

1 (2.05 pm)

2 LADY JUSTICE HALLETT: Mr Keith?

3 MR KEITH: Colonel, may I now turn to the methodology that

4 you adopted in this case by particular reference to the

5 appendices and the structure of the individual reports?

6 There are a number of methods, or there were

7 a number of methods, open to you to assist you in

8 reaching your overall view as to the likelihood of

9 survivability, which was a likelihood based on the

10 balance of probabilities. Is that right?

11 A. That's correct, yes.

12 Q. Firstly, there is, as we've discussed, past research on

13 the effects of particular explosive devices and their

14 construction?

15 A. Yes.

16 Q. Secondly, research on the likely effects on the body and

17 its tissues and organs of the detonation of an explosive

18 device?

19 A. Yes.

20 Q. In that regard, is it possible to compute through the

21 use of highly advanced computers and modelling systems

22 something known as blast loading, that is to say the

23 effect on the body and its tissues of the detonation of

24 a device?

25 A. Yes, you can. It has to be with caveats because we

1 do -- as we did -- have to make assumptions, we had to
2 make assumptions on the explosive output of the device.
3 We knew about the environment and the team could
4 construct a virtual Underground carriage, but we also
5 had to make assumptions about the positions of people
6 within that and allow for those positions to be
7 different in reality to that which was portrayed on the
8 map, for obvious reasons.

9 Q. But as best you could, you, or rather your
10 computer-modelling colleagues, constructed two forms of
11 computer model; one a well-known and relatively
12 well-tested computer model which sets out the basic
13 answers in terms of the effect of the detonation of an
14 explosive device?

15 A. Yes.

16 Q. But also, because of the exigencies of this particular
17 case, a second model, a much more complex model, your
18 appendix G --

19 A. Yes.

20 Q. -- which endeavoured to add, on that which is previously
21 known, all the complexities associated with this case?

22 A. That's correct. The simple model effectively tells you
23 survival distances or predicted survival distances from
24 a bomb going off in a noncomplex environment and the TNT
25 equivalence is assumed based on the other reports and

1 the documents with which we were provided. The complex
2 environment modelling takes into account the effects of
3 being within the carriage and the effects of other
4 structures around, such as the bomber, were they leaning
5 over the bomb, and people.

6 Q. Did you also have, of course, available to you, as is
7 inferred from the material that you were sent, objective
8 evidence relating to the nature of the injuries that
9 were actually sustained, externally?

10 A. Yes, we did. We had the external post-mortem reports.

11 Q. So anatomical observations about the effects of the
12 bomb?

13 A. Yes, we had surface observations and clear injuries that
14 could be demonstrated by a surface examination, and we
15 also had the fluoroscopy, which is a limited form of
16 X-ray, particularly looking for breaks and the presence
17 of external fragments, but, as previously stated, we did
18 not have internal post-mortem information.

19 Q. Did you also have some physiological observations, such
20 as evidence from witnesses as to degrees of
21 consciousness, alertness, difficulties in breathing,
22 evidence of blood pressure, pulse and the like?

23 A. Yes, we did. We didn't necessarily have all that for
24 every casualty.

25 Q. Of course.

1 A. Where that was available, that was provided to us in the
2 document referred to as the time-lines. When it was
3 provided, that is included as a separate annex within
4 the individual reports.

5 Q. But your approach must, overall, be read subject to
6 a number of caveats?

7 A. Yes.

8 Q. Firstly, as you mentioned, there was no invasive
9 post-mortem in any case.

10 A. Yes.

11 Q. Secondly, the X-ray examination was limited, as you've
12 just said, to fluoroscopy?

13 A. Yes.

14 Q. Thirdly, although you have photographic evidence, in
15 some cases the photographs were difficult to interpret,
16 for reasons I won't explore with you?

17 A. Yes.

18 Q. Fourthly, although there was some objective evidence as
19 to the location of some of the deceased, there is
20 a distinct lack of clarity as to where and how they were
21 moved by the emergency responders?

22 A. Yes, and certainly in a crowded environment such as
23 King's Cross there are -- some of the deceased, you
24 can't be certain where they were within that dense
25 crowd.

1 Q. With all those issues in mind, was your approach in
2 every one of these cases to examine the time-line --
3 that's to say the material from court and from the
4 witness statements where appropriate -- concerning the
5 events after the detonation of each of the bombs; then
6 to assess the proximate location of the person, where
7 they were; then to assess the blast loading, the effect
8 of the bomb, the likely effect of the bomb on that
9 person; then to assess what the likely effect will have
10 been in terms of the severity of blast lung from which
11 they consequentially suffered; and then, finally, to
12 look at everything in the round, including all the
13 clinical observations and the witness evidence, and to
14 reach your view?

15 A. My start point was with the photographs so I could get
16 an understanding of who this person was and what
17 injuries were evident, where photographs would tell us
18 that. And from that, I could draw an opinion and
19 I asked my colleagues to do the same thing, to look for
20 obvious injury, and we started with scene photographs
21 and the scene maps. Then we moved into the post-mortem
22 documentation and, in essence, built up a picture of the
23 injuries that we could see and the injuries that had
24 been recorded, and from that, independently, we had the
25 modellers working through the blast environments and, as

1 you've discussed and described, at the end, we'd bring
2 all that together to try and form an opinion that was
3 tested in as many ways as realistically possible.

4 Q. I've referred to the fact that you were invited to
5 consider the assessment of survivability on a balance of
6 probabilities.

7 A. Yes.

8 Q. Does it follow from everything that you've said that the
9 approach, although the best that current science and
10 research can offer, is necessarily a rough and ready
11 instrument insofar as it's not open to you, in the light
12 of relatively small changes in the evidence -- for
13 example, one or more witnesses altering the known
14 understanding of where the deceased was -- to gauge the
15 effect of an alteration in the underlying material or
16 evidence on your overall conclusion in relation to that
17 deceased?

18 A. No question about that at all. For example, if we've
19 got somebody who we believe is close to the bomb, the
20 physiology and the descriptions would be consistent with
21 blast lung. If you then take that person and witnesses
22 say, "No, they weren't there at all, they were down the
23 far end of the carriage", you could have very similar
24 physiology, albeit not the burns and unlikely the
25 amputations, from a penetrating injury to the chest

1 causing, say, a pneumothorax and, with bleeding,
2 a haemothorax -- that's just air in the chest or blood
3 in the chest -- so you could still get similar
4 physiology, but it would really depend on, you know,
5 where you were in relation to the explosion.

6 Q. So if I were to say to you, in relation to person X, new
7 evidence has come to light to suggest they may have been
8 a matter of a few feet in a different direction, perhaps
9 further away or to the side of the bomb, and/or there is
10 a dispute in the evidence as to whether or not they
11 survived for 15 as opposed to 20 minutes, are changes of
12 that type likely to substantially affect your overall
13 conclusion in relation to that particular deceased?

14 A. Short changes in time -- so when we're talking about 5,
15 10, 15 minutes -- highly unlikely.

16 Q. Thank you.

17 A. If you were taking us to beyond an hour or two hours,
18 certainly. With some of the distances, if you said
19 somebody was a matter of feet further away from the
20 bomb, then based on our simple modelling and the
21 survival curves you get from explosions in simple
22 environments, that could move somebody into an area
23 around the bomb where survival might be expected.
24 However, it's quite possible that still with the
25 complex environment modelling, you can still say this is

1 somebody who is likely to have suffered a lethal amount
2 of blast, blast loading.

3 Q. Thank you very much, Colonel. May we now turn to the
4 individual reports, commencing with Richard Ellery who
5 was killed at Aldgate, and I commence with him because
6 he is alphabetically the first of those persons whom you
7 considered in relation to Aldgate.

8 My Lady has, I know, hard copies of all the
9 individual reports. I'm afraid I don't have access to
10 the order in which they're assembled in my Lady's
11 bundles. They are, for those who are following this on
12 Lextranet, contained at INQ11065.

13 Could I start very briefly with the time line, so as
14 to remind ourselves as to the salient features of the
15 evidence relating to Mr Ellery.

16 It's INQ11065 -- I don't ask for it to be brought
17 up -- 77.

18 The evidence in relation to Mr Ellery was quite
19 substantial, insofar as a number of witnesses reported
20 that he was unable to speak, he wasn't coherent, he
21 couldn't verbalise words, he was moving occasionally in
22 a reasonably violent way and lashing out, and at times
23 trying to move and to get up on all fours. He was
24 obviously very severely injured, and the time-line
25 suggests, does it not, that he may have survived up to

1 between 9.20 and 9.35. That's based on the evidence of
2 the Fire Brigade and the London Ambulance Service, in
3 particular Mr Cassidy and Mr Treacy, who came to tend to
4 him towards the end of these events.

5 You had that time-line. You then, at appendix E,
6 INQ11065-54, reached a conclusion on all the material
7 provided to you as to his proximity to the bomb and, at
8 paragraph E4.1, the review concluded that he could be
9 placed an estimated 1.75 metres from the centre of the
10 blast and that he was situated approximately 0.6 metres
11 from the double door D8 next to a glass screen. Is that
12 right?

13 A. That's correct. That's the appendix of my colleague,
14 Mr Hepper, and those, indeed, are his conclusions.

15 LADY JUSTICE HALLETT: Sorry, the page number again,
16 Mr Keith?

17 MR KEITH: My Lady, it's page 54 of the internal numbering
18 of the report.

19 LADY JUSTICE HALLETT: Thank you.

20 MR KEITH: Page 54 of 89. I think it's the same INQ number.
21 Then in appendix G, which is the complex blast
22 loading model at INQ11065-72 -- so page 72 of the
23 internal numbering -- the expert assessment was that he
24 had sustained a peak overpressure at the chest of
25 greater than 2 megapascal --

1 A. That is right.

2 Q. -- which would have been enhanced by the presence of the
3 confining side wall of the train?

4 A. Yes.

5 Q. Could you just tell us, please, something about
6 relativity of the pressure numbers and conclusions that
7 we have in these reports? Generally, what sort of
8 degree of overpressure is likely to bring somebody
9 within the circumference of a fatal amount of pressure?

10 A. Well, as we're sitting here now, we're at atmospheric
11 pressure, and that's given at 100 kilopascals. So
12 that's a 1,000 pascals. Multiply that by 10, you get
13 1,000, a million pascals, multiply that by 20, you get
14 2 million, 2 megapascals.

15 So what you're describing here with Mr Ellery is
16 someone who is suddenly subjected to 20 times atmosphere
17 pressure, and I think -- certainly from my reading,
18 I think one of the best descriptions of this is where
19 we've provided the final appendix by Colonel Clasper,
20 which we haven't done for everybody because we haven't
21 done this blast loading for everybody, which talks about
22 the data from Northern Ireland which approximates at --
23 they talk about having a pressure of greater than
24 560 kilopascals, and for this particular report we're
25 looking at page 88 [INQ11065-88].

1 Q. Yes, page 88 of the report.

2 A. So 560 kilopascals, which would be a quarter of the
3 loading applied to Mr Ellery, as very severe, and then,
4 if you go back to Mr Pope and Dr Kirkman's estimate,
5 they would place 2 megapascals as being, again,
6 extremely severe.

7 Q. On that page, page 88 of the internal numbering,
8 [INQ11065-88] also, we can see there are two tables set
9 out by Colonel Clasper. The first one shows the
10 relationship between the size of the explosion and the
11 distance from that explosion and assesses the degree of
12 severity of blast loading, that is to say the overall
13 effect on the body and the body tissues.

14 A. That's right.

15 Q. So we are concerned here with a likely size of the
16 explosive device as being in a number of a few
17 kilograms.

18 A. Yes.

19 Q. One of the experts puts the likely size at around about
20 9 to 10 kilograms.

21 A. I think that certainly the weight of the explosive is
22 put as 9 to 10 kilograms. My understanding from the
23 ballistic experts, the last experts I consulted, is that
24 the TNT equivalent is much more like around 2 kilograms,
25 and at 2 kilograms, even with that, that would give you

1 very severe loading on Mr Ellery.

2 Q. So if it was between -- if it was 2 kilograms, therefore
3 falling within the range 1 to 3 kilograms, and the
4 distance from the explosion was less than 3 metres, then
5 there is a likelihood of very severe blast lung injury?

6 A. Yes.

7 Q. The next column shows what the position would be if the
8 distance was between 3 and 15 metres. It says "size of
9 explosive", it should be distance, in fact?

10 A. That's incorrect, it should be "distance from the
11 explosion".

12 Q. So if you're 3 to 15 metres away from a similar
13 explosive device, then the degree of blast lung might be
14 considered to be minor?

