SHOT
Serious Hazards of Transfusion

Useful tips for the SHOT Human Factors (and Ergonomics) Investigation Tool (HFIT)

This resource provides information to help understand the causal and contributory factors related to the transfusion incidents being reported to the SHOT from a Human Factors and Ergonomics perspective

For queries contact 0161 423 4208 or
shot@nhsbt.nhs.uk

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SHOT recommend watching the educational short videos for more information about Human Factors and Ergonomics

This link is to the video section of the SHOT website

Scroll to the section titled: Understanding Human Factors in Transfusion

Part 1 and Part 2 should be viewed together where possible

https://www.shotuk.org/resources/current-resources/videos

It will take approximately 6 minutes to view each video

SHOT produced these videos with the NHSBT Digital Learning Team and we would like to also acknowledge valuable contributions from:

All reporting hospitals

SHOT Steering group and Working Expert Group

Health Education England for the funding of this resource

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What is Human Factors (HF)?

- The term ‘Human Factors’ relates to how a human interacts with processes, systems, equipment and the environment
- It is equivalent to the term ergonomics and often is known as HFE- Human factors and Ergonomics
- It should not be mistaken for being only about factors relating to the human themselves
- A badly designed system or piece of equipment could be categorised as human factors because it could lead to errors and incidents
- The following slide has links to further information if you want to know more about human factors

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SHOT resources on Human Factors and Ergonomics

- SHOT Human Factors resources (N.B. current resource listings may later be archived at this link https://www.shotuk.org/resources/archived-resources/)
  - Current resources https://www.shotuk.org/resources/current-resources/
    - Includes SHOT Bite no.12 on Cognitive Bias here https://www.shotuk.org/resources/current-resources/shot-bites/
    - SHOT webinar - scroll to Human Factors Webinar 2020 https://www.shotuk.org/resources/current-resources/webinars
    - SHOTcast1 on HF https://www.shotuk.org/resources/current-resources/shot-casts/
    - SHOT HF videos - scroll to Understanding Human Factors in Transfusion https://www.shotuk.org/resources/current-resources/videos
    - Chapter from 2021 Report (includes figures and cases) –7.-Human-Factors-in-SHOT-Error-Incidents-2021.pdf (shotuk.org)
    - **Just released! Transfusion related HFE e-learning module from SHOT which can be accessed here: https://learninghub.nhs.uk/catalogue/NHSBT-Learning-Zone**

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Further information and reading about Human Factors and Ergonomics

These links are provided for information only.
Their inclusion should not be considered as approval or endorsement by SHOT.

- Clinical Human Factors Group http://chfg.org/
- NHS England Human Factors Concordat https://www.england.nhs.uk/wp-content/uploads/2013/11/nqb-hum-fact-concord.pdf
- Chartered Institute of Ergonomics & Human Factors Making Human Factors and Ergonomics Work in Health and Social Care Chapters 1 & 2 https://ergonomics.org.uk/resource/hf-in-health-and-social-care-ebook-chapter-1.html & https://ergonomics.org.uk/resource/hf-in-health-and-social-care-ebook-chapter-2.html
- Free book - *Safer Healthcare, Strategies for the Real World* by Vincent & Amalberti http://www.springer.com/gb/book/9783319255576
- Steven Shorrock's Humanistics Systems, a Human Factors blog site https://humanisticsystems.com/author/stevenshorrock/
- Erik Hollnagels' website https://www.erikhollnagel.com/
- Video produced by www.systemsthinking.com, Loughborough University https://www.youtube.com/watch?v=5oYV3Dqe0A8
- Free online course by the University of East Anglia, supplied via Future Learn, part of the Open University https://www.futurelearn.com/courses/human-factors-healthcare
- NHS Education for Scotland - Human factors and ergonomics https://www.nes.scot.nhs.uk/our-work/human-factors-and-ergonomics/

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SHOT Human Factors Investigation Tool (HFIT) background

- Errors continue to account for majority of SHOT reports. Errors in healthcare may be related to the workplace environment and these can be the human factors that contribute to mistakes in transfusion

Timeline:

- In January 2016, SHOT introduced human factors questions, i.e. a human factors investigation tool (HFIT). Reporters were asked to estimate the factors related to the incident on a scale of 0 to 10, where 0 is none and 10 is the total cause
- In January 2017, SHOT produced and published this learning package
- In January 2021, SHOT updated this learning package, reviewed and updated the HFIT to incorporate The Yorkshire Contributory Factors Framework (YCFF) and produced their own human factors videos
- In January 2023, the HFIT and learning package were further updated, and a new Human Factors in transfusion e-learning module has been released in July 2023

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What's new for 2023?

