Health Services Safety Investigations Body

Investigation report

Investigation report: Access to critical patient information at the bedside

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Theme:
Cardiac, Communication and decision making

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A note of acknowledgement

We would like to thank the Patient whose experience is documented in this report. We are also grateful to the healthcare staff and stakeholders who engaged with the investigation with the aim of improving patient safety.

About the Patient

The Patient referred to in this report was a retired man aged 79 years. He was described as well-liked and very sociable. He enjoyed travelling and taking photographs

About this report

This report is intended for healthcare organisations and their staff, policymakers and the public to help improve patient safety. The investigation in this report focused on critical information about patients and how, in an emergency, it is accessed at a patient's bedside on a hospital ward by healthcare staff.

HSIB recognises that the subject of this investigation is emotive, and there are varying views about the terminology and language used to refer to decisions about whether someone is recommended to be resuscitated following a cardiac arrest. The investigation has taken advice during the development of this report and uses the term 'CPR recommendation' in relation to these decisions.

Executive Summery

Background

This investigation aims to improve patient safety by supporting staff to access critical information about patients, at their bedsides, in emergency situations. In this investigation critical patient information has been defined as 'information about patients that needs to be accessed rapidly and accurately to ensure correct care is delivered when it is required'. The types of information seen as 'critical' will depend on the particular context and situation. In this investigation critical information was considered through a focus on patient identifiers (such as name and date of birth) and decisions relating to whether someone is recommended to receive cardiopulmonary resuscitation (CPR) if their heart stops (cardiac arrest).

Following someone's heart stopping there is a high risk of death immediately or in the near future. Because of this, in some cases it may be decided that it is not recommended to try to treat a person with CPR. When a decision has been made that CPR is not recommended, that recommendation is documented in a person's 'Recommended Summary Plan for Emergency Care and Treatment' (ReSPECT) or on a 'do not attempt cardiopulmonary resuscitation' (DNACPR) form.

The reference event

HSIB investigated the care of a Patient in a hospital who was found unresponsive in bed. A short time later he stopped breathing and his heart stopped. Help was immediately sought from the ward staff and a team gathered around the Patient's bed. The team confirmed the Patient's identity and noted that a decision had been made that he was not recommended to receive CPR if his heart stopped. CPR was not started.

Around 10 minutes later a nurse who had previously been caring for the Patient returned from their break and recognised that the Patient had been misidentified as the patient in the next bed. The Patient whose heart had stopped was recommended to receive CPR. CPR was immediately started, but despite this, the Patient died.

HSIB found that misidentification of the Patient, and limited access to critical information about the Patient at the bedside delayed his treatment. The investigation identified factors that contributed to the event. These included: access to computer systems, the display of information around the bed, and the sharing of information among staff to support familiarity with their patients.

The national investigation

A national investigation was undertaken to explore the factors that affect the ability of staff to access critical patient information at the bedside. While the focus was on accessing someone's CPR recommendation, findings may also be applicable to other forms of critical information. Findings related to patient identification will also be used as evidence for a future HSIB national learning report on positive patient identification.

The investigation involved engagement with hospitals across England, experts in fields associated with human factors and the display of information, and national bodies with the remit of policy and strategy in the NHS.

Findings

- Clinical staff are not always able to access accurate, critical patient information at bedsides to support decision making in emergencies.
- Patient identity wristbands are not consistently checked by staff during the undertaking of clinical tasks.
- The expectations of how staff should identify patients in an emergency and access critical information in relation to their care cannot always be met in practice because of limitations of technology and the work environment.
- Concerns around confidentiality can prevent the display of critical patient information at bedsides that may be needed to support safe care, particularly in emergencies.
- What and how critical patient information is displayed at the bedside varies across hospitals, with differences in positioning, visibility, readability and legibility.
- There is no national guidance to support consistency and visibility of critical patient information on low-technology displays (whiteboards/posters) or high-technology displays (via digital systems).

- Lighting on hospital wards can make it difficult for staff to see critical patient information, either through too little light, or too much light causing glare.
- Clinical staff consistently report difficulties accessing digital systems because of limited or poorly functioning hardware. This can result in the use of less reliable, paper-based systems for accessing critical patient information.
- Limited interoperability of multiple digital systems means critical patient information may not be accessible or consistent across all systems used in the care of a patient. Staff need to know which systems contain the information they need.
- Limited ability at a national level to influence the functionality of digital systems and their procurement means healthcare organisations are implementing systems with varying design and functionality.
- At the hospital level, the configuration of electronic patient record systems can introduce further safety risks where the infrastructure and staff training needs necessary for successful implementation have not been fully considered, and the needs of the clinical users have not been fully established.
- There is variation in the words and symbols used to indicate CPR recommendations, and in the level of understanding of CPR recommendations across hospitals, that may influence responses to cardiac arrests.
- Nursing handovers (where information about patients is passed between nursing staff at shift changes) may not provide the information staff need to care for their patients because of where and how they are undertaken. There is no national guidance on how best to undertake handovers of care.
- The implementation of electronic handover systems in clinical workplaces is limited by digital infrastructure, and systems that do not meet the needs of their users

Safety recommendations and safety observations

HSIB makes the following safety recommendations

Safety recommendation R/2023/211:

HSIB recommends that the Office of the National Data Guardian supports local interpretation of the Caldicott Principles to give organisations and staff the confidence to display full patient names at the bedside to support correct patient identification for safer care.

Safety recommendation R/2023/212:

HSIB recommends that NHS England develops guidance to providers, via any digital maturity assessments that are developed, to help ensure critical patient information (such as patient identifiers and cardiopulmonary resuscitation status) is available to clinical staff when accessing electronic patient record systems.

Safety recommendation R/2023/213:

HSIB recommends that NHS England provides guidance to healthcare organisations to support local design and configuration of electronic patient records to enable end users to access critical patient information (such as patient identifiers and cardiopulmonary resuscitation status).

Safety recommendation R/2023/214:

HSIB recommends that NHS England, during review of relevant Health Building Notes and Technical Memoranda, includes, as a consideration, that bedside patient information should be consistently visible.

Safety recommendation R/2023/215:

HSIB recommends that NHS England assesses the priority, feasibility, and impact of future research into what and how critical information pertaining to the emergency care of patients in the acute hospital setting can be readily and reliably accessed at a patient's bedside.

Safety recommendation R/2023/216:

HSIB recommends that the Resuscitation Council UK clarifies and promotes expectations around the sharing, presentation, and language of cardiopulmonary resuscitation recommendations in hospital ward environments in line with the findings of this investigation.

Safety recommendation R/2023/217:

HSIB recommends that the British Standards Institution, with support from relevant stakeholders, provides symbology to standardise how information relating to a patient's resuscitation status can be displayed in digital systems.

Safety recommendation R/2023/218:

HSIB recommends that the Royal College of Nursing develops guidance for ward-based nursing handovers with consideration of the following: how handovers are organised, their content, the environment in which they take place and the technology needed to support them.

HSIB notes the following safety observations

Safety observation O/2023/204:

It may be beneficial for healthcare organisations to provide guidance to support decisions in clinical areas that balance confidentiality and the visibility of critical patient information for patient safety.

Safety observation O/2023/205:

It may be beneficial for healthcare organisations to assess their information technology infrastructure needs, such as equipment availability and network coverage, to enable staff to consistently access critical patient information.

Safety observation O/2023/206:

It may be beneficial if the language used to refer to cardiopulmonary resuscitation recommendations is standardised and clarified through the implementation of the Recommended Summary Plan for Emergency Care and Treatment.

1 Background and context

The investigation considered how patients are identified, and how recommendations are recorded and accessed in relation to whether a patient is for cardiopulmonary resuscitation (CPR) in the event of their heart stopping (cardiac arrest).

1.1 Positive patient identification

1.1.1 Positive patient identification is the correct identification of a patient to ensure that the right patient receives care meant for them. Care may include tests for diagnosing health problems, or treatment in routine or emergency situations.

1.1.2 Healthcare organisations have processes to identify patients; these are usually described in policies. Identification requires the gathering and viewing of information about the patient and the matching of that information with what is confirmed by the patient. For patients who cannot confirm their identity, confirmation may be sought from other sources including relatives or friends.

1.1.3 Patients staying in hospital will have an identity wristband which will have been printed when they were admitted. Wristbands include details such as first and last names, date of birth, hospital number, and NHS number (National Patient Safety Agency, 2007). Wristbands are generally white; those for patients with an allergy may be red or have a red border.

National and international perspectives

1.1.4 In 2004 the English National Patient Safety Agency (NPSA) published a framework for action entitled ‘Right patient – right care’ (National Patient Safety Agency, 2004). This described the risk of patients receiving care not intended for them because of misidentification, and the need to consider innovative solutions to support identification.

1.1.5 After 2004 three safer practice notices were published by the NPSA to support improvements in patient identification. These included the use of identity wristbands for hospital inpatients (National Patient Safety Agency, 2005), standardising wristband design with core identifiers (last name, first name, date of birth, and NHS number) (National Patient Safety Agency, 2007), and direction for all NHS organisations to use the NHS number as the national patient identifier (National Patient Safety Agency, 2009). NHS Improvement published a reminder in 2018 about the recommendations of the NPSA that remained relevant to the mitigation of Never Events (patient safety incidents that are considered to be wholly preventable) (NHS Improvement, 2018) which included the 2005 and 2007 safer practice notices (National Patient Safety Agency, 2007; 2009).

1.1.6 Patient misidentification is an international issue which the World Health Organization has highlighted and suggested potential solutions for (World Health Organization, 2007). However, despite a global focus, misidentifications continue to occur (The Joint Commission, 2022).

NHS number

1.1.7 The NHS number is a 10-digit number unique to a person. It is assigned to people at birth or the first time they receive NHS care in England, Wales or the Isle of Man. The number remains with a person for life except in rare circumstances where a new number may be assigned for reasons such as gender reassignment.

1.1.8 A person's NHS number is available on most of their NHS documents such as prescriptions, test results and appointment letters. It is also available via the NHS App (NHS, n.d.a) and the NHS's online number service (NHS, n.d.b).

1.1.9 Previous HSIB investigations have identified limitations in the use of the NHS number during incidents resulting in misidentification of patients (**Healthcare Safety Investigation Branch, 2019; 2020; 2021a; 2021c; 2022a**).

1.2 Cardiopulmonary resuscitation

1.2.1 A cardiac arrest happens 'when someone's heart suddenly stops beating, and their breathing is abnormal or has stopped' (Resuscitation Council UK, n.d.a). A person's heart may stop for several reasons including heart attacks, inherited conditions of the heart, infections, injury, and overdoses of medication or illicit drugs. A person's chances of survival following a sudden cardiac arrest are 'generally poor' (BMJ Best Practice, 2022).

1.2.2 Cardiopulmonary resuscitation (CPR) refers to interventions given to people who have collapsed and have stopped breathing, or whose heart has stopped. It is important for CPR to be started quickly for people to have the best chance of survival. The Resuscitation Council UK (RCUK) provides resources and training for healthcare staff and the public to learn about CPR (Resuscitation Council UK, n.d.a).

1.2.3 CPR is often not successful, and a person's survival following a cardiac arrest is affected by who it occurs to and their health, where it occurs, and how quickly the person receives treatment (Fernando et al, 2019). Data from the National Cardiac Arrest Audit (2021/22) showed that 22.7% of people who had a cardiac arrest in hospital survived to be discharged (Intensive Care National Audit and Research Centre, 2022). Survival is lower if the cardiac arrest occurs out of hospital, and only a small number of those people will have no lasting effects from injury to the brain (Gräsner et al, 2016). The CPR itself can also cause bleeding, broken ribs and injury to a person's lungs.