15 A. Yes.

16 Q. And then the second --

17 A. Or -- yes, you're right, minor.

18 Q. Equally, if you're more than 15 metres away?

19 A. These are based on Northern Ireland data, so these are
20 not theoretical, these are actual effects.

21 Q. Then the second table shows the approximate degree of
22 overpressure and the degree of lung injury. So as we
23 can see in this case, and as you've just described, if
24 you receive blast loading of more than
25 560 kilopascals --

1 A. Yes.

2 Q. -- then the degree of blast loading will be very severe
3 and there is a significant incidence of death?

4 A. Yes.

5 Q. So anything in the range of 2 megapascals, there is no
6 chance?

7 A. Our interpretation would be that would be very severe
8 blast loading, very severe blast injury, and that's why
9 we categorised Mr Ellery's injuries the way we did.

10 Q. Did you, therefore, conclude at appendix H, page 75 [INQ11065-75],
11 that it was highly likely -- paragraph H5.1 -- that
12 Mr Ellery suffered from severe primary blast lung
13 injury?

14 A. Yes, that's the writing or conclusions of my colleague
15 Dr Kirkman, who's the expert in blast physiology, and
16 I agree with these conclusions.

17 Q. Then, at appendix D, which, for my Lady's benefit,
18 replicates the opinion in the body of the report itself,
19 and, therefore, I needn't take you to the opinion in the
20 report, appendix D suffices, page 50 -- I don't want it
21 on the screen, please, thank you very much -- you've
22 addressed the injury mechanisms, and the reason why
23 I don't want it displayed on the screen is that you go
24 into quite considerable detail from the post-mortem
25 report on the full extent of the injuries that Mr Ellery

1 suffered.

2 A. Yes.

3 Q. The purpose of that is in order to be able to gauge the
4 consistency of those clinical findings, objective
5 clinical facts, against the assessment from the blast
6 loading?

7 A. Correct.

8 Q. At page 51, you bring all the evidential strands
9 together and conclude at D6.2:

10 "While the external injuries in themselves do not
11 appear lethal, Mr Ellery's deterioration suggests the
12 extent of his internal injuries would not have allowed
13 survival. In the view of the expert team, the balance
14 of probability is that he died from non-survivable
15 internal injuries and blast lung is highly likely to be
16 one of the main causes of his death."

17 A. Yes.

18 Q. Turning next to Fiona Stevenson, who also died at
19 Aldgate, the time-line is at INQ11076-77 of my Lady's
20 report. We can recall the evidence came predominantly
21 from the accounts given by Crystal Main and Bruce Lait.
22 You will remember, Colonel, the description given by
23 those witnesses of the severity of the injury to her
24 face --

25 A. Yes.

1 Q. -- and, in particular, how Mr Lait described how he felt
2 her hand move and then fall still. Notably, he noticed
3 a degree of gurgling, which indicated some respiratory
4 difficulty.

5 A. Yes.

6 Q. At page 79, the evidence of Dr Quaghebeur was to the
7 effect that there was a very vague impression of a pulse
8 but very shortly after that there was nothing there at
9 all.

10 A. Yes.

11 Q. Did you then, based on the material from the seating
12 plan as well as the witness statements and the oral
13 account of the witnesses at appendix E at page 54 [INQ11076-54] ,
14 compute that the distance from the bomb was likely to be
15 in the order of 1.85 metres?

16 A. Yes, we did, and again, that's the work of my
17 engineering colleague, Mr Hepper, based on the seating
18 plan, but also based on the scene photographs with
19 Ms Stevenson in situ.

20 Q. Then, in relation to the calculation of the peak over
21 pressure appendix G at page 71 [INQ11076-71] , does that map represent
22 the tip of the very large computing iceberg and
23 endeavour to set out an estimate of the relationship
24 between the distance, distances, from the bomb and the
25 height or the amount of the overpressure?

1 A. Yes, it does. On the original, it's colour-coded,
2 which -- certainly on my screen it's black and white,
3 and, on the original, red indicates very higher pressure
4 and it goes through yellow, green, down to blue, where
5 blue is the lowest pressure.

6 But all the pictures do is give you -- certainly the
7 picture, as you're looking at this at the top of the
8 page, gives you one fraction in time, so this could be
9 a matter of a certain number of milliseconds after the
10 explosion and the subsequent work, which actually runs
11 as an animation, gives you how that pressure moves
12 throughout the carriage.

13 Q. Altering as it moves, bouncing off walls and giving rise
14 to a very complex picture of the effects?

15 A. Indeed, and there are some areas that stay at high
16 pressure and there are some areas that only have
17 transient high pressure.

18 Q. In relation to somebody who, as Fiona Stevenson was
19 assessed to be, perhaps, at 1.85 metres from the centre
20 of the blast, that would put her within certainly two
21 out of those five radial circles?

22 A. Yes, it would, and our understanding, also, from other
23 injuries, was that she was within, as we call it, line
24 of sight of the bomb, and that's -- that's just a way of
25 looking at it: is there a solid obstacle between that

1 person and the bomb? And our understanding was that she
2 would have been exposed to the full force of the
3 explosion.

4 Q. So at page 72 [INQ11076-72] of the report, was it concluded that she
5 had sustained a peak overpressure of the chest, again of
6 greater than 2 megapascals?

7 A. Yes, it was.

8 Q. Also, that the images of the specific impulse indicate,
9 as you have said, that she had some shielding but would
10 have been subjected to the full blast wind?

11 A. Yes.

12 Q. As a result, page 75 [INQ11076-75], was it concluded that it was
13 highly likely that she would have suffered from severe
14 primary blast lung injury, paragraph H5.1?

15 A. Yes, it was, and that was consistent with the
16 descriptions from the witnesses.

17 Q. Therefore, at page 51 -- I'm sorry, page 50, did you
18 review the clinical findings in light of those
19 assessments and, in essence, report thus: that
20 fluoroscopy findings, paragraph D5, indicated debris --
21 that's to say fragments -- embedded in her right elbow
22 and right ankle, and also very severe injuries to her
23 right thigh and the right side of her face and bruising
24 to the right side of her body?

25 A. Yes.

1 Q. Do you, at D6, conclude that she must have died very
2 quickly after the bomb?

3 A. Yes.

4 Q. And the right-sided injury may have included severe
5 right-sided internal injury but, because of the absence
6 of a post-mortem examination internally, that can't be
7 confirmed, but the gurgling, as I've mentioned, may
8 indicate a degree of airway construction?

9 A. Yes, and that would consistent with her being as
10 unconscious as she is described by the witnesses.

11 Q. Then taking into account the assessed location and the
12 degree of overpressure at D6.3, was it your corporate
13 view that, on a balance of probability, the injuries
14 that she would have instantaneously received were
15 non-survivable?

16 A. That was our view, yes. I think to clarify one thing,
17 my -- our view was, although she had a degree of some
18 shielding by other people, she certainly was in line of
19 sight. So everything within that, in our view, confirms
20 that blast lung is highly likely for this lady.

21 Q. Turning next, please, if I may, to Carrie Taylor,
22 INQ11071 for those who are following. The time-line is
23 at page 78 [INQ11071-78] of my Lady's report. Again, we can recall
24 the evidence of Bruce Lait and, in particular,
25 Dr Quaghebeur --

1 A. Yes.

2 Q. -- who respectively describe Carrie making some moaning
3 noises and to there being a possibility of a spinal
4 injury. That was the suspicion that Dr Quaghebeur had,
5 and she also observed that she never, in fact, saw her
6 eyes open. She goes on to describe how she was drifting
7 in and out of consciousness and every now and again she
8 would try to grab hold of her and then Dr Quaghebeur
9 would try to calm her down and bring her some small
10 degree of solace.

11 In light of that, as well as the rest of the
12 evidence, did you assess that the distance -- page 55 [INQ11071-55] --
13 was around 2.6 metres from the centre of the blast?

14 A. The distance on the diagram indicated that Ms Taylor was
15 outside -- was beyond 2 metres, so with that -- when we
16 came to the court to discuss which map we should be
17 using, we took the original witness statement map which
18 put Carrie Taylor beyond the 2 metres which would give
19 the loading of 2 megapascals. But our subsequent review
20 of her injuries drew us to the conclusion she was closer
21 in to the bomb.

22 Q. The blast environment was of particular note in Carrie's
23 case, because there was evidence, was there not, of her
24 proximity to a glass screen --

25 A. Yes.

1 Q. -- and how she had become entangled with that screen and
2 the pole?

3 Do you, at the bottom of page 55, note that there
4 were elements of primary, secondary, tertiary and
5 quaternary injury mechanisms, that is to say the various
6 types of injury that you described earlier?

7 A. Yes, again, this is the observation of Mr Hepper, who's
8 got the blast engineering experience, and his view was
9 that Ms Taylor would have suffered all of those injury
10 mechanisms and the fragment injuries would bring her
11 closer to the seat of the explosion than where she was
12 positioned on the map.

13 Q. Does he also note that the presence of apparent flash
14 burns and the partial traumatic amputation of her leg
15 also indicate that she was relatively close to the
16 source of the explosion?

17 A. Yes. I think, as you've drawn out previously where
18 people were when the bomb detonated and where they
19 were -- where they were either thrown to or fell down to
20 are clearly different locations, albeit fairly close but
21 different locations.

22 Q. In relation to the blast loading and the complex
23 modelling, the conclusion is, at page 72 [INQ11071-72], that she
24 sustained a peak overpressure at the chest of greater
25 than 350 kilopascals and the images of the specific

1 impulse indicate that she may have had some shielding
2 from the direct wind blast, but may at the same time
3 have been impacted by other people who had been closer
4 to the device when they were blasted sideways by the
5 bomb?

6 A. Yes. Again, that's Dr Pope's work based on the original
7 map, and I fully accept that our view would bring Carrie
8 closer in and give her a higher blast loading based on
9 her other injuries, as we bring out in our conclusion.

10 Q. Your overall opinion -- I don't ask for this to be
11 brought up, please -- is at page 52 where you refer
12 specifically to the significant part of Dr Quaghebeur's
13 evidence --

14 A. Yes.

15 Q. -- and her description of the involuntary movements that
16 Carrie had displayed, and also the possibility of other
17 internal injuries on account of the evidence of bubbles
18 from her mouth.

19 A. Yes.

20 Q. Was it your joint view that, on a balance of
21 probability, it was very likely that she had suffered
22 significant primary blast lung injury and that she'd
23 also been thrown from her initial position, and so she
24 probably had other significant injuries, including head
25 injury and spinal injury?

1 A. Yes, it was.

2 Q. What view did you therefore reach in her case in
3 relation to the likelihood of survivability?

4 A. Our overall view was that survival was unlikely.

5 Q. Turning now, please, to Edgware Road and to
6 Michael Brewster. The time-line is at page 78 of your
7 report which is INQ11074.

8 In relation to Mr Brewster, there were some
9 significant features to the witness evidence relating to
10 his position after the explosion and to the length of
11 time that he survived.

12 A. Yes, and for Mr Brewster we were given an updated
13 time-line from the court when further witness evidence
14 became available.

15 Q. On page 78, did, in fact, the summary provided to you by
16 Counsel to the Inquests show that it was unclear what
17 the precise period of time was during which he had been
18 alive post the explosion, but it was clear that he must
19 have died prior to the arrival of the paramedics,
20 somewhere between 9.25 and 9.30?

21 A. Yes, it was.

22 Q. The evidence, in fact, was summarised so as to
23 distinguish between the first attempts to pull him out
24 of the bomb crater, as we will all recall, then the
25 second attempts to push him out from underneath, and

1 then, thirdly, the attempts by Mr Coulson to come to his
2 aid.

3 A. Yes.

4 Q. The essence of the witness evidence was, however, as we
5 can see on page 79 [INQ11074-79] in the middle, that in the first
6 stage, after the bomb, he had been able to move his
7 upper limbs and his arm to put an arm out to the witness
8 Jason Rennie, and also that there was a level of
9 communication.

10 A. Yes.

11 Q. But as events proceeded and as he weakened, his ability
12 to move himself was greatly reduced and he finally
13 lapsed into unconsciousness before dying?

14 A. Yes, the evidence describes somebody who was initially
15 very vigorous and trying to help himself, but fairly
16 rapidly after that his physiology deteriorated.

17 Q. At page 54 [INQ11074-54], at E4.1, the review of the positional data
18 placed him in the carriage, as we know, between doors D3
19 and D4, and the scene report placed him an estimated
20 0.55 metres from the centre of the blast, just over half
21 a metre, and so, what conclusions did you reach in
22 relation to the line of sight?