- We have continued to incorporate The Yorkshire Contributory Factors Framework (YCFF) into our HFIT. This Framework has an evidence base for optimising learning and addressing causes of patient safety incidents by helping SHOT, clinicians, risk managers and patient safety officers identify contributory factors incidents
- **We have removed the need for reporters to allocate a score to the contributory factors within the HFIT**, acknowledging that this can place additional burden and workload on reporters. We want to encourage consideration of all of the factors that led to the incident
- It is anticipated that the HFIT questions will take around 15 minutes to complete
- The underlying aim is to develop a more sophisticated understanding of the factors that cause incidents (though not ignoring individual accountability for unsafe practice). These factors can then be addressed through changes and recommendations in systems, structures and local working conditions rather than focusing on individuals
- Identifying all factors causing or contributing to patient safety incidents offers an opportunity to address systemic flaws effectively, and improve transfusion safety

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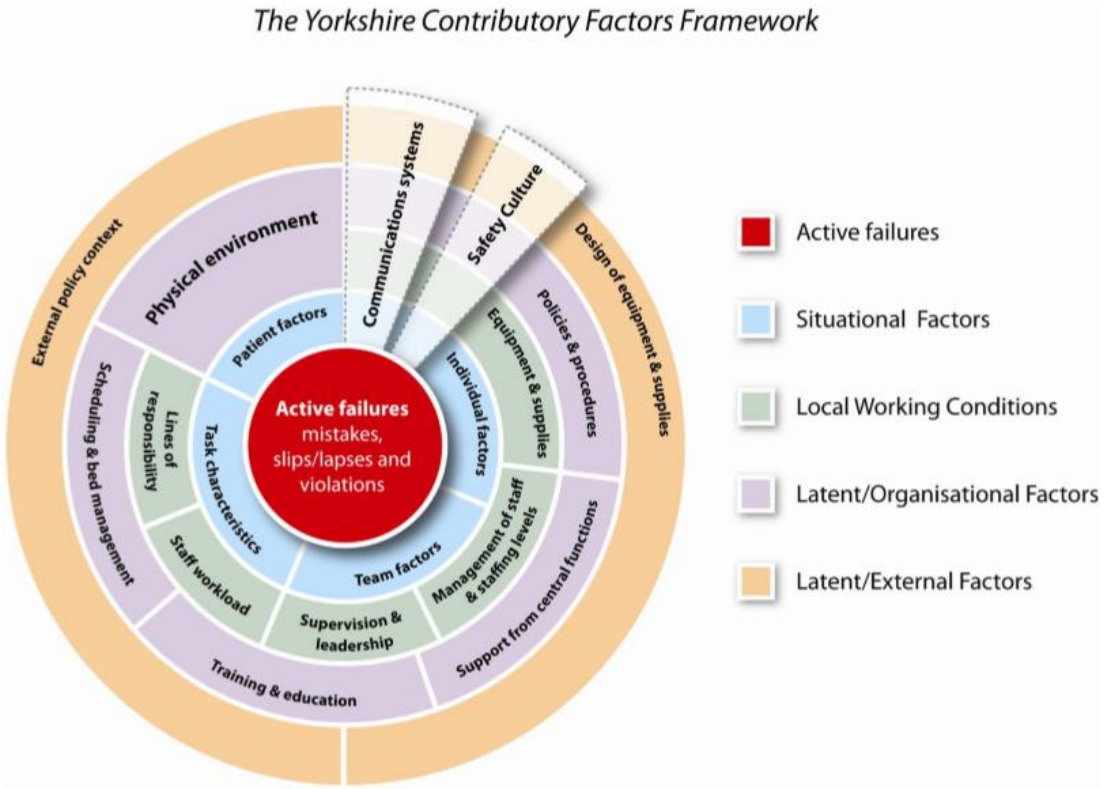
HFIT incorporates an adapted version of The Yorkshire Contributory Factors Framework



