, do you have any knowledge
 15 of what the position is about ambulances abroad, so what
 16 other countries may do and whether they carry blood
 17 products, all of which may be of some significance to
 18 me? If you don't know, please do say so.

19 A. I know that there are some non-physician provided
 20 ambulance services which have access to blood products
 21 in other countries, but I'm more knowledgeable about the
 22 UK situation.

23 SIR JOHN SAUNDERS: Okay, thank you very much.

24 MR COOPER: On that, perhaps I could just ask as
 25 a subsidiary this. We are aware for instance that some

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1 beliefs, such as Jehovah's Witnesses, for instance, are
 2 against the infusion of blood but carry with them
 3 permanently a blood product, so that should they be
 4 unfortunate to meet an event which requires blood, they
 5 have a blood product with them, which they carry around
 6 with them. Do you know what that blood product is?

7 SIR JOHN SAUNDERS: I'm sure you're right about that.

8 I must say it wasn't generally known to me at the time.
 9 Was it known to you, Dr Rees?

10 A. No. It's nothing I have ever encountered.

11 SIR JOHN SAUNDERS: We'll ask to ask somebody else, but
 12 obviously worth pursuing.

13 MR COOPER: Thank you, sir, I will move on.

14 I would like to ask you about REBOA, please. You
 15 touched on it earlier on with Mr Greaney. It has been
 16 described, has it not, as an internal tourniquet? Have
 17 you heard it described as an internal tourniquet?

18 A. Yes, I have.

19 Q. And again, statistically, are you aware that it has
 20 approximately, if applied, an 88.6% survival rate?

21 A. I am aware of that data. That's in the context of —
 22 that's difficult data to interpret, I have to say.

23 I lead the UK programme of developing this for defence,
 24 so I would have to see the data to be sure of that
 25 figure.

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1 SIR JOHN SAUNDERS: But surely every case is fact specific
 2 as to whether — how successful it's going to be?
 3 A. Yes, the data sets, the international data sets of use
 4 of REBOA in this setting are usually restricted to very
 5 severely injured patients, compared against a comparator
 6 who are having resuscitative thoracotomies, having their
 7 chests opened, and the data sets are very blurred I have
 8 to say. But it is certainly an alternative therapy in
 9 exsanguinating severe haemorrhage.
 10 MR COOPER: If you can help us, you may not be able to, but
 11 is the survivability of REBOA, can it be applied for
 12 (inaudible: distorted) to 90 minutes to assist stricken
 13 individuals? Is that the timescale that the procedure
 14 lasts for?
 15 A. The timescale when controlling lower limb haemorrhage,
 16 so with a balloon deployed in the bottom of the aorta,
 17 might be an hour. The time scale when it's deployed
 18 more proximally than that, so deployed to control
 19 bleeding from abdominal organs, is even shorter, maybe
 20 30 minutes. So it's as short as practicable: as long as
 21 that balloon is up, the rest of the body tissues are
 22 being starved of oxygen and so as short as possible is
 23 the answer to that.
 24 SIR JOHN SAUNDERS: Can you administer it out of hospital or
 25 would you need to be in hospital to have it

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1 administered.
 2 A. It's a very complex therapy to deliver pre-hospital. It
 3 has been delivered by London Air Ambulance successfully
 4 in the pre-hospital arena, but to my knowledge that is
 5 the only service, pre-hospital service routinely
 6 deploying it. For example, my service which I fly with
 7 does not deploy this routinely in the pre-hospital
 8 arena.
 9 MR COOPER: It's not a new discovery, is it? It was
 10 discovered in 1954, wasn't it, during the Korean War?
 11 A. That was the first documented use of the procedure, yes,
 12 in very severely injured patients. So it has been
 13 around for some time, but has been — there's been a
 14 resurgence of interest in it as a novel haemorrhage
 15 control modality over the last maybe 10 years.
 16 SIR JOHN SAUNDERS: Have you been on Wikipedia again,
 17 Mr Cooper?
 18 MR COOPER: I'm afraid, sir, I have.
 19 SIR JOHN SAUNDERS: Always good to know where the research
 20 comes from.
 21 MR COOPER: That actually wasn't Wikipedia: that was simply
 22 online papers which I was scan reading, but not
 23 Wikipedia. I can get Mr Greaney a copy if he's
 24 interested.
 25 Would it have potentially helped John Atkinson?

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1 I'll put it broadly, could it have saved him?
 2 A. It depends when it was employed. If it was employed as
 3 part of — as we have said, none of those points are
 4 mutually exclusive, they all have to happen pretty much
 5 at the same time, so a combination of this and blood
 6 product transfusion and early damage control surgery
 7 would have been the optimal pathway that we discussed
 8 earlier.
 9 Q. Is there any reason why it is only available in London
 10 and not, say, in Manchester?
 11 SIR JOHN SAUNDERS: We're talking about outside hospital?
 12 MR COOPER: Outside hospital, yes.
 13 A. So London has the highest volume of pre-hospital trauma
 14 of any other service and also has been in existence the
 15 longest. This is just supposition but the ability to
 16 develop this complex pre-hospital intervention with the
 17 back door of an advanced surgical capability just
 18 evolved — I think that's how it evolved and why it
 19 evolved with that service.
 20 SIR JOHN SAUNDERS: And that's only air ambulances, as you
 21 know, who have used it?
 22 A. Yes, London Air Ambulance is the primary user of this,
 23 yes.
 24 SIR JOHN SAUNDERS: Thank you.
 25 MR COOPER: Just air ambulance or pre-hospital teams

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1 generally in London?
 2 A. They could deploy by air or by road, but the overarching
 3 charity is London Air Ambulance.
 4 Q. This is my last question simply in terms of moving
 5 forward, God forbid should this happen again, is there
 6 a view that you would support that perhaps the use of
 7 this device should be further looked into and extended
 8 for provision of on scene treatment to help people, God
 9 forbid, like John Atkinson in the future?
 10 A. There is a programme developing our understanding of the
 11 use of this for haemorrhage control which is being
 12 championed at London Air Ambulance. There is more data
 13 being gathered regarding it. I have to say it is still
 14 a very complex pre-hospital therapy to deliver and with
 15 the challenges provided by the scene here, I think that
 16 would provide a very unique set of challenges.
 17 MR COOPER: That's helpful. Thank you.
 18 SIR JOHN SAUNDERS: If it comes from — if air ambulance
 19 looking at it, as I understand it, air ambulances are
 20 not actually funded by the state, they are privately
 21 funded.
 22 A. Charity funded, almost extensively. With some
 23 exceptions, yes.
 24 SIR JOHN SAUNDERS: Thank you.
 25 MR GREANEY: Sir, I don't have any further questions for the

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1 doctor. Do you?
 2 SIR JOHN SAUNDERS: No.
 3 I am really grateful, you have been extremely clear,
 4 so even someone like me has been able to understand your
 5 evidence. So thank you very much, Dr Rees.
 6 MR GREANEY: Yes, thank you, doctor.
 7 Sir, we do need to have a break at this stage. It's
 8 probably a good time in any event because we need to
 9 re-arrange the courtroom. Next, we are going to hear
 10 from Colonel Clasper, who will help us with the issue of
 11 survivability.
 12 SIR JOHN SAUNDERS: Is a quarter of an hour a reasonable
 13 time?
 14 MR GREANEY: It is, sir.
 15 SIR JOHN SAUNDERS: Thank you.
 16 (11.32 am)
 17 (A short break)
 18 (11.52 am)
 19 MR GREANEY: Could Colonel Clasper be sworn, please?
 20 COLONEL JONATHAN CLASPER (sworn)
 21 Questions from MR GREANEY
 22 MR GREANEY: Could you begin by telling us your full name,
 23 please?
 24 A. Jonathan Charles Clasper.
 25 Q. Are you Professor Jonathan Clasper?