23 A. Again, this is from one of Mr Hepper's annexes, the
24 blast engineer, and his view was that Mr Brewster was in
25 direct line of sight of the weapon and would have had no

1 shielding or protection from the direct effects of the
2 explosive.

3 Q. In which direction would he have been blasted by the
4 bomb?

5 A. Mr Hepper's assessment was that Mr Brewster would have
6 been pushed towards the carriage door or the glass
7 partition adjacent to the door and, because of that, he
8 would have expected Mr Brewster to demonstrate primary,
9 secondary, tertiary and quaternary injury mechanisms.

10 Q. So he would, as you've described earlier in outline, not
11 only have received a very high peak overpressure because
12 of his close proximity to the bomb, but he would have
13 received very significant injury from all the multiple
14 combining effects of the secondary and tertiary
15 injuries?

16 A. Yes.

17 Q. Do you, at page 56, or, rather, does Mr Hepper, on
18 page 56, describe -- and I don't want it on the screen,
19 please -- the patterns of the injuries which Mr Brewster
20 sustained, in particular the injury pattern to the back
21 left of his body and the presence of traumatic
22 amputation to found his conclusion that he had suffered
23 very significant injuries in all those different ways?

24 A. Yes, he does, and I'm conscious about not delivering
25 graphic clinical detail, but the combination of the

1 burning injury, plus the amputating injury leads
2 Mr Hepper to that conclusion.

3 Q. Then in appendix G, at page 71 [INQ11074-71], we can see the peak
4 overpressure map for Edgware Road carriage, and over the
5 page, one further page on, page 72 [INQ11074-72], was the opinion
6 reached that he would have sustained a peak overpressure
7 of greater than 2 megapascals?

8 A. Yes, it was.

9 Q. So page 76 [INQ11074-76], would he have been likely to have suffered
10 severe primary blast lung injury?

11 A. Yes, he would.

12 Q. That informed the ultimate conclusion at appendix D,
13 which is page 50, that it seems that he did probably
14 survive for about 40 minutes after the explosion,
15 paragraph D5.1, but, as you've observed, he began to
16 deteriorate, he became weaker -- I don't want it on the
17 screen, thank you very much -- he became weaker and his
18 breathing and pulse deteriorated?

19 A. Yes, they did.

20 Q. You make particular reference to the fact that
21 Mr Pantling described the red tie being placed around
22 Mr Brewster's leg.

23 What significance, if any, did the fact that he had
24 suffered those leg injuries have in terms of your
25 overall assessment?

1 A. Well, one of the things that we were asked to do was
2 comment on survivability or not. One of the -- going
3 back to our earlier discussions this morning about
4 military protocols and our CABC protocol, we were
5 looking specifically to see, were there people, within
6 those you had asked us to consider, who could have bled
7 to death from their injuries, and although the witness
8 statement describes a red tie being placed upon
9 Mr Brewster to form a tourniquet, the other witnesses
10 state that they did not see a lot of bleeding from his
11 leg and, actually, I think another witness questions
12 whether this would have been effective or not.
13 So we drew that together to say we did not have
14 evidence from the descriptions that Mr Brewster was
15 bleeding badly from his legs. The wounds, as we
16 interpreted them, indicated burnt tissue, which wasn't
17 going to bleed, so it was another piece of evidence that
18 said this is not somebody who bled to death, this is
19 somebody who most likely died from the effects of blast
20 loading.
21 Q. Over the page at page 51, you summarise the conclusions
22 reached by Mr Hepper: namely, the close proximity to the
23 bomb, the very close proximity to the bomb, and the fact
24 that he would have had direct line of sight to the
25 blast.

1 A. Yes.

2 Q. You summarise Dr Pope's conclusions in relation to peak
3 overpressure at D5.9?

4 A. Yes.

5 Q. Then, at D6.1, what did you conclude?

6 A. Our conclusion was that -- I think I've just stated that
7 Mr Brewster would unlikely have bled to death from his
8 injuries. Being close to the bomb, with the loading
9 that we've described, our view was that, on the balance
10 of probability, blast lung was likely and, at those
11 distances and at that loading, blast lung would have
12 been non-survivable.

13 Q. Thank you. Turning next to Laura Webb, INQ11062, the
14 time-line is at page 54. Again, we'll all recall the
15 evidence relating to the attempts to carry out CPR on
16 Ms Webb without success from Mr Boodi and Mr Hucklesby.
17 The time-line showed that there might initially have
18 been some slight movement to her chest, and we'll all
19 recall the evidence from the witnesses to the effect
20 that there was some blood around her nose, but the
21 attempts to provide her with resuscitation, as I say,
22 failed, but they must have taken some moments to effect.
23 Did the time-line estimate that, putting the
24 evidence of those witnesses together, in terms of the
25 attempts to resuscitate her, she may have survived to

1 some point between 9.00 and 9.10?

2 A. Yes, they did.

3 Q. Appendix E, at page 51, assessed that she was an
4 estimated 0.85 metres from the centre of the blast and
5 will have been in the direct line of sight to that
6 blast.

7 A. Yes, it does.

8 Q. Also, that because of the way in which she would have
9 been pushed towards the seating at the side of the
10 carriage, she would have suffered primary, secondary,
11 tertiary and quaternary injuries as well?

12 A. Yes, they do.

13 Q. Over the page, at page 52, there is analysis of the
14 degree of blast loading and how it's predominantly to
15 the front left quadrant of her body, a description of
16 the flash burn injuries and also of the peppering and so
17 on, page 53 at E7.1, did your colleague conclude that
18 she had been in a complex blast environment and had been
19 displaced, blown backwards, by the blast wind as well?

20 A. That's correct.

21 Q. In relation to Laura Webb, there is, we will have noted,
22 no appendix F, G or H. That's to say no blast loading
23 modelling was carried out in relation to her case. Why
24 was that?

25 A. We could have inferred blast loading modelling from the

1 work that was done within the carriage, but we took our
2 main tasking to be to answer the question as most
3 directly as we could, was it a survivable or
4 a non-survivable injury, and again, without wishing to
5 offer graphic clinical detail, there is good evidence
6 from the witness descriptions and particularly from the
7 post-mortem -- external post-mortem and post-mortem
8 photographs that she suffered a severe and
9 non-survivable head injury.

10 Q. Is that particularly referenced, for my Lady's note, on
11 page 48, at the top of the page?

12 A. Yes, it is.

13 Q. On account of the severity of that injury, there was
14 simply no point in carrying out the modelling?

15 A. Our view was that the detail offered in the post-mortem
16 report, the detail offered on the photographs, indicated
17 that we had a clear -- as clear as we could ascertain --
18 cause of death for this lady and we regarded that as
19 a non-survivable head injury.

20 Q. So your conclusion was that she'd suffered
21 non-survivable injuries, which included a very severe
22 head injury and most likely included blast lung,
23 paragraph D6.1?

24 A. Yes, we did.

25 Q. Turning next, if I may, to King's Cross/Russell Square.

1 We remind ourselves that, in consideration of the
2 individual reports at King's Cross, in terms of the
3 evidence of the witnesses, you had before you their
4 witness statements, but not, because of the timing of
5 the reports, any summaries of the evidence that they
6 actually gave in court?

7 A. No, we didn't.

8 Q. The first person to be considered is Samantha Badham at
9 INQ11072. The time-line is at page 79. There was
10 a great deal of evidence in relation to Samantha Badham.
11 Her discovery, certainly orally, because of the screams
12 being heard by Inspector Mingay, the assistance given by
13 the British Transport Police Sergeant Johnson, the
14 medical evidence provided by the HEMS paramedic,
15 Mr Nation, as well as the LAS employees Messrs Sinclair
16 and Desmond.
17 The complex time-line concludes on the last page, at
18 page 82, with the pronouncement of her death by Mr Kehoe
19 at 10.43.

20 A. Yes, it does.

21 Q. Appendix E at page 55, you summarise how she was
22 recovered from the space between the tunnel wall and the
23 train and conveyed up to the ground floor level of
24 King's Cross Underground station and, over the page,
25 your colleague sets out the likely primary, secondary,

1 tertiary and quaternary effects of the bomb on her.

2 A. Yes, he does.

3 Q. There was very severe injury caused to her, at page 57,
4 including the traumatic amputation of her right leg and
5 fractures of the left ankle, the left arm and
6 a considerable degree of peppering.

7 As a result of those clinical observations, what did
8 you conclude in relation to proximity to the seat of the
9 explosion?

10 A. Even though Ms Badham was recovered not from within the
11 train, our understanding from that was that she had been
12 very close to the explosion.

13 Q. Were you able, though, to express a definitive view on
14 the likely distance from the bomb, either based on
15 objectively verifiable material or based on the blast
16 modelling in appendix G?

17 A. No.

18 Q. So at page 73, did you state that no exact position for
19 her could be given?

20 A. Correct. While her injuries -- rather, while the
21 injuries we could attribute to blast would indicate that
22 she was close to the bomb, we cannot be more specific
23 than that, and also, we can't disentangle injuries from
24 the blast to injuries from her being thrown.

25 Q. So, at page 77, did you make that point, that you were

1 unable to distinguish between the possibility of impact
2 with the structures of the train and the tunnel wall as
3 opposed to those received from the bomb itself?

4 A. That's right, and that's the conclusion of my colleague,
5 Dr Kirkman.

6 Q. Your conclusion is at page 50. You detail the injuries
7 that she suffered.

8 A. Yes.

9 Q. You note that she must have been close to the bomb.

10 A. Yes.

11 Q. You note on page 51 the breathing difficulties that she
12 was having --

13 A. Yes.

14 Q. -- and you can't say for certain whether or not that had
15 emanated from lung injury, but you noted that blast lung
16 is a high possibility in someone that close to an
17 explosion.

18 A. Certainly. If we take the other injuries as indicating
19 her proximity to the weapon, then that's likely, but
20 again, we can't be certain because of the other -- the
21 circumstances you've described.

22 Q. For all those reasons, but in the main because she had
23 been propelled out of the train, were you able to
24 express a view as to whether or not her injuries would
25 have been survivable?

1 A. No, we didn't. In fact, we could say that this lady had
2 suffered very severe injury. We could say that we felt
3 she was close to the seat of the explosion. We felt
4 that she had severe injuries but we were not in
5 a position to say survivable or non-survivable.

6 Q. Thank you. Turning next to Philip Beer, please,
7 INQ11064. The time-line is page 78. You will recall,
8 of course, the evidence of Patrick Barnes, his friend --

9 A. Yes.

10 Q. -- who noted that he was alive after the explosion
11 because he spoke to him, of course.

12 A. Yes.

13 Q. Then the very vivid evidence from the paramedic,
14 Mr Taylor, who described how he saw him but was forced,
15 because of the exigencies of triage, to come back to him
16 later?

17 A. Yes.

18 Q. So the time-line indicated that he may have survived for
19 quite some time and died whilst Mr Taylor was carrying
20 out the triage process in that carriage around about
21 9.50.

22 A. Yes, our estimate, based on the time-line, was
23 a survival of around one hour.

24 Q. Page 54, please, Mr Hepper concludes at paragraph E4.1
25 that Mr Beer's body had been near the rear set of double

1 doors in carriage 2 after the explosion, but there was
2 no evidence to positively identify his position before
3 the explosion that enables an assessment of the blast
4 environment, but Mr Barnes, his friend, was
5 approximately 2 and a quarter metres from the blast.

6 A. Yes.

7 Q. Because of the inability to provide an exact position
8 for him, it was impossible to express a view as to what
9 the peak overpressure would have been?

10 A. No, it wasn't.

11 Q. As we see on page 72 and, likewise, page 75, it was
12 impossible to express a view on the degree of severity,
13 likely severity, of blast lung injury?

14 A. No, it wasn't.

15 Q. Your conclusion conditioned by those features is at
16 page 49, and over the page on to page 50, you note at
17 paragraph D5.3 the very severe injuries that he
18 suffered, particularly bony injuries, the fractures and
19 the like, and in particular, the amputation of his left
20 leg.

21 At paragraph 5.4, you were able to say something
22 about his likely proximity to the seat of the explosion
23 but because of the nature of those injuries and also the
24 injury that he sustained to his jaw?

25 A. Yes, we were. The nature of the burning to his injuries

1 and the nature of the fracture to his jaw indicated to
2 us he was likely to be close to the seat of the
3 explosion and likely to have been impacted against
4 a solid object.

5 But without more accurate positional data, we did
6 not feel it would be appropriate to try and give
7 detailed blast loading. So the injuries indicate likely
8 close, but we can't say with any more fidelity what the
9 blast loading would be.

