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clinical human factors group

working with clinical professionals and managers to make healthcare safer

HUMAN FACTORS IN HEALTHCARE: COMMON TERMS

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for the Clinical Human Factors Group

human factors...

**...the understanding of what affects
behaviour and performance in the workplace**

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Common Terms listed by category



Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
			
Organisation	A group of people working to a common goal with formal structures, processes and methods created to enable work to be done efficiently and effectively.	Healthcare involves organisation structures, processes and methods to deliver care services along Patient pathways in primary and secondary care.	To operate an airport involves the organisation of a group of people and a common goal. It requires structures and processes to manage check-in, passport control and methods to transport luggage to planes.



Function Allocation	The distribution of functions between users and technology, or between different team members.	During assessment, the functions to collect and analyse a blood sample are allocated i.e. Professional orders test, patient comes to hospital, blood is taken by phlebotomist, sample is processed by pathology lab and results accessed via IT system by practitioner.	The functions of choosing a route, navigating and giving directions used to be done by the driver or the passenger. Now that function may be given to technology i.e. the Sat Nav.
Functions	Activities that have a specific purpose and are required to achieve a goal.	To order, perform and interpret a blood test result, different people have specific functions e.g. Clinicians formulate a diagnosis and select appropriate tests, the phlebotomist collects samples from patients, the porters provide transport, the pathology lab analyses samples and the clinicians interpret results and make a diagnosis.	There are different functions to support the goal of driving a car. The motor provides energy, the breaks stop the car, the dashboard gives status information, the driver provides navigation, and makes decisions.
Systems	A set of interdependent elements that interact to achieve a common aim. These may be human, process or procedures, technology, equipment, or policy and regulatory requirements.	Patient referred with a skin lesion for assessment and treatment for skin cancer, interacts with primary care, specialist referral system for diagnosis (clinician, radiology, pathology lab), enters a system for surgical treatment and then enters oncology for chemotherapy and radiotherapy.	A system to support online shopping includes production, transport, warehousing, customers selecting the item on the website, payment transactions and delivery.
Tasks	The set of physical and mental actions that are required to deliver, or fulfil a function, and achieve a goal.	Treating an asthmatic patient with a nebuliser involves a decision to treat wheeze, drug selection, (prescribing drug and reading prescription), collecting nebuliser, filling with salbutamol solution, connecting to oxygen supply and applying mask to patient.	Making a cup of tea involves a decision to have a drink. Then actions to put water in the kettle and boil water. Put teabag in cup and pour water onto teabag . Finally, adding milk or sugar.
Workload	The mental or physical demands placed on a person by the task requirements, workplace environment and organisation.	The number of complex patients to see and diagnose within a short time in a GP surgery. Workload could increase because of more than one seriously ill patient presenting, or a large number of patients waiting. Mental workload might increase if patients have complex or uncommon problems to be managed.	A high workload when your boss sets a lot of high priority tasks to complete in short time. A low workload with few tasks may lead to reduced attention levels. For example, a security guard at night in a quiet warehouse and few tasks has a low workload, causing vigilance problems and boredom.