1.2.4 Where CPR is initially successful in restarting a person's heart and/or breathing, that person will continue to have a high risk of death in the near future. They may also have long-term problems resulting from injury to the brain and other organs (such as kidney and liver). Injury to the brain is a significant factor that can affect the outcomes of people after a cardiac arrest.

Cardiopulmonary resuscitation recommendations

1.2.5 The low chances of survival following a cardiac arrest, the harm as a result of CPR, and the potential long-term problems if a person's heart is restarted means that, in some cases, it may be decided that CPR is not recommended to allow for a peaceful and dignified death (Resuscitation Council UK, n.d.b). Some people may choose themselves to not receive CPR in the event that it is needed, and there are also occasions where a healthcare team may need to make the decision on behalf of their patient. Any decision must involve the patient and family where possible. Decision making about CPR recommendations is supported by guidance from the RCUK (Resuscitation Council UK, 2016).

1.2.6 When a recommendation has been made not to perform CPR, that recommendation is documented on a 'do not attempt cardiopulmonary resuscitation' form or in a person's Recommended Summary Plan for Emergency Care and Treatment.

'Do not attempt cardiopulmonary resuscitation' (DNACPR) forms

1.2.7 Traditionally, a recommendation to not commence CPR has been documented on a specific form, often referred to as a 'DNACPR form'. The form is kept in a person's clinical records and may be paper or electronic. The RCUK states that 'A DNACPR decision is made and recorded to guide the decisions and actions of those present should the person suffer a cardiac arrest, but is not a legally binding document' (Resuscitation Council UK, 2016; n.d.c).

Recommended Summary Plan for Emergency Care and Treatment (ReSPECT)

1.2.8 Since 2016 RCUK has supported implementation of ReSPECT (Resuscitation Council UK, n.d.d). This is a process for developing a personalised set of recommendations for the clinical care of a person in an emergency situation. The recommendations allow the person to discuss the right balance for them, whether to prolong life or focus on comfort. The CPR recommendation is one part of ReSPECT and the plan includes documentation as to whether CPR is recommended or not recommended. The RCUK is advocating for all healthcare organisations to move to using the ReSPECT process in England.

1.2.9 The use of ReSPECT aims to support and enhance discussion relating to CPR by promoting care planning. The contents of a person's ReSPECT plan are not legally binding, but help ensure treatment is in line with the wishes of the person (Resuscitation Council UK, n.d.d).

Advance decisions to refuse treatment (ADRT)

1.2.10 An adult may decide, at a time in their life when they are able to make decisions, that there are treatments that they do or do not want in the future. These advance decisions are legally binding and clarify a person's wishes in advance of the time they may be needed. The RCUK states that 'CPR must not be attempted if it is contrary to a valid and applicable ADRT' (Resuscitation Council UK, 2016).

2 The reference event

This investigation used the following patient safety event, referred to as 'the reference event', to examine the issues surrounding access to critical information about patients at the hospital bedside. The items of critical information considered in the reference event were the Patient's identifiers and his cardiopulmonary resuscitation (CPR) recommendation.

2.1 Chronology of events

2.1.1 The Patient was an inpatient on a ward in an acute hospital. At around 14:00 hours on the day of the reference event, a physiotherapy team came to the ward to see the Patient. They found him unresponsive, cold, cyanosed (blue lipped) and with a weak pulse. The physiotherapy team immediately alerted a healthcare assistant who went to seek help from nursing staff.

2.1.2 The Patient's named nurse (the nurse who had been looking after him that day) was on a break, so the healthcare assistant approached another nurse. The other nurse had been caring for the female patients on the other side of the ward.

2.1.3 At the bedside the Patient's identity was ascertained using a nursing handover sheet (typed and printed), and noted that 'DNACPR' (do not attempt cardiopulmonary resuscitation) was recorded next to his name. This indicated that the Patient was not recommended for CPR in the event of a cardiac arrest. As the Patient proceeded to have a cardiac arrest, staff made him comfortable and did not commence CPR.

2.1.4 When the Patient's named nurse was informed a short time later that the Patient had died, they immediately attended the bedside and recognised that the Patient had been misidentified as the patient in the bed next to him. The two patients had the same first name, but different last names and dates of birth. The patient in the next bed was recommended not to receive CPR, while the Patient who had been found unresponsive was recommended to receive CPR.

2.1.5 The nurse immediately pulled the emergency alarm and a 'crash call' was put out to alert the cardiac arrest team. The team arrived around 5 to 10 minutes after the Patient had initially been made comfortable. The Patient was treated with CPR but attempts to treat him were unsuccessful.

3 Involvement of the Healthcare Safety Investigation Branch

This section outlines how HSIB identified the reference event and the focus for the national investigation. It also describes the criteria HSIB used to decide whether to progress with this national investigation, and the methods used in the investigation.

3.1 Notification of the reference event and decision to investigate

3.1.1 During routine review of the Strategic Executive Information System (StEIS) HSIB identified a patient safety concern related to how critical information about patients is accessed. StEIS is a national database for reporting serious patient safety incidents. The reference event was identified by HSIB's Intelligence Unit from StEIS.

3.2 Decision to conduct a national investigation

3.2.1 HSIB conducted an investigation into the reference event which determined that the patient safety concern met HSIB's criteria for national investigation (see below). HSIB's Chief Investigator authorised a national investigation.

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

Accessing incorrect information about patients can lead to significant harm through their misidentification and receipt of inappropriate care, such as wrong medication or treatments. HSIB has undertaken several investigations which have demonstrated the impact these events can have.

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

HSIB's previous, related investigations have involved outpatient and emergency departments, maternity and ambulance care. This reference event occurred on a hospital ward. Various safer practice notices published between 2005 and 2018 further demonstrated the risks associated with misidentification (National Patient Safety Agency, 2004; 2005; 2007; 2009). The risks are persistent and widespread across healthcare.

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

It was agreed by HSIB that this new investigation would add learning around how staff can be supported to access critical information about patients to support patient identification and to make decisions about their care in emergency situations.

Positive patient identification has been considered in several previous HSIB investigations. Those investigations, alongside this report, will contribute to a future HSIB national learning report on **positive patient identification**.

3.3 Evidence gathering

3.3.1 The investigation was completed between April 2022 and November 2022.

3.3.2 The investigation interviewed staff involved in the reference event, and staff from the wider organisation involved in management of the acute hospital trust (referred to in this report as 'the Trust'). Interviews were undertaken face to face and virtually, and included:

- ward nursing, medical and administrative staff
- physiotherapy staff
- the Trust's resuscitation team.

3.3.3 The investigation visited the ward where the reference event occurred and two other wards in the Trust to undertake observations. Other sources of evidence gathered included:

- the Patient's clinical records and investigations related to his care
- relevant local and national policy and guidance
- relevant academic literature.

3.3.4 Following the reference event investigation, it was agreed that the national investigation would:

- explore the factors that impact on the ability of staff to access critical patient information at the bedside, such as a patient's cardiopulmonary resuscitation (CPR) recommendation
- explore the variability in the way hospitals' systems and processes enable a shared understanding of their patients' CPR recommendations.

3.3.5 During the national investigation six wards across three acute hospitals were visited. A further three acute hospitals were engaged with remotely. The investigation met with leads for resuscitation, estates and digital systems for the hospitals. It also engaged with national NHS bodies and advisors in the areas of exploration (see table 1). Further evidence was gathered from national policy and guidance, and the academic literature.

Table 1 National bodies and stakeholders who supported the investigation

National bodies	**Other stakeholders**
NHS England	A healthcare architect
NHS Digital	A professor of typography with specialism in information design and health communication
Resuscitation Council UK	Chartered specialists in ergonomics and human factors
Office of the National Data Guardian	Resuscitation leads across the NHS
Information Commissioner's Office	Digital and estates teams across the NHS
The Society of Light and Lighting	
Royal College of Nursing	
British Standards Institute	

3.3.6 To help understand the healthcare system in the reference event, the investigation used the Systems Engineering Initiative for Patient Safety (SEIPS) (Carayon et al, 2006). SEIPS is a framework for understanding structures, processes and outcomes and the relationships between them.

3.3.7 During the national investigation, the following methods were used:

- Critical Decision Method (CDM) (Klein et al, 1989): a technique for establishing how staff obtain information to make decisions. CDM was used across six healthcare of the older person wards in three of the acute hospitals.
- Functional Resonance Analysis Method (FRAM) (Hollnagel, 2012): to help explore variability and the adjustments staff make in practice to access critical information rapidly. A sample of the FRAM is available in the appendix to this report.

4 Analysis and findings – the reference event

This section provides an overview of the findings from HSIB's investigation of the reference event. The investigation considered the systems and processes that influenced the decision at the Patient's bedside to not commence cardiopulmonary resuscitation (CPR). The investigation considered the following processes:

- identification of the Patient at the bedside

- accessing the Patient's CPR recommendation
- creating a shared understanding of the Patient's critical information (in this case the Patient's identity and CPR recommendation).

4.1 Identification of the Patient at the bedside

4.1.1 The investigation explored the misidentification of the Patient with the staff involved. The physiotherapy team confirmed that they had intended to see the Patient and did not know how the subsequent misidentification occurred. The nurse who attended the Patient had not worked on the ward before, and was not familiar with its male patients.

4.1.2 None of the staff involved could recall the exact words or discussion that took place at the bedside. When asking for the Patient's name, the nurse recalled the name being pointed to on the ward's nursing handover sheet, and the healthcare assistant who approached the nurse recalled using the Patient's first name. The nurse also recalled confirming the Patient's name at the bedside, but could not remember clearly whether his first name only was used. All staff recalled communication around the Patient's identity, and that his identity wristband was not checked.

4.1.3 The factors that contributed to the misidentification of the Patient at the bedside are considered in the following sections.

Task of identifying patients

4.1.4 Staff told the investigation that, because it was an emergency situation and they trusted that each other had already identified the Patient, they did not consider looking at the Patient's identity wristband.

4.1.5 One member of the physiotherapy team and the healthcare assistant had met the Patient previously. The physiotherapy team confirmed that they had intended to see the Patient, and one of the team recognised the Patient having met him before. When the physiotherapy team arrived at the bedside they recognised that the Patient was unwell. Their first action was to seek help from the ward staff.

4.1.6 During visits to the Trust's wards, the investigation observed variation in how staff identified patients at the bedside. There were few instances where staff formally asked a patient for their details and compared them to their wristband. The investigation was told that this was because staff knew their patients and so would generally refer to them by first name or bed number. Staff said that they would normally check a patient's identity wristband when administering medications or taking a patient to the operating theatre, but would not think of doing it routinely or in an emergency situation.

Technology supporting identification

4.1.7 The staff at the bedside confirmed the Patient's identity using the nursing handover sheet and discussing the Patient's name between them. The handover sheet displayed each patient on the ward in a table, with key information about each person. The ward had separate sheets covering the male and female sections of the ward. The nurse who attended the patient had to use the healthcare assistant's copy of the sheet detailing the male patients, as they only had a sheet for the female side of the ward. Staff only had a copy of the sheet for the part of the ward to which they were allocated.

4.1.8 Handover sheets were typed on a word processing system and printed for each nursing handover. Nursing staff told the investigation how they updated the sheet for the patients they had been caring for at the end of their shifts, using the electronic patient record (EPR) to help them know what to type. The word processing system was independent of the EPR. The sheet had no means of highlighting patients with similar names.

4.1.9 The investigation was told by the Trust that it would expect staff to access the EPR to help with patient identification and care planning. The EPR contained the majority of patient information, including clinical notes, and was accessed via desktop computers or laptops on wheeled workstations. Nursing staff also had handheld devices to record routine observations such as patients' heart rate and blood pressure at the bedside, but these did not provide access to the EPR.

4.1.10 The investigation was told of limited computer availability (3 or 4 computers for an 18-bed ward) at the time of the reference event following repurposing of the ward. Poor laptop battery life was also described. At the Patient's bedside staff recalled no immediate access to the EPR and the nurse did not have a handheld device. Devices were available, but the nurse could not log in to it as they found their password was not working that morning.