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1 A. Yes.
 2 Q. Are you also Colonel Jonathan Clasper?
 3 A. I'm colonel retired. I left the army in 2019. I can
 4 still be called colonel though.
 5 Q. And you were, at the end of your period in the British
 6 Army, a serving officer with the Royal Army Medical
 7 Corps; is that correct?
 8 A. Yes.
 9 Q. Are you a fellow of the Royal College of Surgeons of
 10 Edinburgh and London?
 11 A. Yes.
 12 Q. And were you, until the end of August of this year,
 13 a consultant in orthopaedic surgery at Frimley Park
 14 Hospital in Surrey?
 15 A. That's correct.
 16 Q. Are you also a visiting professor in bioengineering at
 17 Imperial College London?
 18 A. Yes.
 19 Q. And clinical lead for the Royal British Legion Centre
 20 for Blast Injury Studies?
 21 A. Yes.
 22 Q. So that we understand your area of expertise, you are
 23 the expert who formed part of the blast wave panel in
 24 hospital care?
 25 A. My expertise is the injuries, what could have caused the

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1 injuries, how you could have prevented the injuries,
 2 survivability, treatment in hospital — surgical
 3 treatment predominantly.
 4 Q. That's a much clearer answer. You have, I believe,
 5 a research interest in injuries following explosions?
 6 A. Yes.
 7 Q. Particularly, the pattern of injuries and the prevention
 8 and mitigation of blast injuries?
 9 A. That's correct.
 10 Q. To put it in very simple terms, do you have also
 11 extensive operational experience of military trauma?
 12 A. Yes.
 13 Q. Including having personally treated and researched
 14 injuries from the military conflicts in both Iraq and
 15 Afghanistan?
 16 A. That's correct.
 17 Q. As I indicated, do you form part of a panel that we have
 18 described as the blast wave panel or blast wave experts,
 19 together with Professor Anthony Bull, Colonel Peter
 20 Mahoney, Dr Mark Ballard and Mr Alan Hepper?
 21 A. I do.
 22 MR GREANEY: Sir, you will recall that when Professor Bull
 23 and Colonel Mahoney gave evidence on 21 September, they
 24 explained the composition of the panel and the expertise
 25 that each member holds. Unless you wish me to do so,

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1 I'm not going to go back into that?
 2 SIR JOHN SAUNDERS: No, thank you.
 3 MR GREANEY: As we know, colonel, the panel was asked to
 4 provide its view on survivability in the case of each of
 5 the 22 murdered in the arena attack.
 6 A. Yes.
 7 Q. One of those in respect of whom the panel was asked to
 8 provide its opinion was John Atkinson.
 9 A. Yes.
 10 Q. That is of course the principal reason why you are in
 11 the witness box at the moment, but before we get to
 12 that, there are two issues of general understanding that
 13 I am going to seek your assistance in respect of.
 14 First, tranexamic acid or TXA. There have been
 15 references to that in the evidence. It would be helpful
 16 to have your explanation of what that is. I'm at page 6
 17 of your report of 24 March 2021, so that's the third
 18 report, {INQ041014/6}. Do you have that page available
 19 to you?
 20 A. I do, yes.
 21 Q. So I'm going to ask you an open question, I hope not
 22 unfairly to you, what is tranexamic acid?
 23 A. It's a drug that is given to essentially improve
 24 clotting and it does that by stopping the clot being
 25 broken down. So when your blood clots, the blood clots,

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1 but at the same time your body breaks down that clot;
 2 TXA stops --- inhibits that breakdown.
 3 Q. Is it a new treatment?
 4 A. No, it has been around for quite a while. It's
 5 actually --- we use it in hospitals, in major surgery,
 6 it's used in obstetrics, it's been used in trauma a lot.
 7 Q. Is it widely available?
 8 A. Yes.
 9 Q. Do various analyses and studies demonstrate the value of
 10 TXA in reducing mortality in some cases of severe
 11 bleeding?
 12 A. Yes, they do. The big study is the crash study which
 13 showed a benefit with TXA, a survival benefit.
 14 Q. Can TXA be employed in both compressible and
 15 non-compressible bleeding?
 16 A. Yes.
 17 Q. Very much towards the end of my questions I'm going to
 18 ask you whether --- don't answer this now, but I'm going
 19 to explore with you whether an earlier use of TXA in
 20 John Atkinson's case was capable of making any
 21 difference in so far as you feel able to express a view
 22 about that. But shall we get to that in due course?
 23 A. Okay.
 24 Q. The second issue of general understanding: blood.
 25 I think it would be accurate to say that there are in

1 broad terms at least four blood groups?
 2 A. Yes.
 3 Q. A, B, AB and O?
 4 A. Correct.
 5 Q. Is it also accurate to say that for emergency
 6 transfusions, blood group type O negative is the variety
 7 of blood that has the lowest risk of causing serious
 8 reactions for most people who receive it?
 9 A. That's correct.
 10 Q. Because of that, am I correct that it is sometimes
 11 called the universal blood donor type?
 12 A. Yes.
 13 Q. As you appreciate, the issue that has arisen is whether
 14 ambulances should carry such blood or blood products in
 15 order to transfuse at the scene, or during
 16 transportation, casualties who have lost much blood.
 17 You're aware that's an issue that witnesses have been
 18 asked questions about?
 19 A. Yes.
 20 SIR JOHN SAUNDERS: I think the two issues, if I may say so,
 21 are: would it help if they did in a situation like this?
 22 And, secondly, is it practical? That breaks down into
 23 two.
 24 MR GREANEY: Sir, those are the very issues I was going to
 25 explore. Thank you for putting them in such clear

1 terms.
 2 Before we get to your opinion, because I know
 3 you have a well-formed opinion about this, are there
 4 both military and civilian situations in which something
 5 such as that may occur?
 6 A. Yes.
 7 Q. The military situation in which we might encounter that?
 8 A. The military carry blood and blood products on MERT, the
 9 emergency response that Dr Rees mentioned earlier, which
 10 is a four-man team, with a qualified doctor, specially
 11 trained paramedics and nurses.
 12 London HEMS carry it, again a specialised team
 13 dedicated in the treatment of trauma, with a doctor and
 14 specialist with him as well.
 15 Q. HEMS standing for?
 16 A. Hospital Emergency Medical Services, I believe. London
 17 HEMS.
 18 Q. So it is something (overspeaking) ---
 19 A. --- (overspeaking) helicopter (overspeaking) ---
 20 Q. --- which is encountered both in military and in civilian
 21 life?
 22 A. Yes.
 23 Q. Let me ask a general question but please along the way
 24 of your answer address the chairman's two points. So
 25 first of all, would it help, and secondly, is it

1 practicable? My general question designed to encompass
 2 those two questions is: do you consider that the
 3 chairman should recommend that all or at least some
 4 ambulances should be able to transfuse blood?
 5 A. No. I think it would be very reasonable for the
 6 chairman to recommend that every Ambulance Service looks
 7 at the provision of blood, but I suspect they've all
 8 done it anyway.
 9 Q. It might seem very obvious that the answer to the
 10 question should be yes, because obviously paramedics
 11 will come across situations in which they have to deal
 12 with people who have lost a lot of blood. A way of
 13 dealing with that is to put back in blood that has been
 14 lost, so why not ensure that ambulances have that
 15 facility available? Why is it not so simple?
 16 A. Simplifying the treatment of major trauma, such as
 17 Mr Atkinson, you have to stop the bleeding, you have to
 18 get them to hospital, you have to put the blood back in,
 19 and then you have to do the definitive surgery to stop
 20 the bleeding. If you reverse the order, so you put the
 21 blood in and then delay the transfer to hospital,
 22 you are unlikely to benefit someone a great deal unless
 23 there's a significant delay in getting to the hospital.
 24 That is why MERT and places like HEMS will use it: there
 25 is a delay in getting them to hospital.

1 They will use it at the same time as evacuating the
2 patient to hospital. So in MERT you will have a blood
3 transfusion on the helicopter while you come back; they
4 won't stay on the ground giving the blood transfusion.

5 I can explain the logistics of it as well. Blood is
6 a thick, viscous fluid. It has to go in a big needle
7 and it is not routine practice to put a big needle in
8 during resus by the paramedics. It has to be warmed,
9 it's a dangerous drug. Blood transfusions gone wrong
10 will kill. It's a limited resource as well. It has to
11 be warmed up; if you give it cold you actually may add
12 to the problems of blood clotting -- and blood itself
13 doesn't have clotting factors, it is a means of carrying
14 oxygen.

15 So for that sort of resuscitation, you would have to
16 have blood, you would have to have fresh frozen plasma,
17 you would have to pre-prepare them, you would have to
18 warm them, you have to have specialist knowledge and
19 specialist equipment. It's not for general ambulances:
20 it's for specialised resuscitation teams.

21 SIR JOHN SAUNDERS: So in situations where there is going to
22 be a lot of delay in getting help to somebody or getting
23 them to hospital in particular where they can have the
24 transfusions they need, then provision is being made or
25 can be made to deal with that. So the air ambulances,

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1 who may be in exactly that situation, with the military
2 who are in that situation -- and indeed I gather they
3 can come out in cars, in vehicles as well.

4 A. Yes, they can.

5 SIR JOHN SAUNDERS: So where you know there's going to be
6 a big delay and they won't get the blood to them and
7 then they may inevitably die, even given the practical
8 difficulties you have described, which I well
9 understand, it is possible?

10 A. It is possible, but I think I would go back to the
11 question that Dr Rees was asked about MERT: MERT do
12 nothing else but wait to be called out to critical
13 incidents like that.

