HSIB

HEALTHCARE SAFETY INVESTIGATION BRANCH

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SUMMARY REPORT

DELAYED RECOGNITION OF ACUTE AORTIC DISSECTION

Healthcare Safety Investigation I2017/002b

January 2020 Edition


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HEALTHCARE SAFETY
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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 us at **enquiries@hsib.org.uk** We aim to provide a response to all correspondence within five working days.

www.hsib.org.uk/tell-us-what-you-think

ABOUT HSIB

The Healthcare Safety Investigation Branch (HSIB) conducts independent investigations of patient safety concerns in NHS-funded care across England.

Most harm in healthcare results from problems within the systems and processes that determine how care is delivered. Our investigations identify the contributory factors that have led to harm or have the potential to cause harm to patients. The recommendations we make aim to improve healthcare systems and processes in order to reduce risk and improve safety.

Our organisation values independence, transparency, objectivity, expertise and learning for improvement.

We work closely with patients, families and healthcare staff affected by patient safety incidents, and we never attribute blame or liability to individuals.

A NOTE OF ACKNOWLEDGEMENT

HSIB would like to thank Richard's partner, who was present throughout Richard's care, for her time in sharing her recollection of the 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.

HSIB would also like to express its gratitude to the healthcare professionals who looked after Richard and who gave their time to assist with the investigation, providing open and honest accounts of events to support learning and improve patient safety.

OUR INVESTIGATIONS

Our team of investigators and analysts has diverse experience working in healthcare and other safety-critical industries and have expertise in human factors analysis, safety science and the design of safety management systems. We consult widely in England and internationally to ensure that our work is informed by appropriate clinical and other relevant expertise.

We currently undertake two types of patient safety investigation.

NATIONAL INVESTIGATIONS

Our national investigations can encompass any patient safety concern that occurred within NHS-funded care in England after 1 April 2017. The topics we select are informed by suggestions provided by healthcare professionals and the public, and our own analysis of NHS patient safety databases and reporting.

We decide what to investigate based on the scale of risk and harm, the impact on individuals involved and on public confidence in the healthcare system, as well as the potential for learning to prevent future harm. We welcome information about patient safety concerns from the public, but we do not replace local investigations and cannot investigate on behalf of families, staff, organisations or regulators.

Our investigation reports identify opportunities for relevant organisations with power to make appropriate improvements through:

- *'Safety recommendations'* made with the specific intention of preventing similar events happening in the future
- *'Safety observations'* with suggested actions for wider learning and improvement.

Our reports also identify 'safety actions', which are steps identified during an investigation as being immediately necessary to improve patient safety.

We ask organisations subject to our safety recommendations to respond to us within 90 days. These responses are published on the investigation pages of our **website**.

MATERNITY INVESTIGATIONS

Since 1 April 2018, we have been responsible for all patient safety investigations of maternity incidents occurring in the NHS in England which meet criteria for the **Each Baby Counts programme**.

The purpose of the HSIB maternity investigations programme is to achieve rapid learning and improvement in maternity services, and to identify common themes that offer opportunity for system-wide change. For these incidents HSIB's investigation replaces the local investigation, although the NHS trust remains responsible for meeting the Duty of Candour and for referring the incident to us.

We work closely with parents and families, healthcare staff and organisations during an investigation. Our reports are provided directly to the families involved and to the trust. The trust is responsible for actioning any safety recommendations we make as a result of these investigations.

Our longer-term aim is to make safety recommendations to national organisations for system-level improvements in maternity services. These recommendations will be based on common themes arising from our trust-level investigations.

EXECUTIVE SUMMARY

Introduction

The aorta is the main blood vessel leaving the heart, carrying oxygenated blood to be distributed to all parts of the body. Aortic dissection is a rare but life-threatening condition in which a split develops in the wall of the aorta, allowing blood to flow between its layers, which can result in catastrophic rupture of the aorta and death if not treated urgently. Depending on the type of dissection, surgical repair may be required.

This investigation was initiated as a result of the death of a 54-year-old man following an aortic dissection, in which there was a delay of around four hours in recognising the diagnosis. The investigation found that existing data do not allow a good understanding of the number of people who have an aortic dissection and their outcomes, but there may be around 2,500 cases a year in England. The length of delay before diagnosis in this case is not unusual; aortic dissection is uncommon and often difficult to diagnose, but there are existing and potential ways in which this can be improved.