4.1.11 The EPR was seen by the investigation. It displayed a banner across the top of a patient's record with their identifiable information. The investigation was also told that the EPR will "flag" patients with the same names on the same ward when viewed in "list mode". Some staff were unaware of this functionality and were not clear whether it provided a flag for same last and/or first names. The investigation ascertained that it only flagged same, not similar, last names.

4.1.12 The Trust also had barcoding technology that matched electronic prescribing and administration software records to a patient's wristband. The investigation was told by staff that the barcode checked the identity for them. During observations, where the investigation saw the barcode being used, no other identity checks were witnessed. This is explored further in 4.1.18.

Ward environment and patient positioning

4.1.13 Figure 1 shows the layout of the ward bay where the reference event occurred and the relative positions of the Patient and staff. The Patient was located in the adjacent bed to the patient he was misidentified for. The patients had the same first names, but different last names and dates of birth. The investigation did not identify any local guidance or staff practices to minimise the risk of patients with similar names being located near each other.

4.1.14 During the investigation's observations several posters were seen displayed around each bed. Bay and bed numbers were the most prominent information displayed, with other information describing patients' food and fluid intake, and how to access the entertainment system.

4.1.15 Every bed space on the reference event ward had a patient whiteboard. These were 51cm high by 28cm wide, with space to write the patient's name, consultant, nurse and wishes (such as preferred name and what they liked to do). There was also space for magnets with symbols and words on (externally procured and used in a standardised way across the Trust) which highlighted key information, such as patients at risk of falls. It was confirmed that there was no magnet for CPR recommendations.

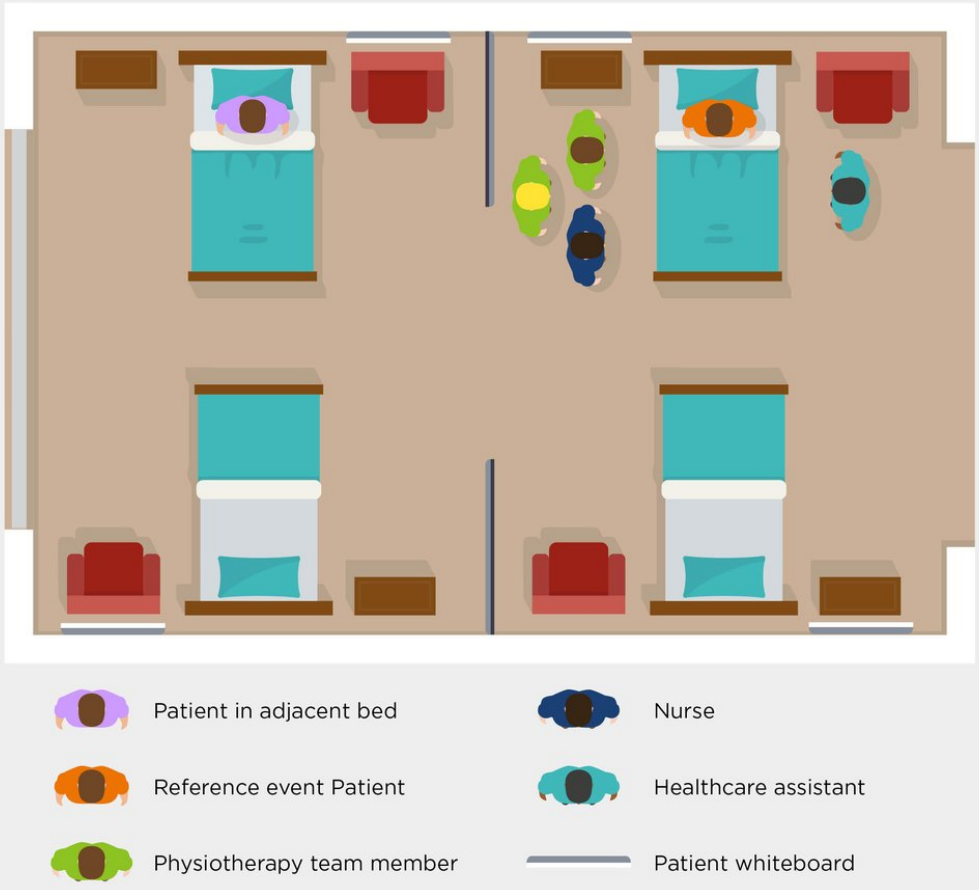


Figure 1 Location of the Patient, staff and whiteboards in the reference event (not to scale)

4.1.16 The position of the whiteboards around beds varied on and across the wards visited, and they were often obstructed from view by curtains, equipment or linen. Figure 1 shows the position of the Patient's whiteboard in relation to where the staff stood. The nurse did not recall seeing the whiteboard; they thought this may be because of their position in relation to it and the resulting line of sight.

4.1.17 Staff reflected to the investigation that there was no consistency in the information displayed on the whiteboards and they had received no guidance on what to write. This contributed to the observed variation in what information was displayed, size and colour of writing, and legibility (how easy it was to recognise the letters, words, and lines from each other). At the time of the investigation's visit the whiteboards were displaying first and last names. Staff informed the investigation that at the time of the reference event they recalled only patients' first names were displayed. On visits to other wards the investigation observed that first or preferred names only were often displayed. Situations were also seen where two patients in the same bay had the same first names, with no visual alerts highlighting the similarities.

Trust's patient identification processes

4.1.18 The Trust had a patient identification policy that included the need to ask for a patient's name and date of birth when confirming their identity, and cross-referencing with a care record or identity wristband. This task was not completed in the reference event for the reasons described in 4.1.4.

4.1.19 The investigation noted that the policy asked for two identifiers to be checked when confirming the identity of a patient. Staff described that commonly this would be name and date of birth, but recognised that these two identifiers could be similar between patients. Other HSIB investigations have highlighted the risks associated with using only two patient identifiers (for example, **Healthcare Safety Investigation Branch, 2021a**) and the importance of the NHS number as the unique identifier. Staff told the investigation that the NHS number was not commonly used at the bedside.

4.1.20 The policy also provided a list of situations in which formal identification of a patient should be undertaken, but did not describe what to do in an emergency. The resuscitation policy also did not describe the need for patient identification in the case of a cardiac arrest, or when to undertake it during such a scenario.

4.1.21 Staff described not having received any training on the patient identification policy or formal identification of patients. They described that it was “assumed” that they would know what to do, and any patient identification training was part of “packages” such as medication administration.

4.1.22 Other than the use of identity wristbands, the investigation was unable to identify any Trust guidance on how patient identifiers should be displayed at the bedside. The investigation was told of concerns around having too much information about a patient on display. The Trust was not aware of any national guidance on how best to display patient information in a ward environment such as on whiteboards.

4.2 Recognition of the Patient’s CPR recommendation

4.2.1 Following misidentification of the Patient, staff verified that he was not recommended for CPR as ‘DNACPR’ (do not attempt cardiopulmonary resuscitation) was recorded on the nursing handover sheet. The investigation considered the available controls at the bedside aimed at ensuring staff 1) correctly verify a patient’s CPR recommendation, and 2) rectify a patient misidentification where it has already occurred. The controls are reviewed below.

4.2.2 At the time of the reference event a patient’s CPR recommendation was recorded in three places – the nursing handover sheet (paper), the original ‘DNACPR forms’, and on the EPR. Since the reference event a central whiteboard in the ward office has been introduced which includes CPR recommendations.

Nursing handover sheet

4.2.3 At the bedside the consistently available documentation of a patient’s CPR recommendation was via the nursing handover sheet (see 4.1.7). The sheet included a notation next to a patient’s name if it had been decided that they were not recommended for CPR; in these cases it read ‘DNACPR’.

4.2.4 While the handover sheet referred to in the reference event was understood to be correct, the investigation observed situations where the information recorded on the handover sheet was incorrect or missing. This included an example where a patient’s CPR recommendation on the sheet was recorded differently to that on the EPR. The investigation further noted that CPR recommendations were highlighted in red on the sheet. Some staff only had black and white copies of the sheet as the Trust had taken steps to restrict colour printing. The investigation asked whether any staff were colourblind, but this was unknown; ‘red-green’ colour vision deficiency affects 1 in 12 men and 1 in 200 women (NHS, n.d.c).

4.2.5 The investigation found that the nursing handover sheet was not a reliable source of information as staff did not always have a copy, and the information it contained was not always accurate.

4.2.6 The physiotherapy staff involved in the reference event had their own printed sheets listing the patients they were to see that day. These sheets were created via a physiotherapy digital system with some information automatically populated and updated from the EPR. CPR recommendations were not available on the physiotherapy sheets.

'DNACPR forms' and the electronic patient record

4.2.7 Each patient who was not recommended for CPR had a physical, handwritten DNACPR form stored with the clinical records in an office in the centre of the ward, some distance from the beds. The location of the forms meant staff did not have immediate access to them at the bedside.

4.2.8 As detailed in 4.1.11 the EPR displayed a banner across the top of each patient's main page with information about the patient. Where a patient was not recommended for CPR a notation was added manually to the banner which read 'DNACPR'. Staff described the notation as "clear", but to see it they would have to access the EPR (see 4.1.9).

4.2.9 With the 'DNACPR' notation in the EPR being manual, staff described that it was sometimes entered without a signed DNACPR form. This was because paper forms had "gone missing on transfer [when moved from ward to ward]" or were not filled in. The investigation found that this created a risk where a patient may be recorded as not recommended for CPR without a valid decision having been made.

4.2.10 The investigation explored the concept of validity with respect to CPR recommendations. The Trust's resuscitation policy stated the need for a 'valid DNACPR' in order to not commence CPR. The policy did not define 'valid', but the Trust's resuscitation team told the investigation that a valid DNACPR was the signed DNACPR paper form.

4.2.11 As described in 4.1.9 and 4.1.12 the Trust used barcode technology and handheld devices at the bedside, but neither provided access to information on CPR recommendations.

Central whiteboard

4.2.12 The central whiteboard was not present on the ward at the time of the reference event. This was because the ward had recently been repurposed from a day-case ward (see 4.3.7) which specialised in the care of patients having surgery and being discharged on the same day. The board was located in an office in the centre of the ward. Two other wards visited had similar boards in their main corridors. The whiteboards seen had similar information and all included

bed numbers, some form of patient identifiers (initials, surnames or full names) and CPR recommendations. The information on the whiteboards on main corridors was visible to anyone on the ward.

4.2.13 The investigation observed that CPR recommendations were displayed differently on central whiteboards on the different wards. Two wards used a red heart symbol to represent patients not recommended for CPR, while on another ward, ‘DNACPR’ (in red) or ‘CPR’ (in green) was written with no heart symbol (see figure 2) as the ward “did not like it [the heart symbol]”.

4.2.14 During a second visit to the Trust the investigation was shown a new central electronic whiteboard under trial. The CPR recommendation was displayed on this board using a red diamond and exclamation mark symbol for patients not recommended for CPR, and a white circle with a black outline for patients recommended for CPR (see figure 2).

