HSIB

HEALTHCARE SAFETY INVESTIGATION BRANCH

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Summary

Clinical decision making: diagnosis and treatment of pulmonary embolism in emergency departments

Independent report by the
Healthcare Safety Investigation Branch I2019/016

March 2022

Providing feedback and comment on HSIB reports

At the Healthcare Safety Investigation Branch (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** or complete our online feedback form at **www.hsib.org.uk/tell-us-what-you-think**.

We aim to provide a response to all correspondence within five working days.

About HSIB

We conduct 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 the potential for harm to patients. The safety recommendations we make aim to improve healthcare systems and processes, to reduce risk and improve safety.

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

Considerations in light of coronavirus (COVID-19)

A number of national reports were in progress when the COVID-19 pandemic significantly affected the UK in 2020 and 2021. Much of the work associated with developing the reports necessarily ceased as HSIB's response was redirected.

For this national report, the investigation was initially paused, but then restarted due to its association with COVID-19. The processes HSIB used to engage with staff and families had to be adapted. Changes are described further in this report.

A note of acknowledgement

HSIB would like to thank the many healthcare staff who contributed their time and insights to the investigation, particularly during the added pressures of the COVID-19 pandemic. Their input has helped shape this report and allowed an in-depth exploration of decision making in clinical practice.

This report also shares the story of the care of a patient, Martin. HSIB did not specifically investigate the events affecting Martin, but his case helps convey the human and emotional importance of supporting improvements in patient safety. HSIB is grateful to Martin's Wife for sharing his experience.

About this report

This report is intended for healthcare organisations, healthcare staff, policymakers and the public to help improve patient safety in relation to the decisions made in the diagnosis and treatment of pulmonary embolism in emergency departments. The report focuses on clinical decision making and the challenges staff face when making decisions with limited information and time. For readers less familiar with the areas explored in this report, terms are explained throughout.

Since agreement of the safety recommendations outlined in this report plans were announced for Health Education England to merge with NHS England and NHS Improvement. While this does not change the recommendation made, the recipient of the recommendation may require updating in the future.

Our investigations

Our investigators and analysts have diverse experience of healthcare and other safety-critical industries and are trained in human factors and safety science. We consult widely in England and internationally to ensure that our work is informed by appropriate clinical and other relevant expertise.

We undertake patient safety investigations through two programmes:

National investigations

Concerns about patient safety in any area of NHS-funded healthcare in England can be referred to us by any person, group or organisation. We review these concerns against our investigation criteria to decide whether to conduct a national investigation. National investigation reports are published on our website and include safety recommendations for specific organisations. These organisations are requested to respond to our safety recommendations within 90 days, and we publish their responses on our **website**.

Maternity investigations

We investigate incidents in NHS maternity services that meet criteria set out within one of the following national maternity healthcare programmes:

- Royal College of Obstetricians and Gynaecologists' 'Each Baby Counts' report
- MBRRACE-UK 'Saving Lives, Improving Mothers' Care' report.

Incidents are referred to us by the NHS trust where the incident took place, and, where an incident meets the criteria, our investigation replaces the trust's own local investigation. Our investigation report is shared with the family and trust, and the trust is responsible for carrying out any safety recommendations made in the report.

In addition, we identify and examine recurring themes that arise from trust-level investigations in order to make safety recommendations to local and national organisations for system-level improvements in maternity services.

For full information on our national and maternity investigations please **visit our website**.

Executive Summary

This investigation was launched during the early stages of the COVID-19 pandemic, which meant that HSIB had to adapt its usual investigation method. Rather than investigating a specific patient safety incident, this investigation took an exploratory approach. It reviewed incidents associated with the diagnosis and treatment of pulmonary embolism in emergency departments to identify the factors that contributed to these incidents. The factors were then grouped into themes to identify the broader focus for a national investigation. One of the themes that emerged was clinical decision making, and this became the focus of the national investigation.

It is recognised that further factors will also influence the diagnosis and treatment of patients, and that patients with pulmonary embolism will seek help from other areas of healthcare. However, these issues were outside of the scope of this investigation.

Background

A pulmonary embolism (PE) is a blockage in the arteries of a person's lung, usually caused by a blood clot. Patients with a PE may have a range of symptoms (health problems that the patient experiences) and signs (things that clinicians find through examinations and tests). These include the classic symptoms of PE such as breathlessness and chest pain. PE may be difficult to diagnose and, if not recognised, can cause significant harm.

The purpose of this investigation is to identify learning that could support clinicians to make decisions about the diagnosis and treatment of PE patients in emergency departments (EDs). This learning may also apply to the treatment of other conditions where patients have non-specific symptoms.

Clinicians diagnose a PE by assessing a person's symptoms and signs, and then requesting appropriate tests. The decisions made during the diagnosis and treatment of PE can be influenced by several factors including the expertise of the staff who assess the patient, and the context within which they are working.

The investigation

HSIB identified a safety risk related to delayed or missed diagnosis and treatment of PE across several areas of healthcare where patients may first seek help. A review of events reported into the Strategic Executive Information System (a national database of patient safety incidents) identified EDs as one of these areas.

