Wednesday, 13 March 2019
(10.00 am)
(Proceedings delayed)
(10.10 am)
(In the presence of the jury)
THE CORONER: Good morning, members of the jury.
Sorry for the slight delay. There was a good reason for it.
Can I just say that I have been reviewing your notes and I will return to some of them either today or sometime during the week.
Yes.
FURTHER EVIDENCE RELATING TO PAMELA PALMER
MR HILL: We begin today, Sir, with the piece of footage that we couldn't play yesterday because of some difficulties with the sound, which I hope have now been resolved.
It is an interview from 15 August 1975, with Derek Blake. Derek Blake was Pamela Palmer's boyfriend, and he was intending to marry her.
As we heard yesterday, he was with her in the Mulberry Bush at the time of the explosion. He said that Pamela was sitting facing the jukebox and that he was at the bar getting drinks.
This is the footage that we tried to play yesterday

and will now play it today.
Thank you.
(Video played)
MR HILL: That was 15 August 1975.
We turn now, Sir, to some evidence from Mr Thomas Waterworth, if he could be brought forward, please.
MR THOMAS WATERWORTH (sworn)
Questions by COUNSEL TO THE INQUEST
MR HILL: Could you state your full name for the court, please.
A. Thomas Alan Waterworth.
Q. Mr Waterworth, we have from you a statement dated November 2018, which I believe you have in front of you.
A. Indeed, I have.
Q. Attached to that are some articles that you wrote at the time about the injuries that you dealt with that night?
A. That is correct.
Q. If you would like us to refer to those at any stage, then please let us know.
My name is Matthew Hill and I will ask questions on behalf of the Coroner. You may then be asked some questions by representatives of the families and of West Midlands Police.
I will be addressing you throughout this as Mr Waterworth. That is because you are a surgeon, is

that correct?
A. That is correct.
Q. And surgeons traditionally are called Mister rather than Doctor?
A. That is correct.
Q. But the jury should understand that you are a fully qualified doctor?
A. Correct.
Q. And had a lengthy career in medicine?
A. Correct.
Q. I would like to begin just by asking a few questions about your training and your experience. Is it right that you qualified at St George's Medical School in London in 1965?
A. Correct.
Q. You then specialised as a surgeon?
A. Correct.
Q. You became a Fellow of the Royal College of Surgeons in 1972?
A. Correct.
Q. And you had a career in London, until 1974, when you moved to the West Midlands?
A. Correct.
Q. And you then began six-month rotations in various hospitals in the West Midlands?

A. Correct.
Q. Is it right that on 21 November 1974 you were based at the General Hospital in Birmingham?
A. I was.
Q. What was your position at that stage?
A. I was a senior surgical registrar.
Q. The jury heard something of the hierarchy yesterday, but just by way of reminder, you have junior and senior house officers. Then the registrar, then the consultant, is that right?
A. You get a house surgeon, senior house surgeon, registrar, senior registrar and then consultant.
Q. You were the senior registrar, so one step below consultant at that time?
A. That's right.
Q. And you became a consultant, I understand, in 1976?
A. Correct.
Q. Is it right that you retired in 2002?
A. Correct.
Q. Is it also correct that during your medical career you also served in the Royal Naval Reserves?
A. And the RAMC, the Royal Army Medical Corps, as well.
Q. Thank you.
Could we have on screen, please, Henry, jury bundle page 24. This is a map that the jury have seen before,

just showing the position of the General Hospital. We can see it indicated there, a little to the north of the Tavern in the Town and the Mulberry Bush.
A. Yes.
Q. And the Accident Hospital is a little to the southwest, is that right?
A. That is correct, yes.
Q. Thank you. That can come off the screen.
We heard evidence yesterday from Professor Boffard from the Accident Hospital. Is it right that that was a specialist trauma hospital?
A. Correct.
Q. Could you describe what the General Hospital was?
A. The General Hospital had its own accident department but it was not specialised in major injuries as such. It was more the more trivial injuries, although you did still see some serious injuries coming in.
But the major accidents, major injuries, would by definition have gone to the Accident Hospital.
Q. Is it right that you didn't work in the casualty department at the General Hospital but you would have dealings with it in your role as Senior Registrar for Surgery?
A. Correct.
Q. On Thursday 21 November 1974, you were on duty that day,

is that right?
A. I was, yes.
Q. When did your shift start?
A. 9.00 am that morning.
Q. When would your shift usually have finished?
A. Well, it normally finishes, if you are not on duty, as on duty about 6.00 or so or 7.00 in the evening, but if you are on call, as I was that night, you are resident in the hospital until 9.00 am the next morning, when you pass over to the next senior registrar, who takes over from you.
Q. What is the role of the on-call surgical registrar?
A. It is to go and see and assess the injured or the ill patients that come in and, if within his capability, to operate upon them, if operation is necessary, and to make the decision whether the operation is necessary.
Q. These are patients who come in outside of normal hospital hours?
A. Indeed. They may come in from an accident or they may come in by referral from the general practitioner.
Q. If the senior registrar feels that he or she cannot deal with the emergency, what does he or she do?
A. Rings his consultant at home.
Q. So the consultant won't be in the hospital but could be called in?

A. Correct.
Q. You say that you were the on-call surgical registrar that night, so you were present in the hospital overnight?
A. I was, yes.
Q. And you were due to be present then?
A. I was, yes.
Q. When did you first learn that there was an emergency arising from the bombings?
A. When we were emergency bleeped.
There was a method of bleeping you, which is a radio call, which is just a steady bleep if it is just a question required and you pick up the phone and talk to the switchboard. If it is an emergency bleep you get a fast, rapid call. In which case you get to the nearest phone as quickly as you can and take directions, and go to wherever the telephonist says the problem lies.
Q. Which bleep did you get that night?
A. An emergency bleep.
Q. And what did you do?
A. Picked up the phone, where it just said: go to casualty immediately. Which I did, along with the other doctors.
Q. Were you told anything more about what you were expecting?

A. At that stage, no.
Q. Are you able to give us any indication of what time it was that you received this bleep?
A. Yes, I've got it written down here.
Q. I am not sure that I saw in your statement any specific time for when you received the bleep?
A. No.
Q. If you can't assist now, after 45 years, please say.
A. No, I cannot assist you now.
Q. How long did it take you to get to the casualty department?
A. Two or three minutes.
Q. You mentioned other doctors being sent there as well?
A. Yes.
Q. Was that something that you saw?
A. Yes. We were all running down the way to the casualty department.
Q. When you got to the casualty department, had patients begun to arrive?
A. They had.
Q. Are you able to say how much earlier the patients had got there than you?
A. I do not know that.
Q. Is it right that you were interviewed on the one-year anniversary of the bombing, for a newspaper?

A. Yes.
Q. We have a copy of that article at [INQ004375] page 22, if that could be brought up, please, Henry.
The picture there, is that you at the time?
THE CORONER: A slight change. A slight change in your look.
A. Indeed, Sir. The ravages of time.
MR HILL: If we look down in the first column, about five or six paragraphs down, there is a paragraph that states:
"Waterworth was in the hospital mess bar when he was bleeped on his pocket radio and told to go straight to the casualty department."
First of all, that is consistent with your memory now?
A. Indeed.
Q. Then there is a quote:
"'I arrived there at the same time as the patients were coming in', he recalls. 'It was a sight I will never forget: the patients, police and others all pouring through the door.'"
First of all, a quotation from you, I think?
A. Yes.
Q. Is that, do you think, an accurate recollection of what happened?
A. I think it is, yes.

Q. That can be taken from the screen. Thank you.
Do you personally know whether the General Hospital was given a prior warning that patients were going to be incoming?
A. I do not know that.
Q. Are you able to describe now the situation that you saw in casualty on your arrival and shortly thereafter?
A. I think "chaos" would be a suitable description. There were people running round all over the place, shouting, screaming, yelling. There were people coming in. Relatives, with the injured. Police were there. It was just a fairly chaotic situation.
Q. The people who had come in with the patients, understandably may have been distraught at the situation.
A. They were, indeed.
Q. We heard from Professor Boffard yesterday that one issue in dealing with people who have been in an explosion is that very often their hearing has been affected. Is that something that you came across?
A. Absolutely.
Q. What systems were in place at that time at the General Hospital to deal with a major incident such as this?
A. There was a system, which was really an extending of what I have already told you. That is, you call the next person senior up the line if you cannot cope with it. If there is a major accident, you use a cascade system, and that is where your boss is called, and he, or the telephonist at his direction, triggers the calling of other consultants to come in.

Q. Of course, in 1974 we are dealing with landline phones and dial telephones?
A. We were, indeed.
Q. Was the cascade system put into effect that night?
A. So far as I can remember, and as far as I can tell, yes.
Q. Did it work?
A. Not entirely, no.
Q. Why not?
A. Well, apparently -- and this is only hearsay -- the telephone calls coming in blocked the available lines, and they couldn't dial out to the people concerned.
Q. The telephone calls coming in were coming from whom?
A. Members of the public and people such as that who had an interest in the event.
THE CORONER: So relatives, for example, were calling in and the switchboard got blocked?
A. Relatives were calling in. People whose relatives were in Birmingham at the time were calling in to see if their relative had been injured.

MR HILL: You said in your statement that you gave in November 2018, that some of the consultants took a little longer than expected to arrive. Is that your memory?
A. Yes.
Q. Is it also right that other consultants came in without being called, and other members of staff came in without being called, when they heard the news?
A. I believe that is so.
Q. Your role initially in the casualty department, what was it?
A. Triage, really. If you understand that term. What it means is, continuing ongoing assessment of the injured to see who had priority for treatment.
Q. In those early minutes, who was the most senior doctor on site?
A. I was.
Q. Within the triage system, what was your role?
A. I had to go and see patients who had been brought in, who had been initially viewed by a more junior doctor who had said, "I cannot deal with this; please come and advise and see what needs to be done and, if necessary, initiate the treatment".
Q. Does it follow that you were dealing with the more serious cases, then?

A. Absolutely, yes.
Q. You said that the situation when you arrived was chaotic?
A. Yes.
Q. Were you able to gain control of the situation at the hospital?
A. Yes, indeed. By sort of directing people what to do and who to do it, we got a degree of control over what was happening.
Q. Are you able to give any indication of how quickly that was achieved?
A. I am afraid not.
Q. The people that you were working with, these are more junior doctors, nursing staff, and the general hospital staff, is that right?
A. Indeed, yes.
Q. Then at some stage, more senior doctors would have arrived on scene as well?
A. Yes.
Q. You, of course, were a surgeon.
A. Yes.
Q. Did you operate on patients that evening?
A. Yes, I did.
Q. Are you able to say when you began to operate on patients?