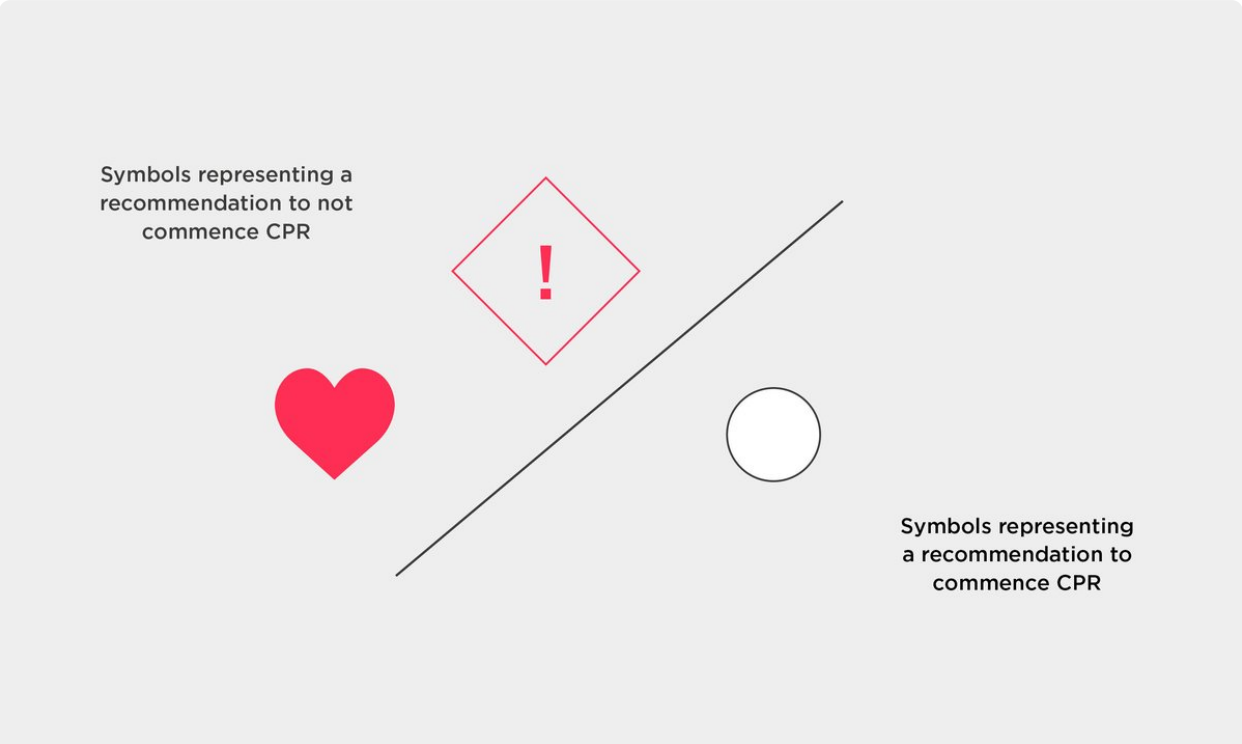


Figure 2 CPR recommendation symbols seen during the reference event

4.2.15 Whiteboards at the bedsides (see 4.1.15) did not display CPR recommendations. Staff described confidentiality concerns around having recommendations displayed at bedsides, and risks that they might not be updated if situations changed.

4.3 Shared understanding of the Patient's critical information

4.3.1 The investigation identified several factors that limited the familiarity of staff with patients on their ward. The nurse who attended the Patient had not received a handover for the male patients on the ward as they were caring for the female patients. It was their first day on the ward having been redeployed from elsewhere in the Trust.

Nursing handover processes

4.3.2 The investigation was told by the Trust of the importance of the nursing handover to create an understanding among staff about the patients on their ward. The nursing handover on the reference event ward at the time of the event was separated into the male and female sides, with staff attending the handover for the patients they were to care for. This meant staff had no knowledge about patients in the other part of the ward.

4.3.3 Separate handovers for different parts of wards were also observed by the investigation on the other wards visited. However, those other wards had 'huddles' and 'board rounds' (short meetings to discuss patients' care) which brought together staff from across the ward and the wider multidisciplinary team. Since the reference event the ward where it took place had introduced huddles and board rounds. The investigation noted that these meetings did not include all members of the ward nursing team or discuss all patients on the ward.

4.3.4 The investigation observed several handovers on the wards visited. It was noted that the content and delivery of the handovers differed. Each handover listed the CPR recommendation for each patient, but this was among a large amount of other information. The volume of information would make it difficult for staff to remember individual pieces of critical information over a long period of time. The reference event occurred 7 hours after handover.

Handover environment and technology

4.3.5 Handovers on the reference event ward occurred in the ward office and staff room. The handovers were regularly interrupted by other staff coming into the ward office. There was also limited seating in both locations. The primary information source for the ward handovers and huddles was the nursing handover sheet (see 4.2.3).

4.3.6 Staff told the investigation that handheld devices, via the electronic observation system, had a handover function. However, this was not used as staff preferred paper.

Repurposing of wards and redeployment of staff

4.3.7 At the time of the reference event, wards at the Trust had been repurposed and staff redeployed because of the COVID-19 pandemic, to meet the demand created by increasing numbers of patients with medical problems. The situation was described as "all very new and

reacting". In the months prior to the reference event, the ward had been an elective (planned) day-case surgery ward for patients without COVID-19. Shortly before the reference event the ward had been repurposed. This meant that it was changed from caring for patients following day-case surgery, to caring for patients with other types of medical problems, often with frailty and dementia.

4.3.8 Staff told the investigation that early after repurposing, the information sharing processes that may be more common on medical wards were not yet established on the reference event ward. These included the central whiteboard with patient information (see 4.2.12), huddles and board rounds (see 4.3.3). Staff reflected that this may have been because it had been a surgical ward, had recently been repurposed rapidly, and remained under the surgical directorate.

4.3.9 Staff described that the repurposing resulted in "bare minimum" equipment on the ward including laptop computers and handheld devices. At the time of the investigation's visit the reference event ward was still awaiting some storage equipment, but had seen an increase in laptops.

4.3.10 The ward management team was not aware of any risk assessments that had been undertaken when repurposing the ward. The investigation was shown an organisational checklist for the opening of additional beds, but considered that its focus was on opening extra beds for patients on wards already experienced with managing them, rather than the set-up of new wards.

Redeployment of staff

4.3.11 Early in the repurposing of the reference event ward the number of staff needed to care for the patients with medical needs had not been clarified. Two nurses and two healthcare assistants were allocated per shift with staff telling the investigation that there was a constant need for more staff and that they "got what they could".

4.3.12 On the day of the reference event there were 3 nurses and 5 healthcare assistants caring for 19 patients. One nurse (who was also the nurse in charge) cared for the male patients, and two nurses cared for the female patients. Due to limited staffing, when the Patient's named nurse was on a break, there was no other nurse available who knew the male patients.

4.3.13 The Trust told the investigation that it had a staffing model for 'extra-capacity medical wards', but was unsure why it had not been implemented on the reference event ward. The Trust considered this may have been because the ward remained under the surgical directorate. Since the reference event the staffing levels for the ward have been addressed. For the day shift the ward now has five nurses and five healthcare assistants.

4.3.14 Of the eight members of staff present on the ward on the day of the reference event, three had worked on the ward before. The investigation was told by staff who had experienced redeployment that it occurred with limited warning, preparation or choice. The nurse who first attended the Patient described having never worked on the ward before and expressed anxieties about caring for patients with complex medical needs as their main experience was working with day-case surgery patients.

4.3.15 The investigation explored redeployment with the Trust. The Trust aimed to redeploy staff to wards with similar types of patients. However, sometimes it was necessary to move staff from whichever area could release them. The selection of staff for redeployment was made by ward managers and concerns were shared with the investigation that the process did not consider skills or experience. The Trust knew of no national guidance to support redeployment.

5 Analysis and findings – the national investigation

This section provides an overview of the analysis and findings from HSIB's national investigation. The national investigation explored the variability in systems and processes that support shared understanding of critical patient information at bedsides in emergency situations. The investigation focused on cardiopulmonary resuscitation (CPR) recommendations, but the findings may be applicable to other forms of critical information.

5.1 Observations made by the investigation

5.1.1 As described in 3.3.5 the investigation visited medical wards in acute hospitals. These provided the evidence in support of the investigation's analysis, safety recommendations and safety observations in the following sections.

Patient identification at the bedside

5.1.2 The investigation found the following in relation to patient identification:

- In cardiac arrest situations nursing and medical staff felt it unlikely that they would formally check a patient's identity and would rely on other information such as other staff, nameboards, or printed nursing handover sheets.
- In non-emergency situations all staff told the investigation that they would "check" patient wristbands for identification; this was rarely observed in practice across the hospitals visited.
- The investigation observed that some patients did not have wrist bands because the patient had removed them.

- Every ward visited displayed bedside information differently via ‘low-technology’ whiteboards or laminated paper. Variations in the information displayed included the names used, readability (how easy it was to understand the words that were used) and legibility (how easy it was to recognise the letters, words, and lines from each other).
- Staff described confidentiality concerns about displaying full names on whiteboards; commonly first names only were used.

5.1.3 These findings will be used to inform HSIB’s future national learning report on positive patient identification.

Verifying CPR recommendations at the bedside

5.1.4 The investigation found the following in relation to verifying CPR recommendations:

- There were no visible cues around patients’ beds or on patients to inform staff of their CPR recommendations. CPR recommendations were documented as shown in table 2.
- On the wards visited by the investigation, the main source of information to verify CPR recommendations was the nursing handover sheet.
- CPR recommendations were written and referred to verbally in different ways (see table 2, and figures 2 and 3).

Table 2 The investigation’s observations of where CPR recommendations were documented and displayed

Location	**Investigation’s observations**
Nursing, paper handover sheet	Sheets were typed and printed with CPR recommendations documented. ‘Not recommended for CPR’ terminology included: DNACPR, DNR, DNAR, DNA, and ‘not for CPR’. ‘Recommended for CPR’ terminology included: FR, FOR, FOR CPR, or left blank. The investigation noted that the recommendations on the sheets did not always correspond with those recorded in other locations.
Electronic patient records and other digital systems	All electronic patient records (EPRs) had a route to access CPR recommendations. Not all were visible on a patient’s EPR front page. Where electronic DNACPR forms existed, these were completed on the EPR which created a visible alert. Where handwritten, an alert would then require manual creation in an EPR.

Location	Investigation's observations
	'Not recommended for CPR' alerts included: DNACPR, NOT FOR RESUS, or a symbol (see figure 3). 'Recommended for CPR' alerts included blank fields, FOR CPR, FOR RESUS, or a symbol (see figure 3). The investigation noted multiple other digital systems such as electronic prescribing, and observation systems. These did not include CPR recommendations, but were often accessed at the bedside.
Hard copy DNACPR form	Each ward had a paper copy of a patient's DNACPR form. These were handwritten originals or printed versions where completed on EPR. Print versions were "backups" in case of EPR access issues. The investigation noted that DNACPR forms were not kept at the patient bedside. Most forms were red, one was purple.
Central ward whiteboard	Wards had a central area for handover/huddles where a handwritten whiteboard described key information about each patient. These were often in public corridors and displayed varying information. Some included CPR recommendations through annotations. 'Not recommended for CPR' annotations included: DNACPR or DNAR, or a symbol (see figures 2 and 3). 'Recommended for CPR' annotations included FOR RESUS, or a symbol (see figures 2 and 3). Colour was sometimes used (red DNACPR, green FOR RESUS).