10 Q. If his injuries indicated he was likely to be close,
11 does it also follow that he was likely, therefore, to
12 have received a potentially fatal overpressure?

13 A. It is likely. Injuries indicate close. The clinical
14 description describes somebody deteriorating in the way
15 you would expect with significant blast lung. But in
16 the absence of the loading, we can't say for certain.

17 Q. You've used the expression "for certain".

18 A. I have.

19 Q. Hitherto, you've been careful to use the phrase "on
20 a balance of probabilities" or "likelihood". May we
21 take it from your conclusion that, although you cannot
22 say for certain that Mr Beer would have suffered from
23 potentially fatal, very severe blast lung injury, on the
24 balance of probabilities, you would have done so?

25 A. On the balance of probability, given his other injuries

1 and given the likely proximity to the bomb, on a balance
2 of probabilities, it is likely he suffered a blast lung
3 injury, but that's as far as we can offer. Without
4 accurate positional data, we can't calculate the loading
5 and, without that, we can't give you a more definitive
6 answer.

7 Q. All right. Anna Brandt, please, if I may. Also, of
8 course, at King's Cross, INQ11073.

9 In relation to appendix F and the time-line, you
10 were not provided with a time-line in relation to
11 Anna Brandt, is that correct --

12 A. That's correct.

13 Q. -- because there was no evidence as to events after the
14 explosion, as far as she was concerned?

15 At appendix E, page 55, there is a discussion of the
16 nature and extent of her injuries?

17 A. Yes.

18 Q. Including traumatic amputation of the legs, both legs,
19 as well as impact injury and the presence of fragments
20 on her body and, in particular, the presence of blast
21 injury to her front right quadrant.

22 A. Yes.

23 Q. So what conclusion was reached in relation to proximity
24 to the seat of the explosion in the following paragraph?

25 A. From those injuries, the conclusion was that Mrs Brandt

1 had been very close to the explosion and the presence of
2 her fractured right -- the right-sided rib fractures
3 indicated she had been thrown with considerable force.

4 Q. Because you weren't, because of the absence of exact
5 position, able to compute over-peak pressure from the
6 blast modelling, page 71?

7 A. No.

8 Q. But in the conclusion at page 49, were you nevertheless
9 able to express a view as to whether or not she would
10 have been likely to survive?

11 A. Our view was that she suffered non-survivable injury and
12 likely died at the time of the explosion or very soon
13 after. The combination and constellation of injuries
14 that she suffered are those we would associate with
15 someone who would die very, very -- at the time of or
16 very soon after an explosion.

17 Q. You noted that she would not only have been likely to
18 have had severe blast lung injury, but that she would
19 have been likely or would appear to have suffered
20 a severe lung injury?

21 A. Yes.

22 Q. Which particular clinical observation did you rely upon
23 for your assessment that she would have suffered a very
24 severe lung injury?

25 A. Well, we were looking at the fractured ribs.

1 Q. Fractured ribs?

2 A. Yes, upper ribs are more difficult to break than lower
3 ribs, and in the external post-mortem report there is
4 reference to fractures to the right-sided upper ribs,
5 which I think we -- we mention that in the summary. So
6 as well as likely blast loading that caused the
7 widespread disruption we would expect with blast lung,
8 in addition, that injury indicates being thrown with
9 significant force and, in addition, we would expect
10 underlying lung injury from that as well.

11 Q. We turn next, please, to Ojara Ikeagwu, INQ11067. The
12 time-line is absent in this case again because of the
13 absence of evidence from the witnesses relating to the
14 condition post the explosion.

15 Appendix E at page 54 points, though, to the
16 existence of traumatic amputations of the legs, blunt
17 injury to the arm and extensive flash burns.

18 A. Yes.

19 Q. So what conclusion were you able to reach in relation to
20 proximity?

21 A. I view the combination of the amputations and the
22 combination of the flash burns and other burns was that
23 she was very close to the bomb when it exploded.

24 Q. Again, although, as in the previous case, you are unable
25 to express a view on peak overpressure and, thus, the

1 degree of severity of blast lung injury because of the
2 absence of evidence as to where she was after the
3 explosion and the absence of evidence on her condition,
4 did you nevertheless conclude, at page 49, that on the
5 balance of probabilities, she suffered non-survivable
6 injury?

7 A. Yes, we did. The combination of the amputations and
8 burns, as you've described, and also some of the other
9 tissue injuries, which, again, I won't go into in deep
10 clinical detail, all of those indicated she was very
11 close to the bomb and all of those we would expect to
12 see in somebody who was a non-survivor.

13 Our impression was she probably died either at the
14 time of the bomb or very soon afterwards.

15 Q. The range of injuries that she suffered from, or
16 sustained, were amongst the most serious that you
17 encountered?

18 A. Yes, for someone who was relatively intact.

19 Q. Next, may we please look at the position concerning
20 Shelley Mather, INQ11069.

21 The significant features of the time-line are as
22 follows. We recall the evidence of Susan Harrison, who
23 described how Shelley was lying on the floor of the
24 carriage underneath her, and you will recall that she
25 described how she was lying on her back on the floor and

1 how Susan was lying across her hips and legs. The
2 evidence is also set out there of the paramedic
3 Mr Whittaker and how she was found to be in obvious pain
4 and discomfort?

5 A. Yes.

6 Q. He particularly noted severe, very severe injuries to
7 her abdomen.

8 A. Yes.

9 Q. There was then evidence concerning how she was removed
10 out of the train on the makeshift stretcher, conscious,
11 though, but in pain and complaining of difficulty
12 breathing, and then, as we recall, there was evidence in
13 relation to the attempts to insert a cannula.

14 A. Yes.

15 Q. Do you recall seeing photographs showing the locations
16 where a cannula had been inserted?

17 A. Yes, we did. We saw photographs from the scene and
18 photographs taken during the post-mortem process
19 indicating puncture wounds on both sides of her chest.

20 Q. Page 56 of appendix E, there is a discussion of the
21 post-mortem report and images relating to the injuries
22 to the back left side of her legs and also fragment
23 injuries consistent with debris being blasted outwards
24 by the bomb.

25 Do you conclude that she was not next to the device,

1 but that other objects must have been between her and
2 the bomb at the moment of detonation?

3 A. Yes, again, this is the opinion of Mr Hepper and based
4 on the statement of Mr Todd that it wasn't a fragmenting
5 weapon, ie it wasn't a bomb with fragments as part of
6 its makeup. His view was that, when you had someone
7 demonstrating fragment injury, it's likely that there
8 was an object between them and the bomb, which would be
9 consistent with Ms Mather.

10 Q. Because you didn't have exact -- or evidence enabling
11 you to position her, you weren't able to express a view
12 on the likely degree of overpressure or on the severity
13 of blast lung?

14 A. That's correct.

15 Q. But you were able to conclude, at page 49, that in light
16 of the injuries that she had sustained, particularly in
17 relation to the injuries to the back left-hand side of
18 her legs and the injuries which had caused stripping of
19 the tissue from the bones, that she was -- paragraph
20 D5.7 on page 51 -- relatively close to the bomb --

21 A. Yes.

22 Q. -- and that it had probably exploded behind and to her
23 left?

24 A. Yes.

25 Q. What conclusions did you reach in relation to blast

1 lung?

2 A. We weren't sure where she was, or couldn't say for
3 certain. We can say from her other injuries, we had an
4 indication that she was close to the bomb. We couldn't
5 do over-pressure, but there is detailed description from
6 the pre-hospital crews about their attempts to treat
7 Ms Mather by decompressing her chest.

8 Now, from their statements, from the witness
9 statements, what they were concerned about was
10 a condition called pneumothorax, which is where you have
11 a build-up of air from an air leak inside the chest and
12 what they were trying to do was decompress that, and we
13 had the statement from the anatomy Professor indicating,
14 in his view, they would have been successful in entering
15 her chest cavity to achieve that aim, but given the fact
16 that did not make her better, we can say it's unlikely
17 she was suffering from a significant pneumothorax, and
18 so, given her likely proximity to the bomb, the most
19 likely explanation for her is that she had blast lung
20 injury.

21 That would fit with the time course, although
22 I can't say for -- the same issue about saying for
23 certain. I can't say with more -- any more definitely
24 than that.

25 Q. You will recall from the witness statements how, when

1 the attempts were made to insert the cannula, that they
2 hadn't succeeded and that the distended abdomen had
3 remained and how the way in which her chest was elevated
4 didn't disappear.

5 If pneumothorax was not the cause, you think, of her
6 injuries or of her condition, given that you proceeded
7 on the premise that the attempts to insert the cannula
8 had succeeded, can you think of any other likely
9 explanation that might have caused her death consistent
10 with the distended abdomen that was observed in
11 particular by Susan Harrison?

12 A. Distended abdomen in this situation could indicate
13 somebody's bleeding. You've only got two reasons to
14 distend an abdomen. One is that someone is just
15 stressed and they're swallowing a lot of air, and the
16 second thing is you have something leaking within the
17 abdomen and, in trauma, the most likely thing to be
18 leaking is blood.

19 So you can't rule out an abdominal injury from the
20 witness statements as another cause of death. Equally,
21 from the descriptions of her being short of breath, you
22 can't rule out blast lung.

23 Q. Thank you. Turning next to Behnaz Mozakka, the report
24 in relation to Ms Mozakka is at INQ11063. There was no
25 time-line again in relation to her because there was no

1 evidence as to her survival after the explosion.

2 A. Correct.

3 Q. Insofar as the witnesses were concerned. At appendix E
4 at page 55, there is set out a description of the nature
5 of the injuries based on the post-mortem report --

6 A. Yes.

7 Q. -- and also some observations in relation to the
8 presence of bony fragments in her left calf.

9 What conclusions were reached in relation to
10 proximity?

11 A. The conclusion from that was that Mrs Mozakka would have
12 had to have been very close to the bomb for bone
13 fragments to be energised to that extent. She would
14 have had to have been very, very close to it.

15 Q. No conclusions were reached in relation to blast
16 modelling, for the same reason?

17 A. No, the same reason, we weren't in a position to say her
18 position.

19 Q. Absence of evidence.

20 Your conclusion is at page 50. Do you set out, at
21 paragraph D5.1, the full extent of the injuries she
22 suffered?

23 A. Yes, we do.

24 Q. For those reasons, do you conclude that she was close to
25 the bomb?

1 A. Yes, we do.

2 Q. At D5.2, you explore further the issue of her location
3 or likely location and you correlate her location to the
4 likely position of the bomb, namely, that it must have
5 been located at ground level and to her right.

6 A. Yes.

7 Q. You reiterate her close proximity to the bomb, and then,
8 what do you conclude at paragraph D6.1?

9 A. Our view was, on the balance of probability, that
10 Mrs Mozakka was close to the bomb when it had exploded
11 and the combination of injuries that we observed
12 indicated non-survivable internal blast injuries and we
13 would have expected that she died when it exploded or
14 soon afterwards.

15 Q. Thank you. Now, may we turn, please, to the case of
16 Christian Small, INQ11061.
17 The time-line is at page 54 but, as you've
18 confirmed, was based, in fact, upon witness statements,
19 in particular from Lilian Ajayi and a witness called
20 Gruen.

21 A. Yes.

22 Q. Subsequent to receipt of this time-line, were you made
23 aware that her Ladyship heard from Mr Garri Hollness on
24 6 December and it appeared from his evidence that he had
25 been the gentleman who was lying on top of a number of

1 other people and he confirmed that he might have been
2 the person whom Lilian Ajayi had stated was lying under
3 a body and whom had put their hand out and said, "Can
4 you lift me up?"

5 In which case, were you informed that it may have
6 been the case that there was no evidence as to
7 Christian Small after the explosion because the person
8 to whom the witness was referring was, in fact,
9 Garri Hollness?

10 A. Yes, I was in court on that day observing, and so
11 I heard the testimony and, at that point, because the
12 time-line hadn't been taken out by the court, we left it
13 in our document. I heard for definite, once the
14 document had been submitted, that, in fact, the view was
15 that that was not Christian Small.

16 But I think as I described in our process, we look
17 objectively at the injuries and that time-line was not
18 influencing our decisions about the injuries suffered by
19 Mr Small.

20 Q. The injuries suffered by Mr Small were terrible and
21 traumatic?

22 A. Yes.

23 Q. You describe them on page 52. Their extent was such
24 that you concluded that he must have been very close to
25 the seat of the explosion indeed?

1 A. The extent was such that we were surprised to learn
2 initially that there had been reports of him speaking
3 after the explosion, so the later time-line really is
4 very much in accordance with what we thought.