A. I can't remember a time now.
Q. We heard yesterday that a number of those who died were declared dead on arrival at the General Hospital in ambulances. The names of Mr Michael Paterson and Dr John Hetherington were given.
Were you involved in certifying the death of anybody in an ambulance?
A. No.
Q. We also heard evidence yesterday about Thomas Chaytor, a man who received serious burn injuries --
A. Yes.
Q. -- originally taken to the General Hospital, and then transferred to the Accident Hospital. First of all, are you aware of Mr Chaytor's case?
A. No.
Q. Were you involved in it in any way?
A. No.
Q. I would like to ask you now about some of the other casualties that you dealt with. Is it right that you wrote an article for the British Medical Journal in April 1975?
A. I did, yes.
Q. Could we just have the front page of that on screen, please. [INQ004375], page 8. It is entitled: Surgery of violence: Report on injuries sustained by patients

treated at the Birmingham General Hospital following the recent bomb explosion.
We see your name and MJT Carr. Who was MJT Carr?
A. He was a casualty registrar. He was more junior.
Q. Is it right that the two of you reviewed the records that the General Hospital had of that night in order to write this article?
A. Correct, yes.
Q. What was the purpose of the article?
A. To try to inform people of the type of injuries they were likely to see if they were unfortunate enough to be involved with a bombing incident.
Q. When you say "people", these are professional colleagues --
A. Professional people in hospitals, yes.
Q. The British Medical Journal is a prestigious journal that was available to doctors across the country?
A. Indeed.
Q. The context, the jury will know, is the IRA bombing campaign that was ongoing at that time.
A. Indeed.
Q. Some figures from the article -- and I will take these quite briefly if I may:
You record in there that 82 patients were seen and treated at the General Hospital?

A. Correct.
Q. And 61 of those were assessed to be suffering from minor injuries and they were discharged after treatment that night?
A. Correct.
Q. When you were talking about triage earlier, so these are the type of people who would have been seen by more junior doctors and you would not necessarily have seen these?
A. Correct.
Q. The article says that 20 patients were admitted. One of whom, suffering from extensive burns, was immediately transferred to a burns unit, where he subsequently died?
A. Correct.
Q. We know from that description that that was Thomas Chaytor?
A. Yes.
Q. The article goes on saying that 19 patients were then admitted into hospital, none of whom died. That leaves one remaining patient.
At this stage, could I ask to have on screen, please, Henry, [INQ001033], page 1.
This is a document that was shown to the jury yesterday. If we could expand the text of it.
It is a statement by James Inglis, dated 30 December

1974. What Dr Inglis says is this:
Witness statement of DR JAMES INGLIS (read) [INQ001033]
"On Thursday 21 November 1974 I was on duty at the General Hospital Birmingham.
"At about 9.00 pm that evening I went to the casualty department to assist in the treatment of major injuries resulting from the bombings.
"At about 9.05 pm I saw Michael William Beasley, who was suffering with extensive injuries. An attempt was being made to resuscitate the man. But in view of the extensive injuries, bilateral traumatic amputation of both legs and left arm, with extensive burns to face and right arm, further continuation of resuscitation was not likely to be successful. On this basis, I instructed that resuscitation attempts should cease, and certified the patient as dead."
If we just expand out again, please, Henry.
We can see that Dr Inglis is a consultant anaesthetist. First of all, do you remember Dr Inglis?
A. I remember the name, but I can't remember beyond that.
Q. It would appear that what he's describing there is a casualty, Mr Beasley, who made it to the General Hospital but a decision was taken by Dr Inglis to cease resuscitation once he was at the hospital?
A. Correct.

Q. Would that seem to be the further casualty who is referred to in your article?
A. Possibly, yes.
Q. You, yourself, were not involved in the treatment of Mr Beasley?
A. I was not involved with him, no.
Q. The 19 admitted to the General Hospital, I will not go through the detail of their injuries, but we can see from the article that you had one case of a patient with significant lung and spleen injuries caused by the blast?
A. Yes.
Q. Nine patients with perforated eardrums?
A. Yes.
Q. Ten cases with burns, and several injuries caused by fragments of wood, concrete, and glass, causing cuts and lesions, and some very serious and requiring surgery?
A. Correct.
Q. Many of the injuries recorded in the article are to the lower limbs, the legs?
A. Yes.
Q. In the article you suggest that that may be a result of the bombs being placed at ground level?
A. Correct.
THE CORONER: Just a moment.

Yes.
MR HILL: How many of those patients did you personally operate upon?
A. If my recollection is correct, about six. It may have been seven, may have been five, but I think it was about six.
Q. When did you finish operating on patients on the night of 21 and 22 November?
A. About 7 o'clock the next morning.
Q. That's the morning of the 22nd?
A. Yes.
Q. Which would have been 11 hours or so after the initial patients came in?
A. Correct.
Q. When did you leave the hospital on 22 November?
A. Late that evening.
Q. I think the time that you gave, both in the article in 1975 and in your statement, was that you got home at about 7.00 pm?
A. Correct.
Q. So by that stage you would have been on duty for some 34 hours?
A. Yes.
Q. Finally, this: was there a debriefing for members of staff, in which you were involved, after the event?

A. I cannot recollect a formal debriefing that went on. There was -- words were passed to and fro. Most of the attention was on the fact that the cascade system via the telephone system needed looking at. That's as far as I can remember.
THE CORONER: It sounds as though you needed more lines?
A. Correct, Sir.
MR HILL: Do you know if any steps were taken afterwards to have more lines in the hospital?
A. I do not know that, no.
MR HILL: Those are the questions that I have for you, Mr Waterworth. Thank you very much.
MR THOMAS: Sir, no questions.
THE CORONER: Thank you.
Mr Waterworth, nobody else wishes to ask you questions. Thank you very much for coming.
(The witness is released)
MR HILL: We turn now, Sir, to some expert evidence and to Mr Skelton.
MR SKELTON: Sir, I am going to propose that we first call Professor Bull on his own. He will be followed by Professor Clasper and Dr Cary, who will be heard together as witnesses.
May I suggest we hear Professor Bull and then have a short break, because the two experts will need to be

individually sworn --
THE CORONER: Yes.
MR SKELTON: Can I also give a health warning again, as I did yesterday, about the evidence.
It is likely that the evidence that Professor Bull and the other experts will give will get into territory which may be distressing. So those who are following proceedings, either in the room or outside the room, should be forewarned about that.
THE CORONER: Yes.
If I can say to the jury, because we have experts, sometimes they actually come and give evidence together. It is known in the law as hot-tubbing. You can imagine why.
It is simply so that, to keep the flow, maybe one needs to answer one question and the another needs to answer the next question. It usually works quite well. We shall see.
PROFESSOR ANTHONY BULL (sworn)
Questions by COUNSEL TO THE INQUEST
MR SKELTON: Professor Bull, would you state your full name to the court, please.
A. Anthony Michael James Bull.
Q. Could you summarise your expertise as an academic and professor.

A. Sir, I am a Professor of Musculoskeletal Mechanics, which means the interaction of forces, deformations and motion on the musculoskeletal system: bones, joints and tissues.
I am also Head of the Department of Bioengineering at Imperial College. And I am Director of the Centre for Blast Injury Studies. This is a national centre focused exclusively on the analysis of the point of wounding, the environmental effects, the medical treatment, the initial medical treatment and protection and the rehabilitation of those following blast injuries.
We established this in about 2008 in collaboration with the British military at the height of the Afghanistan War.
Q. Much of the work that you do is involved in explosions in conflicts overseas and understanding those explosions, how they affect military personal, with a view to improving or preventing injuries?
A. That is right, and with a view to instigating better medical treatment, and perhaps even changing behaviour by the military personnel.
Q. You have produced a report for the purposes of these Inquests. It is right to say, I think, that that is a team effort. Could you explain who the team is that has produced the analysis for us?

A. Yes. So I will regularly refer to this report.
We were asked, as a centre, to provide expert commentary for this. The team consists of myself -- and I chair the panel -- Professor John Clasper, who will give evidence later on -- and he can introduce himself but he was, at the time in 2008, when I first met him, the incoming Defence Professor of Trauma and Orthopaedics; Professor Peter Mahoney, also military, an emergency physician and also Emeritus Defence Professor in Emergency Care; and Alan Hepper, Principal Scientist at the Defence Sites and Technology Laboratory, who leads on matters related to injury, particularly of the military. I can read out some of his CV points --
Q. There is probably no need. Thank you. That is a very useful summary.
Is there another member of the team, Emma Burke?
A. Emma Burke was at the time the Centre Manager for the Centre for Blast Injury Studies, but also an explosives expert, so she acted as secretary to the panel and was present at all our meetings.
Our meetings were held jointly with all the evidence that we had which was provided by you.
Q. And is it right to say that in producing your report you have had access to post-mortem reports on the deceased that were produced at the time of the incidents we are concerned with?
A. Yes.
Q. You have seen photographs?
A. We have.
Q. You have seen reports and evidence from West Midlands Police?
A. Yes.
Q. Including a lot of witness statements about the events that occurred?
A. That's right.
Q. I think you have also liaised with Dr Cary, who is the pathologist in these proceedings, who has produced post-mortem reports based on information he has been provided as well. And you have liaised with him in terms of understanding the effect of the bomb explosions on those who died?
A. That's correct.
Q. Thank you.
Can I ask you, first of all, to explain in very simple terms what happens when an explosion occurs.
First of all, just to clarify, we are dealing here -- and the jury will hear in due course from an explosives expert -- but I don't think it is controversial to say that we are dealing here with

high explosives?
A. Correct.
Q. Can you explain, when a high explosive detonates, what it does?
A. Yes. What it does. The first thing it does is it produces a rapid high-pressure wave called a shock wave. That dissipates very quickly from the seat of the explosion. So the high-pressure wave will cause injury in and of itself. And we will describe that in a moment.
Q. Just to clarify, is that -- it is instantaneous and travels faster than sound?
A. Yes. And instantaneous means that within probably a millisecond, a thousandth of a second, is when that pressure wave will be generated.
Q. And it is followed by --
A. It is followed by the blast wind, which is an energy mass of all the other products and the air mass behind it, which provides energy to anything that it comes into contact with.
So you have this combination of the shock wave and then this blast wind, that combined is a significant amount of energy, that will then be deposited into anything it comes into contact with, be that a person or the environment.