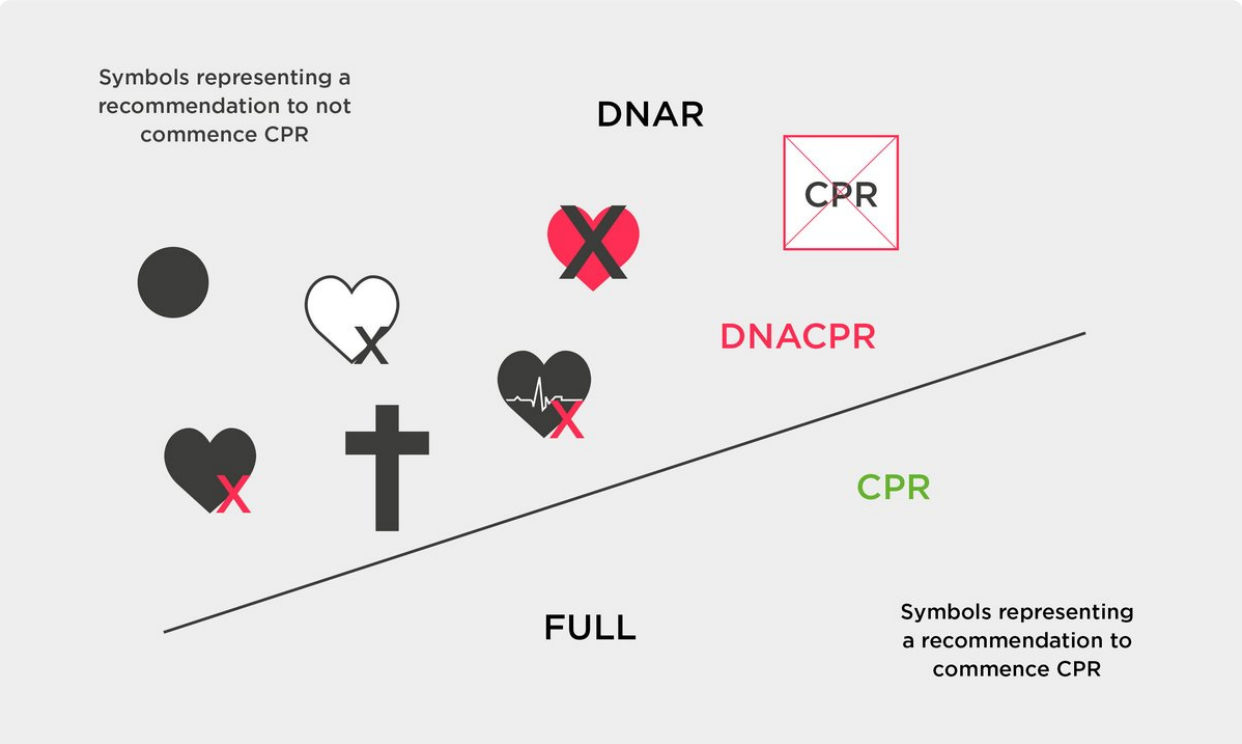


Figure 3 Symbols for ‘recommended not for CPR’ and ‘recommended for CPR’ seen by the investigation in addition to those in figure 2

5.2 National investigation analysis and findings

5.2.1 Using the Functional Resonance Analysis Method (FRAM) (Hollnagel, 2012) with the evidence gained from the observations (see 5.1) and engagement with national stakeholders, the investigation found variability mostly arose from:

- availability of and access to critical patient information at the bedside
- knowledge and practice around CPR recommendations
- staff familiarity with their patients.

These sources of variability are shown in figure 4. A summary of the FRAM is provided in the appendix.

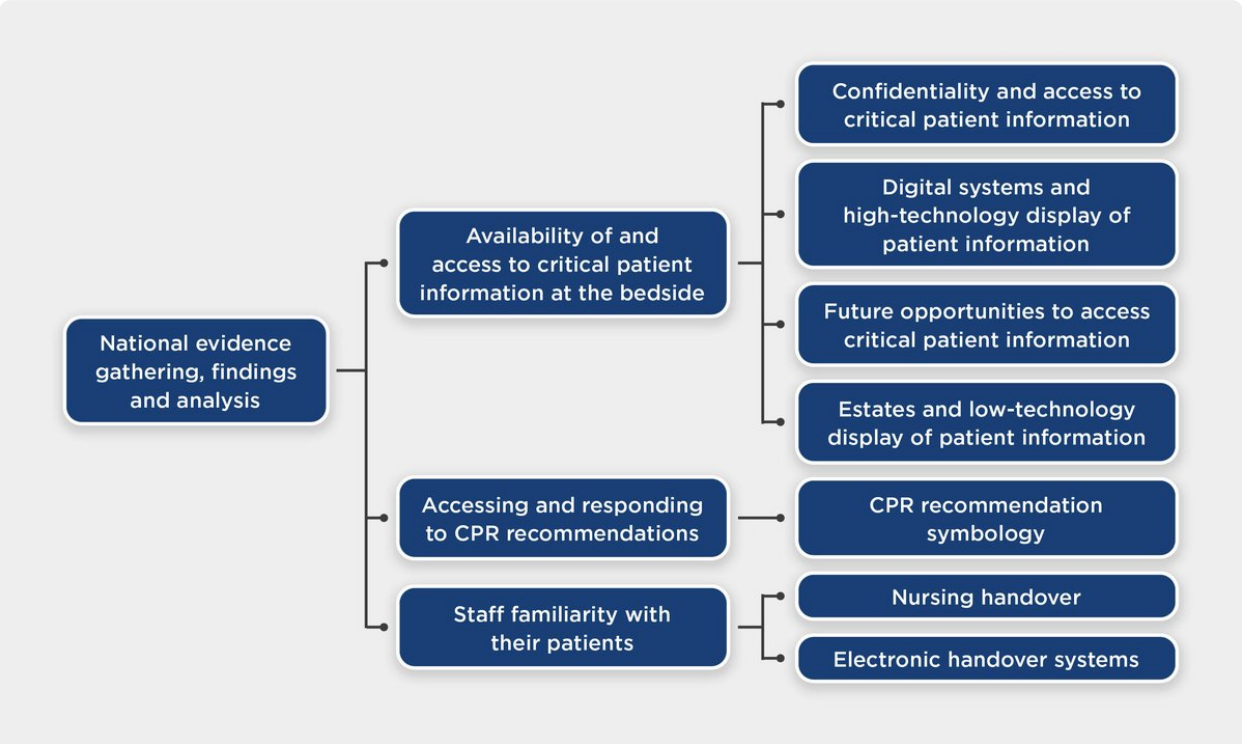


Figure 4 Sources of variability explored during the national investigation

Availability of and access to critical patient information at the bedside

5.2.2 The investigation's engagement with hospitals and national bodies demonstrated that "no one knows the best way" to ensure critical patient information is quickly available and accessible at bedsides. The investigation heard of individual hospital projects exploring the display of information. One project was introducing "DNACPR wristbands", but other stakeholders were concerned of potential risks where CPR recommendations change and wristbands are not changed.

5.2.3 The investigation considered that while there is no known 'best way' to ensure critical patient information is accessible, staff need multiple options to access information. Consideration is needed as to what, where, and how information is displayed, and how it is consistently kept accurate.

Confidentiality and access to critical patient information

5.2.4 Ward staff across the hospitals visited told the investigation that decisions about what patient information to display were for wards to make, with no known local or national guidance. The primary factor in those decisions was confidentiality because displayed information may be visible to people not involved in a patient's care. Wards avoided displaying certain information such as surnames, infection status, allergies, and CPR recommendations.

5.2.5 The investigation found no consensus among staff or across hospitals about what critical patient information should be displayed around bedsides or on central whiteboards. There were contradictions with CPR recommendations not displayed at bedsides to maintain confidentiality, while also being displayed on central whiteboards in public areas next to patients' names.

5.2.6 The investigation met with representatives from a hospital which was shortly to open new wards, the majority of which were to have single patient rooms. The hospital had plans to place electronic whiteboards outside each room, but was debating what information would be on them. The hospital representatives described that there had been concerns around information governance and noted the absence of national guidance to support information governance decisions.

5.2.7 To understand UK regulations around data protection, the investigation approached the Information Commissioner's Office and the Office of the National Data Guardian (NDG). The NDG advises on ensuring confidential information is appropriately used and guides the role of Caldicott Guardians. Caldicott Guardians protect the confidentiality of people's information by considering ethical and legal aspects of data sharing. The Caldicott Principles include (National Data Guardian, 2020):

> **Principle 7:** 'The duty to share information for individual care is as important as the duty to protect patient confidentiality. Health and social care professionals should have the confidence to share confidential information in the best interests of patients and service users within the framework set out by these principles. They should be supported by the policies of their employers, regulators and professional bodies.'

5.2.8 The NDG explained to the investigation that Caldicott Principle 7 and the Health and Social Care (Safety and Quality) Act (2015) support the disclosure of information necessary to provide safe care. The NDG considered that hospitals displaying a patient's full name above their bed or on the door of their room so that they may be correctly identified in an emergency, is consistent with Caldicott Principle 7.

5.2.9 The NDG also considered the display of other critical patient information to be important, but more complex. It would be for individual organisations to determine what information is critical and needs to be displayed in case of an emergency. This depends on the local context, clinical situation, patient wishes, and whether it is necessary for information to be displayed where it might be visible to those not providing care. CPR recommendations, as one form of critical information, are emotive and some patients may not want this information displayed. The investigation observed that efforts to be sensitive and confidential had resulted in various

symbols being developed (figures 2 and 3) with the unintended consequence of causing confusion. The investigation found that the complexities of the decisions to display critical information were not always appreciated by staff.

5.2.10 The investigation found a need to support clinical areas in hospitals to make decisions about what critical patient information is appropriate to display to support safe care. HSIB makes the following safety recommendation with the intent that the NDG, the UK's Caldicott Guardian Council and the national network of Caldicott Guardians support the local implementation of the recommendation.

HSIB makes the following safety recommendation

Safety recommendation R/2023/211:

HSIB recommends that the Office of the National Data Guardian supports local interpretation of the Caldicott Principles to give organisations and staff the confidence to display full patient names at the bedside to support correct patient identification for safer care.

HSIB makes the following safety observation

Safety observation O/2023/204:

It may be beneficial for healthcare organisations to provide guidance to support decisions in clinical areas that balance confidentiality and the visibility of critical patient information for patient safety.

Digital systems and high-technology display of patient information

Access to digital systems

5.2.11 On the wards it visited, the investigation observed digital systems displaying patient information. These included EPRs, electronic prescribing and medication administration systems (ePMAs), electronic observation systems (eObs), and electronic handover systems. Staff across the wards described issues accessing systems at the bedside because of issues with equipment and problems logging in. Equipment issues related to the amount available, faulty equipment, poor battery life, and small screens making reading information difficult. The fixed positioning of desktop computers and limited availability of laptops also meant staff were not always able to have a computer with them at the bedside to access the EPR.

5.2.12 Difficulties accessing digital systems contributed to why systems were not used to access patient information, and why staff relied on printed handover sheets. These difficulties have been identified in other HSIB investigations, for example, ‘Weight-based medication errors in children’ (Healthcare Safety Investigation Branch, 2022b).

HSIB makes the following safety observation

Safety observation O/2023/205:

It may be beneficial for healthcare organisations to assess their information technology infrastructure needs, such as equipment availability and network coverage, to enable staff to consistently access critical patient information.

Design of electronic patient records

5.2.13 All the hospitals visited by the investigation had an EPR system, each from a different vendor. EPRs were used to collate patient notes and in some cases make notes. Some EPRs had linked functionality including ePMA and electronic handover. NHS England told the investigation that there are several EPR systems available, and organisations are able to procure them “off the shelf” and then configure them in line with their local needs. These factors meant the design and functionality of the different EPRs varied.

5.2.14 The investigation observed the use of several EPR, ePMA and eObs systems in practice. The ‘high-technology’ display of information in these systems varied depending on the vendor, with differences in what critical patient information was displayed on a patient’s front page, and how other information could be accessed. An EPR may display the CPR recommendation of a patient, but it may not be displayed in associated ePMA or eObs systems.

5.2.15 The investigation spoke to staff at one hospital about their implementation of an EPR which included ePMA and handover. A key benefit was that the different parts of the system were interoperable, which meant the information was consistent. However, the investigation found other hospitals had systems that functioned independently of each other, meaning that information was not always available across the different systems unless it was entered again. This resulted in two situations observed by the investigation:

- staff had to be familiar with the different systems and know where to access information, and
- information in one system was sometimes different to others, including CPR recommendations.