14 SIR JOHN SAUNDERS: Sorry, you're thinking of the
15 practicalities at the moment. Can I just take it
16 through my -- so it is possible in that situation. I am
17 going to be told by NWS, as part of their case, it was
18 impossible to get these people to hospital, in practical
19 terms, any quicker than they got there. And if that
20 meant that people like John Atkinson died because of it,
21 are we not going to have to start thinking seriously
22 about it to solve this problem that? Either the problem
23 is solved by saying to the ambulances, "You have to get
24 them there quicker whatever your problems and wherever
25 you are at the time", or do we not have to think at

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1 least about making it possible, which it clearly is, to
2 get someone on site in those exceptional circumstances?

3 A. I think that's entirely reasonable, sir, but I would
4 like to think that NWS had already considered that
5 prior to this incident. I know that most ambulance
6 services have considered the management of major trauma
7 which is a system, it's not just an individual
8 procedure.

9 SIR JOHN SAUNDERS: Okay. But Manchester hasn't had
10 anything like this before. In a way, until you are
11 actually hit with it -- I may be doing Manchester an
12 injustice, maybe they have, I have no idea -- but until
13 you get it and you realise that the practicalities are
14 you're just not going to get them there in time, isn't
15 that the only time you really think about it?

16 A. You would think about it in advance though rather
17 than at the last minute, I would suggest.

18 SIR JOHN SAUNDERS: So you think if NWS had positively sat
19 down and thought: if we have a bomb going off at
20 somewhere like the arena and lots and lots of injured
21 people, will we be able to get them to hospital in time
22 to get the blood to them that they need?

23 A. I would be very surprised if NWS haven't thought about
24 how they manage a mass casualty situation, whether that
25 was a terrorist bombing, a train crash. Part of that

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1 will be the command on the scene, a casualty clearing
2 station --

3 SIR JOHN SAUNDERS: I mean, they do have a mass casualty
4 plan, it's not suggesting it doesn't happen, but whether
5 that actually discusses the possibility of getting blood
6 to people and whether it's necessary to think about it.
7 We certainly haven't been referred to it, I don't think.

8 MR GREANEY: I don't think so either, sir.

9 A. If they haven't considered it, they should consider it
10 (overspeaking) adopting it.

11 SIR JOHN SAUNDERS: Right. I'm not meaning to be aggressive
12 to you, believe me, in the questions I'm asking. It's
13 just we want to do something constructive.

14 A. Yes, I understand that.

15 MR GREANEY: So your recommendation -- and are you
16 expressing just your own view or the view of the
17 blast wave panel?

18 A. It's my recommendation because I've just been asked it.
19 I'm sure the blast wave panel can come up with
20 a consensus view if you wished.

21 Q. It may be, sir, that that's a good idea.

22 SIR JOHN SAUNDERS: Absolutely.

23 MR GREANEY: Certainly your view at the moment, subject to
24 consultation with your colleagues, and I wouldn't want
25 you to think that the chairman doesn't consider what

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1 you have said so far valuable, but your recommendation
 2 at the moment is that the chairman shouldn't go so far
 3 as to recommend that ambulances must be able to provide
 4 that facility but that each Ambulance Service should
 5 consider whether that is something that they should be
 6 able to provide?
 7 A. Yes, and if they brought blood forward, it should be as
 8 part of a specialist team.
 9 SIR JOHN SAUNDERS: That's very helpful, thank you.
 10 MR GREANEY: But the model that you consider an
 11 ambulance service should be working to in a case such as
 12 John Atkinson's is at the scene you stop or at any rate
 13 slow down the bleeding?
 14 A. Correct.
 15 Q. You then get them to hospital as quickly as possible?
 16 A. Correct.
 17 Q. And at hospital, you take further measures with what is
 18 available there to deal with whatever problem is causing
 19 the bleed?
 20 A. Yes, as Dr Rees said earlier, you get them to hospital,
 21 as being pre-warned and prepared.
 22 SIR JOHN SAUNDERS: Which they clearly were.
 23 A. Yes.
 24 SIR JOHN SAUNDERS: No problem on that.
 25 MR GREANEY: Against that background, unless the chairman

1 has any further questions on those two issues of
 2 understanding, let's turn to the issue of survivability
 3 in the case of Mr Atkinson.
 4 As I indicated earlier, the blast wave panel has
 5 produced three substantial reports: first of all,
 6 a report dated 27 September 2019; secondly, a report
 7 dated 30 March 2020; and thirdly, a report of
 8 24 March 2021.
 9 A. Correct.
 10 Q. So what I would like to do is just to work through the
 11 views that have been expressed in those three reports
 12 because obviously your opinion has developed, even if
 13 only in terms of emphasis, as a result of further
 14 information becoming available to you as the blast wave
 15 panel?
 16 A. Correct.
 17 Q. So first of all, in your first report,
 18 27 September 2019, paragraph 6.5.1, {INQ025364/21}, you
 19 expressed the following view. Sir, this is your
 20 divider 6, page 21.
 21 What you, the panel, said was:
 22 "John Atkinson sustained multiple secondary blast
 23 injuries with an overall high burden of injury (two
 24 AIS 4 scores, four AIS 3 scores, two AIS 2 scores, and
 25 57 AIS 1 scores)."

1 Then this:
 2 "His injuries were potentially survivable with
 3 current 2019 advanced medical treatment. However, the
 4 post-mortem report noted a pre-existing cardiac
 5 condition that reportedly reduced the chances of
 6 survival given the burden of injury."
 7 First, when your colleagues from the panel gave
 8 evidence on 21 September, they explained what the AIS
 9 scoring system is. I'm not going to ask you to go over
 10 that again, but could you explain to us what we should
 11 understand of these scores, which are specific to John's
 12 case?
 13 A. The fact is that his maximum AIS was 4, so those are
 14 just looking at them without looking at anything else,
 15 potentially survivable injuries. AIS 6 should be
 16 universally fatal and with an AIS of 5, you would expect
 17 the majority of people to die.
 18 But an AIS 4 is potentially survivable. You need
 19 further information and a lot of it is to do with the
 20 degree of burden, but having one AIS 4 compared with
 21 having 57 AIS 4s is obviously a completely different
 22 person. But by scoring — and the scoring is
 23 a retrospective thing, it looks back, so it's not
 24 a standard we work to, it's not 100%, not the gold
 25 standard, but they would imply that the injuries are

1 potentially survivable.
 2 Q. I just want to make sure that I've understood this. The
 3 starting point of that view expressed in 2019 was that
 4 John's injuries were not inevitably fatal?
 5 A. Correct.
 6 Q. To use your language, they were potentially survivable?
 7 A. Yes.
 8 Q. To remind ourselves, that means those are injuries that
 9 could prove fatal but we, the panel, are aware or have
 10 direct experience of individuals who have survived such
 11 injuries?
 12 A. Correct.
 13 Q. So that was the view in September 2019, but you
 14 understandably raised the prospect that the pre-existing
 15 cardiac condition might be of relevance to
 16 survivability?
 17 A. Yes.
 18 Q. Report 2, the March 2020 report. Sir, this is your
 19 divider 7, I'm at page 3, paragraph 3.1.1,
 20 {INQ032039/3}.
 21 By this stage, you had been provided with a good
 22 deal of further information; am I correct?
 23 A. Correct. Particularly the video imaging.
 24 Q. Exactly. You'd have witness statements, but you'd also
 25 had some closed-circuit television footage and some

1 body—worn camera footage?
 2 A. Correct.
 3 Q. That did, as we're going to see, result in some small
 4 adjustment, certainly to the language that you used?
 5 A. Yes.
 6 Q. So may I read out to you what the panel said on that
 7 occasion.
 8 "John Atkinson sustained multiple secondary blast
 9 injuries with an overall high burden of injury."
 10 And then you list in the same terms the AIS scores:
 11 "The post—mortem photos and medical imaging
 12 demonstrate severe leg injuries. These leg injuries
 13 were associated with severe compressible bleeding. The
 14 video demonstrates catastrophic and continuing external
 15 bleeding. This appears amenable to treatment outside
 16 hospital."
 17 A. Correct.
 18 Q. "Based on the video footage, witness statements and the
 19 above information, we believe [the panel said]
 20 John Atkinson could have potentially survived in this
 21 situation with earlier treatment (the application of
 22 effective bilateral tourniquets)."
 23 So let me repeat that:
 24 "We believe John Atkinson could have potentially
 25 advised in this situation with earlier treatment (the

