



HEALTHCARE SAFETY
INVESTIGATION BRANCH

WWW.HSIB.ORG.UK



TRANSFER OF CRITICALLY ILL ADULTS

Healthcare Safety Investigation I2017/002A

January 2019 Edition



HEALTHCARE SAFETY
INVESTIGATION BRANCH



PROVIDING FEEDBACK AND COMMENT ON HSIB REPORTS

At HSIB we welcome feedback on our investigation reports. The best way to share your views and comments is to email enquiries@hsib.org.uk

When we receive your feedback, we will share it with the most appropriate person to provide a response and you can expect to be contacted within five working days.

The decision to conduct a national investigation is based on specific criteria. More detail about this

criteria can be found on page 16 of this report or on our website www.hsib.org.uk

All information provided to HSIB is collated and may provide inform other investigations.

Thank you for taking the time to read this investigation report and we look forward to receiving your feedback and comments.

ABOUT HSIB

The Healthcare Safety Investigation Branch (HSIB) began operating on 1 April 2017. The HSIB offers an independent service for England, guiding and supporting NHS organisations on investigations and conducting independent safety investigations.

HSIB aims to improve patient safety through effective and independent investigations that do not apportion blame or liability. This is delivered through:

- Learning for improvement – by using findings to deliver practical solutions, address contributory factors and provide support to increase the capability within local NHS systems.
- Diffusing learning – through effective communications and engagement with the wider health and social care system.

HSIB's investigations are conducted by a team of professional investigators from a range of safety-critical backgrounds, including the NHS, transport and the military. The HSIB also draws on additional expertise when required, including Human Factors advisors.

HSIB investigates up to 30 safety incidents each year to provide meaningful safety recommendations and share learning across the whole of the healthcare system for the benefits of everyone who is cared for by it and works in it.

HSIB works with patients and their families and carers, healthcare staff, Trusts, hospitals and other healthcare providers across England.

HOW HSIB DECIDES WHAT TO INVESTIGATE

Safety risks for potential investigations can be shared by individuals, groups or organisations. The decision to start an investigation could relate to a single event, a series of events or a risk discovered through current, ongoing investigations.

An HSIB investigation does not replace the local investigation of a patient safety incident. Instead, the aim is to identify national learning from these events to consider the wider systems and processes involved.

The following three criteria are used to determine whether the HSIB will commence an investigation:

OUTCOME IMPACT

Assessing the impact, or potential impact, on people is a crucial part of the process. It helps identify the most serious risks as these usually involve significant physical and emotional harm.

HSIB also considers the impact on services, and whether the safety risk(s) have, for example,

reduced the ability to deliver safe and reliable care. In addition, the HSIB also looks at whether an incident has caused a loss of confidence in the healthcare system.

HSIB also considers whether an incident has caused a loss of confidence in the healthcare system.

SYSTEMIC RISK

The systemic risk is reviewed; that is, how common or widespread is the risk? Does it occur in different areas of healthcare and/or across multiple sites?

LEARNING POTENTIAL

HSIB will consider whether an investigation has the potential to reduce risk through meaningful, influential and effective safety recommendations.

INVESTIGATION APPROACH

Investigations conducted by the HSIB do not attribute blame or liability; their purpose is to provide lessons for future safety and identify wider opportunities for systemic learning.

Although funded by the Department of Health and hosted by NHS Improvement, the HSIB is operationally independent. The HSIB is also independent from regulatory bodies like the Care Quality Commission (CQC).

HSIB's independent status ensures that its investigations are not conducted on behalf of the families, staff, organisations or regulators. Following an investigation, Safety Recommendations, Safety Observations and Safety Actions taken may be identified.

Safety Recommendations are directed to a specific individual or organisation for action. They are based on information derived from the investigation or other sources such as safety studies, and are made with the intention of preventing future, similar events.

Safety Observations are made for wider learning within the NHS and may be directed to a specific individual or organisation for consideration. They are made when there is insufficient or incomplete information on which to make a definite recommendation for action, but where findings are deemed to warrant attention.

Safety Actions are actions taken during the investigation as a response to the issue under investigation.

A NOTE OF ACKNOWLEDGMENT

HSIB would like to thank Richard's partner, who was present throughout Richard's care, for her time in sharing her recollection of events and experiences which are central to this report. Her continued engagement and support has enabled a much richer perspective of the incident through the eyes of the family.

EXECUTIVE SUMMARY

The reference event

Richard was a fit 54-year-old man who regularly attended a gym. He had a history of paroxysmal atrial fibrillation (a type of irregular heart rate) but had not been on any treatment.

Richard was lifting weights in the gym at around 18:00 hours when he experienced sudden chest pain accompanied by pain in his left arm, which was severe enough to cause him to stop exercising. After phoning his partner to inform her that he was feeling unwell, he drove himself home, arriving around 15 minutes later. Shortly afterwards, at 18:40 hours, he made a call to the NHS 111 helpline and described his symptoms. He confirmed he had experienced chest pain and light headedness that had caused him to sit down. He reported that the chest pain had dissipated, and he was left with a *“strange sensation in his throat, as though it had been strained”*. He was left with a pain between his back and chest; Richard confirmed, when questioned, that the pain felt like a crushing feeling or a band being tightened around his chest.

Following an assessment using the NHS Pathways triage system, the call was passed to the ambulance service and an emergency ambulance was dispatched. It arrived at Richard’s home at 19:05 hours with a two-person crew comprising a paramedic and a year one student paramedic.

The student paramedic performed an examination of Richard that included routine examinations designed to assist in the detection of abdominal aortic aneurysm (AAA)¹. The examinations were normal. An electrocardiogram (ECG) did not show evidence of any specific problem. The crew also measured bi-lateral blood pressure readings, which may be an indicator of aortic dissection² if there is a disparity between them, but they were considered normal. Richard’s medical history was documented. The ambulance crew concluded that Richard was suffering from muscular pain but, as a precaution, decided that he should be taken to hospital for further tests.

Richard was taken to the emergency department (ED) of a nearby acute Trust, where he was triaged and underwent blood tests and a chest X-ray. He arrived at 20:04 hours. Whilst waiting for the test results Richard began to experience vomiting and had diarrhoea. Once the results of Richard’s blood

tests were available, further tests were conducted including a computerised tomography (CT) scan. The CT scan showed that he had suffered an acute aortic dissection. The diagnosis was discussed with a cardiothoracic surgeon at the tertiary specialist cardiothoracic centre. It was decided that Richard should be transferred to the tertiary centre for emergency surgery.

Following a 999 call at 01:26 hours by the acute Trust an ambulance crew collected Richard and commenced an emergency transfer to the tertiary centre at 01.57 hours. There were no specialist hospital staff accompanying Richard even though some consideration had been given to providing an intensive care specialist for the journey. About 12 minutes into the journey, Richard suffered a respiratory arrest. He initially recovered but then went into cardiac arrest soon afterwards. The ambulance crew attempted to resuscitate Richard and requested assistance from the ambulance control centre; they were subsequently joined en route by two paramedics.

After further discussion with the control centre it was decided that the ambulance would divert to the ED of a nearby Trust. On arrival at the ED, a message from the tertiary centre was passed to the ambulance crew instructing them to proceed there immediately as emergency surgery was considered to be the only chance Richard had for survival.

The ambulance immediately departed and continued its journey to the tertiary centre, contacting them en route to advise that Richard had been in cardiac arrest for 32 minutes. On receiving this information, a cardiothoracic surgeon confirmed that *“there was nothing else to be done”* and that *“surgery would be futile”*. The crew were advised to stop cardiopulmonary resuscitation (CPR). However, they continued to administer CPR and returned to the nearby Trust’s ED. Further efforts to save Richard were unsuccessful and he was pronounced dead at 03:15 hours.

The national investigation

An ambulance Trust contacted the Healthcare Safety Investigation Branch (HSIB) about Richard’s case. Following initial information gathering and evaluation of the safety issues against the HSIB criteria for investigation, the Chief Investigator authorised an HSIB safety investigation.

¹ An abdominal aortic aneurysm is a swelling or a bulge in the aorta, the main blood vessel that runs from the heart.

² A tear in the inner wall of the aorta.

The investigation reviewed the entire incident from the start of Richard's onset of pain through the pathway of care that he followed to understand the decisions made. The human factors which may influence decision-making at all levels throughout the transfer process were considered.

As the investigation progressed, the complexity of the case became apparent. As a consequence, the investigation was split into two separate investigations; part one dealing with the transfer of critically ill adults; part two dealing with the recognition of acute aortic dissection.

This investigation focuses primarily on the transfer of critically ill patients, the governance of the networks that support those providers involved in transfers, the preparation of patients for transfer and communication between clinicians in different environments and locations. The investigation identified opportunities and systemic remedies to reduce the risk to critically ill adult patients during transfer.

This investigation also identified contributory factors relating to Richard's case that have implications for the wider healthcare system.

Findings

- There was a lack of national guidance to assist clinicians during time-critical transfers of level two and three patients (the most critically ill).
- There are no consistent guidelines for the transfer of critically ill patients for both emergency and planned situations.
- There was variation in how Critical Care Operational Delivery Networks, whose role is to coordinate patient pathways between healthcare providers, are set up and governed, with a lack of consistent oversight.
- Ambulance pre-alerts have evolved from their original intent and become mini-handovers with a lack of consistent structure and guidance.

HSIB MAKES THE FOLLOWING SAFETY RECOMMENDATIONS

Recommendation 2019/025:

The Department of Health and Social Care should co-ordinate the development of national guidance, with the arm's length bodies, for the transfer of critically ill adults, both in planned and emergency situations.

Recommendation 2019/026:

The Association of Ambulance Chief Executives should work with partners to define best practice standards for the criteria, format, delivery and receipt of ambulance service pre-alerts.

HSIB MAKES THE FOLLOWING SAFETY OBSERVATIONS

Observation:

It would be beneficial for formal governance arrangements to be established to oversee the transfers of critically ill patients.

CONTENTS

- 1 Background and context **9**
- 2 The reference event **11**
- 3 Involvement of the Healthcare Safety Investigation Branch **16**
- 4 Findings and analysis of Richard's management in relation to national and local guidance and policy **18**
- 5 Analysis and findings from the wider investigation **21**
- 6 Summary of HSIB findings, Safety Recommendations and Safety Observations **30**
- 7 Appendix A **31**
- 8 Appendix B **32**
- 9 References **35**

1 BACKGROUND AND CONTEXT

1.1 Aortic dissection

1.1.1 Aortic dissection occurs when the innermost layer of the wall of the aorta tears, allowing blood at high pressure to flow in between the layers, forcing them apart. See Appendix A for more information about the aorta and diseases that can affect it.

1.1.2 The most frequent symptom is a sudden onset of severe chest and/or back pain, often described as *'tearing'* in character, together with vomiting, sweating, and faintness. The location of the pain can be variable and can change. Pain is often most severe at the onset but then subsequently subsides.

1.1.3 The incidence of aortic dissection is 3.5 to 6 per 100,000 people per year and can affect all ages but tends to be highest in middle-aged men (Redfern et al, 2017).

1.1.4 The diagnosis is usually only made with computerised tomography (CT) scanning.

1.1.5 Aortic dissection is rare, but potentially fatal, with a cumulative mortality rate of 1 to 2% per hour during the first 48 hours (Hebballi et al, 2009). Left untreated, there is a 90% mortality at 30 days. This can be reduced to 10 to 25% with emergency surgery, which is the only definitive treatment.