Q. So from the seat of the explosion it will shoot outwards --
A. Yes.
Q. -- as a blast wave, coming into contact with human beings, walls, furniture, anything?
A. That is correct.
The physics of this is rather complex, and it is affected by the environment. So in particular, if the environment is shaped in a certain way, the shock wave will be directed by that shape. And so therefore -- although much of the experiments that are done to characterise these are done in an open environment, where you will see a radial growth of the shock wave and the blast-wind effects, in an enclosed environment it is far more complicated, and it is deflected by the environment and the shape of the environment.
Q. So -- and we will come on to this in the context of individuals -- people that you may not think were in the direction of the explosion may receive a shock wave deflected from a surface within an enclosed environment?
A. That is correct.
Q. There is a concept, also, known as overpressure. What does that mean?
A. Well, what happens is, the shock wave produces this high-pressure wave. I think you are referring to the

area under the curve, which is the pressure occurring for some certain period of time, and then that dissipates extremely rapidly. So that is called the overpressure period.
And then, typically, there is a negative pressure that happens after that, as effectively almost like a vacuum, due to all the detonation products taking the air out. In an enclosed environment that is less likely to be the case.
Q. Just to conclude on the basic effects of high explosive detonation: heat and light?
A. Yes. So there is immediate heat, and that could cause singeing in the immediate environment. But then that also deposits energy, which may cause burning of other material around. And they are sort of two different types of heat that you might get as a result of an explosion.
Q. It causes heat in itself, but may come into contact with things which are flammable?
A. That's right.
Q. So wood or --
A. And that would be a blast effect as well, because it is due to the explosion.
Q. -- alcohol presumably?
A. Yes.

Q. Certain types of alcohol?
A. Yes.
Q. And beyond the shock-wave deflection, is there anything in particular about an indoors confined environment which is relevant to the context of these Inquests?
A. Yes. So the physics of this is that the shock wave normally is dissipated very quickly. So that if you go twice the distance away from the seat of the explosion, the peak of that shock wave is one eighth of the size. So much smaller. So you don't have to be very far away from a shock wave in an open environment for the energy to be extremely low.
Inside an enclosed environment, that dissipation doesn't occur in the same way. You are effectively in an echo chamber, so the pressure stays for a much longer period, and so the effect of that pressure wave is more severe, even further away from the seat of the explosion.
Q. May I turn now to the injuries caused by explosions, again with a focus, if I may, on indoor environments as opposed to outdoor environments, because that is what we are looking at here?
A. Yes.
Q. I appreciate the science of this is reasonably complex and has been developed over many years. I'm just trying

to simplify it to its basics.
THE CORONER: Can I just ask a question while you are talking about the shock wave dissipating quickly and then dissipating less quickly in an enclosed environment.
A. Yes, that is correct.
THE CORONER: Does the shock wave bounce off walls, for example, and other physical objects?
A. Yes, it does. And in fact there are many examples of that bouncing off walls even in supersonic aircraft, where a shock wave from that bounces off the ground and you get interference. So it is observed in many instances.
But in this enclosed environment, it is that bouncing off the walls that maintains the pressure level at a high level for a longer period of time.
The times we are talking about are still milliseconds. We are not talking about seconds.
THE CORONER: But a lot can happen in a millisecond?
A. That is correct.
MR SKELTON: There is a classification system which you have used in your report and which will be used when we come on to the individual deaths, which divides injuries by reference to primary, secondary, tertiary and quaternary. And I think there is a fifth, although the

fifth is probably less apt in the context of these deaths.
Could you describe, first of all, the primary effect, which I think is the effect of the shock wave?
A. Yes.
So primary blast injuries occur due to the shock wave interacting with the human body. This is very fast, and it particularly affects tissues at the interface between tissues of different densities. That means air and soft tissue interfaces, for example in the lungs; or fluid and soft tissue interfaces, perhaps in the bowels.
So this is rapid. It sometimes doesn't leave any external evidence on an individual. The pressure can have an effect purely internally at those interfaces, and that is called primary blast.
Q. You mentioned the lungs. I think you are probably aware that Professor Boffard has given evidence previously here an expert as well, as it happens in a similar field but from a medical perspective. There is a concept called blast lung. Is that what you are describing? The effect of a shock wave on a human lung?
A. Yes. There are different ways of defining this. Blast lung could be defined as the physiological effects that happen after that. But in terms of the physical

effects, that is what I am referring to as blast lung. It is the shearing of the tissues at these interfaces between materials of different densities.
Q. And that effect, that primary injury, is often fatal?
A. Yes.
Q. Can I ask you about the secondary injuries?
A. The secondary blast is where the blast wind energises fragments. And these can come from the blast itself, called primary fragments, or they can come from the environment, called secondary fragmentation.
THE CORONER: Say that again. The blast wind --
A. The energy from the explosion, the blast wind, energises fragments. These could be things contained within the explosive device or they could be things from the environment, such as the glass, wood, concrete, as already has been mentioned today.
THE CORONER: Yes. Just a moment.
So some bombs are nail bombs, as they are called?
A. Exactly, yes.
THE CORONER: So there are nails inside the bombs?
A. That's right.
THE CORONER: So they would be specifically energised by the blast wind?
A. Yes, that is correct. And that would be the intention of them.

THE CORONER: Or if there is nothing in the bomb itself like nails --
A. Then it could still --
THE CORONER: -- then it is objects around it?
A. That is correct.
MR SKELTON: So this can effectively turn small objects into bullets which can penetrate and kill?
A. Correct. And these maintain their energy for a longer radius than the pressure wave, the initial pressure wave. And so, as I said, the pressure wave dissipates, where, if you double the distance, the pressure is one eighth of the size, the magnitude. If you double the distance, the energy of a fragment is only a quarter of the energy. So it maintains its energy for a longer distance.
Q. When you say "in practice", you mean --
A. Speed.
Q. High-velocity movement?
A. Yes, kinetic energy.
Q. So things could come out of the bomb that would strike you and kill you, or the wave may hit things in the environment -- the glass you are sitting in front of, a chair, anything -- and turn that into something that strikes you: either a large object or a small object which could penetrate the body?

A. That is correct.
Q. Just to clarify, when we say "primary, secondary, tertiary -- and we are coming on to quaternary, or fourthly, as it were -- that is not the order of things that can kill you. It is just the classification system. Any of those things can kill you?
A. That is correct.
Q. So tertiary next.
A. That is where the individual is energised himself by the blast wind. So these are not fragments, now. This is now the person. And that can cause injuries due to that motion of the individual.
Q. So the blast wave moves you, and it can move the entire body and hit you against a wall, or it can move parts of the body?
A. That is correct.
Q. In other words, traumatic amputations and things like that?
A. And crush injuries and the like. There is a corollary of this, sometimes called something else: solid blast. But it is also a form of tertiary blast, where large heavy objects, not fragments, are energised. And they produce these types of crush injuries, which are very similar. So that would also be called tertiary blast.
Q. And that tertiary injury is caused by the body or the

body part being moved. So a body part being moved, traumatically amputated, or the whole body striking something else?
A. That's right.
Q. So someone, for example, can suffer a severe head injury from being blown into a wall?
A. Yes.
Q. The fourth type of injury, or quaternary, as I think it is termed, is what?
A. It is the heat effects. So there will be burning, there will be the flash burns and there will be the subsequent burning due to the environment as well.
Q. Flash burns, again, to clarify, that is the burns caused by the explosion, the explosive flash?
A. Yes.
Q. And then there is burning caused by environmental factors as you previously described?
A. So flash burning is much closer to the seat of the explosion. If you are further away you are less likely to have flash burns. But you might have other forms of burns due to the environment.
Q. And there are injuries associated, are there, with burns, like inhalation injuries?
A. Yes.
Q. So damage to the lung from inhaling hot air or smoke?

A. That is correct.
Q. Within a confined space, you have already described that the shock wave will move around in a very complex way. I think it is right to say that in the case of these particular pubs the environment is so complex, and the information is not sufficient, in terms of knowing where people were, to be able to plot precisely how the shock wave would have moved through the two pubs?
A. That is right.
Q. One of the reasons for that, to clarify, is that you have a lot of human beings there, and shock waves can be deflected or absorbed by human beings?
A. They are significantly influenced by everything that is in that environment. And human beings are a very large proportion of what is in that environment.
Q. I think you have also described the pressure that you get within a confined space. How is that likely to turn into an injury to the people within that space?
A. It is highly likely, because of the enclosed environment.
Q. So within confined spaces, such as the two pubs, you are more likely to see injuries like blast lung, eardrum rupture and burns, the type of things that you associate with explosions in confined spaces?
A. That is correct.

Q. And also, I think, just building on what you have already said, within complicated spaces such as pub environments where there is a lot of glassware, furniture, decorations and just other objects, you are also likely to see a lot of secondary injuries from those objects being smashed and thrown around by the explosion?
A. That is correct.
Q. And hence, I think, in respect of a lot of those that survived, we have evidence that has either been heard or read, that they were hit by a lot of wooden splinters, bits of glass, bits of metal, some of which were seriously injurious and some of which were less so?
A. That would be expected.
Q. And likewise tertiary injuries: people are going to be thrown into walls, thrown into large pieces of furniture and injured through that mechanism?
A. That would be expected.
Q. Again, in an environment -- particularly a pub, which might contain alcohol, things like that -- or indeed lighters, you may get those objects catching fire as a result of the explosion?
A. Yes.
Q. Causing injuries to those who are nearby?
A. Yes.