1 application of effective bilateral tourniquets)."
 2 You went on to add:
 3 "However, the post—mortem noted a pre—existing
 4 cardiac condition that reportedly reduced the chances of
 5 survival given the burden of injury."
 6 A. Correct.
 7 Q. "This reduction in chance of survival due to the
 8 pre—existing cardiac condition is a matter not within
 9 the expertise of the panel."
 10 So you continue to point out that there was an issue
 11 that needed to be explored that was capable of bearing
 12 upon survivability and the panel itself did not have
 13 expertise to address?
 14 A. Correct.
 15 Q. Also, there had been a subtle change in language from,
 16 in the first report, "potentially survivable", to,
 17 in the second report, "could have potentially survived".
 18 A. Correct.
 19 Q. Am I right that that change in language was deliberate?
 20 A. Yes.
 21 Q. In fact, the explanation for that change of language we
 22 find in the third report. Sir, this is your divider 8,
 23 page 13, paragraph 7.2, {INQ041014/13}.
 24 You stated:
 25 "The relevant additional information considered

1 between the overview report, the first report and
 2 addendum report was the video footage that confirmed our
 3 initial analysis. This resulted in changing our summary
 4 from 'potentially survivable' to 'could have potentially
 5 survived'.
 6 You then identify the definition, which I've
 7 repeated, of "potentially survivable" and added:
 8 "The small change in language between the overview
 9 report and addendum report is not a change of category
 10 but reflects a strengthening of our opinion that timely
 11 medical intervention (the application of effective
 12 bilateral tourniquets) could have made a material
 13 difference to John Atkinson."
 14 A. That's correct.
 15 Q. So what you had seen had resulted in a degree of firming
 16 up of the conclusion?
 17 A. Yes. The other thing I would say is the comment we made
 18 in the first time was very much injury based rather than
 19 Mr Atkinson based. By providing us with the video, we
 20 could see what was happening to Mr Atkinson, so in
 21 a sense the second one is a personalised comment on
 22 Mr Atkinson; the first one is a comment on his injuries.
 23 Q. The result was — we know about the three categories
 24 that the blast wave panel used. The result was that
 25 Mr Atkinson was still in the same category but you were

1 able to use language that was to some extent stronger
 2 in relation to survivability?
 3 A. Yes.
 4 Q. So "could have potentially survived".
 5 That then leads us to the third report, the most
 6 recent report, dated 24 March 2021.
 7 Sir, I hope I'm not going over this too quickly,
 8 either for you or anyone else and the evidence is
 9 emerging clearly.
 10 SIR JOHN SAUNDERS: I'm perfectly happy with the way it's
 11 coming out, thank you.
 12 MR GREANEY: Am I right that by the stage of the blast wave
 13 panel's third report, you had seen a report of Dr Rees,
 14 the cardiologist?
 15 A. Yes.
 16 Q. And you had also seen a joint report of Dr Lumb and
 17 Professor Crane?
 18 A. Yes.
 19 Q. In short, you considered that those reports did not
 20 affect the conclusion that you had expressed in your
 21 second report —
 22 A. No, they did not.
 23 Q. — "could have potentially survived"?
 24 Importantly, for our purposes, and I've no doubt for
 25 the family as well, by that stage you had carried out

1 a most careful assessment of what the footage from the
 2 closed-circuit television cameras and the body-worn
 3 cameras showed; is that correct?
 4 A. That's correct.
 5 MR GREANEY: Sir, you referred to this earlier today. This
 6 is page 12 of the third report.
 7 SIR JOHN SAUNDERS: Thank you. I couldn't find it just now,
 8 so thank you for that.
 9 I think whoever did this, I found it really helpful.
 10 MR GREANEY: I think it was Colonel Clasper who did this.
 11 A. And Professor Bull.
 12 Q. And they have heard your thanks, sir.
 13 What I'm not going to do, unless the chairman thinks
 14 it's valuable, is take you through every single --
 15 SIR JOHN SAUNDERS: No, no, I certainly wouldn't. It just
 16 gives the timescales and really what's happening.
 17 MR GREANEY: Exactly.
 18 But I will ask you, please, general questions.
 19 First, from what you see in the footage, did the
 20 application of the improvised tourniquet stop the
 21 bleeding?
 22 A. I don't know if it stopped it. It certainly slowed it
 23 down, so it did make a difference.
 24 Q. It made a difference?
 25 A. Yes.

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1 SIR JOHN SAUNDERS: Okay. If you have your thing at
 2 page 12, so we have the first tourniquet being put on --
 3 you first see it at 21 minutes and 19 seconds after the
 4 explosion.
 5 A. That's the first time we could see it, but we believe it
 6 had put on quite far before that.
 7 MR GREANEY: We know it had been put on, from the 999 call,
 8 within minutes.
 9 A. Two to 3 minutes (inaudible) that time.
 10 Q. Exactly.
 11 SIR JOHN SAUNDERS: And then at 30:23:
 12 "A very large pool of blood visible. Demonstrably
 13 larger than at 17:25, catastrophic haemorrhage."
 14 Are you saying you could tell from that that there
 15 had been a slowdown in the bleeding?
 16 A. The details are gory and I apologise for this --
 17 SIR JOHN SAUNDERS: Okay. Is this going to be... You've
 18 heard so much upsetting evidence already, for the
 19 families, are you happy about this?
 20 MR COOPER: Certainly from my communication with the family,
 21 they would prefer to have a robust analysis.
 22 SIR JOHN SAUNDERS: I'm sure you do and you have heard so
 23 much already, I'm sure we can't distress you any more
 24 than you already have been.
 25 A. On the first thing that -- when we saw the right leg we

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1 could see it bleeding, it was that obvious. We didn't
 2 see the right leg obviously bleeding after that, so we
 3 assume it had been at least slowed. If you look -- when
 4 we refer to the pool of blood, the pool of blood is
 5 predominantly to the left of Mr Atkinson. We know it is
 6 a left injury and we know it wasn't dealt with. So our
 7 assumption is that what was happening was the left was
 8 continuing to bleed and the right had been at least
 9 slowed.
 10 SIR JOHN SAUNDERS: Bearing in mind the blood is coming from
 11 both sides, it is still bleeding, is it, the right leg?
 12 A. Oh yes (overspeaking) obviously until at least
 13 40 minutes.
 14 SIR JOHN SAUNDERS: If, and this is no criticism of the
 15 person who did it, Mr Blake, who did absolutely
 16 everything he could, so I'm not intending to criticise,
 17 but had it been put on harder, would that have stopped
 18 the bleeding or with a belt is it really that that sort
 19 of catastrophic bleeding is really impossible to
 20 completely stop?
 21 A. It's very difficult to stop significant thigh bleeding,
 22 particularly in someone that's larger, with a very thin
 23 device. So the tourniquets we use in hospitals are very
 24 broad.
 25 SIR JOHN SAUNDERS: And you can tighten them up with --

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1 A. You can tighten them, you can adjust them. If you use
 2 an improvised tourniquet, it is not as good as a CAT
 3 tourniquet, which is not as good as a hospital
 4 tourniquet.
 5 If you use it on the thigh, it's not as good.
 6 You have to pull it tight and it loosens. So a belt, if
 7 you pull it tight and you hold it tight, will be
 8 effective -- and we believe it was effective. Whether
 9 it stopped it all is impossible to say, it probably
 10 didn't at times, but it probably made a big difference.
 11 SIR JOHN SAUNDERS: And one does have to consider the
 12 practical position, the circumstances in which Mr Blake
 13 was when trying to do that.
 14 A. I think he did brilliantly actually. We would be
 15 looking at a completely different timeline if he hadn't
 16 done it.
 17 MR GREANEY: He ought to know that he made a difference.
 18 Out of fairness to a point Ms Roberts was making
 19 earlier, obviously Mr Atkinson had lost blood before the
 20 application of that improvised tourniquet.
 21 A. Yes.
 22 Q. But I believe it is accurate to say that after the
 23 application of the tourniquet, whilst that made
 24 a difference, he continued, it was obvious from the
 25 footage, to lose blood?