Common Terms listed by category



Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
 [Training]			
Simulation	A representation of a system, event, or situation that is used to test systems, identify potential problems, support learning and provide opportunity for rehearsing skills and knowledge.	A simulation of a patient with anaphylaxis in the CT scanner room provides an opportunity for staff to rehearse management of the condition, and tests systems for responding to a medical emergency in the radiology suite.	A new driver may learn basic skills in a driving simulator prior to getting in a car to avoid the risk of an accident. Practising an emergency stop could be done in a simulator to develop skills needed to respond in a real event
Skills Gap	The difference between the skills of an individual or group compared with the demands of a job or task they may be required to perform. For example, if a change to the system requires a very different way of working, multi-skilling or new technology then there may be a skills gap.	Moving vascular access service for hospital inpatients from critical care to radiology department creates a skills gap. For example Radiology technicians require new training to insert central venous catheters.	If a bank decides to move to only internet banking, a proportion of its customers may not have the IT skills to access and manage their accounts. Therefore, customers would need further training or support.
Training	Training provides personnel with their essential job skills, knowledge, values and attitudes to perform their function.	Training for clinicians that administer blood transfusions provides knowledge of correct procedure for storing and administering blood. It includes specific training on two person check and positive patient ID to reducing blood patient mismatch events	A plumber responding to a leaking gas main needs correct training in safe procedures, understanding of system to isolate gas supply, and of equipment and techniques to repair a the pipe safely without harming themselves or others.
 [Workforce]			
Competence	The use of the knowledge, skills and attitudes required to perform a specific range of tasks, job or role to a prescribed standard.	Surgeons need knowledge of human anatomy, fine motor skills to perform surgery and positive attitudes to interact with patients.	Knowledge to operate an electric mower, and the right attitude to take precautions not to cut the lead and risk electrocution.
Job design	The balance of tasks and responsibilities that make up a job. The allocation of tasks and roles to a job that are appropriately structured, achievable and can be performed by an individual.	A healthcare assistant may do basic tasks to support an Occupational Therapist in treating patients, but would require supervision to deal with complex tasks outside their capability.	A lecturer's role may involve a range of tasks, e.g. administrative tasks, managing staff in an office, giving a lecture at a university or writing a policy paper.
Personnel	People employed in an organisation. Their aptitudes, experience and other human characteristics necessary to deliver a service, operate equipment, maintain, sustain and provide training.	Healthcare professionals and their aptitude and capacity to acquire and maintain high levels of knowledge to interpret clinical data images.	People recruited to jobs based on their aptitude experience and qualifications, e.g. A lorry driver needs an HGV driving licence.
Staffing levels	Having the right people in the right place at the right time. Ensuring that they have suitable knowledge, skill and experience to operate safely.	The number of staff, task demands and shift lengths that are balanced to deal with the expected workload, e.g. the ratio and skill mix of registered nurses and healthcare assistants on a ward.	Having the right staff in a supermarket based on the likely number of customers at both quiet and busy times, staff trained to work at the checkout, stack shelves, make deliveries or manage the store.
Workforce	The numbers of people required and available to deliver a service, operate equipment, maintain, sustain and provide training.	The optimum workforce capability to deliver services and best meet the needs of patients.	The optimum number of people required to support the operation of an airport 24 hours a day.

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Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
			
Cognition	How people think, make judgements and solve problems. This includes thinking, perceiving, remembering, imagining, conceiving, judging and reasoning.	A GP seeing a patient with shortness of breath elicits information about their past history, nature and frequency of symptoms and uses past experience and knowledge to make a judgement on likely diagnosis, and decide on approach to investigate and manage condition.	An architect planning a new house considers the house dimensions, draws on previous knowledge, integrates client's priorities, imagines future layouts and designs, and reasons the best order to approach the build.
Cognitive Tasks	Tasks that require the individual to use their mental processes.	A paediatric nurse calculating the correct dose of paracetamol based on weight of the child.	Solving a GCSE maths problem.
Decision-making	The process of reaching a judgment, choosing an option or course of action to meet the needs of a given situation.	Triage nurse in the emergency department prioritising a patient for urgent medical attention based on discussions with paramedics, patient history and physiological variables.	Deciding how to travel and where to stay for a meeting abroad based on times, transport, budgets, location and previous experience.
Heuristics	A simple, efficient, mental shortcut based on innate learning or past experience, such as following a 'rule of thumb'. It allows people to solve problems and make judgements quickly and efficiently.	Selecting salbutamol nebuliser and oxygen as first line treatment for wheeze, as it is the most common treatment administered.	Diagnosing the problem with your car based what went wrong the last few times or common known faults.
Information processing	The ability to process the type and amount of information within the required timeframe, i.e. memory, attention and decision-making.	A clinician receives information about a patient's current condition, history, and regular medication, then compares similar cases and decides on a course of action.	Receiving a voicemail on where and when to meet a friend, listening to directions, looking at a map and making a decision about how to get there on time.
Memory	The ability to store, retain and subsequently recall information. Memory is classified based on duration, nature and retrieval of information.	Remembering features from a patient history, data points including blood pressure and heart rate, or instructions provided at shift handover.	Remembering the story of a film you saw at the weekend, a food order in a restaurant, or a PIN number.
Situational Awareness	The ability to identify, process and comprehend the critical elements of information in a dynamic situation, and be able to predict what will happen next. In simple terms, Situational Awareness is being aware of what is happening around you.	Doctor or nurse identifying a change in a patient's condition, understanding that this is a bad sign and knowing that in half an hour it will be in the danger zone so action should be taken now, e.g. detecting a deterioration	Driving requires a constant awareness of what is happening on the road, anticipating how an accident may happen and taking action to avoid it, e.g. before turning right the driver looks in mirror, check cars behind, signals, assesses the speed of oncoming cars and waits until safe to turn.
Vigilance	The process of paying close and continuous attention, in order to identify changes in a situation or state.	Observing patients vital signs during a long operation for sudden changes in blood pressure that would need urgent action.	A lifeguard at the beach keeps watch constantly to ensure swimmers are not in difficulty.