1.1.6 Diagnosis is often delayed leading to delays to surgery that reduce survival rates.

1.2 Specialist centres

1.2.1 NHS England is responsible for the commissioning of 143 specialised services, with the majority of other services commissioned by clinical commissioning groups (CCGs). Cardiothoracic surgery is commissioned by NHS England although it is not responsible for commissioning the transfer of patients from local hospitals to specialist centres, which is the responsibility of CCGs.

1.2.2 CCGs commission ambulance services through collaborative commissioning agreements. For each ambulance service there is a coordinating CCG whose role

is to lead on the contract negotiation and management on behalf of the other CCGs within the area. The coordinating CCG's responsibilities include all aspects of ambulance service commissioning including emergency transfers.

1.2.3 Cardiothoracic surgery is provided through 29 specialist centres across England (Society for Cardiothoracic Surgery in Great Britain and Ireland). There is little standardised data to compare the increase in inter-hospital transfers, however, ambulance staff who spoke to the investigation highlighted that the number has increased. Research and audits have demonstrated improved outcomes for patients using these centralised or specialist services, for example in stroke and trauma care.

1.2.4 In 2013 Operational Delivery Networks (ODNs) were launched. ODNs were designed to focus on coordinating patient pathways between providers over a wide area to ensure access to specialist resources and expertise. The following excerpt was taken from the NHS England website (NHS England, n.d. a):

'Operational Delivery Networks are determined by clinical need as agreed between providers and commissioners and their outcomes and outputs are included in the relevant commissioning service specifications. Responsibility for assuring governance arrangements for ODNs sits with NHS England specialised commissioning and responsibility for 'hosting' the ODNs is agreed with a local provider organisation.

The first ODNs in England were developed from established managed networks with national coverage:

- *Adult critical care*
- *Neonatal critical care*
- *Major trauma*
- *Burns care'*

1.2.5 In 2013 each of the 18 Adult Critical Care ODNs was given a role in producing guidelines for Trusts within their network. The guidelines are for use during the

preparation/transfer and delivery of patients, depending on their condition.

1.2.6 The networks are mostly peer led and participation is not mandatory. The investigation observed that network structures across different geographical areas are varied and in some areas participation in the networks has reduced or ceased.

1.2.7 Across the original 18 ODNs there are 10 ambulance services providing the transfer facilities, which means that most of those ambulance services are providing cover to at least two or more ODNs.

1.2.8 NHS funding is dispensed through CCGs. There are 195 CCGs across England; therefore, funding for the networks comes from many different sources including CCGs, NHS England and providers.

1.3 NHS 111

1.3.1 NHS 111 services were introduced in 2013 and 2014 for patients with urgent medical concerns. NHS 111 is staffed by trained call advisors, supported by clinicians, who use the NHS Pathways triage system to direct patients to the most appropriate available service, both in and out of hours (NHS

England, n.d. b). This includes:

- giving self-care advice
- connecting patients to a nurse, emergency dentist or GP
- booking patients a face-to-face appointment
- sending an ambulance directly, if necessary
- directing patients to local services.

1.4 NHS Pathways

1.4.1 NHS Pathways is a clinical triage system that is used across all 111 and some 999 services across England. Around 14 million calls a year are triaged through this system. It contains approximately 800 symptom pathways and uses standardised, universal question sets to identify the appropriate services.

1.4.2 All 111 call handlers undergo training by clinicians, educational and information technology (IT) specialists to ensure they use the system safely and effectively. NHS Pathways uses up-to-date clinical evidence to design the triage questions, and these are reviewed regularly by clinical experts. Any changes are agreed by a National Clinical Governance Group, comprising clinicians experienced in urgent and emergency care (NHS Digital, n.d.).



2 THE REFERENCE EVENT

2.1 Richard's story

2.1.1 Richard was a fit 54-year-old man who regularly attended the gym. He had experienced paroxysmal atrial fibrillation (a type of irregular heart rate) since his 20s but did not require regular treatment.

2.1.2 On this occasion, he was lifting weights in the gym at around 18:00 hours on a weekday when he experienced chest pain accompanied by pain in his left arm, which was severe enough to cause him to stop exercising. At approximately 18:15 hours he phoned his partner and informed her that he was coming home as he felt unwell. He drove himself home, arriving at about 18:30 hours.

2.1.3 At 18:40 hours he called the NHS 111 helpline. He described the pain at onset as a sudden severe chest pain lasting 15 to 20 seconds, which made him breathless for a little while and was accompanied by a pain in his left arm. It then subsided to a faint pain and he experienced a *“strange sensation in his throat, as though it had been strained”*. He reported to the 111 call handler that he felt that his heart went into an irregular rhythm but settled down after about five minutes and that the pain was more in his back or between his back and his chest on the left-hand side. Richard confirmed, when questioned, that the pain felt like a crushing feeling or a band being tightened around his chest. His partner described him as looking *“awful, white, sort of sickly and pale”*.

2.1.4 Following an assessment using the NHS Pathways triage system, the call was passed to the ambulance service and an emergency ambulance was dispatched. It arrived at Richard's house at 19:05 hours, with a two-person crew comprising a paramedic and a year one student paramedic.

2.1.5 The student paramedic performed an examination of Richard that included routine examinations designed to assist in the detection of abdominal aortic aneurysm (AAA)³. The examinations were normal.

An electrocardiogram (ECG) did not show evidence of any specific problem. The crew also measured bi-lateral blood pressure readings, which may be an indicator of aortic dissection⁴ if there is a disparity between them, but they were considered normal. Richard's medical history was documented. The crew concluded that *“everything pointed towards muscular pain”*, but advised that, in view of the chest pain they should take Richard to hospital for blood tests. They described Richard as not being in pain at the time and that, as he was hungry and they were not concerned that he was critically unwell, he was allowed to eat. However, he had to go to the toilet for a bout of diarrhoea before walking to the ambulance.

2.1.6 Richard was taken to the emergency department (ED) at a nearby acute hospital, arriving at 20:04 hours. His partner followed afterwards by car. Richard was placed in the waiting area in the ED. His care was formally transferred to the ED sister, who was working as the triage nurse in the waiting area. As Richard had chest pain, she decided to follow the chest pain pathway on the Trust's E-care triage system. Richard was moved back to the waiting area before the ED sister arranged for him to be moved to a low-dependency cubicle and asked a staff nurse to organise the relevant tests.

2.1.7 The ED staff nurse recalled that Richard walked in looking pale. She recalled the history of chest pain in the gym, the assumption that his pain was muscular, but that in view of his history of arrhythmia he needed an ECG. She organised blood tests and an ECG.

2.1.8 The ECG indicated no abnormalities. The ED sister recalls Richard walking up and down, going to the toilet to vomit and sitting on the edge of the bed. A cannula was inserted into a vein, blood taken for tests and an antiemetic given. The ED sister recalls Richard becoming increasingly pale, sick and sweaty and complaining of chest pain radiating to his back. She took a further ECG, which she believes was also normal.

2.1.9 The care of Richard was taken over by an advanced care practitioner (ACP)

³ An abdominal aortic aneurysm is a swelling or a bulge in the aorta, the main blood vessel that runs from the heart.

⁴ A tear in the inner wall of the aorta.

⁵ The Trust used the Manchester Triage System, which is widely used in emergency departments.

- (a nurse with additional training and qualifications). He took a detailed history and examined Richard. The record includes a description of the onset of chest pain lasting 10 to 15 seconds in the gym while lifting weights above his head, that he subsequently felt unwell, light headed and could feel his heartbeat.
- 2.1.10 The ACP noted that Richard *“looked well”* and said that he was fully conscious and alert, was not in any discomfort and *“didn’t look compromised in any way and he did not look as if he were in any kind of cardiovascular shock”*. The record states that Richard complained of a sensation in the chest *“as if he’d been coughing excessively”* and some pain in the right shoulder. Although a musculoskeletal origin for the pain was thought likely, the ACP was unable to reproduce the pain by palpation or movement and remained concerned that there could be a more serious diagnosis.
- 2.1.11 Other observations were unremarkable, but during the consultation the initial blood test results became available. These indicated a raised white cell count, which reduced the likelihood that the diagnosis was simple musculoskeletal pain. The ACP requested a chest X-ray and a D-dimer blood test⁶.
- 2.1.12 Differential diagnoses of musculoskeletal pain, chest infection or cardiac chest pain were recorded. The ACP then transferred Richard’s care to a foundation year 2 doctor (FY2) at 21:00 hours and ended his shift. The FY2 recalled receiving a verbal handover from the ACP, describing the history. The FY2 said that the ACP had asked her to follow up the results of the chest X-ray and blood tests and was of the opinion that the patient could be sent home if these were normal.
- 2.1.13 At 22.00 hours the chest X-ray became available; it was deemed unremarkable at this time. At a recorded time of 22:48 hours the D-dimer result became available and showed an abnormal reading of greater than 3,000. A normal D-dimer reading would be less than 500.
- 2.1.14 The FY2 reviewed Richard and recorded that she found normal oxygen saturations, no clinical indication of venous thromboembolism⁷, and describes him as walking round the department, although appearing distressed *“in some way”*.
- 2.1.15 The FY2 discussed the case with the ED consultant, who advised that the abnormal blood results remained a cause for concern. The ED consultant suggested that the FY2 discuss Richard’s case with the Medical Specialist Training Year 4 Doctor (ST4), as Richard would probably need to be admitted to hospital.
- 2.1.16 During his time in the ED, Richard’s partner recalled him as having increasingly severe back pain, pacing around and feeling nauseous, followed by vomiting and continuing diarrhoea.
- 2.1.17 At approximately 23:00 hours the FY2 contacted the ST4 who was concerned, based on the abnormal D-dimer result, about an aortic dissection. She agreed to assess Richard and asked the FY2 to take blood pressure readings in both arms.
- 2.1.18 At 23:31 hours the FY2 noted that the systolic blood pressure in both arms showed a difference of 23mmHg (123mmHg and 100mmHg). The FY2 recalls that the ST4 arrived *“fairly quickly”* and on learning the blood pressure results, requested an urgent computerised tomography (CT) scan.
- 2.1.19 At 23:51 hours the ST4 noted that the patient looked unwell, pale and clammy, was walking around and somewhat agitated. A differential diagnosis of aortic dissection, venous thromboembolism⁸ or ischaemic bowel⁹ was recorded.
- 2.1.20 At 00:01 hours, Richard had a CT scan and was admitted to the acute medical unit (AMU), just prior to him exceeding the four-hour standard (being seen, admitted or discharged from the ED within four hours).

⁶ An abnormal D-dimer level can indicate a diagnosis of pulmonary embolus as a cause of chest pain. D-dimer levels may also be abnormal in some other circumstances, including aortic dissection.

⁷ Venous thromboembolism (VTE) is an overarching term for conditions in which blood clots form in the deep veins of the leg (deep vein thrombosis, DVT) or in the lungs (pulmonary embolism, PE).

⁸ Venous thromboembolism (VTE) is a condition in which a blood clot forms, typically most often in the deep veins of the leg, groin or arm (known as deep vein thrombosis, DVT), and travels in the circulation, lodging in the lungs (known as pulmonary embolism, PE).

⁹ Ischaemic bowel is a bowel with an inadequate blood supply.