YQSR
Yorkshire Quality and Safety Research Group

https://improvementacademy.org/resource/yorkshire-contributory-factors-framework/

Removal of the scoring requirement on the Human Factors questions

- You will note that we have made some changes by removing the scale used to answer each section to simplify the process for investigators
- For each question please consider and state the factors that may have contributed to the incident occurring
- There are 5 sections to the questionnaire as seen on the next page

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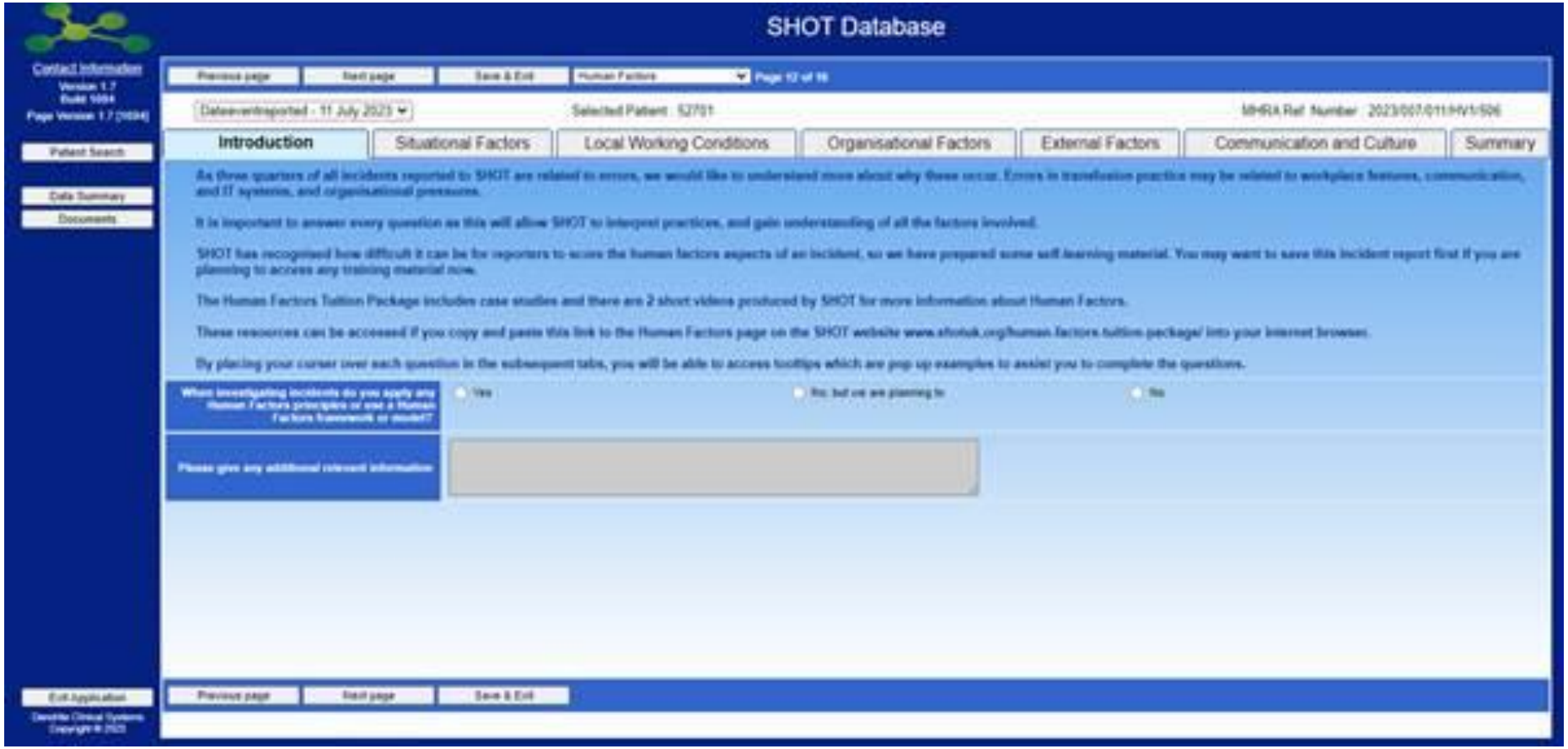
Human Factors page in SHOT Database (Dendrite)