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Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
			
Communication	The process of passing information or instructions between people so that it is received and understood as intended.	A nurse handing over to their incoming colleague passes instructions that a patient needs a dose of intravenous antibiotic at a set time.	Providing information to a new colleague on the background and status of a project, and informing them of any ongoing tasks, actions and deadlines.
Followership or team member behaviours	Behaviour of individual members of the team that facilitate good team functioning. Completing tasks set, updating task status, indicating when they are unable to complete a task, and supporting each other.	During trauma call for a patient with multiple injuries, a team member updates the leader when the task of examining the chest is complete and reports on findings.	Fire fighters take direction from the commander and provide status updates, e.g. enter building if safe to do so, search inside and rescue people or report back if it is all clear.
Non-technical skills	The cognitive and social skills that contribute to safe and efficient task performance. This includes task management, teamwork, situation awareness, decision making and communication. It also involves managing one's own levels stress and fatigue.	As well as mastering the surgical technique, an obstetrician performing a caesarean section is able to make effective decisions, prioritize tasks, know what else is happening around them, and interact effectively with their team to deliver a healthy baby.	A footballer may be very good at tackling and shooting but in team they need to be able to communicate with their teammates, maintain awareness, anticipate future events, as well as perform task of kicking the ball well.
Shared mental models	Team members need to have a common understanding of the task and team goals, and how to achieve them, as well as knowledge of their own individual tasks and the other team member roles and responsibilities.	Team members involved in an operation know the procedure being performed, how it will be carried out in terms of key steps, the roles of everyone in the team, and their own responsibilities.	A group of friends assembling a shed will work better together if everyone, sees instructions and a picture, knows who is going to do specific tasks and what tools are required, so that they can co-ordinate activities.
Team culture	Set of values, beliefs and patterns of behaviour that the team accept as normal in order to achieve goals.	A team working on a medical ward with a good team culture, reviews management of cases at handover, oversights are acknowledged addressed in a positive way.	A project team may implicitly expect people to regularly work additional hours to meet tight deadlines.
Team Leadership	The ability to influence, motivate, and enable others to contribute towards the goals of the task, the team and their effectiveness and success within the organisation.	Emergency medicine consultant heading up a team of professionals to set initial assessment, management and definitive treatment priorities for a patient with multiple injuries.	A fire fighting team dealing with a house fire has a firefighter or officer in command to set the strategy and goals for tackling the fire.
Teamwork	Teamwork is where two or more individuals work together with different responsibilities, towards common goals.	A community rehabilitation team caring for a stroke patient where team members are aware of the priorities for care, and communicate information within the team.	Playing football involves a manager to motivate, set strategies. The football team players must all know their dedicated roles, how they fit into the team, what their objective is and who to communicate with.

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Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
			