5.2.16 NHS England told the investigation about its strategy to support frontline digitisation with a focus on integrating EPRs into all hospitals by 2025. However, NHS England described that there is no guidance to support hospitals in their procurement of EPRs and no minimum expected standard of what critical patient information should be available and displayed within systems. It was heard that NHS England is “unable to endorse one system over another”. The outcome of this, described by various stakeholders, was the procurement of systems that did not meet hospitals’ needs, systems that were unable to operate with others, and the need for future, costly additions to systems to update them. The issue of interoperability has been found in other HSIB investigations, for example ‘Surgical care of NHS patients in independent hospitals’ (Healthcare Safety Investigation Branch, 2021b).

5.2.17 The investigation found variability in what and how digital systems displayed critical patient information. HSIB makes the following safety recommendation with the intent of reducing variability in critical patient information displayed in EPRs, by defining what must be available to staff.

HSIB makes the following safety recommendation

Safety recommendation R/2023/212:

HSIB recommends that NHS England develops guidance to providers, via any digital maturity assessments that are developed, to help ensure critical patient information (such as patient identifiers and cardiopulmonary resuscitation status) is available to clinical staff when accessing electronic patient record systems.

5.2.18 The investigation found that clinical staff were not always aware of the functionality of their digital systems. For example, staff were not aware where EPRs had alerts for patients with similar names. Staff told the investigation that induction and training in systems was delivered locally, but did not equip staff with the knowledge they needed to use systems effectively.

5.2.19 EPRs were configured for the needs of hospitals by local digital teams. NHS England told the investigation that they had identified concerns around the usability and consistency of critical patient information in several digital systems, in part because of local configuration. Risks associated with local configuration have been found in other HSIB investigations, for example **‘Weight-based medication errors in children’ (Healthcare Safety Investigation Branch, 2022b)**. EPRs need to be designed to ensure staff are able to access required critical patient information readily and reliably.

HSIB makes the following safety recommendation

Safety recommendation R/2023/213:

HSIB recommends that NHS England provides guidance to healthcare organisations to support local design and configuration of electronic patient records to enable end users to access critical patient information (such as patient identifiers and cardiopulmonary resuscitation status).

Future opportunities to support access to critical patient information

5.2.20 The investigation was aware of potential innovative solutions to support access to critical patient information. These include Radio-Frequency Identification (RFID, a system of a transponder/tag that contains information and can be read); barcodes (bar or quick response (QR) codes for access to information through a scanning device); and augmented reality (where computer generated information is superimposed over a user's view of the real world).

5.2.21 These solutions may provide future opportunities to support access to critical patient information as current controls are not always effective. However, the investigation found limited progress towards fully developing these technologies despite long recognition of their potential benefits (National Patient Safety Agency, 2004).

Estates and low-technology display of critical patient information

5.2.22 Low-technology displays of patient information seen by the investigation included whiteboards, laminated paper, and posters. The investigation found variation in where and how these displayed information at bedsides. Variability included position, visibility, readability and legibility. The investigation observed situations where they were unable to read information.

5.2.23 Local and national stakeholders told the investigation of future aspirations to implement digital bedside information boards linked to EPRs. The investigation did not identify any organisations that had implemented these, with the exception of the hospital in 5.2.6.

Estates – bedhead design requirements

5.2.24 The design and planning of healthcare buildings is guided by the Department of Health and Social Care's Health Building Notes (HBNs) and Health Technical Memoranda (HTMs). HBNs provide best practice to support general design, while HTMs focus on more specialised building and technology. The main HBNs/HTMs relevant to this investigation were:

- HBN 00-03 'Clinical and clinical support spaces', which provides guidance on the design of generic clinical areas including single- and multi-bed rooms (wards) (NHS England, 2013a)
- HBN 04-01 'Adult in-patient facilities', which provides further guidance on inpatient facilities (NHS England, 2009)
- HTM 08-03 'Bedhead services', which provides guidance on installing appropriate bedhead facilities for patients and staff (NHS England, 2013b).

5.2.25 The investigation reviewed the above documents and engaged with NHS England's Estates and Facilities Directorate, which produced the documents. While documents refer to the need for visibility and sightlines, there is no guidance on patient information displays (low- or high-technology) and where these are best placed to support access by users with different needs.

5.2.26 The investigation noted that the documents do refer to the use of EPRs at the bedside, which would typically be via laptop computers, and the importance that any digital displays do not disturb the patient. However, the documents do not consider the role of digital bedside information boards and how these may be incorporated in the future. There is a need to 'future proof' estates services/infrastructure as the NHS's strategy is to expand digitisation.

5.2.27 The investigation identified a need for greater standardisation of the position of patient information at bedsides to improve visibility of information, while accounting for individual user needs such as people's ability to see details. The design of estates also need to be able to support future incorporation of digital patient information systems. HSIB makes the following safety recommendation with the intent that it also includes consideration of future digital solutions to support access to patient information.

HSIB makes the following safety recommendation

Safety recommendation R/2023/214:

HSIB recommends that NHS England, during review of relevant Health Building Notes and Technical Memoranda, includes, as a consideration, that bedside patient information should be consistently visible.

Low-technology display of information

5.2.28 The investigation noted that where information was handwritten on displays at the bedside, the readability and legibility varied. The investigation considered that this made understanding information difficult, particularly when staff may be unfamiliar with a ward and its patients. The investigation worked with a professor of typography to explore good information design and presentation.

5.2.29 Typography is the study of the style and appearance of information and has been used in support of healthcare information, such as instructions for COVID-19 tests (Walker et al, 2022). While a review of typography research is outside the scope of this investigation, typography principles may be useful when considering how best to display critical patient information and are relevant to low- and high-technology systems. Aspects such as clear layouts, typographic hierarchies (showing which information is most important), graphic cueing (using pictures or symbols to help convey information) and meaningful colours are known to be useful (Walker et al, 2022).

5.2.30 The investigation was unable to find healthcare guidance on how best to display patient information at the bedside. There is research and guidance from other settings (for example, Health and Safety Executive, n.d.), and for design of signage and procedures (for example, Chartered Institute of Ergonomics and Human Factors, 2020; NHS England, 2005). The investigation engaged with NHS England about the above findings. NHS England had identified a similar safety risk with regards to how patient information is displayed. The lack of research and guidance in healthcare around displaying patient information needs to be addressed to clarify the best approach for healthcare.

HSIB makes the following safety recommendation

Safety recommendation R/2023/215:

HSIB recommends that NHS England assesses the priority, feasibility, and impact of future research into what and how critical information pertaining to the emergency care of patients in the acute hospital setting can be readily and reliably accessed at a patient's bedside.

5.2.31 The development of any 'best practice' guidance for the NHS will take time. In the meantime the investigation noted resources available in other industries and settings that provided principles relating to the display of important information. These resources describe factors to consider such as font, typeface, size, colour, minimising glare, and line spacing. The resources recommend using sans serif fonts, avoiding block capitals and italics, and using

colour contrasts such as black on yellow, rather than green on red (Briggs, 2005; Chartered Institute of Ergonomics and Human Factors, 2020; Health and Safety Executive, n.d; Walker et al, 2022).

Lighting and display of information

5.2.32 During observations the investigation noted several occasions where it was not possible to read the information on whiteboards and information posters around beds because of the amount of light falling on them. HBNs and HTMs refer to guidance on lighting of healthcare premises (Bukorovic, 2019). Specifically for hospital wards, the guidance describes levels of light required for nursing tasks, several of which involve accessing patient information.

5.2.33 The investigation took light readings (lux – a measure of light striking a surface) at whiteboards above bedheads across the different wards. Despite readings being consistently taken around midday, light levels varied from very low to high. The investigation shared the readings with an expert who described that the lower readings would likely reduce the ability to read whiteboards. Where there were high light levels, glare also made reading difficult. The investigation found that lighting may contribute to staff not accessing critical information because of its effects on visibility.

Accessing and responding to CPR recommendations

5.2.34 Resuscitation teams in several hospitals told the investigation about local events similar to the reference event. Examples included where patients had been misidentified, and where CPR recommendations relating to other patients had been accessed. The investigation found variability affecting access to CPR recommendations, including:

- how patient identification is undertaken in an emergency
- where and how ‘valid’ CPR recommendations are recorded
- how staff refer to CPR recommendations (see table 2)
- how CPR recommendations are presented as symbols (see figures 2 and 3).

5.2.35 The investigation reviewed 12 resuscitation policies and 8 patient identification policies from hospitals in England. None of the policies directed staff to check patient identity during CPR, although one did note the importance of establishing identity at the earliest opportunity. Each resuscitation policy referred to the need for a ‘valid’ CPR recommendation, but did not clarify what a ’valid’ CPR recommendation is, where it should be documented, and how it should be accessed. The investigation also noted that national life support algorithms did not refer to patient identification or the confirming of CPR recommendations during CPR (Resuscitation Council UK, 2021). The investigation acknowledges the need for algorithms to be simple and clear.

5.2.36 Staff told the investigation that a ‘valid’ CPR recommendation is the one they can access to support their decision making. The majority of nursing staff described how recommendations on a handover sheet or EPR would be valid. However, the investigation identified that these sources of information could sometimes be incorrect because of the need for manual entry; this challenged the validity of those CPR recommendations. A small number of staff across different hospitals told the investigation that a valid CPR recommendation is the original “legal” document (see 5.2.40).

5.2.37 When staff were seen to write, or heard to refer to patients’ CPR recommendations, the investigation noted differences in language. The investigation commonly heard the term “not for resus” or “DNAR” (do not attempt resuscitation). However, several resuscitation leads and the Resuscitation Council UK (RCUK) told the investigation that referring to “resus” may incorrectly lead staff to interpret that a patient is not recommended for any type of resuscitation. The investigation noted that the term ‘DNAR’ was used in national documents including those from professional bodies (Royal College of Physicians and Royal College of Nursing, 2021).

5.2.38 The investigation shared its findings with the RCUK and was told about its ongoing implementation of the Recommended Summary Plan for Emergency Care and Treatment (ReSPECT, see 1.2.9). The investigation noted that some hospitals visited had not implemented ReSPECT, and where it had been implemented, staff still commonly referred to “DNACPR”.

5.2.39 The RCUK further told the investigation that using the term ‘valid’ implies that the DNACPR is a legal document, which it is not. They described that when accessing a CPR recommendation, it would be via an agreed, clear and available record of the recommendation. This may be available on a paper form (DNACPR form or ReSPECT) or, where it has been completed in an EPR, with links to the original form.

5.2.40 The RCUK directed the investigation to its guidance on decisions relating to CPR (Resuscitation Council UK, 2016). The investigation reviewed the guidance and noted that it does not clarify what a valid CPR recommendation is and how it should be accessed. It does describe a valid advance decision (see 1.2.11) refusing CPR. The investigation also noted the following differences between what was prescribed in the guidance and what was seen in practice. Guidance stated that:

- A ‘CPR decision form in itself is not legally binding’ and that a ‘DNACPR decision does not override clinical judgement in the unlikely event of a reversible cause’. The investigation found staff who were not aware of these points.
- ‘Systems (whether paper-based or electronic) for recording these decisions must be reliable and responsive.’ The investigation found situations where availability of equipment and Wi-Fi made accessing EPRs unreliable.

5.2.41 The investigation did not review resuscitation training delivered in hospitals, but were told by some staff that they did not recall training related to terminology, identification of patients and accessing CPR recommendations. However, several resuscitation officers stated that they informed their staff to start CPR and then seek to clarify information.

5.2.42 The investigation found that CPR recommendation practices in hospitals were often different to what was expected to be done by the RCUK. The investigation acknowledges that much of this relates to local implementation of recommended practice, but there are also potential opportunities to support increased standardisation.

HSIB makes the following safety recommendation

Safety recommendation R/2023/216:

HSIB recommends that the Resuscitation Council UK clarifies and promotes expectations around the sharing, presentation, and language of cardiopulmonary resuscitation recommendations in hospital ward environments in line with the findings of this investigation.