5 Q. So notwithstanding that there had been some evidence
6 subsequently established to be erroneous which had
7 suggested he had survived, you had concluded, in any
8 event -- page 48 -- that the extent of his injuries were
9 such that they were non-survivable?

10 A. Yes.

11 Q. Indeed, you did not go any further in carrying out the
12 complex blast loading modelling --

13 A. No.

14 Q. -- because you were so sure of your conclusions?

15 A. Yes.

16 LADY JUSTICE HALLETT: Mr Keith, if you wish to have a break
17 at any stage, it's a matter for you, you choose your
18 moment.

19 MR KEITH: My Lady, I'm sorry to say that there are five
20 more to go, but I can conclude them I think in the next
21 20 minutes or so and --

22 LADY JUSTICE HALLETT: Would you prefer to do that, because
23 I appreciate it's difficult work?

24 MR KEITH: My Lady, I'm quite content to continue, but thank
25 you for the consideration.

1 The next case is that of Mala Trivedi. There was,
2 again, no time-line --
3 A. Correct.
4 Q. -- because of the absence of evidence as to survival
5 after the explosion.
6 Page 52 of INQ11077 sets out the extent of the
7 injuries that Ms Trivedi had suffered. The existence of
8 traumatic amputations of the legs. There was impact
9 injury as well as flash burns?
10 A. Yes.
11 Q. Did Mr Hepper therefore conclude that she must have been
12 close to the seat of the explosion and suffered primary,
13 tertiary and quaternary injuries?
14 A. Yes, he did.
15 Q. There was no complex blast loading carried out and no
16 assessment of the severity of the likely blast lung, but
17 the conclusions, at page 77, were nevertheless that she
18 must have sustained non-survivable injuries? I'm sorry
19 not page 77, page 47.
20 A. Yes, the extent of her injuries indicate our belief was
21 that she was killed instantly.
22 Q. May I now invite you to turn, please, to
23 Tavistock Square and to Marie Hartley, INQ11066?
24 The time-line is at page 54.
25 A. Yes.

1 Q. Of particular note, it's the evidence of Dr Choudhary,
2 confirmed by him in oral evidence, that he recalls
3 inserting a drip. There was also subsequently evidence
4 from a witness, Daravina, and the possibility that
5 Ms Hartley had died about 8 minutes after being brought
6 into the courtyard, and also evidence from Mr Boyd, the
7 head of security for the BMA, that she was moved
8 subsequently around just after 10.00. So the time-line
9 appears to be consistent with the evidence that was
10 given orally.

11 At appendix E, page 51 of the report, did -- I think
12 it's Colonel Clasper.

13 A. Appendix E in this case would be -- I think it would be
14 Mr Hepper.

15 Q. Mr Hepper -- thank you very much -- examined the
16 material relating to her post-mortem --

17 A. Yes.

18 Q. -- and discussed the nature of the significant head
19 injuries, in particular, that she had received?

20 A. Yes, he did.

21 Q. Did he report at paragraph E6.3 that she would have been
22 subject to a high peak overpressure?

23 A. Yes, he does.

24 Q. And comment upon the existence of fragments, parts of
25 the bomb and the material around the bomb, being found

1 on her skin and, therefore, indicating a degree of
2 proximity?

3 A. Yes, he does.

4 Q. There was no complex modelling for Ms Hartley or,
5 indeed, for any of the deceased victims from the bus
6 bomb?

7 A. No, there isn't. The difficulty we were faced with with
8 the bus bomb is that Porton felt it was modelling they
9 could do, but it would have taken a long time. In fact,
10 it would have taken them well into February. The
11 difficulty being is for them trying to work out at what
12 point the bus broke up, because when the structure
13 breaks up, a lot of the explosive products are vented,
14 which is why you have people with amazing stories of
15 survival from the bus, because it was vented and they
16 were not subject to the blast effects.

17 So we did not know initially when we started this
18 task whether we'd need complex blast loading, but in the
19 event, the majority of the injuries that we were dealing
20 with were tertiary-related injuries from people being
21 flung out of the bus, so we thought that blast loading
22 was not going to offer the court helpful, useful,
23 additional material.

24 Q. Of particular significance to Ms Hartley's case, the
25 tertiary injury most commonly associated with this bomb

1 is head injury, is it not --

2 A. Yes, it is.

3 Q. -- because of the impact of the person being blasted off
4 the bus and then hitting the road afterwards?

5 A. What we don't know as well is whether the people hit the
6 structure of the bus and then it ruptured, or whether
7 the bus ruptured and then they were -- at the time, they
8 were being flung into the street.

9 Either way, to be thrown from the top of a bus and
10 suffer head impact is a very, very serious mechanism of
11 injury for head injury.

12 Q. Indeed, at page 47, did you list there the extent of the
13 injuries that she had suffered to her head?

14 A. Yes, we do.

15 Q. And confirmed the view of Mr Hepper that she would have
16 suffered blunt trauma from the tertiary injury --

17 A. Yes.

18 Q. -- the impact with the ground after being ejected from
19 the bus, and did the history and the photographs
20 indicate that she would have died, therefore, from that
21 severe head injury?

22 A. That was our joint views, yes.

23 Q. In terms of survivability?

24 A. Our view was that the time-line was such and the
25 descriptions of the injury were such, and the evidence

1 we were presented with was such that we regarded this as
2 an unsurvivable head injury.

3 Q. I asked you at the commencement of your evidence whether
4 or not the cause of death was an issue to which you had
5 paid regard when preparing your reports and in general
6 terms you had said, "No, we were addressing a different
7 question: namely, the likelihood of survivability based
8 on an assessment of blast lung". But when you came --

9 A. In closed environments, very much so.

10 Q. In that closed environment.

11 But when you came to the bus in particular, was the
12 degree of severity of the head injuries encountered by
13 some of the deceased such that it was so plainly the
14 cause of death that it swept away any issues of
15 survivability?

16 A. Yes. Similar to our discussion with Laura Webb, the
17 evidence that we were given from the post-mortem and the
18 evidence that we had from the descriptions was that this
19 was an unsurvivable head injury. Again, unless you'd
20 like me to, I'll leave the clinical detail.

21 Q. No, I've deliberately invited you not to go into that
22 and thank you, Colonel, for respecting that.

23 May I then turn to Shahara Islam, please,
24 appendix E? I'm sorry, appendix F. The time-line can
25 be found at page 54 of INQ11068. It referred in

1 particular to the witness statement of Dr Lodhi, one of
2 the BMA doctors who had to come out of the building and
3 attended to a person who, it seems, was Shahara Islam.
4 In his witness statement, which he confirmed in oral
5 evidence, he described the very severe injuries that she
6 had sustained.

7 A. Yes.

8 Q. There was also evidence before her Ladyship orally from
9 Mr Bannister to like effect. Was the conclusion,
10 therefore, at page 47 that the extent of the injuries,
11 in combination, were such that she would not have
12 survived?

13 A. Correct. We were provided with very little material
14 from -- for this lady, but from the one scene photograph
15 we had, we felt very confident in being able to say
16 these were non-survivable injuries.

17 Q. Turning next to Miriam Hyman, please. INQ11075. The
18 time-line is at page 55. The time-line broadly gave the
19 period of survival as between 9.47 and 9.57, 10 minutes.
20 In fact, there's been some evidence given in court
21 orally to the effect that she would have died
22 approximately 5 to 10 minutes after the blast. At
23 appendix D at page 47, you describe at D5.3 the very
24 extensive injuries that she suffered.

25 A. Yes.

1 Q. At the bottom of the page, you refer to Mr Hepper's
2 conclusion that her injuries are consistent with being
3 close to the bomb and are most likely due to
4 a combination of primary and tertiary injuries.

5 A. Yes.

6 Q. What did you conclude in relation to likely
7 survivability?

8 A. We concluded that the combination of injuries, and again
9 this includes -- our view was it was highly likely that
10 Ms Hyman had a significant head injury, but her other
11 injuries would also indicate significant blood loss.
12 Our view, these were most likely, in the balance of
13 probability, non-survivable injuries, particularly with
14 that very rapid time course of death.

15 Q. May we then turn to William Wise, please, INQ11070? The
16 time-line is on page 53 of that report. There is the
17 one reference from Inspector Perry to a male on the bus
18 with a beard and he notably referred to the colour, the
19 appearance of the skin of the person whom he saw.

20 A. Yes.

21 Q. Your conclusion was at page 47 of that report.

22 A. Yes.

23 Q. What was it?

24 A. Well, again, we're not in any way challenging what
25 witnesses have reported, because our team wasn't there,

1 but the photographs we saw of Mr Wise, his position in
2 the bus, and the position of the collapsed upper floor
3 of the bus and the degree of head injury that he
4 suffered made us surprised that he could have spoken
5 afterwards.

6 Again, I'm not doubting a witness's report. The
7 issue is that of elastic deformation which Mr Hepper
8 refers to. When a structure is blown up or is moved at
9 speed, the position that you see on scene, say in this
10 case of the upper floor of the bus, is not the position
11 it's been through. It's bowed down, and then it's flown
12 back up again and it's done that multiple times.

13 So for Mr Wise to be trapped with the structure
14 right up against him indicates it's being through a much
15 larger range of movement before it's come to rest.

16 So our impression was that the -- we were looking at
17 somebody who went -- had non-survivable injury, and our
18 interpretation of the injuries would have been that he
19 was killed instantly, but clearly a witness reports
20 otherwise, so I can't reconcile that.

21 Q. You may have put yourself at a disadvantage
22 unnecessarily, Colonel, because there's no evidence that
23 he spoke. You said there was some evidence of him
24 speaking. The only evidence was from Inspector Perry
25 reporting on the appearance of the gentleman and the

1 colour of --

2 A. That may be my mistake. I thought I read a witness
3 transcript saying -- I must call the page up --

4 Q. I'm very grateful, I'm the one who's mistaken, there is
5 some reference to him saying "Help me". I stand
6 corrected.

7 A. Thank you.

8 Q. Do you, consistent with what you said, describe at
9 paragraph D5.3 the very extreme nature of the head
10 injuries that he suffered?

11 A. Yes, very extreme head injuries.

12 Q. Finally, may I turn, please, to Mrs Gladys Wundowa,
13 INQ11078? The time-line is at page 56.

14 Mrs Wundowa was moved, of course, into the BMA
15 courtyard after the explosion and treated in particular
16 by Dr Choudhary.

17 A. Yes.

18 Q. You refer -- or there is a reference on page 57, rather,
19 to the HEMS doctor --

20 A. Yes.

21 Q. -- Dr Teasdale. In evidence, he spoke of how she was
22 pronounced dead at 10.40, so confirmed the time-line
23 which you had there and on the previous page.

24 Your conclusions in relation to Mrs Wundowa are on
25 page 48. The fluoroscopy showed a considerable number

1 of fragments in her left upper arm, right-sided chest,
2 right calf and right shin, and also particular injury to
3 her jaw.

4 A. Yes.

5 Q. On account of those features, as well as the post-mortem
6 images, what did you conclude in relation to proximity
7 and likely cause of death?

8 A. We know from her -- we've got good evidence of where
9 Gladys Wundowa was sitting on the bus, so we know she
10 was not on top of the bomb, but relatively close to the
11 bomb, but she was sitting in a corner in the bus, and
12 so, one of the things that Mr Hepper brings out is,
13 although we haven't got complex blast loading for her,
14 it's likely her corner position resulted in increased
15 blast effects on her, and then, in addition, the
16 fractured jaw that she had and some of the other
17 appearances such as the blood in her ears and the
18 description of her from the witnesses could indicate
19 a head injury, I would entirely expect that with her
20 being thrown out of the bus.

21 But equally, there are witnesses thinking or raising
22 the possibility of a spinal cord injury. Remember,
23 however, that the head -- the brain and the spinal
24 column, the spinal cord, rather, they're all in
25 continuity, so it's not unusual for a mechanism of

1 injury that injures the head to also injure the upper
2 parts of the neck.

3 Q. Would that also explain respiratory or breathing
4 difficulties that the witnesses reported her having?

5 A. It could do. Both head injury and a high spinal cord
6 injury, both could cause breathing difficulties, both
7 could cause changes in heart rate and in this case slow
8 heart rate. So our impression was it was likely that
9 the significant injury was blunt injury to the head or
10 to the spinal cord or potentially a combination of both,
11 complicated by blast loading with her corner position.

12 Q. Therefore, was the cause of death likely to have been
13 one or other, a head injury or the spinal injury --

14 A. Yes.

15 Q. -- and, therefore, that she had suffered
16 a non-survivable injury?

17 A. Our view was, on the balance of probability, from the
18 description and from the injuries that we could see,
19 this was a non-survivable injury.

