Human Factors and Ergonomics principles in IT implementation – An aide-mémoire

What is covered in this document?

This practical, human factors and ergonomics principles-based aide-mémoire is intended to support staff in the implementation of, or changes to, transfusion digital systems. It is structured to promote safe adoption, usability, and resilience, and should be used alongside technical assessments, clinical governance reviews, and formal change control processes.

How should this aide-mémoire be used?

This aide-mémoire is intended to support the safe implementation, upgrade or modification of transfusion-related IT systems. It should be used throughout the lifecycle of the change, from planning and design through to implementation, review and ongoing optimisation. It complements, but does not replace, local governance, risk management, procurement, validation and change control processes.

This is designed to prompt discussion, identify potential risks, and ensure that human factors considerations are addressed alongside technical requirements. Organisations should use it to challenge assumptions, identify gaps, and confirm that systems are safe, usable, resilient and fit for the people who rely on them every day.

Any gaps, concerns or risks identified through this review should be addressed, mitigated and reviewed in a timely manner. Where issues cannot be fully resolved, the residual risks should be formally assessed, documented and approved through the appropriate governance processes.

Implementation should not be considered complete at go-live. User feedback, incident reports, near misses and operational experience should be actively monitored after implementation to identify unintended consequences and opportunities for improvement. Lessons learned should be used to refine the system, update training and procedures, and inform future digital change programmes.

Transfusion IT implementation or change

1. Purpose & Context

☐ Clear statement of why the change is needed (safety, efficiency, compliance)

☐ Expected safety, quality and operational benefits defined before go-live

☐ Clearly defining responsibilities for Information Technology (IT) teams and end users to ensure appropriate testing is undertaken, safeguarding key safety-critical system functions during future system developments and upgrades.

☐ Alignment with transfusion workflow including clinical and laboratory workflows

☐ The risks associated with not implementing the change are understood and communicated

2. Change Control & Risk Assessment

☐ Formal change control followed (documented and approved)

☐ Human factors and ergonomics included in risk/impact assessment (not just technical risks)

☐ New failure modes identified (workarounds, over-reliance on automation) and mitigations applied

☐ Risks and mitigations agreed, documented, and monitored following implementation especially impact on staffing levels, workload distribution, time pressure and user fatigue has been assessed

3. Interoperability & System Interfaces

☐ Interfaces with LIMS, EPR, blood supplier systems and other relevant clinical IT systems tested and validated to identify any unexpected potential for workarounds that may impact on transfusion safety, e.g., requirement for manual transcription of results where the electronically transmitted results do not file to the appropriate data fields

☐ End-to-end testing reflects real-life clinical and laboratory workflows

☐ Negative and exception testing completed (e.g. incorrect data, missing information, interrupted workflows) to simulate human factor impact on actual use

☐ Risks at system boundaries identified (handovers, duplication, delays)

☐ Downtime behaviour of interfaced systems understood, documented and included in training material and associated policies, SOPs and procedures

4. Users & Usability (Easy to use, easy to adopt, easy to sustain)

☐ End-users involved early (laboratory, clinical, portering, out-of-hours staff)

☐ System supports safe practice and minimised risks related to workarounds and workloads

☐ Screens, alerts, and prompts are intuitive and minimise cognitive load

☐ Critical information is visible, accessible and presented clearly at the point of decision making

☐ Resilience by design/error prevention (prevents, detects, and mitigates mistakes)

☐ Use of terminology and system design consistent with existing practice where possible

☐ Accessibility requirements have been considered (e.g. visual, cognitive, physical and neurodiversity needs)

5. Stakeholders & Communication

☐ All stakeholders identified and engaged (e.g., transfusion laboratory and other pathology disciplines where relevant, clinicians, nursing, IT, governance, Equality Diversity and Inclusion, Information Governance team, suppliers, regulators, finance)

☐ Roles, responsibilities, ownership and escalation routes are clearly defined

☐ Proposed changes discussed with stakeholders at an early stage to allow time for review, walkthrough and amendment to plans