5.2.43 The investigation noted that the hospitals visited for observations had not yet implemented ReSPECT. While the investigation did not focus on the implementation of ReSPECT, the RCUK described that its implementation would address several of the issues found by the investigation.

HSIB makes the following safety observation

Safety observation O/2023/206:

It may be beneficial if the language used to refer to cardiopulmonary resuscitation recommendations is standardised and clarified through the implementation of the Recommended Summary Plan for Emergency Care and Treatment.

CPR recommendation symbology

5.2.44 As shown in figure 3, the investigation found variation in the symbols used to represent a patient's CPR recommendation. Some symbols were described as "uncomfortable" or "ambiguous," for example the red heart (see figure 2) to represent a patient 'not for CPR'.

5.2.45 The investigation explored symbols with the professor of typography and was told that pictures can support understanding, particularly when used with writing. However, as Bravo (2021) states: ‘Pictures increase comprehension, but they may be difficult to interpret, especially for viewers without prior knowledge.’

5.2.46 The investigation considered that to support standardisation of information about CPR recommendations, a first step would be the agreement of standardised symbols (symbology). Currently symbols are locally designed or a ‘default’ from the designers of EPRs. The investigation engaged with the British Standards Institution (BSI) which confirmed that there are no standard symbols for CPR recommendations, but that they could be developed through International Standard ISO 15223-1:2021 which specifies the symbols to be used to express information on medical devices and accompanying information (International Organization for Standardization, 2022). Symbol development requires stakeholder engagement and user testing.

HSIB makes the following recommendation

Safety recommendation R/2023/217:

HSIB recommends that the British Standards Institution, with support from relevant stakeholders, provides symbology to standardise how information relating to a patient’s resuscitation status can be displayed in digital systems.

5.2.47 During development of the above safety recommendation the investigation heard concerns about the use of a symbol and the potential for it to create safety risks. Concerns related to scenarios where the symbol may not be removed when a patient’s situation changes, or where it may be seen as ‘inflexible’ regardless of the circumstances at the time of an emergency. The investigation recognises these risks and any implementation of a symbol requires processes and associated training to ensure it is appropriately used. The intent of the safety recommendation to BSI is to help minimise the variation in symbols found by the investigation which are causing confusion. With increasing digitisation of patient information, which include the presence of symbols, the information in those systems would benefit from being presented in a standardised way with functionality to ensure information is accurate and current.

Staff familiarity with their patients

Nursing handover

5.2.48 In the reference event, the ward handover processes meant the nurse who attended the Patient did not have information about him. The investigation observed several handovers across the hospitals visited and noted variations between them.

5.2.49 Ward staff told the investigation that the purpose of a handover at shift change is to ensure oncoming staff are aware of the important information about the patients they are to care for. The investigation observed the following during handovers:

- Attendance varied with staff coming and going.
- They were commonly undertaken in ward corridors by whiteboards.
- There were regular interruptions and distractions.
- Environments were not comfortable, with limited seating and space.
- Content varied depending on what was recorded on handover sheets.
- Invariably handover sheets were read through line by line.
- EPRs were sometimes used, but paper handover sheets were relied on.
- Staff did not receive a handover for every patient they were expected to look after during their shift.

5.2.50 The investigation was told that handovers ensure teams are aware of the critical information about their patients. The investigation considered that the observed handovers could not be relied upon to ensure staff retained information because of the way the handovers were delivered, the volume of information shared, and the limitations of human memory.

5.2.51 The investigation engaged with the Royal College of Nursing (RCN) around how staff can be supported to improve the quality of their handovers. The RCN directed the investigation to guidance for modern ward rounds (Royal College of Physicians and Royal College of Nursing, 2021) and nursing workforce standards (Royal College of Nursing, 2022). These documents describe the importance of structured handovers, but do not provide guidance on how to undertake effective handovers.

5.2.52 The investigation was unable to find any national documents guiding the undertaking of effective nursing handovers, such as is available for ward rounds (Royal College of Physicians and Royal College of Nursing, 2021). This is despite handover being seen as a safety-critical part of patient care. HSIB makes the following recommendation with the intent that it considers factors such as handover organisation, delivery, content, environment and supporting technology.

HSIB makes the following safety recommendation

Safety recommendation R/2023/218:

HSIB recommends that the Royal College of Nursing develops guidance for ward-based nursing handovers with consideration of the following: how handovers are organised, their content, the environment in which they take place and the technology needed to support them.

Electronic handover systems

5.2.53 Hospital digital teams and clinical staff told the investigation of local efforts to implement digitally supported handovers using EPRs or electronic handover systems. However, it was described that where this had been tried, staff quickly reverted back to paper handover sheets. The factors influencing this included limited access to devices, difficulty accessing information in software, inconsistent functioning of systems, and interoperability that limited access to all the required information. Despite integration of digital solutions, the persistence of paper-based systems is a recognised issue (Mount-Campbell et al, 2020).

5.2.54 Healthcare systems need to support staff to access accurate patient information quickly. This removes the need for staff to have to rely on remembering information. With regard to handover, paper systems cannot be guaranteed to be accurate, and current electronic handover systems may not provide for the needs of users.

5.2.55 There is potential benefit in electronic handover systems that are accessible at the bedside and interoperable with other systems to ensure up-to-date information. To develop these systems, hospitals' information technology infrastructure needs to support access, and the systems need to be designed to meet the needs of the user.

6 Summary of findings, safety recommendations and safety observations

6.1 Findings

- Clinical staff are not always able to access accurate, critical patient information at bedsides to support decision making in emergencies.
- Patient identity wristbands are not consistently checked by staff during the undertaking of clinical tasks.

- The expectations of how staff should identify patients in an emergency and access critical information in relation to their care cannot always be met in practice because of limitations of technology and the work environment.
- Concerns around confidentiality can prevent the display of critical patient information at bedsides that may be needed to support safe care, particularly in emergencies.
- What and how critical patient information is displayed at the bedside varies across hospitals, with differences in positioning, visibility, readability and legibility.
- There is no national guidance to support consistency and visibility of critical patient information on low-technology displays (whiteboards/posters) or high-technology displays (via digital systems).
- Lighting on hospital wards can make it difficult for staff to see critical patient information, either through too little light, or too much light causing glare.
- Clinical staff consistently report difficulties accessing digital systems because of limited or poorly functioning hardware. This can result in the use of less reliable, paper-based systems for accessing critical patient information.
- Limited interoperability of multiple digital systems means critical patient information may not be accessible or consistent across all systems used in the care of a patient. Staff need to know which systems contain the information they need.
- Limited ability at a national level to influence the functionality of digital systems and their procurement means healthcare organisations are implementing systems with varying design and functionality.
- At the hospital level, the configuration of electronic patient record systems can introduce further safety risks where the infrastructure and staff training needs necessary for successful implementation have not been fully considered, and the needs of the clinical users have not been fully established.
- There is variation in the words and symbols used to indicate CPR recommendations, and in the level of understanding of CPR recommendations across hospitals, that may influence responses to cardiac arrests.
- Nursing handovers (where information about patients is passed between nursing staff at shift changes) may not provide the information staff need to care for their patients because of where and how they are undertaken. There is no national guidance on how best to undertake handovers of care.
- The implementation of electronic handover systems in clinical workplaces is limited by digital infrastructure, and systems that do not meet the needs of their users.

6.2 Safety recommendations and safety observations

HSIB makes the following safety recommendations

Safety recommendation R/2023/211:

HSIB recommends that the Office of the National Data Guardian supports local interpretation of the Caldicott Principles to give organisations and staff the confidence to display full patient names at the bedside to support correct patient identification for safer care.

Safety recommendation R/2023/212:

HSIB recommends that NHS England develops guidance to providers, via any digital maturity assessments that are developed, to help ensure critical patient information (such as patient identifiers and cardiopulmonary resuscitation status) is available to clinical staff when accessing electronic patient record systems.

Safety recommendation R/2023/213:

HSIB recommends that NHS England provides guidance to healthcare organisations to support local design and configuration of electronic patient records to enable end users to access critical patient information (such as patient identifiers and cardiopulmonary resuscitation status).

Safety recommendation R/2023/214:

HSIB recommends that NHS England, during review of relevant Health Building Notes and Technical Memoranda, includes, as a consideration, that bedside patient information should be consistently visible.

Safety recommendation R/2023/215:

HSIB recommends that NHS England assesses the priority, feasibility, and impact of future research into what and how critical information pertaining to the emergency care of patients in the acute hospital setting can be readily and reliably accessed at a patient's bedside.

Safety recommendation R/2023/216:

HSIB recommends that the Resuscitation Council UK clarifies and promotes expectations around the sharing, presentation, and language of cardiopulmonary resuscitation recommendations in hospital ward environments in line with the findings of this investigation.

Safety recommendation R/2023/217:

HSIB recommends that the British Standards Institution, with support from relevant stakeholders, provides symbology to standardise how information relating to a patient's resuscitation status can be displayed in digital systems.

Safety recommendation R/2023/218:

HSIB recommends that the Royal College of Nursing develops guidance for ward-based nursing handovers with consideration of the following: how handovers are organised, their content, the environment in which they take place and the technology needed to support them.

HSIB notes the following safety observations

Safety observation O/2023/204:

It may be beneficial for healthcare organisations to provide guidance to support decisions in clinical areas that balance confidentiality and the visibility of critical patient information for patient safety.

Safety observation O/2023/205:

It may be beneficial for healthcare organisations to assess their information technology infrastructure needs, such as equipment availability and network coverage, to enable staff to consistently access critical patient information.

Safety observation O/2023/206:

It may be beneficial if the language used to refer to cardiopulmonary resuscitation recommendations is standardised and clarified through the implementation of the Recommended Summary Plan for Emergency Care and Treatment.

7 References

BMJ Best Practice (2022) Cardiac arrest – symptoms, diagnosis and treatment. Available at **https://bestpractice.bmj.com/topics/en-gb/283** (Accessed 27 October 2022).

Bravo, J. (2021) Three research briefings to inform the design of instructions for Covid tests. Available at **https://research.reading.ac.uk/design-research-for-testing-diagnostics/three-research-briefings-to-inform-the-design-of-instructions-for-covid-tests/** (Accessed 18 August 2022).

Briggs, C. (2005) Reading for transition: an annotated book list to support children's development as readers. Reading: National Centre for Language and Literacy.

Bukorovic, N. (2019) Lighting for healthcare premises. (Lighting guide LG 2): Chartered Institution of Building Services Engineers. Available at **https://www.cibse.org/knowledge-research/knowledge-portal/lighting-guide-02-lighting-for-healthcare-premises-2019** (Accessed 18 August 2022).

Carayon, P., Schoofs Hundt, A., et al. (2006) Work system design for patient safety: the SEIPS model, Quality & Safety in Health Care, 15(1), i50-8. doi: 10.1136/qshc.2005.015842

Chartered Institute of Ergonomics and Human Factors (2020) Guidance on design of effective work procedures. Available at **https://ergonomics.org.uk/resource/guidance-on-design-of-effective-work-procedures.html** (Accessed 18 August 2022).

Fernando, S.M., Tran, A., et al. (2019) Pre-arrest and intra-arrest prognostic factors associated with survival after in-hospital cardiac arrest: systematic review and meta-analysis, BMJ (Clinical Research Ed.), 367, l6373. doi: 10.1136/bmj.l6373

Gräsner, J.-T., Lefering, R., et al. (2016) EuReCa ONE-27 Nations, ONE Europe, ONE Registry: a prospective one month analysis of out-of-hospital cardiac arrest outcomes in 27 countries in Europe, Resuscitation, 105, pp. 188–195. doi: 10.1016/j.resuscitation.2016.06.004

Health and Safety Executive (n.d.) Human factors/ergonomics: control rooms. Available at **https://www.hse.gov.uk/humanfactors/topics/control-room.htm** (Accessed 18 August 2022).