The reference event

Richard was a fit 54-year-old man who experienced severe sudden onset chest pain while lifting weights in the gym. Although the pain subsequently reduced, he still felt unwell. After returning home and calling the NHS 111 service, Richard was taken to the emergency department (ED) of a local acute hospital by ambulance. The ambulance paramedics believed that the cause of the pain was probably musculoskeletal (from the muscles, bones or joints) but felt there was a need to rule out an acute myocardial infarction (heart attack).

After waiting over 30 minutes for triage and, on his case being assigned as priority two (out of five, with one being the most urgent), Richard was placed in a low-dependency cubicle. During his time in the ED, Richard was seen by an advanced care practitioner and a second-year trainee doctor. The trainee doctor discussed the case with, and received advice from, a consultant. Richard initially appeared well but his condition subsequently deteriorated with further pain, nausea, vomiting and diarrhoea. His electrocardiogram (ECG) was normal but blood tests showed a very raised level of a significant blood chemical (D-dimers more than 3000ng/ml).

After three hours in the department with no clear diagnosis, Richard was referred to the on-call medical team. The medical registrar was concerned about the possibility of an acute aortic dissection (AD) and requested an urgent computed tomography aortogram (CTA) scan, which confirmed the diagnosis of an extensive aortic dissection (Stanford type A). After an hour waiting for a formal report of the scan, Richard was sent by ambulance to the regional specialist centre for heart and chest surgery but suffered a cardiac arrest during the journey and died.

The national investigation

The Healthcare Safety Investigation Branch (HSIB) was contacted by an ambulance trust regarding Richard's case. Following initial information gathering and evaluation of the safety issues, the HSIB Chief Investigator authorised a safety investigation.

The investigation gathered evidence to build as complete a picture as possible of the events leading to Richard's death. As the investigation progressed, the complexity of the case became apparent. In particular, there were important safety issues related to the diagnostic processes in the ED, the preparation of the patient for transfer between hospitals and the transfer itself.

A decision was taken to divide the investigation into two parts; part one, which focussed on the transfer of critically ill adults, was published in January 2019 (Healthcare Safety Investigation Branch, Transfer of critically ill adults 2019b).

This report details the analysis and findings of the second part of the investigation, which sought to understand the factors affecting the recognition of acute AD in the ED.

In addition to evidence gathered in the course of the investigation into Richard's case (the reference event), the wider investigation has used published data, available literature and other research to understand the scale and impact of acute AD, why the diagnosis of this condition might be delayed and what remedies might be available to make early diagnosis more likely.

The investigation has found that, although treatment outcomes have improved, acute AD remains an infrequent but very hazardous event, the incidence of which is likely to increase as the population ages. Some measures which could be implemented relatively rapidly to reduce the safety risk have been identified, together with the need for longer term data collection and development of strategies to reduce delays in diagnosis.

Findings from the reference event

- The medical professionals who treated Richard prior to his hospital admission and in the ED did not recognise that the sudden onset of severe chest pain might be a symptom typical of acute AD.
- There appeared to be a lack of awareness among medical staff of the most common symptoms and signs of acute AD and the limitations of measuring the blood pressure in both arms as a diagnostic test for this condition. There also appeared to be confusion for some staff between the presentation of an acute thoracic AD and an abdominal aortic aneurysm.
- The NHS 111 triage resulted in an appropriate response, but the patient was advised to take aspirin, which could have had serious adverse consequences in this condition.
- Richard was taken to hospital to rule out an acute myocardial infarction as the cause of chest pain. However, he waited over 30 minutes for triage and, although his case was assigned to priority two (of five, with one being the most urgent), Richard was then placed in a low-dependency cubicle.
- Although Richard's pain could not be reproduced in a way which would have positively supported the presence of a musculoskeletal injury, there was some reluctance to relinquish this as a possible diagnosis while the possibility of a more serious heart or lung problem was being explored.
- During his time in the ED, Richard was not seen by a consultant but by an advanced care practitioner and a foundation year two (FY2) doctor. The FY2 doctor discussed the case with, and received advice from, a consultant.
- There was a delay in escalation of the case of an apparently well patient with a history of chest pain but without a clear diagnosis.
- A chest X-ray taken in the ED was incorrectly interpreted as normal. A chest X-ray is not a suitable investigation for detecting acute AD.
- The current Royal College of Emergency Medicine standards for management of radiology results were complied with.
- The delay in this case - of around four hours in the hospital - before reaching the diagnosis of acute AD is not unusual.
- Once the diagnosis was made, there was a further wait of over an hour for a formal report of the CTA scan before the patient could be referred to the specialist centre.
- Once referred to the specialist centre, the patient was immediately accepted and the ambulance departed within an hour.
- Immediate measures to control blood pressure and heart rate in patients with diagnosed acute AD are recommended. These measures were considered prior to Richard's transfer but were ruled out to save the time needed to institute them and to avoid the requirement for a medical escort.