Active Errors	A type of error where an action or decision was not intended but led to an undesired outcome with immediate consequences.	Prescribing a medication for a patient with a documented allergy to that medication.	Putting the wrong fuel in the car.
Adverse Event	An event that leads to harm which may be preventable or non-preventable.	An instrument left in the patient's abdomen after an operation leads to injury.	An accident at a pedestrian crossing despite the fact that traffic lights are working.
Confirmation bias	Tendency to pay attention to information that fits prior experience or expectation and selectively ignore information that does not fit.	Assuming that low oxygen saturation is a result of poor finger probe contact, as this is a common problem with this type of monitoring, when the saturation is genuinely low.	Attributing a child's poor reading to low academic ability without considering variables such as needs glasses, has dyslexia or lacks help reading at home.
Human Error	An action or decision which was not intended. This can be due to factors such as time pressure, workload, fatigue, communication, or lack of knowledge.	A paediatric patient receiving 10 times the normal dose of a drug due to reading 100 milligrams instead of 100 micrograms on the prescription chart.	The confusing design of a website leads to the customer selecting two items by mistake on the internet shopping site and receiving a large bill.
Lapse	A type of error caused by an action or plan not being executed, often the result of memory failures.	Forgetting to call a patient's GP surgery for a patient's past history and medication summary.	Forgetting to take the shopping list to the supermarket.
Latent Error	A type of error, or defect in a system, which does not have immediate consequences but increases the potential for harm later. The error may not become apparent until certain other conditions occur.	Two different drugs with very similar labels. Conditions for an error only occur with addition of time pressure and stressed practitioner selecting and administering wrong drug.	A parent buys a shampoo product that looks similar to a drink. It has an opaque pink colour and berries on the packaging. Later, a child mistakes it for a milkshake and drinks it.
Near miss	An unexpected event that had the potential to cause harm, but did not, either by chance or timely intervention.	A patient is about to be discharged when the doctor notices that vital blood thinning medicine needed to prevent clotting of their metallic heart valve has not been prescribed to take home.	A decorator, painting a shop in a busy street, drops a tin of paint off the ladder, which could injure someone, but luckily no-one was passing at that moment.
Omissions	A type of error due to a failure to do something, such as 'missing out a task step'.	Failing to prescribe aspirin therapy, known to improve outcome, for a patient that has presented with a heart attack.	Making a change to driving habits and failing to amend the insurance, hence making it invalid.
Redundancy	Multiple systems, resources, or steps in a procedure, which may compensate for an error or a system malfunction after it has happened but before it causes harm.	Before surgery patient identity, procedure and allergies are checked on the ward and in theatre. If an error is missed by the first check, it can be picked up by the second.	To reduce errors such as deleting a file, a software programme has additional steps to ask 'Are you sure you want to delete this file?' An error is prevented by forcing a response. However, as you may still occasionally make a mistake, the file is put in a 'recycle' bin.
Resilience	The ability for organisations to function flexibly and adaptively in the face of demands and risks and still be successful. For example, being able to anticipate and adapt to changing conditions and recover from unexpected events.	Reconfiguring resources as part of the emergency response to a major disaster including opening up extra theatres and freeing up ICU beds to deal with the huge and unexpected number of trauma admissions.	Intending to travel from London to Edinburgh and being aware of potential strikes, engineering works or adverse weather, and being ready to make alternative arrangements.

Common Terms listed by category

 Individuals

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
 [Safety]			
Safety Culture	The set of values and priorities placed on safety shared by a group or organisation. Sometimes referred to as 'The way we do things round here'.	Staff take an active role in identifying risks of drug administration, and in the event of a near miss, such as the wrong drug being administered, they can discuss issues openly and put measures in place to reduce this risk in future.	Building sites where the 'zero harm' culture encourages all workers to look for areas that may compromise safety, and reports of risks are welcomed as the means to creating a safer working environment.
Slips	A type of error caused by incorrectly executed action or plans, often the result of attention failures.	Selecting a piece of equipment from a store and picking up the adjacent item instead of the one intended, such as a specific suture or needle.	Turning the shower on but not noticing that the shower dial is on red and the water is actually scalding hot.
System safety	Focus on all aspects of the system that affect safety, i.e. people, processes, technology and environment. System design, inadequate management systems or poor training can induce errors.	A system for cancer radiotherapy treatment that ensures that the patients receive the correct treatment is designed to reduce risk of incorrect dosing or radiation exposure to staff exposure through equipment, maintenance, procedures and training.	A rail transport system ensures passengers are safe through regular maintenance on trains, track and signalling systems. Staff have the right skills, knowledge and commitment to follow safe working practices e.g. train drivers adhere to signals and speed limits.
 [Contributory factors]			
Distractions and Interruptions	Concentration and attention being diverted from primary task to a secondary event. May interfere with the ability of the individual to perform effectively.	A nurse checking medicines on the drug round is interrupted for a conversation about another patient.	A mobile phone ringing in the car diverts the driver's attention from the road.
Fatigue	Tiredness associated with prolonged effort or activity resulting in a person being unable to continue to function at normal levels.	Surgical team members experience tiredness when having to stand for long periods when carrying out long cases with a full theatre list.	Not being able to stay alert whilst driving on the M25 after a long haul flight, and experiencing tiredness from jet lag and insufficient sleep.
Stress	The physical, mental and emotional response in reaction to demands placed upon people. Some stress can improve performance, excessive stress leads to deterioration in performance.	A professional experiencing demands that they feel exceeds their capacity, such as time pressure, high workload, or insufficient support.	Adverse effect on a person on being given more responsibility at work, without the skills to deal with it, insufficient time, resources or supervision.
 [Health and Safety]			
Health hazards	Conditions inherent in the use of a device or workspace that may cause death, injury, illness, and disability or reduce the performance of personnel.	Risk of cumulative radiation exposure if regularly present in an orthopaedic operating theatre where X-rays are used frequently.	Frequently using noisy DIY power tools without the use of hearing protection could lead to hearing loss over time.
Slips, Trips and Falls	Physical instability during movement. Slips and trips result in someone falling. Slips are often caused by a slippery floor or footwear whereas trips often result from an obstruction.	An older patient walking across a ward without footwear slips and falls causing an injury.	Slipping over on wet kitchen floor, tripping over a box left in the hall, or falling off balance whilst carrying heavy bag down stairs.