20 MR KEITH: Colonel, thank you very much.

21 LADY JUSTICE HALLETT: Mr Taylor, I'm going to take a break
22 now. I don't know if you're going to want to ask
23 Colonel Mahoney any questions. If there's anything you
24 wish to explore that you didn't want to do in public,
25 please just mention it to Mr Smith. I don't want you to

1 feel you have to go into details you'd rather not go
2 into in public. So if there's anything you wish to
3 discuss with him, take this opportunity now. Thank you.
4 Ten minutes, please.

5 (3.35 pm)

6 (A short break)

7 (3.45 pm)

8 LADY JUSTICE HALLETT: Mr Taylor, I understand you do have
9 a question or two for the Colonel and you can't be here
10 tomorrow, so would you like to go first, if nobody else
11 has any objection?

12 Questions by MR TAYLOR

13 MR TAYLOR: Good afternoon, Colonel.

14 A. Mr Taylor.

15 Q. This relates to my daughter, Carrie, who was on the
16 Aldgate train. Of course, most of the things that
17 you've put in this report here, and I've read through
18 this report, go totally above my head, but there are
19 a few questions that I'd like to ask you just to clarify
20 in my own mind.

21 It's about your colleague, actually, the positioning
22 of Carrie's place in the actual carriage. I don't know
23 if we can put a plan of the carriage on, can we put
24 a plan on?

25 I haven't got the number here.

1 MR SAUNDERS: [INQ10280-8].

2 MR KEITH: Mr Saunders is ahead of me.

3 LADY JUSTICE HALLETT: We have more than one plan, I have to
4 say. Which one are you more familiar with, Colonel?

5 MR KEITH: I think it's page 8 is the one that Mr Taylor
6 showed me a few moments ago.

7 MR TAYLOR: Sorry about that. We tend to agree with this
8 plan here, but your colleague, Colonel Hepper --

9 A. Yes, it's Mr Hepper who was the blast engineer.

10 Q. He tends to think that Carrie was slightly nearer to the
11 explosion?

12 A. That's correct.

13 Q. This plan here says that Carrie was most likely
14 2.6 metres away from the explosion. Carrie is at
15 number 17, if you can see that.

16 A. Yes.

17 Q. He tends to put Carrie slightly farther towards the
18 explosion.

19 A. Yes.

20 Q. Now, we know that Carrie actually entered the carriage
21 through D6, I believe it was. She's gone through there,
22 and then she's turned left to where number 17 is. Most
23 of Carrie's injuries were to the left-hand side of her;
24 correct?

25 A. Yes.

1 Q. We know for a fact, from some of the evidence that we've
2 heard, that there were three other ladies between Carrie
3 and the explosion. That was Fiona, that was Benedetta
4 and that was Anne Moffat, three people.

5 A. Yes.

6 Q. You were accepting in the report that she was partially
7 shielded by these three ladies?

8 A. Yes.

9 Q. Could have been, and possibly by number 6, which was
10 Lee Baisden. Possibly.

11 Now, if you look at that carriage plan there, you
12 will see that there's not -- it's not full up, the
13 carriage is not full up. I can't see that Carrie would
14 enter the carriage through D6, turn left and shuffle
15 down towards the other three ladies. I mean, we're
16 talking about a distance of 7-foot, 2.6 metres, 7-foot.
17 I can't see three ladies shuffling down more towards
18 that -- towards where the explosion was. There's not
19 enough distance between the three ladies to push Carrie
20 down farther. Why would she have moved actually farther
21 down the carriage towards the explosion than on the
22 report here?

23 A. Our comments are really based on the injuries. Do you
24 want me to go into the injuries in detail?

25 Q. We know the injuries, we know the injuries --

1 A. Can I describe in open court to answer your question?

2 Q. Sorry, I didn't quite catch that?

3 A. Do I have the coroner's authority to discuss the
4 injuries in detail in court?

5 LADY JUSTICE HALLETT: It's a matter for you and your wife,
6 Mr Taylor. Do you want to talk any further to your
7 wife? It's up to you the kind of detail we go into.
8 I really don't want -- once it's on the transcript, it's
9 out there for all time. So it's up to you.

10 MR TAYLOR: No, we don't need to go into great detail. We
11 know that Carrie would possibly have lost a limb.

12 A. Our conclusion -- my colleague's conclusion on Carrie's
13 position is based on the fragment injury and based on
14 his knowledge of fragment injury, and his view is based
15 on the explosive device and how it would have shattered
16 the -- or how he believes it would have shattered the
17 screen, I believe, at 8, and created fragments from the
18 glass.

19 His view is to get the type of injuries that we saw
20 on Carrie would require her to be closer in.

21 Now, again, I haven't been exposed to all the
22 evidence that's been given in court and this is not the
23 only plan that I've seen and I accept that these
24 distances are, in fact, very small, but as we've
25 described in our initial generic report describing the

1 effects of explosions, the distance between living and
2 dying in a bomb of this size is this much, and the
3 difference between living and dying in a complex blast
4 environment can be that much, can be that much.

5 LADY JUSTICE HALLETT: Could we -- for those who are
6 following the transcript without sight of you --

7 A. I beg your pardon. It can be 30 to 60 centimetres in
8 a simple environment, and can be up to metres in
9 a complex environment.

10 So what my colleague is saying is, based on the
11 fragment injuries that he has seen, he would place
12 Carrie Taylor closer to the bomb and, based on that, and
13 based on the witness descriptions, we would conclude
14 blast lung injury.

15 But, as I've said all the way through, if you take
16 anyone in the carriage and put them somewhere very
17 different, then we'd look for different explanations,
18 but in Carrie's case, the presence of the fragment
19 injuries are some -- what appears -- what looks to us
20 like glass fragment injuries, would suggest that she was
21 closer.

22 MR TAYLOR: Could those injuries have been caused by flying
23 metal, you know, flying objects?

24 A. You can certainly get a fragment injury from flying
25 metal, no question about that, and some of the closest

1 injuries that I've seen, which allows me to talk about
2 fragment injuries, have been from actual and improvised
3 Claymore mines, which throw a cloud of ball bearings out
4 at people.

5 So based on that, and based on the fact that they
6 were -- the -- there is not a description in the
7 fluoroscopy of lots and lots of metal fragments, which
8 is why Dr Hepper concluded they were more likely to be
9 glass.

10 MRS TAYLOR: She got thrown backwards through a partition.

11 MR TAYLOR: We accept that Carrie was probably blasted
12 backwards into the pole --

13 A. Yes.

14 Q. -- and there was some talk about her actually sustaining
15 spinal injuries on that pole.

16 You didn't have the opportunity obviously to do
17 a full post-mortem, you didn't do a post-mortem at all.
18 You got that information, actually, it was passed on to
19 you by Mr Osborne, was it?

20 A. Yes, the information we've got is the recorded external
21 post-mortems and the witness statements, yes, Mr Taylor.

22 Q. There was no internal examination?

23 A. That's correct, yes.

24 Q. To be fair, we're grateful for that. But from an
25 external examination, could you tell that there were

1 spinal injuries?

2 A. It really depends on the degree of injury. If I can
3 relate it, perhaps, to looking after living casualties
4 when I've done pre-hospital care, or when I've received
5 people in the resuscitation room, it can also depend on
6 the level of the spine. What you can do, if I'm
7 assessing somebody out on the ground or when I was doing
8 pre-hospital care, or assess them in hospital, one of
9 your initial assessments is to run your hand down the
10 curvature of someone's back along the spinal column and
11 what you're looking for is either swelling, tenderness
12 in the awake person or a feeling that the bones aren't
13 in alignment. And in very, very severe spinal injury
14 you would find that.

15 Now, in blast and ballistic injury, our experience,
16 particularly from the type of injuries we're seeing in
17 Afghanistan and people who are unconscious, is that you
18 don't always find it when you run your hand along, it
19 can be quite subtle, and it really needs an X-ray
20 system, a CT scan where you get the 3-dimensional
21 images, where you do a complete imaging of the person,
22 that way you get to see the spinal fractures.

23 So in short answer, yes, you can sometimes find
24 a severe spinal injury on external examination, but
25 generally, you'll be more likely to find it with imaging

1 and with internal examination.

2 Q. At D5.4, it notes that she had a left side forehead
3 injury and also, I think, Mel Finn noted that Carrie's
4 face was covered in blood.

5 A. Yes.

6 Q. That doesn't mean to say that the blood was all
7 Carrie's?

8 A. No, it doesn't.

9 Q. I mean, it could have been obviously from other people?

10 A. It could have been other people.

11 Q. Yes, and you also note that there was no underlying
12 skull fracture.

13 A. That's the report from the external post-mortem. In
14 a number of the patients, casualties, the pathologist
15 particularly states the presence of an underlying skull
16 fracture. In others, we've inferred that from the
17 mechanism of injury or from other external injuries.

18 In the case of Carrie, our reading of the
19 post-mortem report was that, yes, there was
20 a laceration, ie cut, but the pathologist notes that the
21 pathologist did not spot an underlying break in the
22 bone. That does not exclude an underlying brain injury.

23 Q. Without an internal examination, you couldn't tell?

24 A. Very difficult to tell, Mr Taylor. I mean, if someone's
25 unconscious or decreased conscious level, then that does

1 push you towards thinking about an underlying brain
2 injury. Decreased conscious levels is one of the
3 markers of brain injury. Equally, being short of oxygen
4 because of lung injury or, equally, being short of
5 oxygen because of blood loss can all drop your -- or
6 rather can all decrease your conscious level as well.
7 So we can make an inference that, if you've got
8 a cut, there might be an underlying injury, but the
9 implication is, if there wasn't a bump hard enough to
10 break the bone, we don't have sort of obvious concrete
11 evidence.

12 Q. Dr Quaghebeur notes that she thought there was some
13 bleeding from her nose --

14 A. Yes.

15 Q. -- and that could indicate a head injury.

16 A. It certainly could. It could indicate two things. When
17 you think about the position of the nose, you can either
18 get blood coming out of the nose, coming up, coming
19 down.

20 If it's coming down, what you're thinking about is
21 a fracture at the base of the skull, and that's a line
22 that runs -- and I appreciate that this is
23 a transcript -- there's a line that runs really along
24 the bottom of the skull that the face hangs on to. And
25 that's an area in trauma where you do get fractures

1 within the skull, and you get damage to the vessels that
2 are associated with that, and the way the blood is seen,
3 it's seen from the nose, from the ear, and around the
4 eyes.

5 Equally, a lung injury could cause blood to come up
6 and you see it coming out of the nose, but equally,
7 a bad bump on the nose or a bad bump in the mouth could
8 cause localised bleeding and, in turn, that could also
9 lead to blood loss from the nose.

10 Q. With internal injuries, I mean, I noted that we talked
11 about abdominal injuries.

12 A. Yes.

13 Q. There was no sign of an internal abdominal injury. It
14 wasn't distended.

15 A. No.

16 Q. What does that tell us? That tells us that it's
17 probably not an internal injury?

18 A. No, what -- again, we were looking at the photographs,
19 both from the scene and from the post-mortem, and we
20 were using those to infer the presence of injury and
21 infer whether there had been bleeding or not.

22 Now, if I was faced with somebody who -- say, if
23 you're faced with a young soldier, who are normally very
24 fit, thin people, and we see them in the resuscitation
25 room or see them on the back of the aircraft or the

1 helicopter and their belly is distended, you know, sort
2 of out like a boiled egg, then something is in there and
3 the most likely thing that's in there in the context of
4 trauma is blood.

5 Admittedly, we're looking at just photographs of
6 Carrie, but our interpretation of the photographs that
7 we saw, her tummy wasn't bloated.

8 Q. The photographs were taken, what, at the post-mortem?

9 A. We looked at photographs that were taken on the scene,
10 including those that were taken outside the train, and
11 some that were taken at the external post-mortem.

12 Q. The post-mortem was done, what, seven days after the
13 explosion?

14 A. It was certainly done some days afterwards.

15 Q. Would that make a difference to photographs, the amount
16 of time between time of death and then --

17 A. Yes, it could. But what I would expect, if I was
18 looking at a post-mortem photograph several days
19 afterwards, I'd be more likely to see a distended tummy
20 than less likely to see a distended tummy.

21 Q. Basically, your final reports are "survival unlikely",
22 and just what I'd like to ask now is, basically, without
23 the evidence from a full internal post-mortem, it can
24 leave a slight question mark over the possibility of
25 survival, so can you be absolutely certain that Carrie

1 wouldn't have survived if she had had prompt medical
2 intervention?