- 2.1.21 At nursing handover, the AMU nurse remembers checking his medical record and noted a very high D-dimer level. She carried out observations and a safety assessment. She described Richard having nausea and vomiting and being given further antiemetic medication.
- 2.1.22 The ST4 was present during Richard's CT scan and, together with the radiographer, recognised a potential aortic dissection. The images were immediately sent electronically to the specialist cardiothoracic centre, but the ST4 required the scan to be formally reported by a radiologist to confirm the dissection.
- 2.1.23 The CT scan was reported at 01:06 hours as showing a Stanford Type A aortic dissection, with the dissection flap extending to the right common iliac artery and the right brachiocephalic artery. See Appendix A for more information about the aorta and diseases that can affect it.
- 2.1.24 The ST4 called the cardiothoracic surgeon at the tertiary centre. The surgeon had already viewed the CT images, and requested that Richard be transferred by ambulance under emergency conditions, due to the need for urgent surgical intervention as appropriate for a dissection of this type. The cardiothoracic surgeon requested that the patient should be accompanied by a medical or nurse escort and an arterial cannula be inserted (to allow continuous monitoring of his blood pressure). The cardiothoracic surgeon highlighted the need for Richard to be transferred as soon as possible.
- 2.1.25 At 01:23 hours the ST4 recorded the result of the CT scan in the medical notes, that the cardiothoracic team at the specialist centre had been contacted and that a "blue light" transfer was required. She called the intensive care unit (ICU) to request a medical escort for the transfer and also called 999 to request an emergency ambulance. She recalls two anaesthetists, one junior core trainee year 1 doctor (CT1) from the ICU and a core trainee year 3 doctor (CT3) whose primary responsibility was for obstetrics, coming to the acute medical unit (AMU). Their understanding was that it would be best for the patient for a resident doctor to act as a medical escort for Richard, with the on-call consultant coming in to the hospital to cover that doctor's duties whilst they were off site.
- 2.1.26 The ICU junior doctor phoned the ICU consultant at home. The ICU consultant advised that she believed that the best course of action was to transfer Richard as quickly as possible without any form of preparation or escort. She felt that the time taken to make these arrangements would further increase the risk, outweighing any potential benefit of having an escort.
- 2.1.27 The ICU consultant recalled a similar patient a month earlier who had been successfully transferred without special preparation and had survived.
- 2.1.28 The consultant also stated that the hospital transferred all patients with ruptured AAA without escort, this being an agreed policy with the vascular network surgeons because there was no additional survival benefit from the presence of an escort.
- 2.1.29 The anaesthetic CT3 had been expecting to accompany the patient but took the consultant's advice. He recognised that there was guidance within the region for transfer of trauma patients but that, in general, the type of escort would depend on the severity of the patient's condition and the advice of the consultant.
- 2.1.30 To avoid any further delay, it was decided not to insert an arterial cannula or conduct any other pre-transfer stabilisation. The ST4 explained to Richard and his partner the severity of his condition.
- 2.1.31 The anaesthetic CT3 met the ambulance crew at 01:42 hours and escorted them to the AMU where they were verbally briefed on the patient's condition and forthcoming procedure. He was given paracetamol and an antiemetic drug for nausea before departing. The ST4 believed that Richard's systolic blood pressure was 160mmHg at the time the ambulance departed, and Richard placed himself onto the ambulance trolley. The ST4 was not aware of any pre-transfer checklist, standardised documentation or national guidelines used for such transfers.

- 2.1.32 The anaesthetic CT3 transferred Richard's care to the ambulance crew, who departed with the patient at 01:57 hours. Richard's partner accompanied the transfer, sitting in the front of the ambulance.
- 2.1.33 Once the transfer was underway, the senior paramedic attempted to put another intravenous cannula into the patient as he considered the existing single cannula insufficient if anything untoward occurred during the transfer. However, he was unable to achieve this.
- 2.1.34 Approximately 12 minutes into the transfer, Richard suffered a respiratory arrest, from which he initially recovered. However, he almost immediately went into cardiac arrest. Additional access was gained via an intraosseous infusion due to the difficulties in inserting an intravenous cannula.
- 2.1.35 During the transfer, multiple conversations took place between the paramedics at the various locations (transfer ambulance, dispatch, clinical desk and responding vehicles), during which a confused clinical picture developed, resulting in the description of the diagnosis changing from dissection of the thoracic aorta to a ruptured AAA. This confusion was exacerbated by the fact that the ambulance crew had not been given the patient's notes or documentation from the acute hospital. Neither had they been given details of the contact surgeon at the tertiary centre or advice on what to do in the event of the patient's condition deteriorating during the transfer.
- 2.1.36 The ambulance crew pulled into a car park to start cardiopulmonary resuscitation (CPR) at approximately 02:10 hours. At 02:11 hours the ambulance dispatcher arranged for a rapid response vehicle and a paramedic officer in a car, carrying a LUCAS device, to join them.
- 2.1.37 Whilst the ambulance crew were treating Richard they received advice from the clinical advisor at the ambulance control centre's critical care desk that diverting to a nearby Trust to get blood supplies may give Richard a better chance of survival. The senior paramedic decided to divert. They asked the dispatcher to pre-alert the ED on their behalf. After mistakenly giving an incorrect age (50 instead of 54) and an incorrect diagnosis (AAA instead of dissection of the thoracic aorta) the paramedic asked for confirmation that the information had been received; the dispatcher confirmed this. The senior paramedic confirmed that additional help was still required at the scene and then ended the call, without delivering the rest of the information required for a pre-alert.
- 2.1.38 The dispatcher called the ED registrar with the intention of conducting the pre-alert on behalf of the ambulance crew. The dispatcher was unable to give all the relevant information as the registrar interrupted the pre-alert with further questions which the dispatcher was unable to answer. An estimated time of arrival of 10 to 15 minutes was given and the call was ended. The dispatcher had received no training in the delivery of a pre-alert.
- 2.1.39 The ED registrar called the cardiothoracic surgeon at the tertiary centre for clarification of details and it was agreed to advise the ambulance to continue to the tertiary centre as urgent surgery was considered to offer the best chance of survival. On arrival at the ED, this message was passed to the ambulance crew and they immediately departed for the tertiary centre. At this time, neither the ED nor the tertiary centre were aware that Richard had been in arrest for approximately 17 minutes when the pre-alert was conducted.
- 2.1.40 However, after departing, the crew made contact with the tertiary centre, and when the surgeon became aware that Richard had been in cardiac arrest for approximately 32 minutes she advised that surgery was then unlikely to help and that they should return to the nearest ED.
- 2.1.41 The crew continued CPR and returned to the nearby Trust's ED, where Richard was pronounced dead at 03:15 hours.
- 2.1.42 For a diagrammatic timeline of the reference event, see Appendix B.

¹⁰ Intraosseous infusion is the process of injecting directly into the marrow of a bone to provide a non-collapsible entry point into the systemic venous system.

¹¹ The Lund Hospital Cardiac Arrest System (LUCAS) is a mechanical chest compression device.

¹² Pre-arrival information passed from an ambulance crew to an emergency department about a patient's condition, allowing receiving hospitals to determine the level of preparation and staff required to receive a critically ill or injured patient.



3 INVOLVEMENT OF THE HEALTHCARE SAFETY INVESTIGATION BRANCH

3.1 Referral of reference incident

3.1.1 The Healthcare Safety Investigation Branch (HSIB) was notified by an ambulance service of the death of a 54-year-old man who had died from an aortic dissection during a transfer from a local hospital to a specialist cardiothoracic centre for life-saving surgery. The initial information provided to HSIB identified possible issues regarding the preparation and subsequent transfer of the patient.

3.2 Decision to investigate

3.2.1 Following preliminary information gathering, HSIB concluded that the safety issues represented by this event met the criteria for investigation, which the Chief Investigator authorised.

3.2.2 A summary of the analysis against HSIB investigation criteria is given below:

Outcome Impact – What was, or is, the impact of the safety issue on people and services across the healthcare system?

Inadequately prepared patients have a higher risk of a poor outcome during transfer between hospitals. Increased numbers of transfers between local trusts and tertiary centres have resulted in more patients requiring emergency transfers. Issues relating to communication between local trusts, tertiary centres and the ambulance service can adversely impact on the care of patients transferring between providers.

Systemic Risk – How widespread and how common a safety issue is this across the healthcare system?

Specialist services across England are being centralised, reducing the number of hospitals

offering certain treatments. This has led to an increased number of inter-hospital transfers, which can increase the likelihood of risk to patients if they are inadequately prepared before the journey. Patients have a better chance of a good outcome following treatment at hospitals offering a centralised service; however, longer transit times to receive treatment could lead to critical delays in patients receiving the specialist treatment required.

Learning Potential – What is the potential for an HSIB investigation to lead to positive changes and improvements to patient safety across the healthcare system?

Initial information gathering by HSIB identified variation in the standards and processes for transferring critically unwell patients. Initial information gathered also indicated that there was inconsistency in the transfer of information between the ambulance service and hospitals involved in the case.

3.3 Evidence gathering and methodology

3.3.1 Methods used in this investigation included:

- a review of patient clinical records, hospital policy and procedures in place in the Trusts where the reference incident occurred
- observations of ambulance crews from two different regions
- semi-structured interviews with paramedics, 999 call handlers, dispatchers, emergency department consultants, cardiothoracic surgeons and other clinicians at the Trusts involved
- a review of relevant literature
- a review of internal incident reports of the Trusts involved
- interviews and personal communications with national organisations and subject matter experts, both clinical and non-clinical, about general transfers, critically ill adult transfer guidance, pre-alerts and the effects of the restructuring of the services.

3.4 Limitations of observations

3.4.1 The primary limitation of observations is sample size. When compared to the number of Trusts and ambulance crews that perform emergency transfers, and the increased volume of patients that now require an inter-hospital transfer and the doctors involved in the preparation, the number of

observations was small. However, findings were supplemented by insights from clinical subject matter experts with significant clinical experience of emergency transfers, some of whom have been fundamental in regional work to improve transfers and patient outcomes. The findings were also supplemented by a literature review of relevant academic papers.



4 FINDINGS AND ANALYSIS OF RICHARD'S MANAGEMENT IN RELATION TO NATIONAL AND LOCAL GUIDANCE AND POLICY

The investigation interviewed frontline staff and Trust managers within the Trusts where the incident occurred. The investigation reviewed Richard's clinical records, and Trust policies and national guidance were consulted to understand what actions were taken and how these aligned with both the Trusts' and national expectations. The investigation identified factors relevant to Richard's care and treatment.

4.1 Preparation for transfer

4.1.1 The original acute hospital involved in Richard's care had two transfer guidance documents; one dated 2008 which was specific to level 2 and 3 patients (the most critically unwell), and the second dated 2015 which was related to level 0 and 1 (less critically unwell patients). The first document had been due for update in 2010, but there was no evidence that this had been done. The Trust's 2008 guideline document, Guidelines for Transport of the Critically Ill or Unstable Patient, states:

'Most problems in transit occur because the patient has not been adequately stabilised and prepared prior to moving. It is essential to optimize the patient's condition before transferring. In rare cases, it may be appropriate for the patient not to be stabilised before transfer e.g. ruptured/dissecting aortic aneurysm. Consultant advice should be urgently sought as well as the advice of the receiving hospital. Remember that the person at the receiving hospital is not yet responsible for the patient and has not seen them - the advice may not be right for that particular situation! You must use your clinical judgment to assess the situation you are faced with.'

4.1.2 The Trust's intensive care unit (ICU) consultant told the investigation that guidance on transfers was contained within the Trust's Anaesthetic Clinical Services Handbook, including which patient to transfer, when to transfer and escort requirements. Trainee doctors are given a handbook explaining the transfer process. A transfer training module is included during attachments in intensive care.