☐ Go-live date, scope, and expected impact including any planned downtime understood by all relevant stakeholders

☐ Consideration of exceptional users, such as Out-of-hours, temporary or agency staff

☐ Agreed communication channels to ensure all relevant users are made aware of the planned changes and associated downtime

6. Subject Matter Expertise (SME) & Support

☐ Transfusion SMEs (clinical and laboratory) are involved in procurement, design, configuration, testing, implementation and approval

☐ Human factors and ergonomics expertise sought for high-risk changes such as changes to hardware for multiple staff groups, process changes within digital systems that directly impact on patient care

☐ Super-users identified, trained and available to support staff at go-live and in the optimisation phase

☐ On-site or rapid access to system SME support during go-live and in the optimisation phase

☐ Clear contact details for help and escalation of clinical and technical issues

7. Training & Competence

☐ Role-specific training (not one-size-fits-all) reflective of the processes to be used within the organisation

☐ Training reflects real tasks and scenarios, including exceptions or need to revert to manual processes

☐ Simulation of high-risk situations (wrong blood risk, urgent transfusion)

☐ Training completed close to go-live to reduce skill decay

☐ Competence assessed and recorded before systems go live/are in use

☐ New starters, night shift workers and bank/agency staff included in training plans

☐ Schedule for re-training/ regular competency assessment agreed and included in training matrixes

☐ Policies, SOPs, procedures and user guidance current, clear, and readily accessible to all users at the point of use

8. Business Continuity & Downtime Preparedness

☐ Downtime scenarios explicitly detailed (planned and unplanned, short, medium and long term) documented and included in training material

☐ Downtime arrangements tested across both clinical and laboratory services to ensure continuity of the end-to-end transfusion process

☐ Documented criteria for switching to downtime processes and returning to business as usual, including communication channels

☐ Paper or alternative processes readily available and accessible

☐ Reconciliation process after downtime tested and clear

☐ Regular downtime simulations, drills or tabletop exercises conducted with review and improvements where appropriate

9. Workarounds

☐ Any workarounds identified, documented, and risk-assessed

☐ Staff encouraged to report emerging workarounds or system errors post-go-live

☐ Incident, adverse event and near-miss investigation includes review of any workarounds due to digital or hardware failures

10. Go-Live & Early Use

☐ Go-live planned to avoid peak pressure periods where possible, communication of downtime allows for changes in clinical practice, e.g., amendment of operating department lists, transfusion out-patient appointments

☐ Additional staffing or reduced workload considered

☐ Real-time feedback captured from users to support improvements in pathways and digital systems

☐ Changes to digital systems and pathways included under change control processes with consideration of risk/impact and human factors. i.e., avoid rapid, uncontrolled changes which may have subsequent unintended consequences

☐ Early incidents and near misses reviewed rapidly and systems for escalation/fix/communication of any changes agreed

☐ Staff encouraged and supported to report concerns, incidents, usability issues and near misses without fear of blame

11. Post-Implementation Review & Learning

☐ Formal post-implementation review scheduled

☐ User feedback collected from all affected staff groups, including infrequent and out-of-hours users

☐ Lessons learned captured, shared and implemented into future changes/updates

☐ System refinements planned and resourced and included in training materials

☐ Learning incorporated into future system changes and implementations

☐ Actions arising from the review have clear ownership and timescales

12. Benefits Realisation & Safety Monitoring

☐ Measures of success agreed in advance (e.g. errors, incidents, user feedback, turnaround times)

☐ Arrangements in place to monitor effectiveness of the change

☐ Safety indicators reviewed after implementation with findings reported to relevant governance groups

Summary statement

The aim of this aide-mémoire is to ensure that IT systems are not only technically functional, but also safe, usable and supportive of staff and patients. Identifying and addressing risks before go-live, and continuously learning and improving afterwards, are essential to achieving safe and effective IT-enabled care.

Useful resources

Relevant BSH guideline: Guidelines for the specification, implementation and management of IT systems in hospital transfusion laboratories

Human Factors and Ergonomics (HFE) - Serious Hazards of Transfusion