This is a demonstration of the page in the SHOT Database

Don’t worry that you can’t see the detail in this screenshot

The questions and answer options are clear in Dendrite

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Situational, Local Working Conditions, Organisational, External, Communication and Culture

- Reporters may struggle to consider the contributory factors the farther away it gets from the individual and the actual incident, and it is acknowledged these can be difficult to assess

- Discussion points in the following case studies may give ideas for factors to consider that are outside the control of the individual or their local managers

- In particular, it may be worth considering if outside factors could result in staff failing to follow policies

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How can we assess cases for Human Factors ?

This tuition package on Human Factors is designed to help reporters to answer the SHOT human factors questions.

In particular it may help reporters to consider the non-staff related factors that can contribute to the cause of an incident, such as:

- Situational Factors
- Local Working Conditions
- Organisational Factors
- External Factors
- Communication and Culture

Please note: There are no right or wrong answers! The suggested answers given in cases below are not exhaustive, but are examples based on the information SHOT received. Reporters investigating the case locally may have more information that would lead them to assess the incident differently.

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The following case studies are real cases

- The following case studies and the initial scores given are from real cases reported to SHOT using the original human factors investigation tool (HFIT). These have been updated to include worked examples using the 2023 HFIT.
- SHOT is very grateful to reporters for sharing their cases and completing the original HFIT questions
- Reporters are not expected in any way to be human factors experts, so there is no criticism implied by the discussion of scores originally given or factors now suggested in these case studies
- Cases are fully anonymised

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Case study 1 - Total cause of incident initially attributed to individual

- Patient was transfused 2 units of red cells with a Hb of 79g/L, despite known risk factors for transfusion-associated circulatory overload (TACO)
- According to the protocol only 1 unit should have been administered initially and then the patient clinically reassessed, but the patient was not monitored between units and the consultant haematologist for transfusion believes the second unit was inappropriate
- The nurse administering the transfusion had not recognised the risk and only carried out routine blood transfusion observations
- A junior doctor (F1) reviewed the patient after the 2nd unit for complaints of shortness of breath. The F1 documented unlikely to be TACO as the patient calmed down during the examination with reassurance and was not in consistent respiratory distress. The case was reviewed by the Transfusion consultant and SHOT experts who concluded this was an inappropriate transfusion that resulted in TACO
- Patient had a cardiac event, but survived

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Case study 1

When the SHOT report for this case was originally completed the requirement for reporters to allocated a score to the factors below was still in place. For this case, maximum scoring was given to the individual staff member but no score was allocated to the other factors. Please note that there is no requirement to assign a score in the updated HFIT.

Cause attributable to unsafe practice/conditions associated with:
Individual staff member(s) – *maximum score given*
The local environment or workspace
Organisational or management issues in the Trust/Health Board
Government, Department of Health or high level regulatory issues
Communication and culture

Case study 1 - discussion

- To recall, this case was originally scored with a maximum score for the individual staff member but no consideration was given to any other human factors
- However, the **local environment or workspace** was not ideal, because no pump was available so the transfusion was given by free flow. The second unit was given too quickly at 1 hour 45 mins instead of 3 hours
- There were also **organisational issues** with shared care and co-morbidities:
  - *The patient was on regular transfusions at a different hospital for myelodysplastic syndrome (MDS) but treated here for infected leg ulcers*
  - *The patient was taken off regular diuretic medication prior to having computerised tomography (CT) angiography, but was on fluids for acute kidney injury (AKI)*
  - *Appears to have been given the blood, because her regular 3-weekly transfusion was due, without taking into account her inpatient status*
- A patient with complex transfusion issues was being monitored by a nurse who didn't recognise the TACO risk and was referred to a junior doctor to assess the shortness of breath. If apparently inexperienced staff were involved due to poor staffing levels that could be seen as a **Department of Health level issue**, because of possible underfunding of the health service