Healthcare Safety Investigation Branch (2019) Wrong patient details on blood sample I2019/003. Available at **https://www.hsib.org.uk/investigations-and-reports/wrong-patient-details-on-blood-sample/** (Accessed 12 April 2022).

Healthcare Safety Investigation Branch (2020) The role of clinical pharmacy services in helping to identify and reduce high-risk prescribing errors in hospital I2018/019. Available at **https://www.hsib.org.uk/investigations-and-reports/the-role-of-clinical-pharmacy-services-in-helping-to-identify-and-reduce-high-risk-prescribing-errors-in-hospital/the-role-of-clinical-pharmacy-services-in-helping-to-identify-and-reduce-high-risk-prescribing-errors-in-hospital/** (Accessed 12 April 2022).

Healthcare Safety Investigation Branch (2021a) Local integrated investigation pilot 1: incorrect patient identification NI-003718. Available at **https://www.hsib.org.uk/investigations-and-reports/hsib-local-integrated-investigation-pilot/** (Accessed 12 April 2022).

Healthcare Safety Investigation Branch (2021b) Surgical care of NHS patients in independent hospitals I2020/113. Available at **https://www.hsib.org.uk/investigations-and-reports/surgical-care-of-nhs-patients-in-independent-hospitals/** (Accessed 25 August 2022).

Healthcare Safety Investigation Branch (2021c) Wrong site surgery – wrong patient: invasive procedures in outpatient settings I2019/018. Available at **https://www.hsib.org.uk/investigations-and-reports/wrong-site-surgery-wrong-patient/wrong-site-surgery-wrong-patient-invasive-procedures-in-outpatient-settings/** (Accessed 12 April 2022).

Healthcare Safety Investigation Branch (2022a) Local integrated investigation pilot 2: incorrect patient details on handover NI-003716. Available at **https://www.hsib.org.uk/investigations-and-reports/local-integrated-investigation-pilot-2-incorrect-patient-details-on-handover-notes/** (Accessed 12 April 2022).

Healthcare Safety Investigation Branch (2022b) Weight-based medication errors in children I2020/026. Available at **https://www.hsib.org.uk/investigations-and-reports/weight-based-medication-errors-in-children/** (Accessed 25 August 2022).

Hollnagel, E. (2012) FRAM – The Functional Resonance Analysis Method: Modelling complex socio-technical systems. Farnham: Ashgate.

Hollnagel, E. (n.d.) FRAM Model Visualiser (Version 0.4.2). Available at **https://functionalresonance.com/FMV/index.html** (Accessed 25 August 2022).

Intensive Care National Audit and Research Centre (2022) Key National Cardiac Arrest Audit statistics. Available at: **https://www.icnarc.org/Our-Audit/Audits/Ncaa/Reports/Key-Statistics** (Accessed 6 January 2023).

International Organization for Standardization (2022) Medical devices – Symbols to be used with information to be supplied by the manufacturer – Part 1: General requirements. ISO 15223-1:2021.

Klein, G.A., Calderwood, R., et al. (1989) Critical decision method for eliciting knowledge, IEEE Transactions on Systems, Man, and Cybernetics, 19(3), pp. 462–472. doi: 10.1109/21.31053

Mount-Campbell, A.F., Evans, K.D., et al. (2020) Uncovering the value of a historical paper-based collaborative artifact: the nursing unit's Kardex system, Frontiers in Digital Health, 2, p. 12. doi: 10.3389/fdgth.2020.00012

National Data Guardian (2020) The eight Caldicott Principles. Available at **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/942217/Eight_Caldicott_Principles_08.12.20.pdf** (Accessed 18 August 2022).

National Patient Safety Agency (2004) Right patient – right care. Framework for action. Available at **http://brenmoor.com/wp-content/uploads/2015/08/right-patient-right-care.pdf** (Accessed 25 March 2022).

National Patient Safety Agency (2005) Safer practice notice. Wristbands for hospital inpatients improves safety. Available at **https://webarchive.nationalarchives.gov.uk/ukgwa/20171030131037/http:/www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=59799%26p=4** (Accessed 25 March 2022).

National Patient Safety Agency (2007) Safer practice notice. Standardising wristbands improves patient safety. Available at **https://webarchive.nationalarchives.gov.uk/ukgwa/20171030131015/http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=59824%26p=3** (Accessed 25 March 2022).

National Patient Safety Agency (2009) Safer practice notice. Risk to patient safety of not using the NHS number as the national identifier for all patients. Available at **https://webarchive.nationalarchives.gov.uk/ukgwa/20171030130740/http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=61913&p=2** (Accessed 25 March 2022).

NHS (n.d.a) NHS App. Available at **https://www.nhs.uk/nhs-app/** (Accessed 25 March 2022).

NHS (n.d.b) Find your NHS number. Available at **https://www.nhs.uk/nhs-services/online-services/find-nhs-number/** (Accessed 25 March 2022).

NHS (n.d.c) Colour vision deficiency (colour blindness). Available at **https://www.nhs.uk/conditions/colour-vision-deficiency/** (Accessed 6 September 2022).

NHS England (2005) Wayfinding: effective wayfinding and signing systems guidance for healthcare facilities. Available at **https://www.england.nhs.uk/publication/wayfinding-effective-wayfinding-and-signing-systems-guidance-for-healthcare-facilities/** (Accessed 18 August 2022).

NHS England (2009) (HBN 04-01) Adult in-patient facilities: planning and design. Available at **https://www.england.nhs.uk/publication/adult-in-patient-facilities-planning-and-design-hbn-04-01/** (Accessed 18 August 2022).

NHS England (2013a) (HBN 00-03) Designing generic clinical and clinical support spaces. Available at **https://www.england.nhs.uk/publication/designing-generic-clinical-and-clinical-support-spaces-hbn-00-03/** (Accessed 18 August 2022).

NHS England (2013b) (HTM 08-03) Management of bedhead services in the health sector. Available at **https://www.england.nhs.uk/publication/management-of-bedhead-services-in-the-health-sector-htm-08-03/** (Accessed 18 August 2022).

NHS Improvement (2018) Recommendations from National Patient Safety Agency alerts that remain relevant to the Never Events list 2018. Available at **https://www.england.nhs.uk/wp-content/uploads/2020/11/Recommendations-from-NPSA-alerts-that-remain-relevant-to-NEs-FINAL.pdf** (Accessed 25 March 2022).

Resuscitation Council UK (2016) Decisions relating to cardiopulmonary resuscitation (3rd edition – 1st revision). Available at **https://www.resus.org.uk/library/publications/publication-decisions-relating-cardiopulmonary** (Accessed 18 August 2022).

Resuscitation Council UK (2021) Adult advanced life support guidelines. Available at **https://www.resus.org.uk/library/2021-resuscitation-guidelines/adult-advanced-life-support-guidelines** (Accessed 25 August 2022).

Resuscitation Council UK (n.d.a) How to do CPR. Available at **https://www.resus.org.uk/public-resource/how-do-cpr** (Accessed 27 October 2022).

Resuscitation Council UK (n.d.b) CPR decisions, DNACPR and ReSPECT. Available at **https://www.resus.org.uk/public-resource/cpr-decisions-and-dnacpr** (Accessed 27 October 2022).

Resuscitation Council UK (n.d.c) FAQs: decision making (CPR). Available at **https://www.resus.org.uk/home/faqs/faqs-decision-making-cpr** (Accessed 25 March 2022).

Resuscitation Council UK (n.d.d) ReSPECT. Available at **https://www.resus.org.uk/respect** (Accessed 13 February 2022).

The Royal College of Nursing (2022) Nursing under unsustainable pressure. Available at **https://www.rcn.org.uk/Professional-Development/publications/nursing-under-unsustainable-pressure-uk-pub-010-270** (Accessed 24 August 2022).

Royal College of Physicians and Royal College of Nursing (2021) Modern ward rounds: good practice for multidisciplinary inpatient review. Available at **https://www.rcn.org.uk/professional-development/publications/rcn-modern-ward-rounds-good-practice-for-multidisciplinary-inpatient-review-uk-pub009566** (Accessed 24 August 2022).

The Joint Commission (2022) National Patient Safety Goals. Effective January 2022 for the Hospital Program. Available at **https://www.jointcommission.org/-/media/tjc/documents/standards/national-patient-safety-goals/2022/npsg_chapter_hap_jan2022.pdf** (Accessed 13 April 2022).

Walker, S., Bravo, J., et al. (2022) User-friendly point-of-use instructions for home use diagnostic tests, University of Reading. doi: 10.17864/1947.000419

World Health Organization (2007) WHO launches ‘Nine patient safety solutions’: solutions to prevent health care-related harm. Available at **https://www.who.int/news/item/02-05-2007-who-launches-nine-patient-safety-solutions** (Accessed 13 April 2022).

8 Appendix

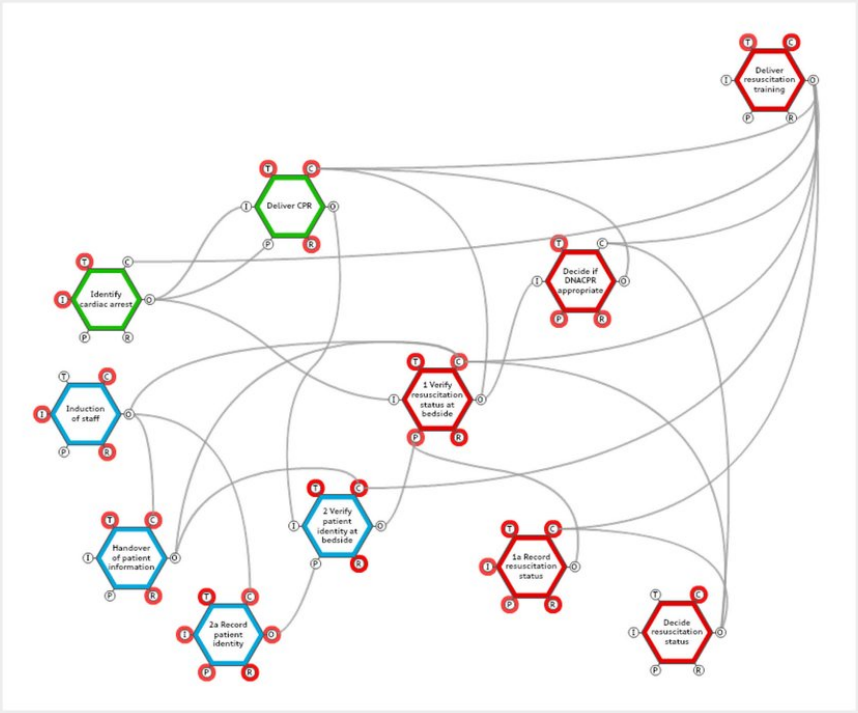
Functional Resonance Analysis Method (FRAM)

FRAM aims to reflect risks within complex systems. It does this through describing variability in the functions within the system and looks to model what is needed for everyday performance to go right.

The FRAM involves exploring ‘work as done’ to identify the ‘functions’ that are being performed. A function is defined as ‘the activities – or set of activities – that are required to produce a certain outcome’ (Hollnagel, 2012). In doing this, FRAM develops a model of the core functions to illustrate how each links, how variability might occur, and how this may affect outcomes. To achieve this, links are created between functions by identifying six specific aspects of each function: input, output, preconditions, resources, controls, and time factors.

FRAM visualisation of key functions for this investigation (Hollnagel, n.d.)

This FRAM is a summary only and does not provide all functions considered by the investigation. Colours represent groups of functions (green – cardiopulmonary resuscitation (CPR), red – resuscitation status, and blue – patient identification).



FRAM visualisation of key functions for this investigation (Hollnagel, n.d.)

Providing feedback and comment on reports

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