Q. I think it is right to say -- and we will come on to this in Professor Clasper's evidence and Dr Cary's evidence -- that many of those who died suffered head injuries. That also is presumably a feature of confined-space explosions, that you are either going to suffer a head injury from being thrown against something or something is going to strike your head?
A. That is right. Secondary or tertiary effects.
Q. Does the shock wave itself cause a primary head injury, or is that mainly manifesting in, for example, blast lung?
A. It can do. There is significant evidence in the military that that is the case. But it is very difficult to identify that if people have died very early.
Q. So you can suffer a fatal brain injury which is difficult to identify in the post-mortem phase --
A. It would be hard to identify it as primary blast in the post-mortem phase.
Q. But in secondary injury, for example an object --
A. It would be easily identified. As would a tertiary injury.
MR SKELTON: Thank you.
Professor Bull, those are the questions I'm going to ask in this first phase. It may be you need to return

space for it to fly hundreds of metres.
Q. Okay. So in this particular case you have the potential for debris to fly hundreds of metres, subject to anything stopping it?
A. Exactly. That is the point about the complex environment.
Q. Okay.
So if the airborne debris were not stopped by a building, a wall, or, if I may say so, a person, it could fly hundreds of metres?
A. Yes.
Q. I think I understood your evidence to be that airborne debris does not necessarily have to be large to be fatal in the case of a bomb?
A. That is correct.
Q. And that we could have debris of a relatively small size that could actually be fatal to persons in the vicinity of a bomb?
A. That is correct.
Q. And in this case, anyone outside the Mulberry Bush would be potentially exposed to being killed by that airborne debris?
A. Yes.
Q. So in that way, we can say that there is an area around the Mulberry Bush that constitutes a kill zone for the

after Professor Clasper and Dr Cary give evidence. But for the moment I will see if others have questions.
Thank you.
THE CORONER: No, thank you.
MR THOMAS: Sorry, Sir --
THE CORONER: Yes, Mr Morgan.
MR MORGAN: I am going to be very brief, Sir.
Questions on behalf of the FAMILIES represented by KRW LAW
MR MORGAN: Professor Bull, my name is Mr Morgan and I ask questions on behalf of Tommy Marsh.
Given what we know about this bomb, Professor Bull, are you able to estimate the size of the zone around the Mulberry Bush that would be likely to be fatal for someone present there?
A. No, I'm not.
Q. So if we consider what you know about the bomb, and the physical presentation of these premises -- in particular the presence of plate-glass windows -- are you able to give any estimation of the size of the zone over which airborne debris may fly?
A. No, I am not, specifically.
Q. So you are not able to say, even in any approximate way, the distance that glass or stone or any other sort of debris would fly?
A. It could fly hundreds of metres. But there was not

purposes of this particular bomb?
A. Yes.
MR MORGAN: Nothing further. Thank you.
Questions by THE CORONER
THE CORONER: Professor Bull, there is an obvious difference between these two pubs. The Mulberry Bush had big windows on two sides, whereas the Tavern in the Town was completely underground. So that, obviously, would affect the result of the blast wave?
A. Absolutely. Although I will say that when the initial shock wave, the primary blast, the shock wave, comes into contact, even though it would push out the glass, there are still reflections that occur at that point as well, because of the instantaneous nature of it. So not all the energy is released --
THE CORONER: You call it reflections, still reflections, meaning?
A. There are still reflections, even though the glass is pushed out.
THE CORONER: Still reflections, what does that mean?
A. Maintaining the high level of pressure. So within an enclosed environment the explosions would have these reflections that maintain the high level of pressure. So if a part of that enclosed space, even if it had glass, were pushed out, we would have reflections that

maintain the pressure within that enclosed space. It would dissipate more quickly than if it stayed enclosed, but it would still be maintained above what it would be, as it were, in an open environment.

THE CORONER: Yes. Thank you.

Further questions by COUNSEL TO THE INQUEST

MR SKELTON: So by reflection, effectively, the energy is bouncing off a surface back into the environment?

A. That's right.

Q. So notwithstanding the fact that the windows are blown out, it occurs so quickly that it bounces before the windows shatter?

A. Yes.

Q. So those who are inside and may not be in the direct line of sight with the bomb are still going to be affected by that reflection, effectively?

A. Yes.

MR SKELTON: Thank you, Professor Bull. Those are, for now, the questions for you.

Further questions by the CORONER

THE CORONER: Just one other thing. It may be an obvious point, but you said that the shock wave was faster than the speed of sound.

A. Yes.

THE CORONER: That means that there would be probably that

flash first, and then sound later?

A. Yes, exactly. However, it is so close -- because the environment we are talking about is so small, they would sound instantaneous. Or be experienced as instantaneous.

THE CORONER: Yes. Thank you.

MR SKELTON: Thank you, Sir.

May we take a short ten-minute break?

THE CORONER: Yes. Ten minutes, members of the jury. Thank you.

(11.08 am)

(A short break)

(11.25 am)

MR SKELTON: Sir, the next two witnesses, to be heard together, are Professor Clasper and Dr Cary.

PROFESSOR JONATHAN CLASPER (sworn)

DR NAT CARY (affirmed)

Questions by COUNSEL TO THE INQUEST

MR SKELTON: Dr Cary, may I start with you. Can you state your full name to the court, please.

DR CARY: Yes. I am Nathaniel Roger Blair Carey.

Q. What is your professional position?

DR CARY: I practice as a full-time Consultant Forensic Pathologist and in that capacity I'm on what is called the Home Office Register. That is the sort of pathology

that concerns post-mortem examinations, and giving evidence about what the findings are. They are the sort of cases that would usually be termed suspicious deaths of one sort or another. And I have been on the register for some 26 years.

Q. You have produced a general report for the purposes of these Inquests on 22 May 2017 --

DR CARY: Yes, I have.

Q. -- in which you provide your general views about the effects of the explosions on the 21 people who died?

DR CARY: Yes, exactly.

Q. In doing so, it is right that you liaised with Professor Bull, Professor Clasper and their team in London?

DR CARY: Yes, I did.

Q. It is fair to say, I think, in summary, that you mutually agree with each other's conclusions?

DR CARY: Yes. It is very helpful to have people coming from different specialities to sort of act together.

Q. Your report, I think, is based on information that is available to you now. Primarily, that is the original post-mortem reports undertaken by the consultant pathologists at the time --

DR CARY: Exactly.

Q. -- in 1974. So photographs taken at the time, and other

evidence, such as plans and maps, and indeed evidence produced for the purposes of these Inquests?

DR CARY: Yes, exactly.

Q. What you don't have, and ordinarily might be considered to be relevant, are the original medical records for the deceased?

DR CARY: No. Although it is fair to say that the likelihood of someone having a serious underlying illness would be very remote, that would be relevant to their death.

Q. So you can be confident that the conclusions that you reach in respect of the deceased are conclusions you can properly reach on the basis of the post-mortem reports?

DR CARY: Exactly.

THE CORONER: So in effect, there are no records from the time, either GP medical records or hospital medical records.

MR SKELTON: That's correct, Sir.

THE CORONER: They are just no longer available, is that right?

MR SKELTON: Yes. But for these purposes, the evidence is from Dr Cary that that makes no difference to the validity of his conclusions.

Thank you.

Professor Clasper, can I ask you your professional

position as well, please.
PROFESSOR CLASPER: My full name is Jonathan Charles Clasper. I am a Consultant Orthopaedic Surgeon, since 1999. I am also a Colonel in the Army, in the Royal Army Medical Corps, and I am the Clinical Lead at the Blast Centre at Imperial College.
Q. When did you first become a doctor?
PROFESSOR CLASPER: 1986. I qualified in Glasgow.
Q. To be clear, you were not in practice in 1974?
PROFESSOR CLASPER: No.
Q. You, as we have heard, are the co-author of the report that Professor Bull has produced along with your co-authors?
PROFESSOR CLASPER: Correct.
Q. And you have based that report, as I asked him, on the same information as I put to him, and have liaised with Dr Cary in the same way that I have described?
PROFESSOR CLASPER: Correct.
Q. Can I ask you, then, first, Professor Clasper, about the basic management, medical management, of those who have been involved in an explosion.
We have heard already the word "triage". Could you explain that from your perspective?
PROFESSOR CLASPER: Triage is "to sort", and it is to identify the priorities for treatment. When there is

a mass casualty situation, what you aim to do is to do the most good for the most number of people. But in general, in triage you would rapidly identify the most seriously ill people who needed immediate treatment, which is usually about five per cent or thereabouts of the victims of an explosion, to rapidly identify them and rapidly initiate treatment.
Triage happens more than once. It is a dynamic process. So it would happen at the scene, to potentially evacuate the right people. It would happen in an emergency department, and happen again in theatres. It is dynamic.
Q. We have heard evidence, for example, from police officers and from fire officers, that they were looking to find people who were alive, and then trying to prioritise the most seriously injured people --
PROFESSOR CLASPER: Yes.
Q. That is a form of triage?
PROFESSOR CLASPER: That is triage.
Q. We have also heard evidence from, for example, Professor Boffard, that when people came into hospital they were being triaged by the doctors and nursing teams?
PROFESSOR CLASPER: Yes.
Q. The types of injuries that people suffered -- and

Professor Bull has already touched on this -- but I think it is fair to say that ordinarily you expect to see multiple injuries from a bomb explosion, from the different types of processes that he described?
PROFESSOR CLASPER: Yes, you see multiple injuries, injuries to different systems, but also injuries caused by different mechanisms, whereas in the NHS we might see multiple injuries but they would normally be caused by the same mechanism: blunt or penetrate.
Q. So for example, a fatal head injury can be caused by being struck by objects, such as flying pieces of metal or glass, or being thrown against an object?
PROFESSOR CLASPER: Yes, or penetration of the object or blunt trauma to the head could kill.
Q. So small objects can become like bullets, effectively?
PROFESSOR CLASPER: Yes.
Q. Blast lung Professor Bull described. That is damage to the lungs, sometimes presumably both lungs, sometimes predominantly one or the other?
PROFESSOR CLASPER: In general, blast lung tends to be more widespread, but again, there tends to be a number of mechanisms of injury, so often someone with blast lung also has an impact. And where that impact is, the underlying lung would be more badly damaged than the rest of the lung.