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Case study 1 - HF when further info considered and reworked using HFIT 2023

Section 1- Situational Factors

Section 1 – Situational Factors	
Does the cause of this incident include any failures in team function?	Yes
Were there any reasons this incident was more likely to occur with the particular staff involved?	Yes
Did task features make the incident more likely?	No
Were there reasons that this incident was more likely to occur to this particular patient	Yes
Please give any additional relevant information for situational factors	The patient was being monitored by a nurse that didn't recognise TACO risk and reviewed by a junior doctor. A lack of experience could have been a factor here. The patient had complex transfusion issues and risk of TACO The patient was known AKI but had been taken off diuretics for investigations

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might answer differently**

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Section 2- Local working Conditions

Section 2 – Local Working conditions	
Was there a mismatch between workload and staff provision around the time of the incident?	No
Was there any failure of team function in relation to leadership, supervision and roles?	Yes
Were there any difficulties obtaining the correct equipment and/or supplies?	Yes
Please give any additional relevant information for local working conditions	No transfusion pump was available on the ward meaning the transfusion was given by free flow. This resulted in the second unit being given too quickly at 1 hour and 45 minutes instead of 3 hours. As above, the patient was being monitored by a nurse that didn't recognise TACO risk and reviewed by a junior doctor. Delegation to inexperienced and junior staff could have been a factor here

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 3- Organisational Factors

Section 3- Organisational Factors	
Did the environment hinder work in any way?	No
Were there problems in other departments that contributed?	Yes
Did organisational pressures play a role in the incident?	Yes
Were there issues or gaps with staff skill or knowledge?	Yes
Please give any additional relevant information for organisational factors	There were issues around shared care The patient was regularly transfused at a different hospital and had co-morbidities and transfusion needs that may have been poorly communicated or subject to a lack of information and handover between organisations

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 4 – External Factors

Section 4- External Factors	
Were there any characteristics about the equipment that were unhelpful?	No
Have any national policies or high-level regulatory issues influenced this incident?	Yes
Please give any additional relevant information for external factors	If inexperienced staff were involved, and a lack of patient monitoring occurred due to poor staffing levels this could be seen as a Department of Health level issue because of underfunding of the health service

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 5-Communication and Culture

Section 5- Communication and Culture	
Did a lack of safety culture in your clinical area contribute to this incident?	Yes
Did poor written, or verbal communication worsen the situation?	Yes
Please give any additional relevant information for communication and culture	The patient was not clinically reassessed or monitored between blood units, suggesting lack of knowledge of transfusion safety There were issues around shared care between hospitals. This was possibly compounded by suboptimal communication and handover

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 6- Summary

Section 6- Summary	
Which of these options do you consider to be the most important contributory factor for this incident? (Single choice) Situational Local working Organisational External Communication and culture	Situational Rationale: Lack of staff knowledge around TACO risk and single unit transfusion
If you could change one thing to make this incident less likely to happen again, what would it be?	Improve intrahospital communication Better skill mix Increased knowledge of transfusion risks and recognition of adverse reactions

*** The suggested summary assumes all discussion points are valid, but the local investigator may know more detail and might answer differently**

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Case study 2
Causes attributed evenly to all factors

- A group A D-positive patient received a haemopoietic stem cell transplant (HSCT) from a group A D-negative donor
- The transplant protocol was received in the laboratory, but the specific transfusion instructions were not recorded in the laboratory information management system (LIMS)
- Post transplant, two units of A D-positive platelets were transfused instead of A D-negative platelets. The lack of transplant information in the LIMS means a new sample may not have been tested before issuing platelets
- A later group and save request highlighted the error that the patient's transplant had not been recorded in the LIMS
- There was no harm to the patient and it can be shown that at the time of the platelet transfusion the recipient was still grouping as A D-positive, i.e. had not yet converted to the donor's A D-negative group.