Findings from the wider investigation

- The investigation was unable to discover national data which would allow an accurate understanding of the incidence and patient outcomes for acute AD in England.
- Analysis of hospital activity, other national data and published literature suggest acute AD may occur in around 4.5 per 100,000 of the population per year (approximately 2,500 cases per year in England). Around 20% of patients with acute AD die before reaching any hospital and 50% die before reaching a specialist centre.
- Acute AD is a rare cause of chest pain, particularly in comparison to acute myocardial infarction. Staff in non-specialist hospitals may be unfamiliar with the condition and its presentation, as it is seen relatively infrequently and symptoms can vary or be confusing.
- A delay in diagnosis of acute AD occurs in around 16-40% of cases and is more likely if the patient walks in to the hospital or a cardiac cause for chest pain is initially suspected.
- Accuracy of interpretation of chest X-rays is improved when reporting is carried out by expert radiologists. Early availability of expert chest X-ray interpretation may improve the ability to make accurate time-critical treatment decisions in the ED.

- A definitive diagnosis of acute AD can only be made by using specific imaging techniques (usually a CTA).
- Acute AD is one of a number of low-frequency, high-risk conditions which are recognised as more likely to be missed in the ED.
- Strategies are available which, if employed, would reduce delay in recognition of acute AD both in the ED and in pre-hospital care settings.

HSIB MAKES THE FOLLOWING SAFETY RECOMMENDATIONS

Safety recommendation R/2020/066:
It is recommended that the Manchester Triage International Reference Group considers the addition of *'aortic pain'* to the Manchester Triage System as a discriminator for chest pain, to raise awareness of acute aortic dissection as a potential cause.

Safety recommendation R/2020/067:
It is recommended that the Royal College of Emergency Medicine, together with the Royal College of Radiologists, develops, deploys and evaluates a national evidence-based process to detect and manage patients with acute aortic dissection presenting to emergency departments. The process should form part of a wider strategy for managing non-cardiac chest pain in the emergency department.

HSIB MAKES THE FOLLOWING SAFETY OBSERVATIONS

Safety observation O/2020/053:
There is a lack of detailed and accurate data regarding the incidence and patient outcomes for acute aortic dissection in England, particularly for those patients who do not reach a specialist treatment centre alive. Such data would assist in understanding the true scale of the problem and where any interventions might be directed.

Safety observation O/2020/054:
It would be beneficial if the providers of emergency department triage systems were to consider the addition of *'aortic pain'* as a discriminator for chest pain, to raise awareness of acute aortic dissection as a potential cause.

Safety observation O/2020/055:
Current recommendations for all patients with acute aortic dissection specify immediate measures to control blood pressure and heart rate. Non-specialist hospitals which may dispatch these patients to specialist centres might wish to review their guidance and instructions to staff in this respect. Specialist centres accepting patients with this and other life-threatening conditions could consider developing clear instructions for dispatching hospitals regarding preparation and transfer of patients, in line with best practice.

HSIB NOTES THE FOLLOWING SAFETY ACTION

Safety action A/2020/019:
In release 18, NHS Digital has amended the content of the NHS Pathways algorithm used for telephone triage of patients, to help improve recognition of chest pain likely to be associated with acute aortic dissection.

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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 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**

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