At the time of investigation access to EDs was limited because of the COVID-19 pandemic, and the investigatory approach was therefore adapted. Rather than examining a specific event, the investigation reviewed 14 serious incident reports obtained from hospitals across England. This review identified the terms of reference for a national investigation which aimed to:

- examine clinical decision making in the diagnosis and treatment of PE and the role of expertise (significant knowledge and skill that supports effective and practical decision making) using an Applied Cognitive Task Analysis (ACTA)

- identify factors in the wider healthcare system that support or inhibit diagnostic decision making when staff are seeing patients with non-specific symptoms and signs that may suggest PE.

This investigation was a first opportunity for HSIB to apply a specific methodology (ACTA) to examine decision making in healthcare.

Findings

- Recognising that a person may have a PE is challenging, particularly for less experienced staff and when the person's signs and symptoms are non-specific or atypical.

- Deciding whether to initiate treatment for a suspected PE requires a decision that balances risks, and this decision can benefit from expert knowledge and skill.

- Despite expertise and the available tools to help identify patients who may have a PE, a small number of PEs may always be missed.

- Experts use different thought processes and show different behaviours when making decisions compared to more novice staff.

- Decision-making skills in healthcare are commonly developed through experience, without formal training or opportunities to practise making decisions.

- Simulation-based learning has the potential to help staff acquire decision-making skills more quickly.

- Other industry sectors, such as aviation and the fire service, aim to accelerate the development of decision-making skills through structured training and the use of 'generic decision tools' for analytical decisions.

- EDs do not always provide the conditions which support the development of decision-making skills.

- Decision making in EDs is affected by workload, workforce availability, and performance targets.

- ED staff asked for further guidance to be provided on the use of decision aids to support the diagnosis of PE.

- The design of ED processes influences the decisions staff make. There is no standard model of initial patient assessment in EDs; this contributes to variation in the requesting of tests which can affect later decisions.

- Pathways for the diagnosis and treatment of PE in outpatient settings may create a safety risk where patients are discharged on anticoagulation medicines without a confirmed diagnosis; the capacity of imaging services is a significant contributor to this.

- Loss of clinical information when a patient's care is handed over was identified as a further safety risk. This can contribute to harm if tests, such as D-dimer (a blood test used as part of the assessment of likelihood of PE), are not followed up.

- Work procedures for the diagnosis and treatment of PE are not routinely designed in line with human factors principles to support their access and use.

- The physical design of environments may also affect decision making.

Safety recommendations and safety observations

HSIB wishes to acknowledge the challenges staff face in EDs when caring for patients with complex health conditions in the context of limited resource and capacity. This has been further exacerbated by the COVID-19 pandemic. HSIB recognises that these challenges mean the safety recommendations and safety observations in this report will be difficult to implement at the time of publication. Publication has gone ahead to ensure learning is shared and for the findings to be acted upon when capacity allows.

HSIB makes the following safety recommendations

Safety recommendation R/2022/188:
HSIB recommends that Health Education England works with appropriate professional bodies to develop and implement a strategy for supporting the education and training of clinical practitioners that can facilitate the development of decision-making skills. This strategy should consider the use of innovative approaches such as simulation and immersive learning.

Safety recommendation R/2022/189:
HSIB recommends that the National Institute for Health and Care Excellence reviews the findings of this investigation in relation to its guidance NG158, 'Venous thromboembolic diseases: diagnosis, management and thrombophilia testing', and updates the guidance if required.

Safety recommendation R/2022/190:
HSIB recommends that the Royal College of Emergency Medicine promotes best practice around diagnostic decision making with respect to patients with potential symptoms and signs of pulmonary embolism.

HSIB makes the following safety observations

Safety observation O/2022/155:
It may be beneficial for healthcare to learn from other industries and develop its own evidence base on strategies to accelerate the development of expert decision-making skills. These strategies may include:

- development of a generic decision tool for implementation in healthcare training and clinical practice to support analytical decision making
- incorporation into education programmes of theory around how people make decisions and influences on decision making
- the use of simulation as a regular intervention to support practice and development of decision-making skills across scenarios with different levels of complexity
- consideration of the role of simulation in competency assessments for key skills.

Safety observation O/2022/156:
It may be beneficial if the findings of this investigation are used to support the development of staff expertise in decision making through:

- building understanding of how experts think and make decisions
- supporting reflection on the outcomes of simple and complex decisions
- development of clinical supervision skills of senior staff
- regular multidisciplinary case review.

Safety observation O/2022/157:
It may be beneficial for individual organisations to understand the extent to which national guidance on the diagnosis and management of pulmonary embolism is implemented across their organisations. This would help to identify local barriers to implementation to address. In particular it may be helpful to consider, in line with the findings of this investigation, local engagement with the scoring systems available to help predict the likelihood of a pulmonary embolism.

Safety observation O/2022/158:
It may be beneficial for emergency departments and same-day emergency care units to have rapid access to recommended imaging for patients who require it for the diagnosis of pulmonary embolism.

Safety observation O/2022/159:
It may be beneficial for the positivity standard for computerised tomography pulmonary angiography (CTPA) (that at least 15% of CTPAs should show a pulmonary embolism) to be evaluated to understand its effects on emergency department decision making.

Safety observation O/2022/160:
It may be beneficial for healthcare work procedures to be written in line with the principles for effectiveness and usability provided by the Chartered Institute of Ergonomics and Human Factors.

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@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.

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