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1 A. Yes.
 2 Q. So we see, just to pick out two of your timings, at
 3 00:30, so that would be 23:01, a very large pool of
 4 blood visible, demonstrably larger than at 17 minutes on
 5 the counter.
 6 A. Yes.
 7 Q. Then further down the page still, 00:43 on the counter,
 8 so that would be 23:14, a pool of blood visible, larger
 9 than at 00:30, the other time we looked at.
 10 A. Correct. It was getting bigger.
 11 Q. So is it too simple to say that in order to save
 12 John Atkinson's life, additional steps needed to be
 13 taken to address the loss of blood?
 14 A. Yes, I think that's correct.
 15 Q. So does the question, or at least an important question,
 16 become when that further intervention would have made
 17 a difference or, to look at it another way, at what
 18 point was John beyond being helped by such an
 19 intervention?
 20 A. I can give an opinion. It is very difficult to be
 21 specific and people might disagree, but it is possible,
 22 I may be taking it out of order -- in a way it's
 23 actually easier to work backwards.
 24 Q. I'm not discouraging you from working backwards. First
 25 of all, I think you're agreeing that it is important to

1 ask the question, when was such an intervention capable
 2 of making a difference or, alternatively, when was John
 3 beyond help?
 4 A. Yes. But tourniquets on their own were effective up to
 5 a point and then tourniquets and rapid transfer to
 6 hospital and other things -- so it's difficult to focus
 7 just on tourniquets and say at what point was it too
 8 late to put a tourniquet on because it's never too late
 9 to put a tourniquet on.
 10 Q. This is what I need make sure I understand. I'm going
 11 to give you an opportunity to answer the questions that
 12 I have posed in your own way.
 13 First of all, I want to provide some context, out of
 14 fairness to those who were in the City Room, by taking
 15 you to paragraph 7.4 of your third report.
 16 SIR JOHN SAUNDERS: Sorry, I just need to take -- give me
 17 your help on this. You said it's never too late to put
 18 a tourniquet on. We heard from paramedics that they
 19 didn't put a tourniquet on because there was no active
 20 bleeding. Presumably, when there is no active bleeding
 21 there is no point in putting a tourniquet on?
 22 A. I don't think there's much blood left, correct.
 23 SIR JOHN SAUNDERS: Thank you.
 24 MR GREANEY: I am going to take you to paragraph 7.4 because
 25 the position is that what you have done in the third

1 report, you the panel, is seek to help in relation to
 2 those questions about survivability, about when an
 3 intervention may have made a difference. You say:
 4 "It is impossible to say at what point an
 5 intervention to an individual would have made
 6 a difference due to the individual physiology and
 7 specifics of the injury. Within the military, the
 8 teaching is that haemorrhage control should be achieved
 9 as early as possible [which Dr Rees told us about].
 10 This has resulted in advanced training and the coining
 11 of the term 'the platinum 10 minutes' as the period
 12 within which to stem bleeding. The panel is aware of
 13 survivors with these injuries."
 14 So we just need to develop that further.
 15 A. Okay.
 16 Q. Now, what we've understood so far is that blood loss, if
 17 it goes on for long enough, will cause hypovolaemic
 18 shock.
 19 A. Correct.
 20 Q. Which ultimately will cause cardiac arrest?
 21 A. Correct, if untreated.
 22 Q. If untreated. And obviously therefore, unless the
 23 cardiac arrest can be reversed, death?
 24 A. Yes. You could survive a cardiac arrest in hospital
 25 from hypovolaemic shock. It would be likely to kill

1 you, but you could survive it.
 2 SIR JOHN SAUNDERS: That's if it happens in hospital?
 3 A. If it happens in hospital and if the cardiac arrest
 4 occurred in front of one of the specialist HEMS or
 5 something like that, they have abilities and techniques
 6 to deal with it.
 7 SIR JOHN SAUNDERS: You would agree with what Dr Rees said,
 8 effectively once the cardiac arrest happens --
 9 A. In Mr Atkinson, once the cardiac arrest happened there
 10 was no coming back.
 11 SIR JOHN SAUNDERS: Thank you.
 12 MR GREANEY: So that course that we've just described --
 13 blood loss, hypovolaemic shock, cardiac arrest, death --
 14 that was the course in John Atkinson's case, was it not?
 15 A. We believe so, yes.
 16 Q. Is it too simple to say that stopping or further slowing
 17 John's loss of blood was going to delay hypovolaemic
 18 shock?
 19 A. Yes, if it was done early enough.
 20 Q. So it's not too simple to say that. And if that had
 21 been done early enough to cause that delay is it also
 22 likely that that would have delayed the cardiac arrest?
 23 A. I think that's likely, yes, or if it was done early
 24 enough it may not have happened at all.
 25 Q. So it could have been prevented altogether?

1 A. Potentially, yes.
 2 Q. But it would have delayed at any rate, or at least, the
 3 cardiac arrest?
 4 A. Yes, if he'd lost less blood, the cardiac arrest would
 5 probably have been delayed, although these are opinions,
 6 they're not hard facts, I can't give you science to --
 7 Q. I appreciate you say it's impossible to say, but you're
 8 doing your best to give your personal view and the view
 9 of the panel about what is likely to have eventuated --
 10 A. Yes.
 11 Q. -- if there had been different treatments given to John?
 12 If this course had been delayed so that John had
 13 reached hospital in a state in which he was not in
 14 cardiac arrest, in your view would that have made
 15 a difference?
 16 A. Yes.
 17 Q. What difference do you think it would have made?
 18 A. He had other severe injuries, but I think if he'd got to
 19 hospital without having had a cardiac arrest, given that
 20 the team were prepared for him, I think there's a high
 21 chance he would have survived. I can't give you an
 22 estimate of exactly how high, but I think it's a high
 23 chance.
 24 Q. That's helpful, but you'll appreciate I'm going to press
 25 you further.

1 A. Yes.
 2 Q. We have this platinum 10 minutes. Should we understand
 3 from that that no intervention after 10 minutes was
 4 capable of making a difference?
 5 A. No, that's not correct. That's the optimum. The
 6 10 minutes is when you -- the less blood you lose, the
 7 better it is for you in terms of your hospital course
 8 and everything else. Again, Dr Rees described that.
 9 But it doesn't mean there's a cut-off at 10 minutes and
 10 after that it's hopeless.
 11 Q. Doing the best that you can, bearing in mind John goes
 12 into cardiac arrest, I think 1 hour and 16 minutes after
 13 the explosion and his injuries, bearing in mind that we
 14 know he was conscious and able to speak, what is your
 15 view about the window during which an intervention would
 16 have made a difference to John's survivability?
 17 A. I think there was a window up to about 40 minutes after
 18 the incident. I base that on the fact that there's
 19 a witness statement talking about obvious bleeding
 20 around that time and we could see the pool of blood
 21 getting bigger, and we know he was conscious after that.
 22 That would be my estimate. Obviously, the closer you
 23 got to 40 minutes, the lower his chances of survival
 24 would be. So if you could do it in 10 minutes, it would
 25 be ideal.

1 Q. But with the qualification you have just given, that is
 2 the window during which intervention at any rate isn't
 3 going to be hopeless or is not likely to be?
 4 A. Approximately 40 minutes, yes.
 5 Q. It's certainly the case that we've achieved a clear
 6 opinion from you in relation to that issue.
 7 Sir, I hope we have worked through it with clarity
 8 for your purposes and the family's purposes.
 9 SIR JOHN SAUNDERS: Thank you.
 10 MR GREANEY: I am going to ask you to deal with two further
 11 issues and then I'll invite the core participants who
 12 have permission to ask you questions to do so.
 13 First of all, in your view, would an earlier use of
 14 TXA, bearing in mind that it was administered at or
 15 shortly after 23.31, I believe, would an earlier
 16 application of TXA have been capable of making
 17 a difference?
 18 A. I don't believe so, no.
 19 Q. Why not?
 20 A. TXA is an adjuvant to everything else: if you don't stop
 21 the bleeding, TXA won't stop you dying. If you stop the
 22 bleeding you don't really need it as much.
 23 Certainly in Mr Atkinson's case, this was
 24 compressible bleeding, not internal bleeding. TXA would
 25 have made a big difference in internal bleeding

1 potentially, but not in Mr Atkinson's case, we believe.
 2 Q. And the second issue: in Mr Atkinson's case, would the
 3 use of a resuscitative endovascular balloon occlusion of
 4 the aorta, a REBOA, have made a difference and, if so,
 5 is it practical for that technique to have been used?
 6 A. REBOA is not indicated in Mr Atkinson. You could stop
 7 the bleeding with other measures. If you have the skill
 8 to do a REBOA pre-hospital, you'd have stopped it by
 9 other methods and you wouldn't have done it.
 10 MR GREANEY: Colonel, thank you very much indeed for
 11 answering my questions.
 12 I'm next going to invite Ms Roberts to ask her
 13 questions on behalf of NWAS.
 14 SIR JOHN SAUNDERS: Just before you start, can I say this,
 15 I have rather pre-empted what your argument might be.
 16 It was presumptuous of me to do so. It was in order for
 17 me to ask a question. I well understand that NWAS's
 18 submissions to me may be different to what I was
 19 presupposing they might be.
 20 Questions from MS ROBERTS
 21 MS ROBERTS: Thank you.
 22 Picking up on that very last point if I may, please,
 23 Colonel Clasper, you talked about REBOA. You said it
 24 was not indicated so far as Mr Atkinson was concerned,
 25 and then said that:

1 "Having the skill to perform that presumes..."
 2 Then you said something else. What skill is
 3 required to perform REBOA? Who has those skills?
 4 A. REBOA is a very specialised skill. It should only be
 5 done by doctors specifically trained in the technique.
 6 Like a lot of these interventions, it is dangerous, it
 7 can cause further problems, it causes a delay. If
 8 you're on site and you delay transit to hospital by
 9 doing REBOA, you're not doing your patient any service.
 10 It is used predominantly for things like pelvic bleeding
 11 where you cannot get a tourniquet. Dr Rees talked about
 12 different things that could be offered, but actually
 13 they apply to injuries at different levels.
 14 Q. Thank you.
 15 A. And he had an injury that would have been perfectly
 16 amenable to tourniquets, we believe.
 17 Q. So far as survivability is concerned, you have helpfully
 18 told us, both within the reports that you and your
 19 colleagues prepared but also in answer to questions,
 20 in relation to potentially survivable, that you and
 21 your — is it you and your colleagues are aware or have
 22 direct experience of individuals or is it just you?
 23 A. Myself and Professor Mahoney.
 24 Q. Thank you. When you are aware or have direct experience
 25 of individuals who have survived such injuries, may

1 I ask in what setting or in what context that has
 2 occurred?
 3 A. I did a trauma fellowship in the United States. We
 4 quite often saw people with vascular injuries. I've
 5 also seen a lot of them in Afghanistan and Iraq.
 6 Professor Mahoney's seen them in Iraq, Afghanistan, and
 7 is deployed extensively with the Red Cross as well.
 8 Q. When in Afghanistan and Iraq and confronted by those
 9 injuries, in what circumstances and treated by whom has
 10 that person survived?
 11 A. In the case of Mr Atkinson's injuries, if he'd had early
 12 bilateral tourniquets, it would have, I think, bought
 13 enough time to get him to hospital and then he would
 14 have had surgery.
 15 Q. Yes.
 16 A. So you would need surgical back-up.
 17 Q. Right.
 18 A. But you wouldn't need necessarily specialist medics.
 19 It's someone who can put a tourniquet on quick enough.
 20 So we train all soldiers to put them on.
 21 Q. And we have heard heavily evidence about that hitherto.
 22 So in the circumstances in which you and your
 23 colleague are aware of or have direct experience of
 24 individuals who have survived such injuries, injuries
 25 such as those which Mr Atkinson sustained, those were

1 where the prompt — were they where the prompt
 2 application of a bilateral tourniquet had been applied
 3 by somebody who knew what they were doing?
 4 A. The prompt application of the tourniquet and/or rapid
 5 evacuation to hospital. We could get people in some
 6 cases in Bastion to hospital faster than a lot of
 7 hospitals in the NHS can.
 8 Q. Thank you.
 9 A. So a combination of both.
 10 Q. By bilateral tourniquets, do you mean tourniquets that
 11 are not makeshift tourniquets, tourniquets that are
 12 specifically designed for that purpose?
 13 A. In Afghanistan, yes, because all the soldiers carried
 14 it.
 15 Q. And how about in this context, in the civilian context?
 16 A. I'm not sure if I've got experience of bilateral. I've
 17 certainly got experience of a single side not having any
 18 tourniquet applied and still surviving. It depends on
 19 the rate of blood loss and the time you get to hospital.
 20 Q. Right.
 21 A. And the level — the higher it is up the leg, the more
 22 serious it is, the more difficult it is to control, the
 23 more blood you will lose.
 24 Q. Thank you. You told us earlier that it's a question of
 25 getting the right people with the right skill and the

1 right equipment available immediately after the injury
 2 has —
 3 A. As soon as possible after the injury.
 4 Q. As soon as possible, forgive me. By the right people,
 5 you mean presumably emergency responders, those who fall
 6 within, my phrase, the Brigadier Hodgetts category, so
 7 people who know what they're doing with a tourniquet?
 8 Is that what you mean by that?
 9 A. People who know what they're doing, who have the
 10 equipment.
 11 Q. Right.
 12 A. And a CAT tourniquet is better than an improvised
 13 tourniquet, but an improvised tourniquet is better than
 14 nothing.
 15 Q. Yes. And "the right skills", does that mean training,
 16 again the like of which we have heard can be done within
 17 an hour or so?
 18 A. Certainly within an hour you can be trained to put on
 19 a CAT tourniquet. But I think in Mr Atkinson's case you
 20 can talk someone through, who's not experienced, putting
 21 an improvised tourniquet on that's effective. It's
 22 having the equipment and the willingness to do it and
 23 the understanding of what you need to do.
 24 SIR JOHN SAUNDERS: So if another tourniquet on the left
 25 leg, similar to the one that was put on Mr Atkinson on

1 the right leg, had been done, that would fulfil your
 2 criteria ?
 3 A. It would be less than ideal and it would not -- it's
 4 very difficult for someone to hold on to two improvised
 5 tourniquets so you would need two people.
 6 SIR JOHN SAUNDERS: Suppose you have two people?
 7 A. You'd need two people with two belts pulling. It would
 8 have improved the situation. I can't --
 9 SIR JOHN SAUNDERS: I know it's difficult (overspeaking)
 10 different variables, aren't there?
 11 MS ROBERTS: When you and your colleagues gave evidence on
 12 21 September, in answer to a number of questions by my
 13 learned friend Mr Greaney Queen's Counsel, you told us
 14 a number of things, one of which was that if
 15 a tourniquet has been applied and the patient is no
 16 longer bleeding, then the key consideration is getting
 17 them help or getting them out.
 18 A. Correct.
 19 Q. What's the consideration if bleeding is still ongoing?
 20 What do you do then?
 21 A. You'd use other measures to try and stop it. So it's
 22 not uncommon with thigh bleeding for a tourniquet not to
 23 be as effective as you'd like, in which case we'd put
 24 a second one on. That's what we would regularly do in
 25 the military. If it continues to bleed with tourniquets

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1 on, you'd use pressure and haemostatic dressings.
 2 Q. Right.
 3 A. Usually, that would only happen if it's very high up the
 4 thigh, with high traumatic amputations.
 5 Q. We know in Mr Atkinson's case, and you've told us that
 6 the improvised tourniquet that was applied within
 7 minutes, in fact, of bleeding occurring, did make
 8 a difference, didn't stop, but it slowed the bleeding.
 9 I hope I have summarised --
 10 A. It made a difference. We don't know if it stopped or
 11 didn't because -- we know there was continual bleeding,
 12 but we know there was left-sided injury as well.
 13 Q. Yes.
 14 A. I suspect, and it's my opinion, though I can't give you
 15 evidence, it didn't stop it completely, but I suspect it
 16 made a very big difference.
 17 Q. Thank you. On the right leg, yes?
 18 A. On the right leg, yes.
 19 Q. But the left continued to bleed?
 20 A. The left continued to bleed based on the videos.
 21 Q. Thank you.
 22 You told us in evidence that the pool of blood
 23 around Mr Atkinson was getting bigger.
 24 A. Yes.
 25 Q. Over what period of time, was that within that

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1 43 minutes or so?
 2 A. Yes. So we could see that at 41 minutes -- sorry, at
 3 43 minutes, we could see that it was bigger than at
 4 30 minutes.
 5 Q. Thank you. Were you able to form, you or your
 6 colleagues, any view from looking at those images and
 7 looking at the pool of blood as you have described as to
 8 the volume of blood that Mr Atkinson had lost at that
 9 43-minute point?
 10 A. No. We did actually look at trying to do that, but it
 11 was just impossible to give any accurate reading.
 12 Q. And is it right that the more blood that one loses, that
 13 increases the chances of mortality?
 14 A. Yes.
 15 Q. Would you agree that there is a 10% increase in
 16 mortality for every 10 units of blood that has to be
 17 transfused?
 18 A. That's blood transfusion. That's not the same as blood
 19 loss.
 20 Q. Right.
 21 A. That's a different concept completely.
 22 Q. Is there a similar concept or a similar equation,
 23 I suppose, so far as blood loss is concerned?
 24 A. Not that I'm aware because it's only in experimental
 25 circumstances you could actually measure the amount of

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1 blood lost. Clearly when you are talking about
 2 resuscitation, which is what you are quoting, you know
 3 how much blood you've given.
 4 Q. Yes.
 5 SIR JOHN SAUNDERS: Would it be a similar figure?
 6 A. No, I don't think you could say at all, sir. I just
 7 don't know. We know you can survive losing 40% of your
 8 blood volume, but you're in trouble. Once you hit about
 9 60% of your blood volume, you're in real trouble. But
 10 that's probably about as accurate as you can be.
 11 MS ROBERTS: You told us a moment or so ago that stopping or
 12 slowing the bleeding in those very early stages would
 13 have delayed cardiac arrest?
 14 A. Delayed or prevented, yes.
 15 Q. Delayed or prevented, thank you.
 16 A. Yes.
 17 Q. In effect, it would have bought Mr Atkinson more time,
 18 would it not?
 19 A. Yes.
 20 Q. When you said that he had other severe injuries but
 21 without the cardiac arrest he would have had a high
 22 chance of survival, did you mean high or higher?
 23 A. I meant -- well, higher is correct, but actually I think
 24 he had quite a high chance of survival if things had
 25 been done sooner --

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1 Q. Right.
 2 A. -- and sooner into hospital. The leg injuries
 3 themselves, if effectively treated, are unlikely -- you
 4 can't say impossible -- unlikely to be fatal in their
 5 own right. The abdominal injury was severe, but again
 6 is manageable. And with that injury, putting it in
 7 a military context, if someone died of that injury
 8 burden, I was part of a group that would be analysing
 9 that in detail to find out why that happened.
 10 Q. Right. Some of the analysis and the questions you would
 11 be asking presumably would be why, if that were in fact
 12 the situation, the tourniquet, the bilateral tourniquet,
 13 had not been applied at the earliest stage possible?
 14 A. Yes. That's one of the things we'd look at.
 15 Q. Could I ask you to look at what I have here? Could
 16 I just ask if you can be shown this, please?
 17 SIR JOHN SAUNDERS: Would you like someone to fetch it?
 18 A. Is it the civilian -- military CAT tourniquet?
 19 MS ROBERTS: You tell us.
 20 A. That's what it looks like.
 21 MR COOPER: May I see it?
 22 MS ROBERTS: Of course, of course, yes.
 23 (Pause).
 24 MS ROBERTS: Whilst my learned friend Mr Cooper is doing
 25 what he's doing, by CAT, combat application tourniquet?