Common Terms listed by category



Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
 [User Centred Design]			
Anthropometrics	The physical characteristics of people, including static and dynamic dimensions measurements of the body.	Data on variations in stature of different Users ensures operating tables, beds and dentists chair, are adjustable to help people work around them.	An office chair is designed to be comfortable for people of different shapes and sizes. Therefore, it has adjustable height, back support, and arm rests.
Devices	A tool or piece of equipment that has a specific purpose.	Inhalation devices for the treatment of Asthma, and injection devices for the treatment of Type 1 Diabetes Mellitus or anaphylaxis (allergic reactions), are designed for patients to use easily.	A TV remote control is a device that is often simple and intuitive to use.
Ergonomics	Ergonomics is about designing for people as they interact with or use systems, processes or equipment. Good design is based on knowledge and understanding of the Users. (Synonymous with Human Factors.)	Understanding the skills and abilities of paramedics, i.e. Users, and their emergency care tasks, informs the design of new ambulances and of mobile treatment units.	Everyday items are designed for the people who use them including office chairs, car seats and controls, computers, phones and IT systems.
Human System Interface (HSI)	The actions, reactions, and interactions between Users and other system components.	GP refers a patient with a skin lesion, to a skin cancer specialist for assessment through a booking website.	A customer ordering their food shopping online accesses a complex system of supply networks, via the website that allows them to interface with the system.
Link Analysis	A method used to optimise design and identify 'links' between physical items such as information, displays, equipment, workstations and communication points.	Determining the space requirements for clinical activities based on the activities and movement of staff can improve the design of an emergency department layout.	Analysis of the activity and layout in a barista coffee shop, steps involve taking an order, making a coffee with individual steps and delivering to the customer, this allows arrangement of the equipment needed in the most efficient manner.
Packaging, Labelling and Signage	A short word, phrase or image that gives information such as contents, instructions, warnings.	Packaging for a sterile suture set, with symbols to indicate date of manufacture, single use only, method of sterilisation and other specific instructions about intended use.	Washing instructions on clothes are often symbols instead of words so people who speak different languages can understand.
Physical Environment	The physical aspects of a workspace, e.g. heat, light, noise, may degrade task performance or be detrimental to health and safety if not maintained within acceptable limits.	The temperature of a burns theatre that is required to be heated for the patients benefit, requires special cooling jackets for the staff working in the environment to be able to function effectively.	An office environment is difficult to work in if it is noisy, making it difficult to communicate or concentrate on a task.
Target Audience Description	A descriptive profile of the characteristics, skills and abilities of the User for system design.	A description of the typical person intended to operate a portable cot designed for the transfer of unwell babies, their qualifications, skills and experience.	Capturing information about who is going to use a new website in order to understand their needs, capabilities and limitations and design for them.
Usability	A measure of the effectiveness, ease and comfort with which a system or device can be learned or used safely.	Assessing how easy an online appointment booking website system is to use for medical centre admin staff or an older patient.	Choosing a mobile phone people try out the phone to see if it is easy to hold, use the menu and see the screen.

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 Individuals

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example
 [User Centred Design]			
User Centred Design	Actively involving Users in the design process. Placing the Users, rather than the technologies, at the centre of the design cycle. It is key to the design of interfaces, equipment, workspaces and systems.	Involving clinicians, maintainers and patients with chronic diseases, at all stages of the design process and evaluation, of home haemodialysis (HHD) technology.	Asking people how they use their current phone and what they need from new one, allowing them to test and evaluate prototype designs and give feedback on a final design.
User-Interface	A User Interface is the means in which a User controls a software program or hardware device.	The patient interacts with the Arrival screen at GP surgery by reading the instructions and selecting the correct information by touching the screen.	A Smartphone screen is an interface with an intuitive menu. A person reads information or view icons and selects the desired option via a touchscreen.
Users	A User is anyone that comes into contact with the system, processes or equipment.	Users include frontline staff operating the patient observation devices, staff interacting with computer interfaces to order supplies, those who clean and maintain equipment, and the patients receiving treatment.	Users for a washing machine include, the person doing the washing at the home, the plumber who installs it and repair person who fixes it when it breaks.
Workspace Design	Designing workspaces, based on the people, equipment and tasks to be carried out, to suit the Users, optimise performance and reduce human error.	The design of the clean preparation room on a ward so that three members of the nursing team can easily prepare medicines at the same time, and still allow other staff easy access to stock and supplies leads to reduced interruptions and increased safety.	A professional restaurant kitchen is designed to enable multiple staff members to work at the same time, use equipment and utensils, prepare food and do their role efficiently to achieve the team goal.
Workstation Design	Ensures the spatial arrangement of displays, devices, working surfaces, storage and seating are designed so that the user can perform all tasks effectively, efficiently, in comfort.	The control room of a magnetic resonance imaging scanner is laid out to see both screens and the patient in the room, and allow full access to the necessary controls for the scanner and contrast injection.	A workstation could simply be an office desk which includes a desk, chair, screen, keyboard, mouse, phone, storage, and lighting that are arranged for efficient working and comfort.