4.1.3 The preparation of Richard for transfer from the acute hospital to the tertiary centre was prioritised around speed. A conscious decision was made by the ICU consultant and the tertiary centre that the transfer was not to be delayed because the need for urgent surgery was critical for Richard's survival chances. It is likely that the urgency of the transfer, combined with the statement within the hospital's Guidelines for Transport of the Critically Ill or Unstable Patient, which advises clinicians that it may not be suitable to stabilise the patient prior to transfer, had an impact on the decision-making process. Decisions made by the clinicians during the incident were therefore primarily based on the requirement not to delay the transfer, due to the severity of Richard's condition and the possibility of a cardiorespiratory arrest during transfer. The 2009 Association of Anaesthetists of Great Britain and Ireland guideline states that *'A 'scoop and run' philosophy is only appropriate on rare occasions when the urgency of the situation and the need for definitive treatment will limit the time available for stabilisation before transfer'*. It further highlights that *'even in these situations the transfer should not begin until essential management and monitoring has been undertaken'*.

4.1.4 Another influencing factor on the decision-making process was a previous, almost identical case of aortic dissection, which had presented to the hospital approximately one month earlier. After discussion with a surgeon from another hospital, this patient was successfully transferred for emergency surgery, without a medical escort and with minimal preparation/stabilisation prior to the transfer.

4.1.5 Whilst there are similarities, it is not known how long it had taken to diagnose the patient in the previous case. However, the severity

of the dissection was described as “*very similar*” to Richard’s.

- 4.1.6 In Richard’s case there was a perception that the mortality rate for aortic dissection was higher than the reality, with the consultant believing it to be 10% per hour. Literature states that the actual figure is normally 1 to 2% per hour (Redfern et al, 2017). This may have affected the decision making on pre-transfer stabilisation.
- 4.1.7 Following the decision to expedite the transfer of Richard, a limited amount of preparation for the transfer and future surgery was carried out. When the ambulance crew arrived, they noted that there was no monitoring equipment being used, but the patient was attached to an intravenous drip of Hartmann’s solution (used to replace body fluid and mineral salts) through a small 20-gauge cannula. When asked to describe the patient on arrival, the senior paramedic stated that “he was sat on the edge of his bed, looked reasonably well” and was still wearing his gym clothing. Richard’s appearance may have induced a bias amongst the paramedics involved regarding how critically unwell he was.

4.2 Policy and guidelines

- 4.2.1 The relevant Trust guideline from 2008 was not referred to during the incident and the decisions that were made were based on the clinician’s professional experience. Additional Critical Care Operational Delivery Network guidelines were published in April 2017, which were also not referred to. It is unclear if these were widely available at the time of the incident.
- 4.2.2 The guideline contained checklists relating to the decision to transfer, communication, pre-stabilisation and equipment and monitoring. There was no risk assessment form within the guideline, although there was in the 2015 guideline for lower dependency transfers.
- 4.2.3 The policy in place was based on the 2002 version of the Intensive Care Society (ICS) document Guidelines for Transport of the Critically Ill (Intensive Care Society, 2011) and the local Critical Care Network guidelines.

The ICS guidance was revised in 2011 and includes standards on risk assessment, pre-transfer checklists, preparation for transfer and accompanying personnel, amongst other key elements. These were not reflected in the local Trust’s guidelines.

- 4.2.4 The Trust’s guidelines also state that they are a supplement and should be used in conjunction with the revisions to the ICS guidelines and is a ‘*guide to local recommendations and arrangements*’. The ICS’s revised guidelines, published in 2011, were not reflected in the document in place at the time of the incident. At the time of the reference incident the local Critical Care Network which is referred to in the policy was no longer in operation, with updates on the network website last being made in 2010.
- 4.2.5 In 2013 Critical Care Operational Delivery Networks were established with responsibility to set out guidance and procedures for the area they covered. These are written by individual Critical Care Networks and focus on the issues that their membership identified as being most important. Whilst multiple guidelines deal with aspects of the transfer of critically ill adults, there is no single set of standards or guidelines which cover both emergency and planned transfers.

4.3 Patient handover

- 4.3.1 Patient handovers are critical interactions between clinicians and have an important role in patient care. Patient handovers between trusts are complicated further by information technology (IT) systems which do not always integrate with each other. An ambulance service deals with many trusts as part of an emergency call and during planned and emergency inter-hospital transfers, and each trust may use different electronic or paper-based documentation systems. During patient handover, the electronic patient care record cannot always be transferred digitally between the two trusts as the IT systems may not be compatible. This means that information may need to be transferred by manually entering the information into the receiving trust’s IT system, as occurred in the reference event.

4.3.2 The ICS 2011 guidance states: *'Handover should include a verbal and written account of the patient's history, vital signs, therapy and significant clinical events during transport. X-rays, scans and other investigation results should be described and handed over to receiving staff.'*

4.3.3 In the reference event the patient notes were not handed over between Trusts, resulting in the ambulance departing with no information on the patient other than that obtained during the verbal handovers. The local Trust's 2010 guidelines contained a communication checklist, which included a requirement to *'designate someone to help with equipment and paperwork'* and ensure that *'all notes, x-rays, scans, results, letters and printouts accompany the patient to allow verbal and*

written handover'. This did not happen in Richard's case.

4.3.4 The acute hospital used an electronic system for patient notes, but the ambulance service system was paper-based and therefore any notes would need to have been printed and handed to the ambulance crew; this was not done. No risk assessment, other than the discussion about Richard's survival chances, or transfer plan were either discussed or completed.

4.3.5 Although the handover of patient information was not part of the direct focus of this investigation, the issues relating to handover of information create additional time pressure on those involved and can lead to key pieces of information being lost at each handover point.



5 ANALYSIS AND FINDINGS FROM THE WIDER INVESTIGATION

5.1 National guidance

5.1.1 The investigation is aware of the following organisations which have produced transfer guidelines that deal with elements of critical care transfer; however, not all aspects are considered:

- National Institute for Health and Care Excellence (NICE) guideline NG94, Emergency and acute medical care in over 16s
- Intensive Care Society (ICS)
- Association of Anaesthetists of GB and Ireland
- Royal College of Emergency Medicine (RCEM)
- European Society for Cardiology
- American Heart Association.

5.1.2 The number of guidelines illustrates the complexity of the subject and the difficulty clinicians face when writing transfer policies and guidelines for Critical Care Networks.

5.1.3 The guidelines set out a general standard and do not account for the intricacies of the location and the distances to be travelled. In rural areas there can often be significant distances between acute trusts and tertiary centres, resulting in longer transfer times and therefore the need to balance the time taken to stabilise a patient with the urgency to transfer. Trauma and stroke networks have conducted a significant amount of work, in conjunction with the ambulance services, to ensure that the standards are understood and applied as demonstrated through the Trauma Audit and Research Network. This work has been carried out on a national scale so that these standards do not vary depending on the region. The investigation observed that networks covering stroke and trauma were generally well funded, well

developed and with clear engagement of relevant partners.

5.1.4 The RCEM has produced guidelines for the management and transfer of patients with ruptured abdominal aortic aneurysms (AAAs). However, for aortic dissection, for which they have produced two safety alerts, there is no specific set of guidelines for transferring patients.

5.1.5 The guidelines all suggest that the preparation of patients for transfer and the need and skills of accompanying clinicians are dependent on the severity of the patient's condition, their physical and mental state, the time of day and the amount of time they have to move the patient to the specialist centre. The 2011 ICS guidance states that patients should be *'stabilised prior to transfer to reduce the physiological disturbance associated with movement and reduce the risk of deterioration during the transfer'*.

5.1.6 There is consensus among the clinicians and subject matter experts spoken to during the investigation that a rapid pick-up and depart transfer is optimum for transfers over short distance and time. The investigation found that this model was more commonly used within urban areas where the distance between non-specialist and specialist units is less than in rural areas. For these transfers, the patient is collected and delivered as quickly as possible and often without preparation. The investigation found no consistency in the guidelines on when to stabilise the patient prior to transfer.

5.1.7 The subject matter experts highlighted that when transfer times are longer (for example during the reference event where the transfer was approximately 45 minutes), then pre-stabilisation of the patient may affect the outcome and subsequent mortality of the patient. Within one of the London critical care transfer networks, teams are trained to stabilise a patient within 20 minutes of identification of the need to transfer.

5.2 NICE guideline NG94

5.2.1 In March 2018 NICE published guideline 94, Emergency and acute medical care in

over 16s: Service delivery and organisation (National Institute for Health and Care Excellence, 2018a). A key recommendation from this guideline is to:

'Use standardised systems of care (including checklists, staffing and equipment) when transferring critically ill patients within or between hospitals'

and

'Use structured handovers during transitions of care and follow the recommendations on transferring patients in the NICE guideline on acutely ill patients in hospital.'

5.2.2 Chapter 34 of the guideline, which focuses on standardisation of transfer, concludes that there is a lack of current standardisation. It states that *'There are some guidelines that have been published however they do cause some degree of inconsistency'*. It further notes that critical care transfers pose *'significant risks'* and that the number of transfers are likely to increase in the coming years. The guideline development group felt that *'Carefully planned transfers improve outcomes such as mortality and avoidance of adverse effects which the guideline*

group felt was of critical importance'. The group concluded that *'transfers should be standardised whether the travel is 100 yards or 100 miles'* (National Institute for Health and Care Excellence, 2018b).

5.3 RCEM safety alert – Missed aortic dissection

5.3.1 In March 2016 the RCEM published a 'Safety Newsflash Alert' (Royal College of Emergency Medicine, 2016) in relation to missed aortic dissection (Fig 1). This alert was sent to all acute hospitals across England and highlighted the key signs and symptoms of the condition.

5.3.2 In April 2018 the RCEM sent out a further reminder to trusts with the launch of a safety poster (Fig 2) and an associated podcast. These were produced jointly with Aortic Dissection Awareness UK, Heart Research UK and the Society for Cardiothoracic Surgery in Great Britain and Ireland. The podcast included patient stories highlighting experiences of patients and their families who had been affected by aortic dissection. This is being used as a teaching tool for

FIG 1 RCEM ALERT ON MISSING AORTIC DISSECTION

The Royal College of Emergency Medicine
March 2016

**Safety Alert:
Missed aortic
dissection**

Sudden chest pain, maximal at onset?
Particularly if it radiates to the back, think aortic dissection

- Patients feel very unwell or collapse
- The pain can vanish then recur in the epigastrium, or elsewhere
- Blood tests can be normal
- ECG and CXR can be normal
- The only way to make the diagnosis is by CT scan

For other RCEM issued Safety Alerts and Safety Newsflashes see:
www.rcem.ac.uk/Shop-Floor/Safer%20Care

FIG 2 RCEM POSTER HIGHLIGHTING AORTIC DISSECTION

Unexplained Severe Pain?
**THINK
AORTA**

Aortic Dissection is an emergency
that is often fatal when missed

**CT Scan for a definitive
diagnosis**

Symptoms	Patient Risk Factors	Physical Examination
<ul style="list-style-type: none"> • Pain is the #1 symptom • Neck, back, chest or abdomen • Numbness or weakness in any limbs • History of collapse 	<ul style="list-style-type: none"> • Hypertension • Aortic aneurysm • Bicuspid aortic valve • Familial aortic disease • Marfans and other connective tissue disorders 	<ul style="list-style-type: none"> • Pulse deficit or vascular signs • Neurological signs of stroke or paraplegia
<p>Pain characteristics can be:</p> <ul style="list-style-type: none"> • Maximal in seconds • Migratory & transient • Pain can be sharp, tearing, ripping 		<p>Diagnostic Warning</p> <ul style="list-style-type: none"> • Chest x-ray, ECG, ultrasound & blood tests can be normal

Aortic Dissection Awareness UK in collaboration with:
Heart Research UK
Society for Cardiothoracic Surgery in Great Britain and Ireland
The Royal College of Emergency Medicine
www.thinkaorta.org

emergency department (ED) clinicians and includes work conducted at Bristol Royal Infirmary advocating lowering of threshold for computerised tomography (CT) scans of the aorta. The RCEM also described the work they had conducted in raising awareness and training for all staff working in the ED.