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1 A. Correct.
 2 Q. Is that in fact a brand or is that a specific kind of
 3 tourniquet?
 4 A. I believe it's a brand.
 5 Q. But other brands are available and other brands will
 6 work, presumably?
 7 A. There are other tourniquets around, yes.
 8 (Handed)
 9 A. It's not a CAT tourniquet, but it is a similar
 10 principle.
 11 Q. Right.
 12 A. In that it is ... It's applied like that (indicating),
 13 pulled as tight as you can, and you would use that
 14 (indicating), which is a windlass, to increase the
 15 pressure. So that is -- that would be an effective
 16 tourniquet. It's also reasonably broad, so it would be
 17 an effective tourniquet.
 18 SIR JOHN SAUNDERS: Do you tighten it up as hard as you can?
 19 A. Yes.
 20 SIR JOHN SAUNDERS: Right.
 21 A. Well, you tighten it until the bleeding stops, which is
 22 usually very hard.
 23 SIR JOHN SAUNDERS: Okay. Thank you.
 24 MS ROBERTS: Would that have helped?
 25 A. That?

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1 Q. Yes.
 2 A. Oh yes. That would have made a difference. Applied
 3 properly by someone that knew what they were doing.
 4 SIR JOHN SAUNDERS: So put on, strapped like that, tightened
 5 up?
 6 A. Pulled tight, twisted as a windlass and secured, yes.
 7 That's the principles of the CAT tourniquet. Just to
 8 add, the windlass makes a big difference. Because the
 9 issue with things like belts and stuff like that, you
 10 can pull them tight, but this allows you to make it even
 11 tighter.
 12 SIR JOHN SAUNDERS: And it locks it tight, does it?
 13 A. You can lock them in that -- most of them will lock. It
 14 looks like that will lock into the thing -- but the
 15 military one does.
 16 SIR JOHN SAUNDERS: So once you have tightened it up, you
 17 lock it --
 18 A. Tighten it, lock it, put the Velcro (overspeaking).
 19 SIR JOHN SAUNDERS: And you don't need to keep holding it?
 20 A. No, and then you can leave it alone, which is why it's
 21 perfect for evacuation.
 22 One of the things, I don't know how relevant this
 23 is, but one of the problems with a belt again is once
 24 you start to move someone on a stretcher, that is going
 25 to come loose at times, no matter how hard you try

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1 because the person is being moved.
 2 SIR JOHN SAUNDERS: And we know the witness was actually
 3 having to hang on (overspeaking) --
 4 A. Yes, you have to hang on. To transport people, that's
 5 what you want.
 6 MR GREANEY: I know it would be of considerable assistance
 7 to Mr Cooper if we could both start and conclude his
 8 questions, even if that means sitting into lunch, unless
 9 that causes a problem for anyone -- and no one is
 10 indicating it does. I will ask Mr Cooper to ask his
 11 questions.
 12 Questions from MR COOPER
 13 MR COOPER: I'm grateful and I don't anticipate being too
 14 long if that assists the timetabling.
 15 I represent, as you know, the family of
 16 John Atkinson.
 17 A. Yes.
 18 Q. Just a few questions for you.
 19 Firstly, can I deal with the survivability point and
 20 go straight to it. You have indicated the window of
 21 40 minutes, as you put it.
 22 A. That's what we believe in Mr Atkinson's case, yes.
 23 Q. And when we say 40 minutes, it could be 50, might be 60?
 24 It depends on the circumstances?
 25 A. No. In this case, no, but on the circumstances, yes,

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1 different circumstances, different injuries , different
 2 person. That's why it's impossible to actually pin
 3 something down unless you have the individual, you know
 4 the injuries , and you have the video evidence.
 5 SIR JOHN SAUNDERS: The nature of this question was could it
 6 be 50, could it be 60?
 7 A. Not in Mr Atkinson's case, but in other cases, yes.
 8 SIR JOHN SAUNDERS: In this case, do you have a bracket or
 9 do you have --
 10 A. The reason I say that is we haven't mentioned the left
 11 tourniquet, which I don't think was effective
 12 particularly .
 13 SIR JOHN SAUNDERS: It wasn't put on as a tourniquet,
 14 really .
 15 A. Yes. So I don't think that was effective. And yet the
 16 statements and the video we've seen, we don't see any
 17 bleeding after about 50 minutes, any significant
 18 bleeding. That bleeding had dramatically slowed and
 19 stopped by 50 minutes. There was no effective
 20 tourniquet and that's because he had lost so much blood.
 21 SIR JOHN SAUNDERS: So up to 40 minutes?
 22 A. Up to 40 minutes there's evidence of him actively
 23 bleeding. There's witness statements of it, you can see
 24 the pool. That 40 could be 43, it could be 45. It's
 25 not 50, 55, because we have evidence, we've got video

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1 evidence of 50 and 55. Certainly based on the
 2 paramedics' statement, by 55 minutes you've lost --
 3 missed the boat to stop the bleeding with a tourniquet
 4 is my opinion.
 5 MR COOPER: Thank you. That's of assistance, I'm grateful.
 6 Again, you gave examples of treatment in
 7 Afghanistan, in Iraq, and you mentioned in civilian and
 8 American context. Do you remember that evidence
 9 you were giving about treatment as far as -- and
 10 survivability , I should put it, as far as individuals
 11 are concerned who may have similar injuries?
 12 A. Sorry, I missed the question.
 13 Q. You referred to examples of people surviving.
 14 A. Yes.
 15 Q. And my learned friend Ms Roberts asked you about the
 16 context of that information and you said in Afghanistan,
 17 Iraq and my learned friend (overspeaking) --
 18 A. America.
 19 Q. -- on that. You also mentioned the American civilian
 20 context as well. Do you remember saying that?
 21 A. Yes.
 22 Q. Can you elaborate on that because you weren't asked
 23 about that? What sort of examples did you but see
 24 there?
 25 A. As part of my training I did a year's fellowship in

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1 trauma orthopaedics in the Shock Trauma Centre in
 2 Baltimore, which was the first one set up, and was
 3 a statewide trauma centre. All severe trauma was
 4 transferred in. They were the first to use helicopters
 5 and things like that. We would see -- we didn't see
 6 many blasts but we would see two or three gunshot wounds
 7 a day. We would see critically ill patients most days.
 8 So that experience -- so tourniquets weren't in
 9 widespread use at that time, so you could see people
 10 with vascular injuries who hadn't had a tourniquet
 11 applied and some of them still survived.
 12 Q. That's the civil context of your experience?
 13 A. Yes.
 14 Q. Thank you. Just a few questions more now, please, about
 15 blood products and the provision of blood and blood
 16 products to the scene. Would it make any difference to
 17 your analysis as to whether blood products or blood
 18 should be taken to the scene or could be taken to the
 19 scene as a matter of being practicable. If we're not
 20 talking about blood but we're talking about blood
 21 products, would that make a difference in the practical
 22 application of blood products to the scene?
 23 A. It depends what you mean by blood products. If we're
 24 talking about fresh frozen plasma, then actually
 25 I believe some helicopter and pre-hospital will take FFP

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1 forward. That can make a difference. But it is not an
 2 isolated, golden bullet; it's as part of a process.
 3 Q. But it would have considerably assisted, wouldn't it,
 4 Mr Atkinson if such a product had been made available to
 5 him at the scene?
 6 A. It depends on what time you're talking about. Actually,
 7 if the bleeding had stopped sooner he wouldn't have
 8 needed the FFP. The bleeding wasn't stopped so the FFP
 9 wouldn't have made a difference in my opinion.
 10 SIR JOHN SAUNDERS: This is going to be really simplistic
 11 and you're going to say it's too simplistic, but
 12 actually if someone hadn't stopped the bleeding with
 13 bilateral tourniquets within 40 minutes, nothing is
 14 going to help?
 15 A. There are things that can help. So at the point that
 16 he had -- I'm using HEMS, I don't work for HEMS, but if
 17 he had arrived at 55 minutes to a HEMS team who carry
 18 blood, it would have improved his chances of survival.
 19 SIR JOHN SAUNDERS: Even if he was still bleeding out at the
 20 time?
 21 A. He's not bleeding out because they would have put
 22 tourniquets on, so he would have stopped bleeding out
 23 and they would have replaced it.
 24 SIR JOHN SAUNDERS: So we're still talking about "you have
 25 to stop the bleeding"?