Q. Victims can suffer damage to major arteries: in other words the major blood vessels transporting oxygenated blood around the body. Either again by a specific injury to a vessel: the carotid artery that provides blood to the head, the aorta that provides blood around the whole body, or by injuries to the arteries caused by the loss of limbs: for example, the legs?
PROFESSOR CLASPER: Yes.
Q. Another sort of major potentially fatal injury is damage to internal organs from the shock wave or from being struck or from striking things?
PROFESSOR CLASPER: Yes. Again, that would often be due to bleeding.
Q. So the internal organs, the liver, the spleen, can be damaged, ruptured, and the surrounding vessels and the vessels internally can rupture, causing internal bleeding and death?
PROFESSOR CLASPER: Yes.
Q. This is a question for your both to answer if you would: is it fair to say that for most of the people who died they would have been rendered unconscious by the explosion?
DR CARY: Yes. That is highly likely. Not simply if they had a head injury, but the blast wave itself can cause loss of consciousness. From the sudden movement of your

head, in effect.
Q. Concussive injury, causing loss of consciousness?
DR CARY: Yes, exactly.
Q. Do you agree?
PROFESSOR CLASPER: I would agree with that.
Q. Again it is a generalisation, but is it fair to say from both of your perspectives that death, for those who died -- and we will come on to the two who died later in hospital -- but for those who died on the night, would have occurred very quickly after the explosion?
DR CARY: Yes, indeed. You have a multiplicity of things going on. So you may have severe limb injuries or internal organ injuries, but actually if you have severe blast lung that may kill you even more rapidly than those other features would.
PROFESSOR CLASPER: Again, I would agree with that.
Q. Thank you. Can I ask you about treatment -- we will come on to the treatment, insofar as we can ascertain it at this remove, of the two men who died in hospital -- but treatment of blast lung in particular.
Professor Boffard touched on it, but I would like you, from your expert perspective, also to do so, please. He described it primarily as supporting the system, supporting the lungs. Is that fair?
PROFESSOR CLASPER: Yes. I'm not an expert in blast lung.

I am an expert in blast injury, so I do have knowledge of and experience of blast lung. But in general it is supportive. It is trying to maintain the oxygen levels within the blood.
Q. And effectively what happens is the lungs heal themselves over time while that support is being given?
PROFESSOR CLASPER: That is the hope. If the patient recovers and there are no complications, the lung sorts itself out.
Q. But for some people who may survive the original explosion, the support, unfortunately, doesn't result in survival?
PROFESSOR CLASPER: Sorry, could you repeat that?
Q. My mistake. For those that may survive the explosion and are then on support in hospital, they may nevertheless not survive?
PROFESSOR CLASPER: Yes. The blast lung will tend to get worse over hours, possibly even days. So you might survive initially and then succumb to blast lung, despite best treatment.
DR CARY: I think the problem is the blast lung is damage to lots of tiny blood vessels and air spaces, really throughout the lung substance. And because of that, you really have to buy time and just hope that that damage will heal. But initially it is characterised by blood

coming out of those blood vessels very locally, with air leaking into spaces it shouldn't be in.
Q. Is it the case that, notwithstanding people suffering what may turn out to be fatal injuries, they can regain consciousness, can communicate, and then succumb to their injuries?
PROFESSOR CLASPER: Yes, because blast lung can evolve over hours. And you can regain consciousness, or initially be conscious, and then deteriorate and die, again despite best efforts.
Q. Another effect which can occur, is this right, is that you get effectively aftereffects of these injuries, such as infections to the lungs, which can prove fatal? Pneumonia being a classic example?
PROFESSOR CLASPER: Yes. Any damage to a lung from any mechanism does predispose you to an infection, chest infection, pneumonia, which again you can succumb to.
THE CORONER: That was very quiet. Could you say that again, please?
PROFESSOR CLASPER: Any damage to the lung, from no matter what mechanism, will result in the potential to develop an infective complication, like a chest infection or pneumonia, which can then cause death.
DR CARY: I have a further comment on that. Of course, you have to bear in mind, when an explosion happens you get

a lot of dust. It is airborne, and you may breathe that highly contaminate material into your lung. So you have that problem over and above the blast lung.
MR SKELTON: Thank you.
THE CORONER: Just a moment.
Yes.
MR SKELTON: I am going to turn now to the individuals who died. I am going to start with the individuals who died at the Tavern in the Town. I will tell you the order as we go through. And it is the order, in fact, that the jury have already heard in respect of the evidence about the explosions and the conveyance of the bodies to hospital.
So I will start, if I may, with Maureen Roberts, please.
If you would orient yourselves by reference to the literature or the documents that are in front of you.
In the generic blast wave report I'm looking at the summaries from page 21 onwards in volume 1, and in the individual reports it is volume 2 and tab C. And Ms Roberts is at C10.
What I am going to do in each case is -- and this is as much a clarification for the jury as for the experts -- I'm going to read out the conclusion that Professor Bull and his team have reached in respect of

each individual person, and then ask if there is anything that needs to be added to that.

What I am not going to ask you to do, unless we need to, is to describe specific injuries, for example major head injuries, blast lungs, severed arteries and the like. I am simply going to use the terminology that the jury have already heard from Professor Bull, in which he refers to primary, secondary, tertiary or quaternary injuries.

DR CARY: Can I just make a comment about process?

Obviously a lot of different pathologists carried out these post-mortem examinations, and so understandably their style will be quite different. So we were able to extract in a fairly systemic manner -- both teams -- information from the post-mortem reports. And that is really what this all depends upon: our extraction of that information. Then we come to conclusions about what that information means.

Q. I think another perhaps useful point of clarification is that from your perspective, as the pathologist and the doctor, you are not commenting on the evidence about the explosion itself, which has come from the witnesses and other form of expertise.

DR CARY: Absolutely. Although it is fair to say that when you look at the nature and extent of the injuries they

are absolutely typical of an explosion. So they stand in their own right as typical explosion-related injuries.

Q. I think it is fair to say that there is no question other than that all of these people were injured as a result of the two explosions?

DR CARY: Exactly.

Q. Starting, then, with Maureen Ann Roberts.

She was injured at the Tavern in the Town. She suffered significant primary and secondary blast injuries, with one particularly significant blast injury and evidence of tertiary and quaternary blast injuries. Her injuries were unsurvivable with current, that is 2017, advanced medical treatment.

Can I ask you, Professor Clasper, to explain what that final sentence means: her injuries were unsurvivable with current, 2017, advanced medical treatment?

PROFESSOR CLASPER: The severity of the injuries were such that even if she was very rapidly evacuated to a major trauma centre that was expecting her, she still could not have survived. That is the analogy --

Q. Even now?

PROFESSOR CLASPER: Even now. With the best process possible, she would still not have survived.

Q. Obviously the report was originally written in 2017. Just for absolute clarification, that applies equally to --

PROFESSOR CLASPER: That applies to today as well.

Q. I think it is right that that sentence is going to recur for almost all of the deaths that we are now going to hear about?

PROFESSOR CLASPER: Yes.

Q. Dr Cary, just to maintain the sort of formality of establishing your views for the benefit of the jury, do you agree with that conclusion?

DR CARY: Yes, I do. It is not really marginal. These are such severe injuries that she would not have survived. Even if you sustained that severity of injury and you were already on an intensive care unit, you would not survive.

Q. Can I turn, please, to Marilyn Paula Nash.

You will find this under tab 7 in volume 2. She was injured in the explosion at the Tavern in the Town. She again suffered significant primary, secondary and tertiary blast injuries, with evidence of quaternary blast injuries.

The conclusion by you, Professor Clasper, and your team is that her injuries were unsurvivable with current advanced medical treatment?

PROFESSOR CLASPER: Correct.

Q. Do you agree, Dr Cary?

DR CARY: Yes, I do. She had a prominent head injury, and that may well have been an overriding factor in spite of all the other injuries.

Q. Thank you.

Jane Elizabeth Davies, again at the Tavern in the Town, suffered significant primary, secondary, tertiary and quaternary blast injuries, with one particularly significant secondary blast injury. And her injuries were unsurvivable even with current advanced medical treatment?

PROFESSOR CLASPER: Which tab?

Q. I'm sorry, that is under tab C4.

PROFESSOR CLASPER: Yes. I would agree with that.

Q. Dr Cary, do you concur?

DR CARY: Yes. In fact it will be a theme running through most of these, that head injuries would be a prominent feature. And she had a severe head injury that was not survivable.

Q. Thank you. I turn now to Maxine Hambleton, at tab 5.

Again, she was at the Tavern in the Town, and the report stated that she suffered significant primary, secondary and tertiary blast injuries, with evidence of quaternary blast injuries. And her injuries were

unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: I agree with that.
Q. Eugene Thomas Reilly, under tab 9, please. Again, at the Tavern in the Town. He suffered significant primary, secondary, tertiary and quaternary blast injuries. His injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: And I agree with that. Again, there was a significant head injury.
Q. Desmond William Reilly, under tab 8.
He was at the Tavern in the Town. And he suffered significant primary, secondary, tertiary and quaternary blast injuries. His injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: Yes, indeed. Again, a head injury and also likely severe blast lung that could have acted even before the head injury caused fatality.
Q. Lynn Jane Bennett, under tab 1.
She was also at the Tavern in the Town. She suffered significant primary, tertiary and quaternary blast injuries, with some secondary blast injuries. Her injuries were unsurvivable with current advanced

medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: Yes.
Q. Stephen John Whalley. He was also at the Tavern in the Town. He suffered significant primary, secondary, and tertiary blast injuries --
THE CORONER: Number reference?
MR SKELTON: I'm sorry, this is C11.
He suffered significant primary, secondary and tertiary blast injuries, with evidence of quaternary blast injuries. His injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes. Again, a very severe head injury that would have acted almost instantaneously.
Q. I am now going to turn to the last of those who died consequent upon the explosions. We now may need to take a little bit more time to discuss what happened to these two victims.
THE CORONER: I think it might help the jury, if you look at your list of those who died, to add in, against the name of Thomas Chaytor, the date of death, being 27 November 1974. And for James Craig, 9 December 1974.
So Thomas Chaytor survived until 27 November and James Craig survived until 9 December. All of the others who died did not survive that night.