3 A. I think with all the people that we've looked at -- I'm
4 not just speaking about Carrie now, and I will answer
5 you in detail -- they fall into a number of groups.
6 They fall into injuries that look utterly devastating
7 and you can say, "No, I do not think under any
8 circumstances a person with those injuries would
9 survive", and you've got people where we've inferred the
10 amount of blast injury where we can say we think it's
11 likely they had this degree of blast injury, but I can't
12 say for absolute certainty, hence we've talked about
13 balance of probability.

14 And when people have lived for -- people who live
15 less than half an hour are one group. If you live half
16 an hour to an hour, you're generally regarded as another
17 group. If you're living beyond an hour -- those are all
18 very crude indications of the underlying severity.
19 So there are situations -- certainly with some of
20 the people, you cannot say for certain, "No, this person
21 would not have survived". All I can offer is a balance
22 of probability based on where we believe they were from
23 their injuries -- and clearly there is a degree of
24 debate and people can debate that -- what we think the
25 likely blast loading is to infer internal injury, and

1 the length of time they survived.

2 I can't be any -- if that's not clear enough, please
3 ask me again and I'll try to clarify further.

4 Q. There are no absolute certainties with this sort of
5 thing, you know, there are a number of factors that
6 could change your opinions on this, but I think we've
7 learnt from today and from evidence that has been given
8 to us there are no absolute certainties why some people
9 survived and other people didn't.

10 A. No, so much of it is the nature of the bomb, the
11 direction of the explosion, where people were, how they
12 were orientated towards the bomb.

13 Some injuries are barn door clear that this person
14 could not possibly have survived and others, where
15 there's been a long period of survival, that's where, as
16 Mr Keith has drawn out from me, we have a degree of
17 uncertainty, and we have to go down the balance of
18 probability. So, I'm sorry, I can't be more certain for
19 you, Mr Taylor.

20 MR TAYLOR: Thank you very much, Colonel.

21 A. Mr Taylor.

22 LADY JUSTICE HALLETT: Sorry, just before you sit down,
23 Mr Taylor, I wasn't quite following, Colonel, when you
24 said essentially you've got the two categories: those
25 where you can say with confidence that the injuries are

1 such that you're really fairly confident and fairly
2 certain they wouldn't have survived; and those where you
3 have inferred that it's likely on the balance of
4 probabilities.

5 A. Yes.

6 LADY JUSTICE HALLETT: In which group did you say you were
7 putting Carrie, do I take it the second group?

8 A. I think the length of time that Carrie survived was not
9 a long length of time, not like someone who had survived
10 for an hour, two hours, but she was alive long enough
11 and she didn't have obvious mutilating injuries where
12 you could say, on the balance of probability, we think
13 they were unsurvivable injuries, but I can't say for
14 certain.

15 MR TAYLOR: We tend to suggest that Carrie was possibly
16 alive at 9.20, 9.23, something like that, you're talking
17 possibly 25 minutes.

18 A. Which, to be honest, is a fairly -- in a post-explosion,
19 is a relatively short period of time, and that would
20 then push someone back towards the group of being less
21 likely to survive.

22 I'm sorry I can't be more -- I can't give you
23 certainty, but these are the issues that we had and
24 certainly, when we were considering Carrie, I would say
25 that Carrie is one of the people where we spent weeks

1 looking at her injuries and all the information we had
2 on her and kept coming back to her, trying to sort of
3 hone down on the opinion that I've expressed today.

4 MR TAYLOR: Thank you very much.

5 LADY JUSTICE HALLETT: Thank you, Mr Taylor.

6 MR KEITH: My Lady, might I be permitted to ask one question
7 arising out of the questions that Mr Taylor has put that
8 may assist --

9 LADY JUSTICE HALLETT: Certainly.

10 MR KEITH: -- in answering the implicit question behind the
11 questions he openly posed?

12 Further questions by MR KEITH

13 MR KEITH: Colonel, the evidence relating to Carrie Taylor
14 showed that she had a broken arm and possible bruising
15 around the face.

16 A. Yes.

17 Q. The evidence from the emergency responders as well as
18 the passengers in the carriage was to the effect that
19 she was recovered initially from the remains of the
20 glass screen and the pole at the end of the bank of
21 seats.

22 A. Yes.

23 Q. If she had been closer to the bomb than position 17 on
24 the map, would the force of the explosion, in your
25 estimation, have been sufficient to propel her towards

1 the glass screen, into the glass screen where she was
2 recovered?

3 A. Again, without more details, I really can't say,
4 Mr Keith.

5 MR KEITH: My Lady, may I also ask one question arising out
6 of my Lady's question, because it touches upon a point
7 that has been openly discussed outside court, but which
8 is what the overall conclusion is that has been reached
9 by Colonel Mahoney?

10 Could I emphasise this, or ask you to emphasise
11 this, Colonel: in relation to the vast majority of the
12 cases that you examined, you are able to say, on
13 a balance of probabilities, that the injuries were not
14 survivable?

15 A. Yes.

16 Q. By which you meant, whatever might have happened, those
17 injuries were not, in your estimation, survivable?

18 A. On a balance of probability, on our assessment of the
19 evidence as given to us, yes.

20 Q. But the converse does not hold true, does it? You are
21 not saying in the other cases that the injuries were
22 such that you would have expected them to survive?

23 A. No.

24 Q. You were merely stating that in certain of the cases,
25 Samantha Badham, Philip Beer and Shelley Mather, you are

1 unable to express a view as to whether or not the
2 injuries themselves were so devastating as to make it
3 unlikely that they would have survived?

4 A. Yes.

5 Q. And in relation to Mr Brewster -- because there's been
6 a query already in relation to what you were saying in
7 relation to him -- your conclusion was that the injuries
8 were not survivable on a balance of probabilities?

9 A. On a balance of probabilities, if our positioning data
10 is correct, and if our interpretation of the nature of
11 the amputating injuries, or at least the burn injuries
12 to his legs are correct, our view is that he suffered
13 a non-survivable blast overpressure. But, as I said all
14 along, change one of those parameters and you can
15 interpret it differently.

16 MR KEITH: My Lady, I apologise for interposing those
17 questions. There's been debate about the significance
18 of the evidence.

19 LADY JUSTICE HALLETT: Thank you. Mr Coltart, you're going
20 next?

21 Questions by MR COLTART

22 MR COLTART: I think I am. Good afternoon, Colonel. I have
23 only a few questions, if I may, on behalf of
24 Richard Ellery's family. So I wonder whether we could
25 just reorientate ourselves with the map of the Tube

1 train?

2 A. Sorry, I have spilt water everywhere, I do apologise to
3 the court.

4 LADY JUSTICE HALLETT: Don't worry, I've done it in my time.

5 A. Fire away, sir.

6 MR COLTART: I'll just pause for a moment. We'll sort out
7 the water, I think --

8 A. That's probably a good thing.

9 MR COLTART: -- and then we'll carry on. Perhaps we could
10 get the plan up on the screen in the meantime.

11 A. Mr Coltart?

12 Q. Thank you. So to remind ourselves, Richard Ellery was
13 at point 11 on this plan?

14 A. Yes.

15 Q. So close proximity to the explosion?

16 A. Yes.

17 Q. In the corner of that carriage, which of itself I think
18 may have been of some significance, as far as your
19 findings were concerned.

20 A. Yes.

21 Q. Then to remind ourselves, if we can, and to assist you,
22 I hope, can I ask you to turn, please, to your report in
23 relation to Mr Ellery at page 14. There's no need to
24 have this on the screen.

25 The essential features of your conclusions in this

1 case is that he probably survived for no more than about
2 45 minutes after the explosion, he was dazed and
3 distressed after the explosion, but not speaking
4 coherently, the engineering review concludes that he was
5 within 2 metres of the bomb when it went off,
6 1.75 metres, and that the corner structure would have
7 increased the blast loading. He sustained a peak
8 overpressure of greater than 2 megapascals?

9 A. Yes.

10 Q. Which would have been enhanced by the confined
11 circumstances in which found himself, and likely to have
12 suffered severe primary blast lung injury.

13 Then, if we look at the final paragraph in your
14 opinion, his other injuries were unlikely of themselves
15 to have been fatal.

16 A. Yes.

17 Q. So can we take it that he's in perhaps your second
18 category of victims, in other words it wasn't inevitable
19 that the crushing traumatic injuries that he had
20 sustained were going to kill him anyway, so it's
21 a matter of inferring the likelihood of death arising
22 out of blast lung injury or other internal injuries
23 which he may have suffered?

24 A. Yes, because when you look at -- again, I'm conscious
25 about clinical detail -- when you look at Mr Ellery in

1 the photographs, he looks relatively uninjured.

2 Q. Yes.

3 A. However, when you go into the details of the
4 post-mortem -- and, again, I'm conscious of the
5 environment -- he does have a significant head injury
6 and he does have indication of bleeding -- burns,
7 rather, so to clarify, he does have indication of burns
8 and the report notes that he has full thickness burns as
9 well as just the flash burns, so full thickness burns
10 again draws you closer to the device in terms of the
11 intensity and duration.

12 Now, you could present us with somebody in
13 a hospital who had the same picture, the same degree of
14 burns and the same apparent head injury from a car
15 accident, with a car fire, and you could look at those
16 injuries and you could say -- be pleased that that
17 person survived.

18 I think the difference here is that putting
19 Mr Ellery as close as we believe he was to the bomb, the
20 implication is, our understanding from that is that the
21 overpressure would have given him severe, significant,
22 internal injury and that would have been the
23 overwhelming injury. Does that clarify?

24 Q. It does, thank you. Now, in his case, him being in that
25 category, is it possible to narrow down the percentage

1 range in terms of likelihood of survivability or
2 otherwise? We're dealing at the moment with balance of
3 probabilities, but of course, that could be anywhere
4 between 51 per cent and 99 per cent.

5 Are you able to give us a clearer idea of how likely
6 these injuries were to cause death, in any event?

7 A. No, I don't think I can do that fairly to you, the
8 reason being, all the caveats. I can infer his position
9 because of his burns and other injuries. We can infer
10 the bomb characteristics. We can give a TNT equivalence
11 and, from that, we can plot the likely effects within
12 the carriage.

13 Q. Yes.

14 A. The witness statements are consistent with my experience
15 of people dying from blast lung injury or other
16 explosive-related injury.

17 But were I to give you a percentage, I honestly
18 don't think I could give you a percentage that means
19 anything.

20 Q. If that's the case, then, I'm not going to press you
21 further on it, but are you able to tell us this: was he
22 one of those cases which involved extensive debate and
23 discussion --

24 A. Yes.

25 Q. -- before you were able to arrive at what is finally

1 a unanimous conclusion?

2 A. Yes, no question. Where we've got obvious mutilating
3 destructive injury in a person, then our opportunity or
4 reason for debate was very limited. Where we've got an
5 individual who is apparently unmarked, for all the
6 reasons you've drawn out, and your parameters can be
7 very variable in terms of, if they were just a metre
8 this way or a metre that way, or they were sitting up or
9 they were lying down or standing up, where you've got
10 that degree of uncertainty, then really we had great
11 difficulty -- I can honestly say, even doing as much of
12 this as we have, we had great difficulty saying for
13 certain -- I realise we can't say for certain, but
14 within the balance of probability what the likelihood of
15 survival or death was.

16 Q. Thank you, that's very helpful.

17 Can I ask you to look, please, at a part of your
18 first generic report which I don't think we've
19 considered yet this afternoon? This is, my Lady, at
20 [INQ10552-8]. I don't see any reason why it couldn't be
21 on the screen. It doesn't relate to any particular
22 deceased.

23 This is that part of your original report where you
24 deal with what type of early intervention, medical
25 intervention, might make a difference in relation to

1 someone who suffered from a blast injury.

2 You say you offer the following opinion relating to
3 these matters, and the extent to which lives can be
4 saved by appropriate and early management of blast
5 injury, and it depends, doesn't it, on the type of
6 injury which someone has suffered?

7 A. Yes.

8 Q. You deal with blood loss and application of
9 a tourniquet. That doesn't apply in Mr Ellery's case.
10 If a victim is unconscious and there is a blockage
11 in their nose or their mouth, then that can be removed?

12 A. Yes.

13 Q. A hole in the wall of the chest, then covering the hole
14 can be life saving. Again, that doesn't apply to him,
15 but all of these things individually might apply to
16 other of the deceased and, if my learned friends wish to
17 ask you questions about them, they can.

18 Internal bleeding and IV fluids, but the one which
19 may -- and I'm going to ask you to assist us with
20 this -- be relevant in his case is at 6.2.6:

21 "The early use of oxygen may also help badly injured
22 people to survive."