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Case study 2

Human factors scores given when the case was submitted are listed below.
Please note that there is no requirement to assign a score in the updated HFIT.

Cause attributable to unsafe practice/conditions associated with:	Score out of 10
Individual staff member(s)	5
The local environment or workspace	6
Organisational or management issues in the Trust/Health Board	5
Government, Department of Health or high level regulatory issues	6

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Case study 2 - discussion

- This case had scores attributed evenly in the original incident report
- Explanatory comments were given about each score, so their accuracy could be determined
- No suggested changes to the original scores were needed when the further information was analysed
- Please note that there is no requirement to assign a score in the updated HFIT

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Case study 2 - HF scores when further info considered and reworked using updated HFIT

Section 1- Situational Factors

Section 1 – Situational Factors	
Does the cause of this incident include any failures in team function?	Yes
Were there any reasons this incident was more likely to occur with the particular staff involved?	Yes
Did task features make the incident more likely?	No
Were there reasons that this incident was more likely to occur to this particular patient	No
Please give any additional relevant information for situational factors	BMS followed procedure but omitted one step Interruptions by colleagues and other healthcare professionals whilst inputting data into the LIMS

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 2- Local working Conditions

Section 2 – Local Working conditions	
Was there a mismatch between workload and staff provision around the time of the incident?	Yes
Was there any failure of team function in relation to leadership, supervision and roles?	Yes
Were there any difficulties obtaining the correct equipment and/or supplies?	No
Please give any additional relevant information for local working conditions	Staff shortages Implementation of a shift pattern has resulted in fewer qualified staff available during routine hours

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 3- Organisational Factors

Section 3- Organisational Factors	
Did the environment hinder work in any way?	Yes
Were there problems in other departments that contributed?	No
Did organisational pressures play a role in the incident?	Yes
Were there issues or gaps with staff skill or knowledge?	Yes
Please give any additional relevant information for organisational factors	Interruptions by colleagues and other healthcare professionals whilst inputting data into the LIMS Implementation of a shift pattern has resulted in fewer qualified staff available during routine hours

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 4 – External Factors

Section 4- External Factors	
Were there any characteristics about the equipment that were unhelpful?	No
Have any national policies or high-level regulatory issues influenced this incident?	Yes
Please give any additional relevant information for external factors	Insufficient NHS funding leading to inability to increase staff levels to cope with increased work loads and changes in work patterns

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 5-Communication and Culture

Section 5- Communication and Culture	
Did a lack of safety culture in your clinical area contribute to this incident?	No
Did poor written, or verbal communication worsen the situation?	Yes
Please give any additional relevant information for communication and culture	Staff were multitasking

*** The suggested answers assume all discussion points are valid, but the local investigator may know more detail and might score differently**

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Section 6- Summary

Section 6- Summary	
Which of these options do you consider to be the most important contributory factor for this incident? (Single choice) Situational Local working Organisational External Communication and culture	Local working conditions
If you could change one thing to make this incident less likely to happen again, what would it be?	Improved skill mix Create a workspace for BMS free from interruptions

*** The suggested summary assumes all discussion points are valid, but the local investigator may know more detail and might score differently**

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Summary

- Human factors is all about how humans interact with processes and systems
- It is common to think the individual is totally responsible for an error, but consider whether they may be working in a poor system
- Our top tip is to review all contributing factors before completing the human factors section in the SHOT Database questionnaires
- If in doubt, please contact the SHOT Office, SHOT@nhsbt.nhs.uk
- Ph: 0161 423 4208

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Thank you

- SHOT owes a huge debt of gratitude to all reporters for their diligent reporting and sharing their cases with us

- SHOT would like to acknowledge the Yorkshire and Humber Improvement Academy. Creative Commons Bradford Teaching Hospitals NHS Foundation Trust for the YCFF https://improvementacademy.org/about-us/

- Many thanks for reading these tips about Human Factors and we hope you have found them useful

Kind regards,

The SHOT Team

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