Yes.
MR SKELTON: May I ask you, first of all, about Mr Craig, please?
It may be that you can assist us by reference to a journal article that was published, I think, in early 1976.
PROFESSOR CLASPER: Correct.
Q. So within two years of the explosions. In this article two doctors, both of whom were doctors at the Birmingham Accident Hospital, wrote about five patients who suffered severe injuries as a result of the explosions, two of whom died and two of whom we can identify as being Mr Chaytor and Mr Craig.
You will find that in the first volume under tab 6. If we can call it up on screen, please. It is [INQ001122] at the first page.
This is an article called, Blast injuries to the lungs: clinical presentation, management and course.
It is in the British Journal of Accident Surgery, volume 8, number 1. There is not a date on it, but I think we understand it was published at the beginning of 1976. Tab 6 in the volume.
You have found it. Thank you.
Focusing first, I think, on your evidence, please, Professor Clasper. Introducing this article, you can

see from the summary that it relates to five patients with blast injuries to the lungs after bomb explosions are reported.
Could you just go on to say what that states in the first paragraph?
PROFESSOR CLASPER: Of the article itself?
Q. Yes, please. Just in the summary page.
PROFESSOR CLASPER: Five patients with blast injuries to the lungs after bomb explosions are reported. In each patient, X-ray changes were apparent on the initial chest film within four hours of the explosion. Arterial hypoxia was also present. Four patients were actively treated with continuous positive-pressure ventilation, which was adjudged effective therapy.
Two patients died, one owing to bilateral pneumothorax which occurred during anaesthesia, and the other owing to overwhelming infection. Hypoxia persisted for four months in one of the survivors. Lung function tests which were performed on the same patient 10 months after the blast injuries, however, were normal.
Q. So the two patients you referred to we will come on to. One had bilateral pneumothorax. What is that?
PROFESSOR CLASPER: That is a collapsed lung. That is air between the chest wall and the lung itself, so the lung

collapses.
Q. Which occurred during anaesthesia. So while an operation is going on.
PROFESSOR CLASPER: Yes.
Q. That is, I think, Mr Chaytor?
PROFESSOR CLASPER: Probably. It is difficult because no hospital records were available so we are basing the assumptions we made on this article, which we identified which we thought represented those two patients.
Q. Yes. And the other patient, who succumbed to an overwhelming infection, we think is likely to be Mr Craig?
PROFESSOR CLASPER: Yes.
Q. In the introductory section, obviously, this article is focused for professionals, it is not for lay people. So the focus is really on the medicine which is not strictly relevant to these Inquests. But it does contain useful information in light of the fact that we don't have medical records.
One of the things that is said within the introduction, you can see in the bottom left, is that these patients were admitted to hospital -- this is the five they are talking about, three of whom survived -- within 30 minutes of the incidents and were all conscious on arrival.

Could I ask you to comment on that recorded timing for the admission of these critically ill patients? By reference really to the standards you would expect in response to these sorts of incidents.
PROFESSOR CLASPER: So with a mass casualty situation -- whether it is explosion or major road traffic accident -- to actually have people in the hospital in the emergency department within 30 minutes would be considered very good performance. In many cases there are delays of two or even three hours even nowadays.
Q. So even applying modern standards, 30 minutes from explosion to admission is impressive?
PROFESSOR CLASPER: Yes.
Q. It goes on to say that each patient had multiple lacerations and splinter wounds which contained much debris, plus superficial burns in addition to the injuries specified in the individual case study.
So they all had multiple injuries consistent with bomb explosions?
PROFESSOR CLASPER: Yes.
Q. The types of injuries that you have both spoken about and Professor Bull --
DR CARY: Yes, exactly. But these are skin injuries as well. That multiplicity of little lacerations, little penetrating wounds, is very typical of a bomb explosion.

So debris is thrown against the skin and it is almost characteristic of a bomb explosion.
Q. Case 1 starts on the same page, please. This is a 34-year old male in severe respiratory distress and deeply cyanosed.
Could you just explain what those two terms mean, respiratory distress and cyanosis?
PROFESSOR CLASPER: Cyanosis is discolouration and it is due to inadequate oxygen in the blood.
Respiratory distress means excessive difficulty in breathing, a very rapid rate, patients may be gasping for breath.
THE CORONER: Do we need to go through all the nonfatal patients who are referred to in this article?
MR SKELTON: No. I was not planning on doing so. This is James Craig.
THE CORONER: Right, thank you.
MR SKELTON: Hence I'm taking --
THE CORONER: Right, that was not clear. It is now clear.
MR SKELTON: Sorry, case number 1 is James Craig, for clarification.
He is treated with the prompt insertion of a drain in the pleural cavity. That is to remove fluid which will prevent the lungs from functioning?
PROFESSOR CLASPER: If someone presents after trauma in

respiratory distress, you would suspect a collapsed lung, which we mentioned earlier, and that is treated by inserting a drain.
Q. Which --
PROFESSOR CLASPER: Helps the lung to re-expand.
Q. That is then followed ten minutes later, because of continuing distress, by intubation and positive pressure ventilation.
So, in other words, he's given assisted breathing?
PROFESSOR CLASPER: He's struggling so much with oxygenation that, yes, he's ventilated so his breathing can be assisted.
Q. It mentions that blood was aspirated from the tracheobronchial tree, so from the airways?
PROFESSOR CLASPER: Yes.
Q. Then a chest X-ray 60 minutes after the explosion, which revealed a large opacity in the right lower zone and fractured the right sixth rib.
He gets to chest X-ray within 60 minutes of the explosion.
PROFESSOR CLASPER: Yes.
Q. Again, can I ask you comment on that as a pathway to treatment?
PROFESSOR CLASPER: That is incredibly impressive, bearing in mind he's got to hospital, had a chest drain put in,

he's been intubated and ventilated, and then he's taken to X-ray. That is a very impressive performance.
DR CARY: I just have a comment. That is entirely consistent with what the surgeon told us earlier this morning, that there were people already in the A&E by the time he got there, so the getting people to hospital was prompt.
Q. The article goes on to say that he developed pneumothorax on the fourth day after the explosion and had in fact, it appeared, started to improve.
Again, is that nevertheless consistent with someone whose injuries may still prove to be fatal?
PROFESSOR CLASPER: Yes.
Q. Because the lungs chart their own course of recovery?
PROFESSOR CLASPER: There are complications. Yes, the lungs chart their own course of recovery. There are also complications of intubation, surgery, mass blood transfusion, and often they will appear days after the initial injury, infection, then coma.
Q. We can see overleaf that a tracheostomy was performed on day 13. So he's been in hospital nearly two weeks.
A tracheostomy is really an intervention required again to assist with breathing?
PROFESSOR CLASPER: For patients on long term ventilation, a tracheostomy makes it easier and more efficient to

ventilate.
Q. Is that a hole in the windpipe into which a tube will be put?
PROFESSOR CLASPER: Yes.
Q. He still has problems on X-ray with his lungs and remained critically ill. But by this late stage that's attributed to septicaemia.
What is septicaemia?
PROFESSOR CLASPER: Septicaemia is a localised infection that is then spread into the bloodstream and then starts to affect you by lowering your blood pressure and increasing your heart rate, amongst other changes.
Q. That is a complication immediately resulting from injuries to the lungs caused by the explosion?
PROFESSOR CLASPER: Not necessarily to the lungs in this case. It could have come from the lungs.
The other thing that appears from the article is that although he went to theatre, he had multiple wounds, a lot of which were cleaned. They were not all cleaned because he was too unstable on the table. So he had wounds that they still had not managed to debride, to clean surgically.
Even nowadays that will be common with critically ill patients who have been involved in an explosion. You can't do everything you want to do initially.

Q. Was there anything, as far as you are concerned, that wasn't done for him to try to keep him alive?
PROFESSOR CLASPER: No. I genuinely think the treatment he received was far better than could be expected in virtually every hospital.
Q. So far as his death is concerned, is it in effect the same cause of death as all the others who died, except the process took longer to work out?
PROFESSOR CLASPER: Yes, he died of complications as a result of multiple injuries from the explosion.
Q. If one hypothesises about whether or not any other form of intervention, or whether earlier intervention could have made any difference, is it still probable that no matter what treatment or what time that treatment took place, it was probable that he would die?
PROFESSOR CLASPER: In my opinion, it was highly likely he would die, regardless of any different treatment.
DR CARY: I agree with that. It is quite apparent from an early stage he had quite severe blast lung even by current standards of classifying it.
He was severely lacking in oxygen because of the lung not working properly. He had pneumothorax, so blood getting into the chest space at the expense of the lung, which then affects the lung function and makes it even worse.

And so, if you took a very simple view and you thought but for the bomb explosion, he would not have died in the way he did, and when he did. In fact, he died in spite of having a lot of targeted supportive therapy over some days.
THE CORONER: May I just ask a question: would it have made any difference that he survived for this period of time because he was a particularly fit young man?
PROFESSOR CLASPER: Yes, I think it did.
I mean, there are multiple reasons why the survival rate in Camp Bastion was so high. One of the reasons, we think, is the individuals were in their late teens to early 30s and were very, very fit. I think that does make a difference.
THE CORONER: Yes. I think we heard from the evidence that James Craig was fit because he played sport.
MR SKELTON: He played a lot of football, as his family members have told us.
Staying, please, with the Caseby and Porter paper, could we proceed, please, to the fifth page at the bottom?
Case number 4. This is a 28-year old male who complained of severe retrosternal chest pain and dyspnea. What is that?
PROFESSOR CLASPER: Again, that is difficulty breathing.

Rapid breathing rate, struggling with breathing.
Q. His respiratory rate was 36 per minute and he was slightly cyanosed --
THE CORONER: It just would be helpful to have his name.
MR SKELTON: I was going to ask that very question.
THE CORONER: Yes.
MR SKELTON: I want Professor Clasper to tell me.
This appears to be Thomas Chaytor?
PROFESSOR CLASPER: Yes.
Q. His name, of course, in the medical paper is anonymised, but we know that he died. And, as you can see from the part I was just about to read, his main external injury was a 50 per cent partial thickness burn which involved mainly the anterior aspect of his whole body.
PROFESSOR CLASPER: Yes, that would be consistent.
Q. Is that his front?
PROFESSOR CLASPER: That is the front.
Q. That is consistent with what we have heard in respect of Thomas Chaytor being removed from the Tavern having suffered severe burns, being conscious for part of this period of time and also having suffered problems with his lungs?
PROFESSOR CLASPER: Yes.
Q. He also undergoes a chest X-ray which reveals a well-defined opacity of eight centimetres diameter in

the left mid-zone and a less clearly defined opacity spanning out above and below it.
Those opacities would be caused by what?
PROFESSOR CLASPER: It is difficult to say for certain. He had evidence of blast lung, which would cause problems with bleeding in the lung; he will have had inhalation burns because the burns were to the front and again they will produce problems; and he would also have been subjected to blunt trauma as well which would also produce -- so it could be any of the three mechanisms but it is consistent with injuries from the explosion.
Q. Overleaf the report continues. I'm not going to ask you to take us through all the treatment, but can I ask you to comment on it?
Again, was this good standard treatment and cannot be criticised?
PROFESSOR CLASPER: I believe he was transferred to the Accident Hospital because that is where the burns unit was. Standard of care would be to resuscitate the patient at the initial hospital and then transfer when stable to a specialist burns centre.
Q. We don't, I think, in the absence of the medical notes, know exactly when that transfer took place.
PROFESSOR CLASPER: No, Sir.
Q. So he went to the hospital where Mr Waterworth was based