23 A. Yes.

24 Q. Given what you've told us about blast lung and the
25 effects of blast lung and the inability of the lungs to

1 function properly and to absorb and process the oxygen
2 into the system, can the early application of oxygen
3 assist, even with those people who have suffered
4 otherwise very severe blast lung damage?

5 A. It depends on how much functioning lung that person
6 still has.

7 Q. Right.

8 A. So if I could illustrate, if you've got someone who's
9 been very close to an explosion and the degree of
10 bleeding and almost instant bleeding and destruction to
11 the lung is such -- and I realise this may be
12 a distressing image, but I think it's important -- that
13 when you look at those lungs after death, you cannot
14 recognise normal lung tissue, it looks more like liver,
15 then you can't do anything with that, you know that that
16 is somebody where the degree of injury and the degree of
17 bleeding was catastrophic and you couldn't do anything
18 about that, so that's one group.

19 At the other end, you have another group who are
20 exposed to blast overpressure, have a degree of injury,
21 but actually don't really notice it and keep fighting in
22 our world, and we only notice it later when they come in
23 when they're blown up or shot for something else, we
24 notice changes on the X-ray, so that's another end.

25 In the middle, you have a group of people where you

1 have significant lung injury and you have a significant
2 effect, the person is short of oxygen in the body and,
3 under those circumstances, additional oxygen can help,
4 it can actually improve the physiology, improve some of
5 the readings that you get on your monitor.

6 It doesn't necessarily alter a person's survival.
7 Generally, what it will do is buy you time to a next
8 stage of care, and I can't say if this would have been
9 the case for Mr Ellery. But if you've got somebody,
10 say, whose lungs are such that the amount of oxygen in
11 the blood is so bad that they're deteriorating rapidly
12 and you give them oxygen and that is enough to
13 compensate and it gets them alive to the next stage of
14 care, then the next stage of care may involve going on
15 a ventilator and other techniques to try and maximise
16 lung function while you're dealing with other injuries.
17 It doesn't guarantee.

18 Q. There's a conflict in the evidence, as far as Mr Ellery
19 is concerned, about whether he did receive oxygen or not
20 and whether, if he did, whether he received sufficient
21 or adequate amounts of oxygen at the scene.

22 I'm not going to ask you to resolve that issue.

23 What I'm hoping you can do is to assist us in
24 determining whether we need to go on to resolve it or
25 whether it's academic in his case.

1 Given what you know of the pressure which was
2 exerted upon his chest during the course of this
3 explosion and his position within the carriage and so
4 on, are you able to say one way or another whether the
5 provision of oxygen or more oxygen would have made any
6 difference to the outcome in his case?

7 A. Taking -- if we take that scene diagram as correct and
8 take my colleague's conclusions about the overpressure
9 as correct, and if the overpressure is -- our belief --
10 well, the belief of Mr Hepper and Dr Pope was that
11 Mr Ellery suffered 2 megapascals, under those
12 circumstances, no amount of oxygen would have made any
13 difference at all.

14 Q. That's very helpful, if I might say so.

15 So is the sad reality of the position this, as far
16 as Mr Ellery was concerned: that he was going to die
17 from these injuries, no matter what treatment was made
18 available to him in that period after the blast?

19 A. That's my understanding, and if I can clarify, when
20 I talked about we needed weeks for people, we certainly
21 did, and we only had the complex blast loading, because
22 it took so long for the computers to give us this,
23 towards the end of the process, and then we revisited
24 everybody, when we had the complex blast loading, as
25 clinicians, and for Mr Ellery, the complex blast loading

1 was very helpful for us to make our decision that this
2 was somebody who, although superficially had injuries
3 that, from a car fire, you'd hope he would survive, the
4 place he found himself in and his relation to the bomb
5 was such our view would be that his lungs were
6 destroyed.

7 MR COLTART: Colonel, thank you very much indeed and, in
8 those circumstances, I have no further questions for
9 you.

10 LADY JUSTICE HALLETT: Is there anybody else who's in
11 difficulties tomorrow? Because I understand you can be
12 back tomorrow, Colonel. Is that right?

13 A. Yes, my Lady.

14 LADY JUSTICE HALLETT: Is there anybody else who would like
15 to go before Mr Saunders? Right, Mr Saunders.

16 Questions by MR SAUNDERS

17 MR SAUNDERS: Can I go back to Aldgate as well, please?
18 Mr Taylor's already asked you some questions. Could we
19 have up on the screen [INQ10280-9], please?

20 Colonel, I hope you've seen this one as well.

21 A. Yes.

22 Q. This, as you'll see from the heading, is the
23 Metropolitan Police doing the best they could
24 post-explosion, all right? So it's slightly different
25 to the one that Mr Taylor was asking you about, which is

1 at the time of explosion.

2 A. Yes.

3 Q. So this is post-explosion, and we know, because we heard
4 a considerable amount of evidence about Carrie Taylor,
5 and I represent the family at number 14,
6 Fiona Stevenson.

7 A. Can I just find my report, if I may?

8 Q. Of course. We have assumed that the cross beside D7 is
9 the point of explosion.

10 A. Yes.

11 Q. Obviously, the person responsible, Tanweer, is seen more
12 towards that door, but from the way in which you and
13 your colleagues have tried to estimate where Fiona and
14 Carrie were, it would appear they may have been slightly
15 more towards the point of explosion.

16 A. Yes.

17 Q. What has happened is there's a direct blast, the
18 aftereffect of the explosion, both of them -- Carrie, we
19 know, was across the person Crystal Main at seat 22 and
20 Fiona Stevenson on Mr Lait at seat 21. That's where
21 they were. Carrie having gone through the partition or
22 across the partition by the pole.

23 But in Fiona's case, it's your and your colleagues'
24 opinion -- I'm simply looking at D6 at the moment --
25 that Fiona has died quickly after the bomb?

1 A. That's what we're taking from the witness statements.
2 So our conclusion on time-lines for people surviving,
3 for the time after the bomb to the time they were alive,
4 to the time that they've died, is based on the witness
5 statements we've been provided with. So our summaries
6 of that are based on the witness statements we've been
7 provided with and, from that, we'll calculate
8 a time-line and, from that, we will infer the injuries.

9 Q. There was in Fiona's case, Mr Lait, in particular, who
10 recognised a slight noise. The gurgling, in fact, comes
11 from Ms Main, who was unable to give evidence, so I want
12 to, as it were, put that to one side, because we never
13 had an opportunity to check or test the sounding.

14 What we had was from Bruce Lait, who said that he
15 recalled momentarily, but immediately, some squeezing,
16 but that was it. There was nothing that went beyond
17 that.

18 A. Yes, he talks about her hand moving around, I believe.

19 Q. Exactly, but that was very much immediately afterwards,
20 when he comes to, and that really was it. There was
21 nobody else significant who sees or is aware of Fiona
22 after that point.

23 So it does look, doesn't it, the opinion that she
24 does die quickly unlikely to be from bleeding?

25 A. Yes.

1 Q. But in fact, in her case -- and I don't -- and I'm
2 grateful that you haven't so far -- need to list the
3 injuries you've set out at D5, because it would appear
4 that Fiona's obviously right-hand side on to the
5 explosion. I'm looking at D5.2, your page 50 of 86.

6 A. Yes.

7 Q. So from all of those, and from the findings of the
8 fluoroscopy, it appears she's right-hand side on to the
9 explosion --

10 A. Yes.

11 Q. -- which is why she, and it may be Carrie as well, have
12 gone in the direction they have towards seats 21 and 22.

13 A. Yes. The engineering interpretation -- again, I'm
14 clearly not a blast engineer -- was that, if you have
15 explosive devices that are of sufficient intensity to
16 bend poles, damage doors, open doors, you will throw
17 people.

18 Q. Yes. Then may I move on from that, please, to the next
19 scene? Mrs Hazel Webb, Laura Webb's mother, is in
20 court. She is, as I say, very grateful for the detail
21 with which you've gone into the report, as I'm sure all
22 the families are.

23 In Laura's case, you've explained that there are
24 certain sections that weren't dealt with.

25 A. Yes.

1 Q. Again, I am not asking, and neither does Mrs Webb, for
2 any of the detail, but it's quite clear that, as far as
3 Laura Webb was concerned, although there is some
4 evidence that there were efforts made by those on the
5 carriage at Edgware Road, she survives for a very short
6 period of time.

7 A. Yes.

8 Q. You don't go on to various of the sections because of
9 the nature of injuries she suffered from.

10 A. That's correct and, again, I'm conscious about not
11 exposing lots of distressing clinical detail, but we
12 were confident from the notes that we had, the external
13 post-mortem report and particularly the fact that
14 Laura Webb's skull was fractured and the associated
15 injuries, all of that was saying to us -- take that with
16 her time-line of survival, all of that was saying this
17 is somebody with a severe and non-survivable head
18 injury.

19 Q. Exactly, I think you used the phrase to her Ladyship in
20 answer to Mr Coltart's question: there are some injuries
21 that are utterly devastating.

22 A. Yes.

23 Q. And Laura would come into that category?

24 A. Yes.

25 Q. Thank you very much indeed. Mr Christian Small you've

1 already now dealt with.

2 A. So no more questions on --

3 Q. So there won't be any questions because, of course,
4 there was the misunderstanding, and I hadn't realised
5 you were in court when we had that evidence from
6 Garri Hollness that, in fact, he was the person
7 responsible --

8 A. Yes.

9 Q. -- and, therefore, again, non-survivable as far as the
10 position of Mr Small.

11 May I just finally ask you about the bus at
12 Tavistock Square?

13 A. Sure.

14 Q. It is not a family I represent and I hope I will be
15 forgiven for just asking one or two questions, my Lady,
16 but Mr and Mrs Parathasangary are here and you didn't
17 look at their daughter. We understand why because
18 there's no evidence that she survives. All right?
19 But she is on the lower deck and you've described
20 how you think the upper deck may have moved more than
21 once, when it came down. It doesn't just come down and
22 remain in that position, but may have moved, because you
23 were describing it in relation to Mr Wise.

24 A. Yes.

25 Q. Now, their daughter -- Shyanu -- is in the seat

1 nearest -- on the nearside of the pavement, and she
2 remains there and nobody ever sees her alive. But
3 should we understand by the evidence in terms of that
4 upper deck, that anybody beneath it may have come into
5 contact with the upper deck on more than one occasion?

6 A. I base my statement on the evidence of my engineering
7 colleague, Mr Hepper.

8 Q. Of course.

9 A. And he demonstrated this, not with video evidence from
10 these attacks, but at Porton there is a considerable
11 library of video evidence of other explosions and other
12 incidents and other structures being subject to
13 explosions, and the critical thing which he was pointing
14 out, as an engineer, is the concept of a survivable
15 space and the survivable space within which a vehicle
16 occupant can survive in the event of an impact.
17 That's something that is very important to us within
18 the military in terms of protecting our vehicles. But
19 what he was pointing out with this material is that
20 there are times when you can come to an incident
21 afterwards and you see someone who's dead and they
22 appear to be in a survivable space, but actually, during
23 the explosion, they've been subject to multiple impacts
24 from the -- a metal structure or other structure down
25 and reverberating, or the space has come together

1 completely, as in some aircraft crashes, where an
2 aircraft -- again, I realise this is not being
3 illustrated on the account -- but when an aircraft hits
4 nose first, the -- and then skids along the ground,
5 a compression wave can go along the body of the
6 aircraft, so that, when you go into it, everyone is
7 sitting in their seats as if they could be alive, but
8 actually they've been crushed as the wave's gone along
9 the vehicle.

10 So it is possible for someone to be sitting in
11 a seat, having been hit more than once by structures
12 which have come to rest in a position which appears to
13 be separate from them, based on my colleague's evidence.

14 MR SAUNDERS: Thank you very much indeed. Thank you,
15 my Lady, for being allowed to ask that.

16 LADY JUSTICE HALLETT: I don't know how many more --
17 Ms Gallagher, do you have questions? There's no
18 restrictions on timing.

19 MS GALLAGHER: I'm afraid I have quite substantial
20 questions.

21 LADY JUSTICE HALLETT: That's fine.

22 MS GALLAGHER: Probably close to half an hour.

23 LADY JUSTICE HALLETT: Of course. In which case, I think
24 we'll break off now rather than deal with it this
25 evening.

1 I'm sorry to have to break off, Colonel, but you
2 might find that, having been in the witness-box all day,
3 that a break might be of an advantage. So 10.00
4 tomorrow, please.
5 (4.30 pm)
6 (The inquests adjourned until 10.00 am the following day)
7
8