5.4 ICS – Guidelines for the transport of the critically ill adult (3rd Edition 2011)

5.4.1 The ICS Guidelines for the transport of the critically ill adult (3rd Edition 2011) (Intensive Care Society, 2011) quotes that in 1997 there were approximately 11,000 critical care transfers. The document highlighted that *'figures for the number of such transfers carried out currently are difficult to obtain as there is no national reporting system'*. The document further described that much of the available data covering transfers is from single centre audits and case studies, proving a weaker level of evidence than national standardised data collection.

5.4.2 At the time of the guideline publication the ICS reported *'widespread deficiency in patient monitoring facilities, staff training and transfer documentation'*. It recommended a standard of *'two suitably trained, experienced and competent attendants'* to accompany the transfer, based on the level of risk and patient dependency.

5.4.3 The ICS advocated the completion of a risk assessment prior to transfer that considers:

- the patient's current clinical condition (assessed using a physiological track and trigger score and other physiological parameters relevant to the patient's condition)
- specific risks related to the patient's condition
- risks related to movement/transfer
- likelihood of deterioration during transfer
- potential for requiring additional monitoring/intervention
- duration and mode of transfer.

5.5 Association of Anaesthetists of Great Britain and Ireland – Inter-hospital Transfers

5.5.1 The publication Inter-hospital Transfers (Association of Anaesthetists of Great Britain and Ireland, 2009) made a number of recommendations to inform local policy and guidance. The document highlighted:

'It is essential that a systematic approach is taken to the process of patient transfer; starting with the decision to transfer, through the pre-transfer stabilisation, and then the management of the transfer itself. This will encompass all the stages including skilled evaluation, communication, documentation, monitoring and treatment, handover and return to base'.

5.5.2 The document made 13 recommendations which included a standardised and co-ordinated approach within networks. The document further highlighted that *'details of every transfer must be recorded and subject to regular audit and review'*.

5.5.3 In relation to accompanying patients, the document highlights that the decision should be taken by a senior doctor and based on the patient's level of acuity. It specifies that an anaesthetist does not always need to be present on the transfer, but that *'All individuals involved in the transport of critically ill patients should be suitably competent, trained and experienced'*.

5.5.4 There was no mechanism to mandate the application of this guideline and local networks and trusts were able to choose how, and what elements, to implement.

5.6 Planned transfers versus emergency transfers

5.6.1 Planned transfers are regularly conducted between a local intensive care unit (ICU) and a higher dependency unit at a specialist hospital. The investigation observed that in these cases there is often better dialogue between referring and receiving clinicians, with time to arrange the transfer and conduct all the requirements of their locally agreed policies. These transfers are generally

less time-critical than emergency transfers with better planning for stabilisation and accompanying clinicians.

- 5.6.2 Emergency transfers, by definition, are conducted in a shortened timeframe where the patient needs to be transferred immediately, generally for life-saving treatment or surgery. In these cases, the transfers are very much unplanned and can happen at any time of day.
- 5.6.3 When organising the transfer of a patient during normal office hours, contacting other clinicians and organisations is easier due to more staffing cover. In the reference event clinicians were contacting specialist clinicians through out-of-hours beepers and switchboards. Significantly, as this was an unplanned transfer, the referring clinician had to make a 999 call to organise the transfer. This meant that the ambulance crew sent to conduct the transfer was the first available crew. In a planned transfer there is more opportunity to organise it with a team consisting of personnel from both the hospital and the ambulance service, with specific enhanced skill sets.

5.7 Medical/clinical escorts

- 5.7.1 The hospital involved in the reference event had two anaesthetists on duty at the time Richard presented, each with responsibilities for distinct areas of the hospital. The senior anaesthetist, a registrar, had primary responsibilities for the ICU, obstetrics and supporting the ED resuscitation area as required. These responsibilities precluded them from leaving the hospital without handing over the responsibilities to another anaesthetist, in this case the on-call consultant.
- 5.7.2 The decision to contact a consultant during their on-call period may impact the efficiency of the hospital in its following day's operations, especially in small acute hospitals with smaller numbers of staff.
- 5.7.3 The investigation met with leaders of the Royal College of Anaesthetists (RCoA), who said that the issue of emergency transfers is regularly highlighted by its members. One of the key issues raised by RCoA leaders

was that the accompanying clinician is most often an anaesthetist, which has a knock-on effect on anaesthetic capacity within trusts, particularly smaller ones. If on-call anaesthetists are called in to provide cover for those on transfers, operations the following day can be impacted.

- 5.7.4 The RCoA leaders also highlighted that in a considerable number of cases, the accompanying anaesthetist is only able to provide a limited number of interventions, due to the availability of space and equipment on board an ambulance. They suggested that in some cases other clinicians with enhanced training, such as a nurse or paramedic, may be more suitable. The use of specially trained nurses and paramedics is already in place across some transfer networks, such as the North Central London transfer network.

5.8 Regulation and monitoring

- 5.8.1 The 2011 ICS Guidelines for the transport of the critically ill adult (3rd Edition 2011) highlighted that there is little published evidence on the value of Critical Care Networks. They quote an unpublished audit that demonstrated little consistency in the *'transfer related activity of networks'* with some areas having *'no functional network at all'*.
- 5.8.2 It is not clear where responsibility lies for the regulation and monitoring of Critical Care Networks, including evaluation of the network to ensure that it is functioning in the manner intended. The investigation observed that some networks are well established and have good engagement from their members; however, this is not universal across England. Agencies such as Public Health England and the Academic Health Science Network are assisting with the development of some local networks. NHS England Specialised Commissioning has overall responsibility for the services it directly commissions, including adult cardiac surgery, but no responsibility for commissioning ambulance services. It was observed that there was also inconsistency in clinical commissioning group (CCG) involvement in networks, despite them being the commissioners of the majority of non-specialised services including ambulance services.

- 5.8.3 Trusts are inspected by the Care Quality Commission (CQC). These inspections concentrate on the provision of care delivered within a registered location (for example, an individual hospital or ambulance service) rather than the interactions between providers sequentially across a pathway. Although the preparation of patients for transfer occurs within individual providers, this does not feature as a specific element of CQC inspections.
- 5.8.4 CCGs are not required to conduct governance and oversight of Critical Care Networks. There is also no requirement for CCGs to conduct assurance visits or monitor the effectiveness of the networks. One transfer network told the investigation that they believe that after approval of the network policies by the Clinical Senate¹³, the CCGs provide assurance and monitoring of those policies; however, there is no guarantee this will be undertaken as there is no mandated practice.
- 5.8.5 Across better established Critical Care Networks, reports that come from incidents and the learning from subsequent investigations are seen by network Boards and in some areas also by the Clinical Senates. However, Clinical Senates were not formed and designed to provide governance and oversight of transfer networks – they provide clinical advice to a region and to commissioners.
- 5.8.6 The investigation understands that NHS England Specialised Commissioning representatives took an active role during the start-up phase of some Critical Care Network Boards. Their presence reduced over time and CCG representatives became the focus for the networks' issues or concerns, thereby limiting NHS England's oversight of their activity.

5.9 Acute Inter-hospital Improvement Project

- 5.9.1 The investigation was informed of work being conducted on an Acute Inter-hospital Transfer Improvement Project. The initial aim of the work is to better understand the concerns that have been raised in relation to inter-hospital transfers and identify whether any aspects of the process are negatively impacting clinical effectiveness and patient safety.

- 5.9.2 Within the project region there were existing policies in place for ICU-to-ICU transfers, which were also supported by a training programme and national guidance. There were, however, no detailed policies or processes in place for transfers of critically ill adults between EDs or wards to other acute or tertiary hospitals.
- 5.9.3 In April 2017, the project region published guidance for the transfer of critically ill patients. The previous guidelines had not been removed from the intranet resulting in two sets of guidelines being available to staff.
- 5.9.4 The project is looking at all areas of the country to identify best practice, whilst also gathering data on regional problems.

5.10 London networks

- 5.10.1 Whilst London is a unique healthcare setting due to the proximity and number of trusts and specialist centres, there has been significant collaboration across the established transfer networks. London is covered by three Critical Care Networks, with London Ambulance Service providing transfer services across the region. A London transfer policy, called the London Health Programmes Transfer Policy, was drafted and covered many of the issues highlighted by this investigation, such as the preparation of patients for transfer, the transfer of critically ill adults, risk assessments, and patient handover and documentation. The policy is prescriptive with regards to requirements placed on trusts and has sections that may be used as a checklist for staff, particularly with respect to documentation and handover.
- 5.10.2 A Pan-London Critical Care Steering Group has been formed that meets regularly to promote collaborative working and improve transfers across the region. Regular transfer training, provided individually by each of the three networks, is conducted across the region, which includes practising stabilisation of patients prior to transfer. In the case of patients with aortic dissection, the guidance in place aims to complete pre-transfer stabilisation in 20 minutes.

¹³ A multi-professional steering group that is a source of independent, strategic advice and guidance to commissioners.

5.10.3 The North West London network has expanded the field of staff who are able to use the equipment required to undertake the transfer of a stabilised patient. It specifically included nurses in the training, alleviating demand on anaesthetists in particular.

5.11 Safe Transfer mobile application

5.11.1 The North West London Critical Care Network has produced a mobile application called the Safe Transfer App (STrApp). This

is a freely available application aimed at providing the required information for all members of the network to enable the safest and fastest possible transfer of patients. The app considers all aspects of the transfer, from patient preparation and equipment required, to the directions to different hospital departments and their contact details.