and ultimately ended up at the hospital where Professor Boffard was based?
PROFESSOR CLASPER: Yes.
Q. You can see, towards the bottom of the first column, that on the fifth day, the right chest drain which had been put in his chest to help had been removed, but there was no improvement in his condition by the sixth day despite radiological clearing of the lung fields.
So in other words, although an X-ray has been performed which makes it look like the lungs look like they are clear -- in other words, not suffering any obvious signs of injury -- he's just not got better?
PROFESSOR CLASPER: I believe the X-ray was done because he was still not right after they had taken the chest drain. So it would be normal practise to repeat the X-ray just to make sure the lung had not collapsed again, and it had not, so you are looking at struggling because of underlying lung damage itself.
Q. So, as with Mr Craig, a decision is taken to perform a tracheostomy? A standard procedure for patients in this condition?
PROFESSOR CLASPER: A standard procedure for people that are reliant on long-term ventilation, yes.
Q. Towards the end of that operation, he says that the patient suffered a cardiac arrest and resuscitation was

unsuccessful.
PROFESSOR CLASPER: Yes.
Q. It goes on to say that the autopsy -- in other words, the post-mortem examination -- revealed bilateral pneumothorax with areas of contusion and foci of bronchopneumonic consolidation in both lungs. So severe lung injuries.
PROFESSOR CLASPER: Severe lung injuries and complicated by infection.
Q. Just to complete that, there were several small lacerations of the visceral pleura near the right hilum.
That is tearing within the gut?
PROFESSOR CLASPER: Sorry, the lung. The pleura is the lining inside the chest.
Q. The visceral pleura near the right hilum?
PROFESSOR CLASPER: Yes, so that is tearing in the chest. The pleura is the lining inside the chest that sits between chest wall and the lungs.
When you have a pneumothorax, air gets into that space, so the tearing would be consistent with why he had a collapsed lung. The lung was torn and it was leaking air into the chest.
DR CARY: I think that is part of the range of what you may see in blast lung. Pneumothorax may be quite a problem because of the damage to the lung tissue allowing air to

burst out into the chest space.
Q. So far as Mr Chaytor is concerned, similarly to Mr Craig, he died from multiple injuries suffered as a result of a bomb explosion, although he happened to die several days later having suffered the complications I have described?
DR CARY: That is correct. So there is a very simple test: but for the explosion, neither of these men would have died when they did in the way they did.
Q. Can I also ask a similar question to the question I asked about Mr Craig: would earlier intervention, or different intervention medically, have made any difference to the outcome?
PROFESSOR CLASPER: I think it is highly unlikely. In the absence of notes we can't say for certain, but the extent of his lung injury and the extent of his burns, the chances of death were very, very high. In burn victims, that death often occurs several days later. So they don't tend to die instantly. So that would be consistent with that.
DR CARY: I agree with that.
Q. So it is probable -- more probable than not -- that he would have died in any event no matter what treatment he got, or when he got it?
PROFESSOR CLASPER: I think it is highly likely he would

have died regardless of the treatment.
Q. Do you agree with that?
DR CARY: I agree with that. Both these men suffered quite severe blast lung which of itself, as we have seen with some of the other victims, was very rapidly fatal.
They were lucky enough to get targeted therapy for a while but, I think because of the severity of it, and in the one instance because it was complicated by burns, the outcome was inevitable.
Q. Thank you.
Can I go back? I think I may have omitted to describe the cause of death of Anne Hayes, who is the fifth person in our list of the 11 who died as a result of the explosions at the Tavern in the Town.
Anne Hayes is under tab 6. She suffered significant secondary and tertiary blast injuries, with evidence of primary and quaternary blast injuries. Her injuries were unsurvivable with current advanced medical treatment.
PROFESSOR CLASPER: Yes.
DR CARY: Yes, I agree with that. Again she had a serious head injury.
MR SKELTON: Thank you.
That concludes the evidence, unless you have anything to add, in respect of the 11 who died as

a result of the explosions in the Tavern in the Town.
DR CARY: No, I don't think so.
Just perhaps in summary form, all of them had a degree of blast lung which I think you might not be surprised by in that sort of confined space. Blast lung is capable of causing very early rapid death. Two people survived a while, but in spite of specific therapy that was to no avail.
Q. Thank you.
Turning then to the Mulberry Bush. The first victim is Michael Beasley. He may be found under tab 14.
Your report, Professor Clasper, states that he died following admission to hospital. The post-mortem report from 27 November 1974 indicated that he died on the day of the bombings, 21 November, but underwent resuscitation attempts at the hospital.
He suffered significant primary, tertiary and quaternary blast injuries with multiple secondary blast injuries. His injuries were unsurvivable with current advanced medical treatment.
It appears that resuscitation was attempted in respect of Mr Beasley, but he could not be resuscitated and therefore died within a slightly longer period than others but nevertheless on the night of the explosion?.
PROFESSOR CLASPER: Yes.

Q. Do you concur, just to clarify, with the report that I have read out?
PROFESSOR CLASPER: Yes. I suspect he may have died before he reached hospital.
DR CARY: It sounds like he was already in cardiac arrest when he reached hospital. And that would be exactly the same nowadays. If you are in cardiac arrest there will be attempts at resuscitation. It doesn't mean you are actually alive. The fact that they attempt resuscitation, it is just that you are in a circumstance where resuscitation is possible.
Q. We don't know in this specific case why resuscitation was attempted. But there are occasions you are describing, and this is likely to be one of them, where resuscitation will be attempted notwithstanding the person has effectively died?
PROFESSOR CLASPER: If there is any evidence or any suspicion of any signs of life at the scene, resuscitation will be started by the first responders. That will then be continued, normally, even today that will be continued, until someone reaches an emergency department. And then usually a senior doctor then assesses the situation to say if is there any chance of survival.
And that appears to be what happened here. Now,

those signs of life may not be any genuine signs of life. But any suspicion that the person might still be alive, resuscitation will start, continuing until they reach hospital.
Q. There is no suggestion, is there, during this time, that Mr Beasley was conscious?
PROFESSOR CLASPER: No, I don't think he was, judging by his injuries.
DR CARY: He had significant head injury, and that would have been associated with loss of consciousness. And of course once he's in cardiac arrest, he will be bound to be unconscious.
Q. Thank you. The next person I would like to address is Stanley James Bodman. He is under tab 15.
The report states this: he suffered significant secondary and tertiary blast injuries, with evidence of primary blast injuries, but no convincing evidence of quaternary blast injuries.
His injuries again were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: Yes. A multiplicity of injuries, including severe head injury.
Q. The third person is Mr Caddick, under tab 16, please. He also suffered significant primary, secondary,

tertiary and quaternary blast injuries.
His injuries were unsurvivable with current advanced medical treatment?
DR CARY: Yes. Very rapid death, due to his severity of head injury.
Q. John Clifford Jones, under tab 18, please.
He suffered significant secondary and tertiary blast injuries, with a particularly significant secondary blast injury, and evidence of quaternary blast injury, with no convincing evidence of primary blast injury.
These injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: Yes.
Q. John Rowlands, under tab 20.
He suffered significant primary, secondary and tertiary blast injuries, with evidence of quaternary blast injuries.
These injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Yes.
DR CARY: Yes, he had a multiplicity of injuries.
THE CORONER: Just one moment.
We will take a short break. Thank you, members of

the jury.
Discussion (in the absence of the jury)
(12.15 pm)
(A short break)
(12.25 pm)
(In the presence of the jury)
MR SKELTON: Sir, the sixth victim, taking them in the order we have taken them before, is Mr Trevor George Thrupp.
The details of his report can be found under tab 21.
He suffered multiple secondary blast injuries, of which one was particularly significant, with no convincing evidence of primary, tertiary or quaternary blast injuries. His injuries were unsurvivable with current advanced medical treatment.
PROFESSOR CLASPER: Correct.
DR CARY: I agree with that. Major internal injuries.
Q. Thank you.
The next person is Charles Harper Gray. He is under tab 17. He was also at the Mulberry Bush.
He suffered significant secondary, tertiary and quaternary blast injuries, with no convincing evidence of primary blast injuries.
His injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Correct.

DR CARY: Correct. Major internal organ damage.
Q. The eighth person is Pamela Joan Palmer. She was also at the Mulberry Bush.
She is recorded as dying following admission to hospital. The post-mortem report dated 26 November 1974 indicated that she died on the day of the bombings, 21 November 1974.
She, too, suffered significant primary, tertiary and quaternary blast injuries, with multiple secondary blast injuries.
Her injuries were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Correct. Again, I think she may have been dead before she reached hospital.
DR CARY: Yes, I agree with that.
Q. Paul Anthony Davies. He is under tab 12.
He suffered a large number of secondary blast injuries, significant tertiary and quaternary blast injuries, with evidence of primary blast injuries.
His injuries, too, were unsurvivable with current advanced medical treatment?
PROFESSOR CLASPER: Correct.
DR CARY: Yes, I agree with that. His multiplicity of injuries include a severe head injury and blast lung.
Q. Lastly, Neil Robert Marsh. He is under tab 13.

He was outside the Mulberry Bush with Paul Davies, the jury have heard.

He suffered a large number of secondary blast injuries, with one particularly significant secondary blast injury, with evidence of quaternary blast injuries. There is no convincing evidence of primary and tertiary blast injuries.

His injuries were unsurvivable with current advanced medical treatment?

PROFESSOR CLASPER: Correct.

DR CARY: Indeed. A severe penetrating head injury.

Q. I have taken you through Professor Bull's conclusions, with which Dr Cary agrees. I have not referred directly, in the parts I have read out, to the specific injuries suffered by each person, though you have alluded to a few of them, Dr Cary. The reason for doing so is that it is simply not necessary for the purpose of determining how those people died, and to avoid unnecessary distress to those who are listening.

May I clarify, though, two matters. First of all, 19 of those who died, save for Mr Chaytor and Mr Craig, died on 21 November 1974.

DR CARY: Yes, they did.

Q. Mr Chaytor, as you have heard, died on 27 November 1974?

PROFESSOR CLASPER: Yes.

Q. And Mr Craig died on 9 December 1974?

PROFESSOR CLASPER: Yes.

Q. Can you say with confidence that all of those who died -- all 21 who died -- died from multiple injuries caused by a bomb explosion?

DR CARY: Yes, in my opinion.

PROFESSOR CLASPER: I would agree.