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1 A. Yes.
 2 SIR JOHN SAUNDERS: And the only way you stop the bleeding
 3 is by having a bilateral tourniquet?
 4 A. Yes, and that's the thing.
 5 SIR JOHN SAUNDERS: From then afterwards, so obviously when
 6 you stop the bleeding, you need to do something quickly,
 7 and that is either get them to hospital quickly to
 8 a ready made trauma team, as we had, as quickly as
 9 possible to deal with it or, alternatively, if that's
 10 not going to be possible then something like blood
 11 plasma getting to him might have helped?
 12 A. Yes, but you would need to give a significant amount,
 13 you couldn't just give -- and again, it would be
 14 probably 4 units minimal, which is what's carried in
 15 a lot of the trauma packs. But ideally, you give him
 16 the blood and take him to the hospital at the same time.
 17 SIR JOHN SAUNDERS: Yes, okay.
 18 A. You don't let giving the blood delay the transfer to
 19 hospital.
 20 SIR JOHN SAUNDERS: No, I understand that.
 21 A. Because he needs surgery.
 22 SIR JOHN SAUNDERS: So it's critical getting him to hospital
 23 as quickly as possible?
 24 A. Yes, the tourniquets and the rapid (sic) to the
 25 hospital, they are the critical things.

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1 SIR JOHN SAUNDERS: And you could delay taking -- sorry
 2 about this, Mr Cooper.
 3 MR COOPER: Not at all, sir, of course.
 4 SIR JOHN SAUNDERS: You could delay taking them to hospital
 5 to put tourniquets on? That would be worth it, the
 6 delay?
 7 A. Sorry?
 8 SIR JOHN SAUNDERS: Suppose someone arrives with the
 9 tourniquets there, ready to put on, but also they could
 10 actually get him immediately to hospital, is it still
 11 worth putting the tourniquets on before you take them to
 12 hospital?
 13 A. Yes, that's so quick to do, but once -- for instance,
 14 using blood products, once you start trying to give
 15 blood products, you've got to put a line in, you've got
 16 to warm it, you've got to put pressure on. Tourniquets
 17 can go on very, very quickly.
 18 SIR JOHN SAUNDERS: Right. Well, I understand. Thank you.
 19 MR COOPER: Put into this matrix of conditions that
 20 Mr Atkinson was in, we know he was, for instance, for
 21 some period of time virtually naked whilst waiting to be
 22 taken to hospital and we know that there was a problem
 23 of getting a blanket or blankets to cover him. Is it
 24 within your expertise to comment as to how that would
 25 play on the general condition that Mr Atkinson was in

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1 and his survivability?
 2 A. It would have made his condition worse, but I don't
 3 believe it would have affected survivability. He had
 4 a cardiac arrest because he lost too much blood.
 5 MR COOPER: Thank you. I have no further questions.
 6 SIR JOHN SAUNDERS: Thank you very much.
 7 I don't know, did you see the evidence from the
 8 paramedic who had worked in Afghanistan?
 9 A. Yes, I did, last night.
 10 SIR JOHN SAUNDERS: And in general terms, you agreed with
 11 what he said? He was talking about the blankets as
 12 well.
 13 A. In general terms, yes. A lot of things that we're
 14 talking about -- sorry to be simplistic like this -- is
 15 icing on the cake, or the cherry on the icing on the
 16 cake. You have to get the cake right.
 17 SIR JOHN SAUNDERS: Okay. So to stop the bleeding?
 18 A. Stop the bleeding, get them to hospital.
 19 SIR JOHN SAUNDERS: Thank you very much.
 20 MR GREANEY: Sir, I don't have any further questions for the
 21 colonel.
 22 If everyone can bear with me, I believe that we can
 23 deal with the evidence of cause of death within
 24 5 minutes or so, which will conclude the evidence of
 25 survivability and cause of death relating to Mr Atkinson

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1 before lunch.
 2 SIR JOHN SAUNDERS: Okay. Is everybody happy to do that?
 3 Right.
 4 MR GREANEY: Sir, I'm going to direct my questions -- and
 5 can I ask also if the colonel could just bear with us
 6 whilst we conclude this evidence? I'm going to direct
 7 these questions to Professor Crane and then invite
 8 Dr Lumb to either agree or disagree with what he has to
 9 say.
 10 Professor, as we know, Dr Naomi Carter performed the
 11 post-mortem examination on John Atkinson on 28 May 2017.
 12 PROFESSOR CRANE: Yes, that's correct.
 13 Q. This is divider 4, I can see that you're looking,
 14 divider 4, page 1, {INQ015996/1}.
 15 Is it the position, as I indicated earlier, that she
 16 concluded that the cause of death was 1A, leg injuries?
 17 PROFESSOR CRANE: Yes, that's correct.
 18 Q. And 2, ischaemic heart disease?
 19 PROFESSOR CRANE: Yes.
 20 Q. When I've used, and when she used, those descriptions,
 21 1A and 2, what was Dr Carter indicating?
 22 PROFESSOR CRANE: 1A, the leg injuries, was the principal
 23 cause of death. The ischaemic heart disease, which was
 24 put under section 2A, was what she regarded as
 25 a contributory factor in the death but not related to

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1 the main cause. So it was another condition that
 2 Mr Atkinson had, which she thought played a part in the
 3 death, although not the major part in his death.
 4 Q. That's very clear, thank you. Professor, the two of
 5 you, so you and Dr Lumb, have reviewed, as we know, the
 6 pathological findings in relation to each of the
 7 22 murdered in the attack.
 8 PROFESSOR CRANE: Yes, we have.
 9 Q. That, therefore, includes the findings of Dr Carter
 10 in relation to Mr Atkinson. By the stage of your
 11 review, did you have the report of Dr Rees, the
 12 cardiologist, available to you?
 13 PROFESSOR CRANE: Initially we hadn't, but then we'd seen it
 14 subsequently, yes.
 15 Q. So it follows that by the stage at which you were able
 16 to reach your settled view in John's case, you had
 17 a benefit that Dr Carter did not, namely Dr Rees'
 18 report?
 19 PROFESSOR CRANE: That's correct.
 20 Q. In light of that, did you and Dr Lumb conclude that the
 21 cause of John Atkinson's death was the leg injuries that
 22 he suffered and that the pre-existing cardiac disease
 23 did not contribute to his death and should not be
 24 included within that cause?
 25 PROFESSOR CRANE: That was our view, yes.

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1 Q. I'm going to give the reference. That's {INQ036619/5}.
 2 Thank you very much, professor.
 3 Dr Lumb, do you have anything you would wish to add?
 4 DR LUMB: No. I agree with everything Professor Crane has
 5 spoken about.
 6 MR GREANEY: Sir, I don't believe that any core participant
 7 wishes to ask any questions and that is helpfully
 8 indicated to be correct.
 9 That therefore, subject to any questions that
 10 you have, concludes the evidence relating to
 11 Mr Atkinson. It also concludes the evidence for today,
 12 although there is much for all, including your team, to
 13 do this afternoon.
 14 Sir, as you know, we will not sit tomorrow, although
 15 there is important work to be done. We will next sit on
 16 Thursday when there is a hearing to consider the
 17 position of a witness. That will be a hearing that,
 18 sir, you, I know, will conduct remotely.
 19 SIR JOHN SAUNDERS: I will for what I hope are very good
 20 reasons, but I don't think it makes any difference
 21 in the circumstances to do it remotely.
 22 Can I just say, I'm really grateful to all the
 23 experts. I have found the evidence really clear, so
 24 thank you. Obviously, that's the skill of the
 25 questioners as well as the responders, but I'm very

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1 grateful for that. It's the end of what has been an
 2 extremely distressing period of evidence and we have
 3 never not had John in our minds at all times as an
 4 individual.
 5 MR GREANEY: Thank you very much, sir.
 6 SIR JOHN SAUNDERS: Thank you.
 7 (1.05 pm)
 8 (The inquiry adjourned until 9.30 am
 9 on Thursday, 14 October 2021)

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