5.11.2 Oversight and governance of the application is conducted by the North West London Critical Care Network.

FIG 3 STRAPP MENUS

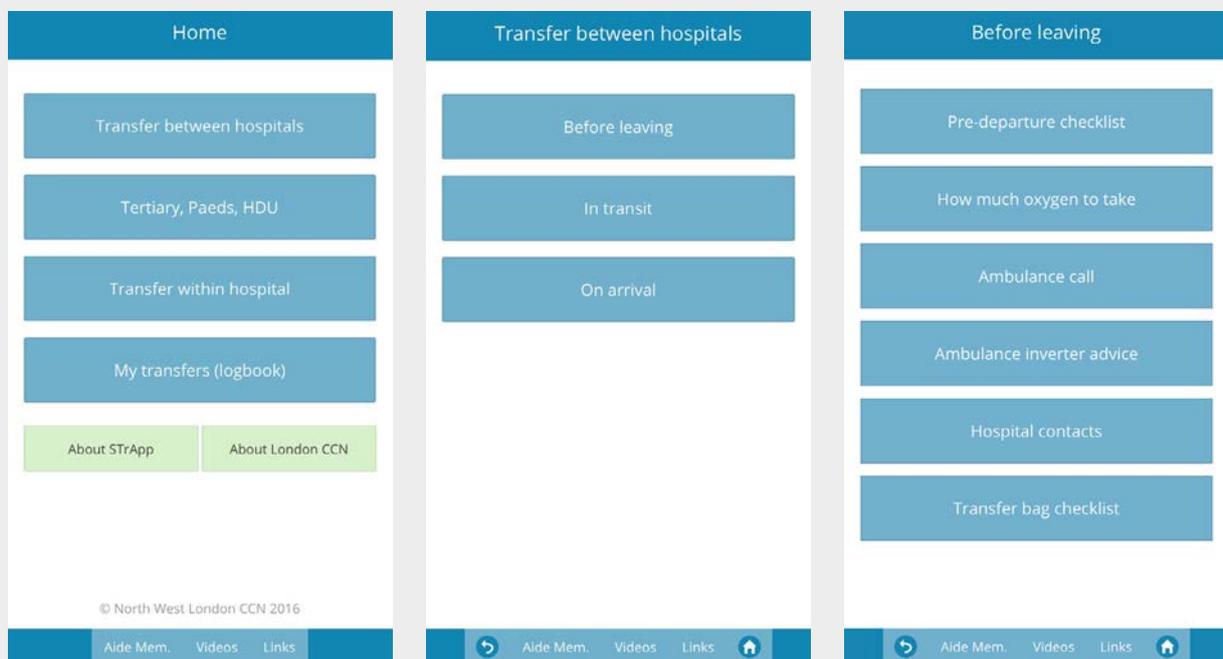
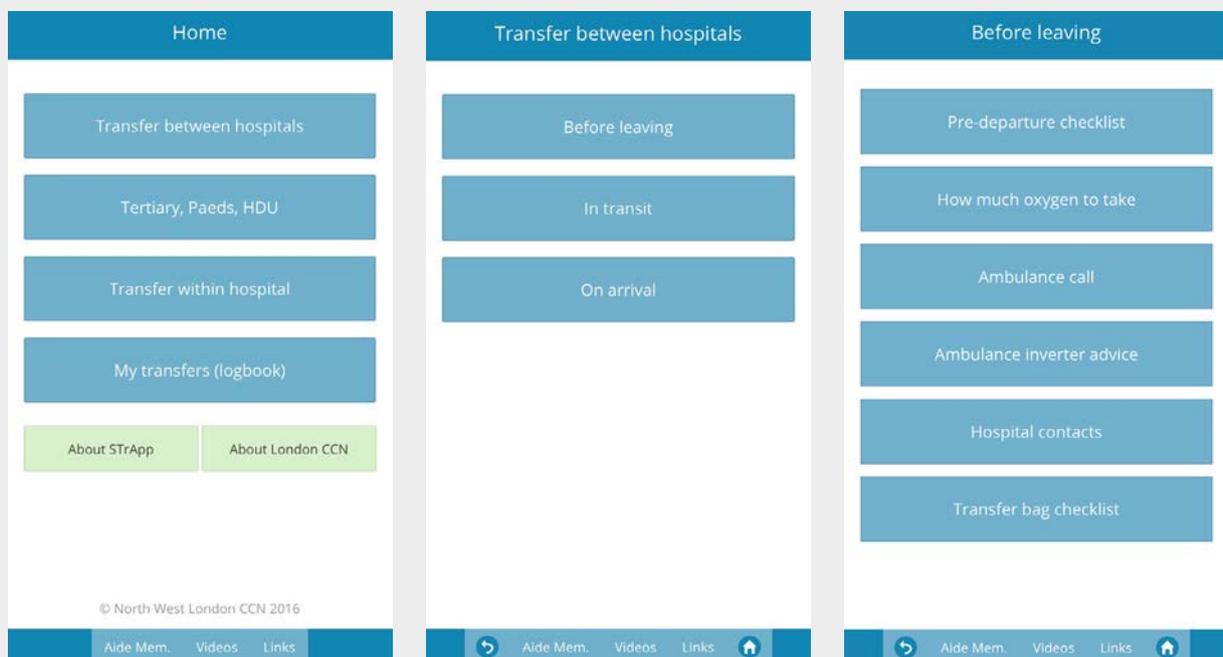


FIG 4 STRAPP 'AORTIC EMERGENCIES' PAGES



- 5.11.3 Fig 3 provides screenshots from the app showing the page flow for inter-hospital transfers.
- 5.11.4 Fig 4 shows the screenshots that follow the menu through to the 'Aortic Emergencies' screen and shows the physiological parameters clinicians should aim for. These have been set using the guidance chosen by the North West London Critical Care Network.
- 5.11.5 The investigation is not aware of the extent to which the STrApp application has been evaluated and validated, however, the network has created a governance board that oversees its continued development.
- 5.11.6 Following a review of the physical evidence from the reference case, engagement with subject matter experts and other stakeholders, the investigation concludes that a national standard is required for the transfer of critically ill patients.

HSIB MAKES THE FOLLOWING SAFETY RECOMMENDATION:

Recommendation 2019/025:

The Department of Health and Social Care should co-ordinate the development of national guidance, with the arm's length bodies, for the transfer of critically ill adults, both in planned and emergency situations.

HSIB MAKES THE FOLLOWING SAFETY OBSERVATION:

Observation:

It would be beneficial for formal governance arrangements to be established to oversee the transfers of critically ill patients.

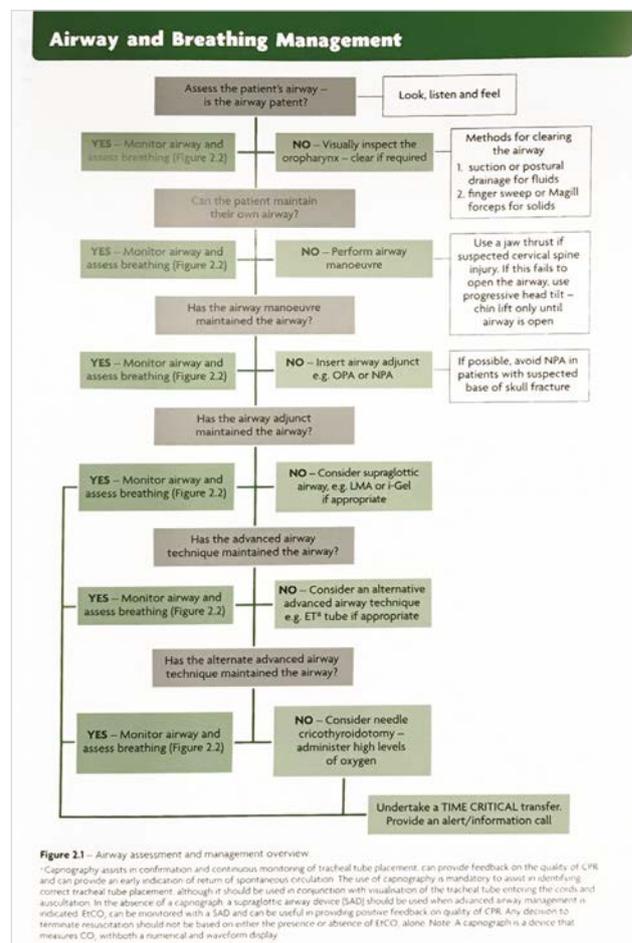
5.12 Pre-alerts

- 5.12.1 All EDs have a priority phone number that ambulance crews can call to 'pre-alert' the hospital to their arrival in emergency situations. This call is used to enable the hospital to receive advanced information about the patient, allowing the ED to prepare for their arrival by bringing in any specialist equipment or teams in advance.
- 5.12.2 Whilst there had previously been methods for the ambulance service to urgently contact EDs prior to arrival, structured and formalised

pre-alerts were conceived and developed by the various clinical networks and have been adopted by ambulance services for conditions such as trauma, stroke, cardiac arrest, airway compromise, respiratory compromise and low Glasgow Coma Score. The pre-alert has become a well-used tool for time-critical conditions: its increased applicability has led to increased use.

- 5.12.3 The Joint Royal Colleges Ambulance Liaison Committee (JRCALC) Clinical Practice Guidelines 2016 refer to a pre-alert as an 'information call' or an 'alert'. Throughout the document there are flow charts that assist paramedics in treating the patients; at the end of some of these flow charts the paramedic will be instructed to provide an information call/alert. An example flow chart can be seen in Fig 5, with the final box in the chart directing the paramedic to make the call. The JRCALC advice is to provide a pre-alert when the circumstances require a time-critical transfer of the patient to the ED.

FIG 5 FLOWCHART FOR AIRWAY AND BREATHING MANAGEMENT, FROM THE JOINT ROYAL COLLEGES AMBULANCE LIAISON COMMITTEE'S CLINICAL PRACTICE GUIDELINES 2016



5.12.4 There is no specific information within the JRCALC guidelines on the content of a pre-alert or how to deliver it. Each ambulance trust has guidance on the use of pre-alerts and the occasions on which they should be used, but there is no agreed national standard for this.

PRE-ALERTS DELIVERY

5.12.5 The investigation identified several different acronyms being used for the delivery of pre-alerts. The pre-alert forms, used by EDs to record information received from ambulance crews, reflected the acronyms that were being used, however, they were all subtly different from each other. The following three acronyms were identified as the most common being used by paramedics across England:

ACRONYMS	DESCRIPTION
A	Age and sex
T	Time of incident
M	Mechanism of injury
I	Injuries/symptoms
S	Signs
T	Treatment
E	ETA (estimated time of arrival)
R	Requirements
A	Age
S	Sex
H	History
I	Injuries/illness
C	Condition
E	ETA
S	Situation
B	Background
A	Assessment
R	Recommendation

5.12.6 Ambulance trusts' information about pre-alerts was found to be included in standard operating procedures, operational instructions or clinical manuals. Attempting to standardise practice, one ambulance Trust has given specific instructions to its clinicians on which tool to use, the method of communication (Airwave radio handset or the mobile data terminal installed in all ambulances) and tips on the content and style of delivery of the pre-alert. This guidance is not consistent across all ambulance services.

5.12.7 The following are excerpts from the Trust's instruction to its clinicians:

'the Trust will move to a direct Clinician to Clinician pre-alert model'.

'In the event that a crew is unable to pass direct to the hospital, the default will be to pass to the EOC [emergency operations centre] and they will pass the ASHICE as currently practiced'.

'The acronym ASHICE should be used to pass all the most vital details of the patient as a PRE-ALERT to the receiving hospital'.

'It is important to also note that the practice of using mobile phones to pass ASHICE should cease in line with this new process. Staff should use either Airwave, or send ASHICE via radio if this fails'.

5.12.8 The investigation observed that clinicians asked dispatchers within the emergency operations centre (EOC) to conduct pre-alerts on their behalf. The dispatchers are non-clinicians and have not had interaction with the patient. They may not understand the importance of all elements of the pre-alert and therefore may not deliver key elements of the message.

5.12.9 Paramedics pass on the pre-alert information using communication devices that may lose signal, although it is predominantly in the most rural areas that the handheld radios suffer from signal issues. Crews were observed to use their own mobile phones to make these calls, reportedly because of accessibility and usability issues when using other devices.

5.12.10 The investigation observed that EDs have pre-alert forms, located next to the priority phone, in preparation for receiving calls from ambulance crews so the details can be recorded and passed to the clinicians. These forms are all very similar, but none are the same. One unit had separate forms for different clinical categories of pre-alert.

5.12.11 Paramedics stated that it was common for ED staff to interrupt the pre-alert with a question regarding the information. These questions can interrupt the flow of the

message, which may lead to vital information being missed.