Q. And that includes those who died following hospital treatment?

DR CARY: Yes.

PROFESSOR CLASPER: I agree.

MR SKELTON: Thank you.

Those are my questions for you. Others may have questions for you.

(Pause).

THE CORONER: Gentlemen, thank you very much, both of you, for coming.

DR CARY: Thank you, Sir.

PROFESSOR CLASPER: Thank you, Sir.

MR SKELTON: Thank you. You may leave the witness box.

(The witnesses are released)

MR SKELTON: May I briefly recall Professor Bull to give evidence, please?

THE CORONER: Yes.

PROFESSOR ANTHONY BULL (recalled)

Questions by COUNSEL TO THE INQUEST

MR SKELTON: I should emphasise, Sir, while Professor Bull is getting ready to give his final evidence, this is no longer to do with the reasons why the deceased, that is any of the 21, died. This is evidence about other matters on which Professor Bull may be able to assist you rather than the jury.

THE CORONER: Yes. Just let me explain that. That is a bit cryptic.

MR SKELTON: It is.

THE CORONER: Members of the jury, what counsel means by that is that Professor Bull is going to be asked a few questions whereby his answers may make a recommendation or two about changes which could be made.

That is not your province, but it is mine. I do have certain powers, as a Coroner, to make a report with recommendations to prevent future deaths, if that is appropriate. So sometimes Coroners hear a little bit of evidence along those lines.

MR SKELTON: Thank you, Sir.

Professor Bull, in your original general report on 22 December 2017, at the conclusion of that report, section 7, page 26, you make a number of recommendations.

Before I ask you to explain what those recommendations are, can I ask you to clarify this:

It is right, isn't it, that these are not recommendations that you would have hoped were in place at the time and that would have prevented these fatalities from occurring? These are learning points, as it were, from your analysis of the 21 people who died, and the circumstances in which that took place, which may assist in the future?

A. Yes, that is correct.

Q. Can I ask you to take us through what your recommendations are? It may be that this is something about which further evidence can be put in writing at a later date if required.

A. Yes, I will.

THE CORONER: Just in brief terms. That would be helpful, at this stage.

A. Yes, I will.

I think the first point is that we learnt a lot of lessons that we would not have been able to learn if we had not met together with this panel. So there are significant lessons learnt that we would not have been able to learn by conducting the analysis separately and individually.

THE CORONER: So a multi-disciplinary team working together?

A. Yes.

And we think that the lessons learned are important and should be captured in a report to be published in the open literature.

We also comment that it has been very difficult because of the timing lapse and the lack of detail that we had. And therefore we make a recommendation that there is detailed record-keeping of all key facts in the future, specifically the location of fatalities, survivors and uninjured. And the point we make about survivors and uninjured is extremely important in the analysis of likely survivability of those who died in any future event.

That includes detailed injury scoring of fatalities and survivors, and post-mortem records and photographs.

THE CORONER: So if there were to be -- and there always may be -- a mass-fatality disaster, or an explosion causing mass fatalities, today or in the future, there is still a bit of a gap there in terms of what record-keeping might be expected?

A. Yes. So our recommendation is that these records would be kept in the future.

We also recommend specifically that three-dimensional plans of the location and the environment of the explosion are kept. That will

facilitate analysis of how the injuries occurred. And that would include structural damage records as well, and of course any details of the explosive device construction or detonation method, should be with this. And with the building records, including construction technique. That is important.

So we would like to highlight the necessity to obtain information on survivors and not just fatalities. We think that is a key point here.

We also have a specific point on the injury scoring systems. We haven't gone into this in detail and we don't need to here. But the injury scoring systems, typically, are not able to score effectively for such a multiplicity of injuries.

So we make a recommendation that such scoring systems could be improved, and that the pathologists reports perhaps could have a standard form, because they didn't in this case and that made it very difficult to interpret some of the information, although we were able to do so.

Our final recommendation is for the future, for the design of public spaces, buildings and the like. We were unable to conduct, to create, a detailed computer model of the explosion and of the blast in these two bombings. And validated computer models could be used

pre-emptively to design facilities that would mitigate the effects of potential explosions and perhaps save lives.

So detailed analyses of these events and any future events, through the record-keeping that I have outlined, would allow us to improve the design of buildings and public spaces. And that requires a significant amount of work, but it would be facilitated by the record-keeping that we have recommended.

Sir, those are our recommendations.

THE CORONER: So these recommendations would be designed to make changes which could help with treatment --

A. Potentially, yes.

THE CORONER: And could save lives, for example in the last point which you made about the construction of buildings and spaces.

A. Yes.

THE CORONER: Public spaces.

A. Yes.

THE CORONER: Buildings to which the public have access.

A. Yes.

THE CORONER: Any other consequences, you would say, of these recommendations?

A. No. Those are the main consequences.

THE CORONER: What would be helpful, from my point of view,

would be if you could elaborate upon those recommendations in writing for me by way of a letter. It will be a public letter, because others will be entitled to see it and comment upon it. And others may be invited to say what they wish to say about those points, and whether any of those have been taken on board anywhere else.

A. I will do so.

THE CORONER: That would be very helpful. Thank you very much.

MR SKELTON: To be clear, Professor Bull, the things you are recommending are not things that are in place at the moment? They are things that are still needed?

A. That is correct. Not in a standardised form, they are not in place.

MR SKELTON: Thank you. I have no further questions for you.

THE CORONER: Yes. Thank you very much, Professor Bull.

(The witness is released)

MR SKELTON: Sir, that concludes today's evidence.

THE CORONER: Yes.

MR SKELTON: We will return on Friday.

Discussion

THE CORONER: Yes. I think what you are saying is that we have not only caught up but we are slightly ahead

of ourselves?
MR SKELTON: We have.
In consultation with the other advocates, we took a view that we didn't need to take too long with the experts and that we could summarise their evidence in the way we have done today, while providing all the information the jury needs and within a shorter time programme than we previously thought.
THE CORONER: Yes.
MR SKELTON: Therefore we have saved ourselves a day and a half. We have some witnesses, particularly Mr Brown, who are coming on Friday, whom we need to hear from on Friday. And likewise we anticipate that Mr Mole, the professional witness, will return to deal with some evidence about issues of timing --
THE CORONER: Yes.
MR SKELTON: -- about which the jury have heard a lot of evidence, but that hopefully will now be put in a simpler form by Mr Mole.
THE CORONER: Thank you.
Members of the jury, we had built in a little bit of space into our timetable so that you and me and everyone else can, perhaps, from time to time, take a breather and just stand back from difficult and detailed evidence.

We had not been able to take that as we had hoped on a Friday so far. But I have encouraged counsel today, and everybody has been very helpful, to reduce this expert evidence, of which I have very large files, but it has been very helpfully reduced into summary form.
As I said to you earlier, you will get the documents in writing about each of those who died, which summarise these points in a helpful way. I know that that will be coming in due course.
THE CORONER: I'm just going to turn to some of your questions, because I just did a short review of them this morning to see what was outstanding. One of your questions was to Professor Hennessey. He will come back in due course. He talked about the history, the background, and the IRA.
Another question was:
"How many police officers were working during the day and the evening on 21 November 1974?"
I probably said when you first asked that question, "Wait and see". We have in fact had quite a bit of evidence about that. And another of your questions, which relates to that, is:
"How many officers were on duty in A Division on a regular Thursday evening?"
So I am just going to summarise briefly now -- and

I am sure I will be told, now or later, if I have this wrong -- that the normal number of officers on duty at Digbeth, according to Police Sergeant Pedersen, would be a minimum of 14 and a maximum of 17.
Police Constable Hazlewood, who later became an inspector, said that it would be 16 or more. That is my understanding of what would be normal.
On 21 November 1974, Police Sergeant Pedersen said, there were nine. Police Constable Hazlewood said there were six or seven. Chief Superintendent Brannigan, in his report, said there were ten at Digbeth and five at Steelhouse Lane. But in addition to those ten which were named in Mr Brannigan's report, we heard evidence that Police Constable Chandler -- and I call him the headlights man -- was there. And he's not on Mr Brannigan's list.
He said that Neil Morris would also have been there. And he's not on Mr Brannigan's list. And he said that others, not many, from the night-shift, like himself, would have been brought forward to work earlier.
So that is a summary of the evidence so far.
Another question is:
"Were there any public campaigns about awareness of mystery packages in 1974?"
We shall hear more about that, partly from Mr Brown,

but from other evidence, especially in relation to commercial premises such as shops and offices.
You also asked:
"Were there any guidelines or processes used by the police in 1974 regarding similar threats, for example unexploded World War II bombs, evacuations et cetera?"
We have heard some evidence about that from Police Constable Hazlewood and also from Police Constable Plimmer, although I think I have mentioned that there are some problems with Police Constable Plimmer's evidence, certainly about timings and whether he was the first police officer on the scene at the Tavern in the Town.
But I will come back to that. We have more to come on that topic. So I flag that up. And certainly in my summing up I will give a summary about the totality of that aspect.
You also referred to a question about Mr Brown, and whether he attended the Rotunda on 21 November 1974. We shall hear from Mr Brown on Friday. I don't think he did, but he will tell us himself.
You also referred to an earlier attack on the Rotunda. I think your question reads -- and I am going to read it as it is:
"Statement re July attack on the Rotunda specifies

officers from Steelhouse Lane attending rather than Digbeth. Why different in November?"

I think the only evidence to date is that from Police Constable Juchnowicz, who is the only officer we have heard from so far, at least from Steelhouse Lane.

He said, in effect, that Central Control would decide who went, that the Rotunda was very much on the border, with New Street as the dividing line, the demarcation line, with Steelhouse Lane to the north and the Digbeth area to the south.

There is then another question which is outstanding:

"Is there any way of establishing what the standard policy would have been for Central Control on learning of a coded warning, ie would they advise all divisions or only specific divisions?"

The simple answer to that is that we have heard no evidence about that, although we have had some discussion about coded warnings and what that might mean to officers if they had it or didn't have it. I will certainly summarise that in my summing up.

So those seem to be the main questions which are outstanding, some of which we will certainly come back to.

So tomorrow is a day off entirely. Some of us will be working, but you don't have to, members of the jury.

But please come back on Friday.

Please don't discuss the case with anybody. And do not start doing your own research. That would not be helpful.

10 o'clock on Friday morning. Thank you very much.

(12.50 pm)

(The Inquests adjourned until 10.00 am on Friday 15 March 2019)

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