PRE-ALERT VARIATION

5.12.12 Not all paramedics from the ambulance Trust involved in the reference event were aware of the 'ER' (Estimated time of arrival and Requirements) at the end of ATMISTER. These are an addition to the original acronym, which is detailed in the Trust guidelines on pre-alerts. The first section of the acronym 'ATMIST' is the handover tool for paramedics on arrival at the ED. The longer 'ATMISTER' acronym has been created specifically as a pre-alert tool, with the estimated time of arrival and requirements being information required by an ED when expecting an ambulance with a patient.

5.12.13 SBAR is a communication tool commonly used throughout the healthcare system to ensure prompt and accurate patient handovers. This communication tool was observed regularly during investigation visits, being used by both paramedics and hospital staff during patient handovers, but also to form the foundation of pre-alerts to the EDs.

5.12.14 ASHICE was the first pre-alert acronym and was replaced with ATMIST(ER) in the majority of trusts. However, at least one ambulance Trust continues to use ASHICE as the basis of their pre-alerts.

5.12.15 Pre-alerts are used by ambulance crews to open pathways of care for patients prior to their arrival at the ED. The trauma and stroke networks have a proven pathway system with the pre-alerts playing a key role. In these scenarios, the ED will mobilise either the trauma team or thrombolysis team respectively, to ensure that the patient is treated promptly and effectively. Certain cardiac emergencies may also trigger a pre-emptive response from the ED, however, this was not always the case.

5.12.16 During ED observations and discussions, it became apparent that most pre-alerts did not influence the reaction of the clinicians; this was also confirmed by one of the consultants. All patients, other than trauma and Face Arms Speech Time (FAST) positive stroke, were triaged and assessed upon

their arrival. Once assessment had been completed the clinician would then summon any specialists required to treat the patient. This would suggest that the volume of pre-alerts and the numerous pre-alert conditions suggested in guidelines are considered to be excessive and unnecessary by some EDs.

5.12.17 The investigation observed different factors that led to variation in pre-alerts being delivered by ambulance crews. These included:

- distractions and interruptions (in the form of phone calls, staff interruptions, questions)
- workload (how busy the paramedics are with treating the patient)
- experience and training.

5.12.18 Some of these factors also affect how the pre-alert is received by the ED staff.

FINDINGS

5.12.19 Pre-alerts began as a method of informing an ED of any specialist equipment or personnel the department might require to treat the patient. ED staff told the investigation that there was a time when the 'red' phone ringing would cause a reaction within the ED but this has now lost its importance due to the volume of pre-alerts for conditions that do not require a pre-emptive ED response.

5.12.20 The investigation observed that the pre-alert appears to have altered over time from a short transmission of critical patient information to an ED into a more detailed pre-hospital handover, with the handover acronyms becoming longer and more complicated over time.

HSIB MAKES THE FOLLOWING SAFETY RECOMMENDATION:

Recommendation 2019/026:

The Association of Ambulance Chief Executives should work with partners to define best practice standards for the criteria, format, delivery and receipt of ambulance service pre-alerts.

6 SUMMARY OF HSIB FINDINGS, SAFETY RECOMMENDATIONS AND SAFETY OBSERVATIONS

6.1 Findings

- There was a lack of national guidance to assist clinicians during time-critical transfers of level two and three patients (the most critically ill).
- There are no consistent guidelines for the transfer of critically ill patients for both emergency and planned situations.
- There was variation in how Critical Care Operational Delivery Networks, whose role is to coordinate patient pathways between healthcare providers, are set up and governed, with a lack of consistent oversight.
- Ambulance pre-alerts have evolved from their original intent and become mini-handovers with a lack of consistent structure and guidance.

6.2 Safety Recommendations

HSIB MAKES THE FOLLOWING SAFETY RECOMMENDATION:

Recommendation 2019/025:

The Department of Health and Social Care should co-ordinate the development of national guidance, with the arm's length bodies, for the transfer of critically ill adults, both in planned and emergency situations

Recommendation 2019/026:

The Association of Ambulance Chief Executives should work with partners to define best practice standards for the criteria, format, delivery and receipt of ambulance service pre-alerts.

6.3 Safety Observations

HSIB MAKES THE FOLLOWING SAFETY OBSERVATION:

Observation:

It would be beneficial for formal governance arrangements to be established to oversee the transfers of critically ill patients.



7 APPENDIX A

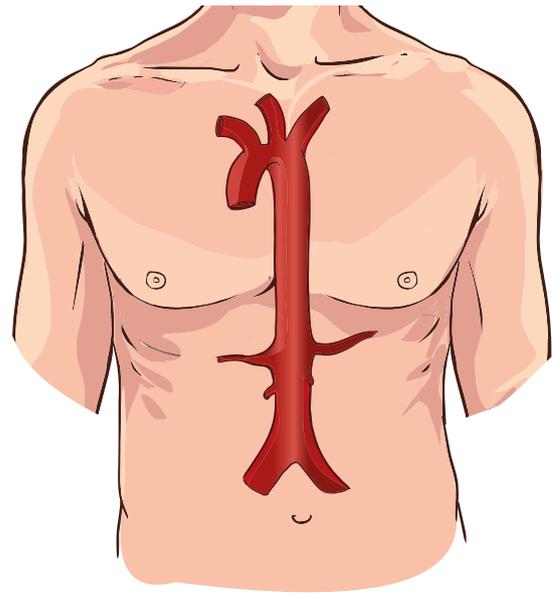
7.1 Aortic disease

7.1.1 The aorta is the largest artery in the body, carrying oxygenated blood from the heart to be distributed to all parts of the body. The aorta is a muscular tube approximately 3cm in diameter, arising from the left ventricle of the heart. It ascends towards the head for about 5cm, before curving round as the aortic arch and descending close to the spine, through the chest and into the abdomen, where it divides at around the level of the hips, into the common iliac arteries.

A number of important vessels branch off the arch of the aorta:

- the coronary arteries (supplying blood to the heart muscle itself) arise close to the origin of the aorta
- the three main vessels supplying blood to the head and upper limbs
- the brachiocephalic trunk (supplying the right arm and right side of the head), the left common carotid artery, and the left subclavian artery.

The aorta can be affected by a number of diseases, including genetic conditions and those affecting the vascular system as a whole, such as disorders of connective tissue and – more commonly – hypertension¹⁵ and atherosclerosis¹⁶.



7.1.2 As a result of disease, the layers of wall of the aorta can split (dissection), or the aorta can dilate (aneurysm). Either of these may result in rupture of the vessel, which is frequently fatal.

7.1.3 These disruptions of the aortic wall may affect either the part of the aorta above the diaphragm in the chest (thoracic), the part in the abdomen (abdominal), or both.

7.1.4 This distinction is important for a number of reasons, including the need for thoracic aneurysms or dissections to be treated in a specialist cardiothoracic unit.

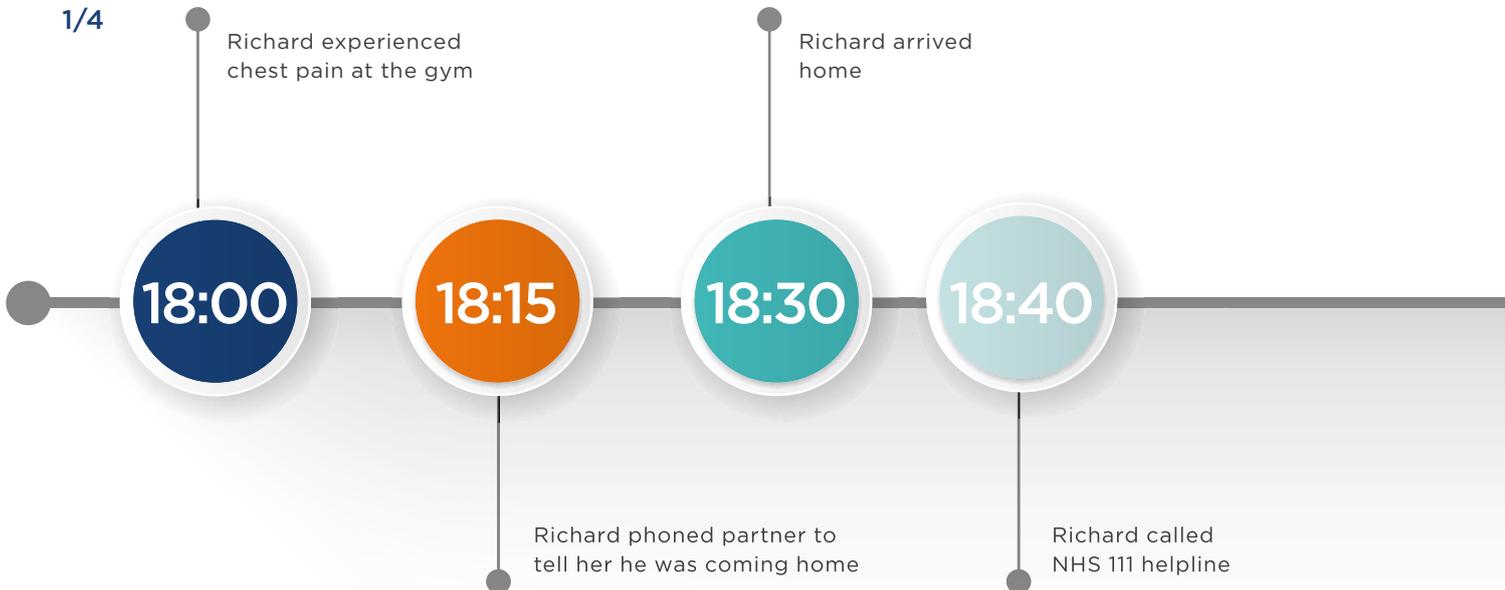
¹⁵ Elevation of the arterial blood pressure above the normal range expected in a particular age group.

¹⁶ A disease of the arteries in which fatty plaques develop on their inner wall with eventual obstruction of blood flow.

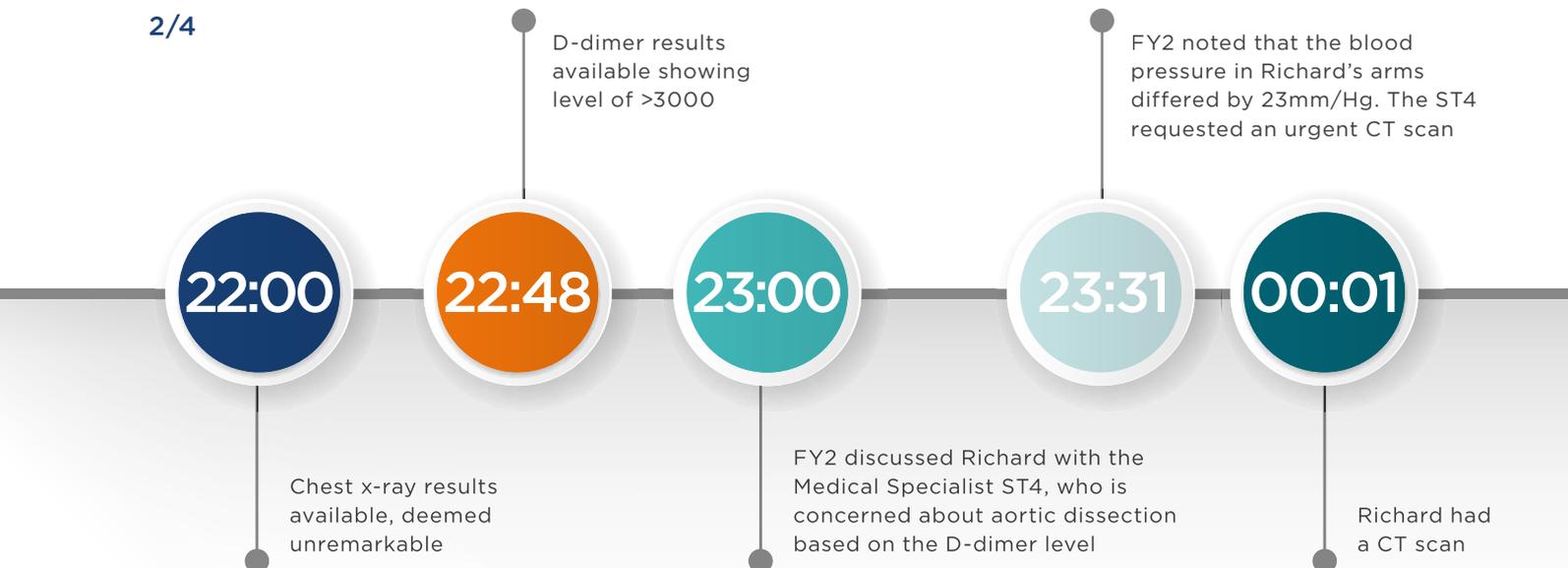
8 APPENDIX B

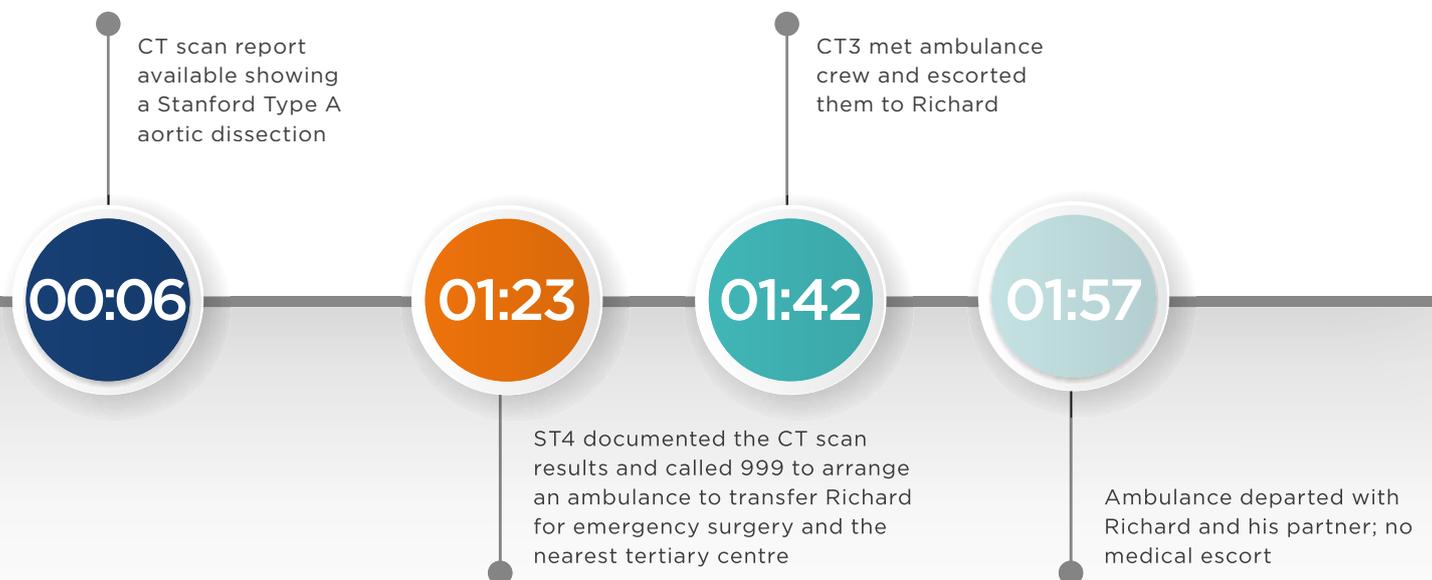
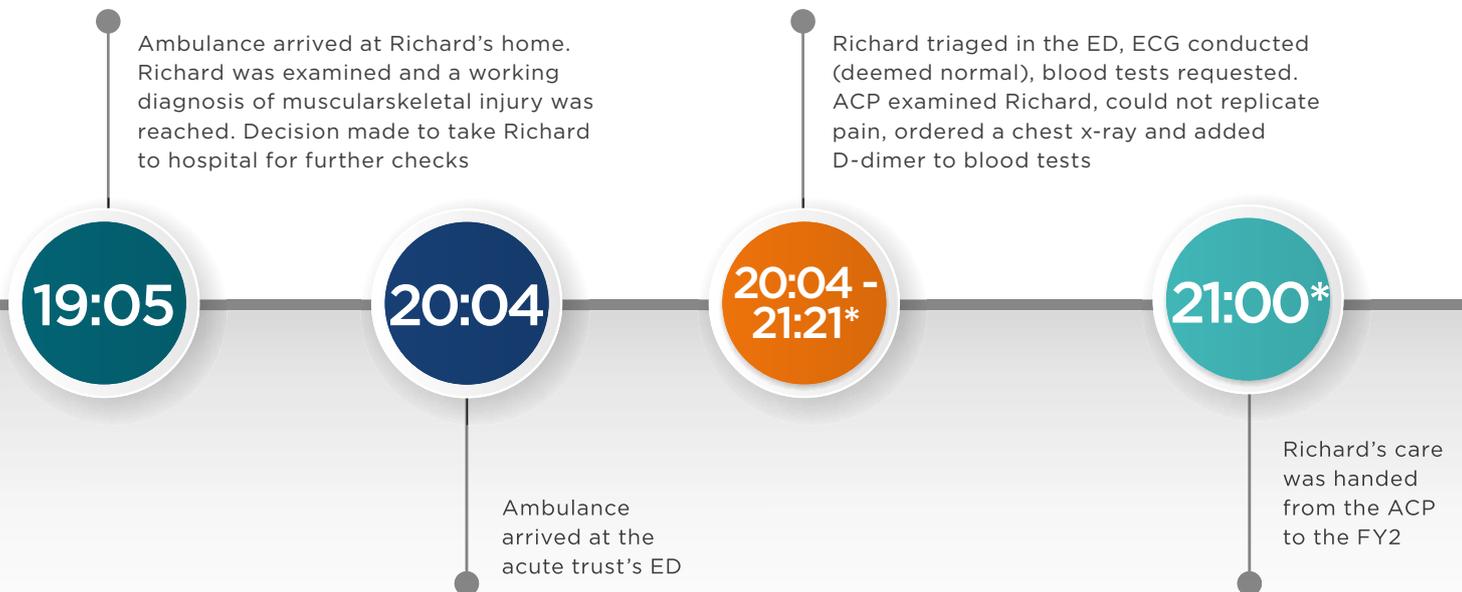
7.1 Timeline of reference event

1/4



2/4





* Denotes where time discrepancies exist

3/4

Richard suffered a respiratory arrest, he recovered but almost immediately suffered a cardiac arrest

02:09

CCD advised it may be worth diverting to collect blood

02:13

02:11

Paramedic officer and a paramedic, in two rapid response vehicles, are sent to assist the crew. The paramedic officer has the lucas device

02:23

Further communication took place with ccd, however, now using incorrect diagnosis of AAA

4/4

Senior paramedic asked the dispatcher to pre-alert the diversion trust to ask for blood. Dispatcher spoke to the ED Registrar but did not mention blood request. Pre-alert was shortened and interrupted

02:26

Ambulance crew called the tertiary centre and informed them Richard had been in arrest for approximately 32 minutes. Crew informed that surgery was not likely to save Richard and that they should return to the ED. They continued CPR and returned to the diversion trust's ED

02:41

02:30

Diversion trust contacted the tertiary centre who advised that the ambulance did not divert and continued directly to the tertiary centre. Both were unaware that Richard was still in cardiac arrest

03:15

Richard was pronounced dead

- **Timing unknown** - Ambulance crew called the tertiary centre and informed them Richard had been in arrest for approximately 32 minutes. Crew informed that surgery was not likely to save Richard and that they should return to the ED. They continued CPR and returned to the diversion trust's ED.

9 REFERENCES

Association of Anaesthetists of Great Britain and Ireland. (2009) AAGBI Safety Guideline – Interhospital Transfer. [Online] Available at:

<https://www.aagbi.org/sites/default/files/interhospital09.pdf>

Hebballi, R and Swanevelde, J. (2009) Diagnosis and management of aortic dissection. Continuing Education in Anaesthesia, Critical Care & Pain 2009; 9(1):14-18.

Intensive Care Society. (2011) Guidelines for the transport of the critically ill adult (3rd Edition 2011). [Online] Available at:

<http://www.ics.ac.uk/AsiCommon/Controls/BSA/Downloader.aspx?iDocumentStorageKey=79bdf30-7676-46dd-856d-b47e4d667568&iFileTypeCode=PDF&iFileName=Transport%20of%20the%20Critically%20Ill%20Adult>

National Institute for Health and Care Excellence. (2018a) Emergency and acute medical care in over 16s: service delivery and organisation. [Online] Available at:

<https://www.nice.org.uk/guidance/ng94>

National Institute for Health and Care Excellence. (2018b) Chapter 34 – Standardised systems of care for intra- and inter-hospital transfers. [Online] Available at:

<https://www.nice.org.uk/guidance/ng94/evidence/34.standardised-systems-of-care-for-intra-and-interhospital-transfers-pdf-172397464673>

NHS Digital. (n.d.) NHS Pathways. [Online] Available at:

<https://digital.nhs.uk/services/nhs-pathways>

NHS England. (n.d. a) Operational Delivery Networks. [Online] Available at:

<https://www.england.nhs.uk/ourwork/part-rel/odn/>

NHS England. (n.d. b) NHS 111. [Online] Available at:

<https://www.england.nhs.uk/urgent-emergency-care/nhs-111/>

Redfern, E, Callaway, M, Zakkar, M and Bryan, J. (2017) Improving outcomes in acute aortic dissection. British Journal of Hospital Medicine 2017; 78(6): 320-326

Royal College of Emergency Medicine. (2016) Safety Alert: Missed aortic dissection. [Online] Available at:

<https://www.rcem.ac.uk/docs/Research/Missed%20aortic%20dissection.pdf>

Society for Cardiothoracic Surgery in Great Britain and Ireland. [Online] Available at:

<https://scts.org/>

WWW.HSIB.ORG.UK

 [@hsib_org](https://twitter.com/hsib_org)



HEALTHCARE SAFETY
INVESTIGATION BRANCH

FURTHER INFORMATION

More information about HSIB – including its team, investigations and history – is available at www.hsib.org.uk

If you would like to request an investigation then please read our **guidance** before submitting a safety awareness form.

 [@hsib_org](https://twitter.com/hsib_org) is our Twitter handle. We use this feed to raise awareness of our work and to direct followers to our publications, news and events.

CONTACT US

If you would like a response to a query or concern please contact us via email using enquiries@hsib.org.uk

To access this document in a different format – including braille, large-print or easy-read – please contact enquiries@hsib.org.uk

© Healthcare Safety Investigation Branch copyright 2019. Any enquiries regarding this publication should be sent to us at enquiries@hsib.org.uk