 Tools & Techniques

Checklists	A job aid designed to concisely summarise the key elements of a task as an aid to memory and ensure correct procedures are followed.	An intensive care intubation checklist, that includes patient factors, drugs, personnel, equipment, is performed before induction to ensure all resources available to ensure safe intubation	Creating a checklist of essential things for a trip abroad before going travelling, such as vaccinations, medication, money, passport and tickets.
Failure Mode and Effect Analysis (FMEA)	A prospective method to examine all the steps in a process to determine what may go wrong or fail. It attempts to identify risks before harm is done.	An acute hospital examines it's stroke pathway to identify where an element of care may be missed or significant delays may occur, as well as the likelihood of this happening and the potential impact on their treatment and outcome.	Designers of a new car consider situations such as the driver can't see an object and reverses into it. The consequence could be damage to car and injury to driver. The car is then designed with 'parking assistance'.
Operational scenario	A description or vignette of a likely event or activity in an operational context that can be used for analysis.	A scenario such as routine hip operation can be used to analyse the pathway for elective operations.	An operational scenario to test a Smartphone before deciding to buy it could be 'I want to buy a train ticket.'

Common Terms listed by category



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Hierarchical Task Analysis	Tasks are broken down into a hierarchy of goals, operations, tasks, sub tasks and plans.	Inserting a urinary catheter. Goal is insertion of a tube into the bladder, operation is 'insertion of catheter, tasks include, collecting equipment, cleaning, inserting catheter, securing, connecting to collection bag. Sub tasks include choosing correct items, applying cleaning solution, inserting lubricating jelly, inflating balloon in bladder, and connecting tubing.	To be able to write a letter on a computer, there are a number of actions that you need to do in the right order e.g. turn on computer, input password select documents, select folder, open file and write letter.
Operational scenario	A description or vignette of a likely event or activity in an operational context that can be used for analysis.	A scenario such as routine hip operation can be used to analyse the pathway for elective operations.	An operational scenario to test a Smartphone before deciding to buy it could be 'I want to buy a train ticket.'
Root Cause Analysis (RCA)	A retrospective method used to find the underlying causes of a serious safety incident. This method may be used in conjunction with the Yorkshire Contributory Factors Framework to identify systems factors.	A serious incident involving a patient's blocked tracheostomy. Root causes identified are staff training and availability of specialist equipment for emergency use.	Considering the possible causes of a house fire, and sequence of events that led to it. Such as, teenager did hair, placed hair straighteners on carpet, forgot to turn them off and left house.
Situation, Background, Assessment and Recommendation (SBAR)	A tool used to encourage structured communication and give critical information in a clear and concise way. It uses prompts: Situation, Background, Assessment and Recommendation.	A doctor calling Critical Care about an unwell patient 'I have a patient that has low oxygen saturations and a low blood pressure, they were admitted yesterday with a pneumonia. I think that they have septic shock and need cardiovascular support.'	Calling a plumber in an emergency 'I'm calling because I have leaking pipe, it started this morning and has flooded the kitchen, I think it's the water main that has burst and think it needs immediate attention.'
Systems modelling	Representation of key steps in a process in order to identify factors that influence system performance.	Modelling the Patient journey through an elective surgery pathway to identify points that may present difficulties and factors that influence a Patient's care.	Modelling the factors that influence the numbers of visitors, access and security arrangements for a major sports event to ensure it will go smoothly.
Task Analysis	A structured way to break down tasks into different steps and identify all the functions, actions, interactions and cognitive processes involved.	A breakdown of the steps involved in dealing with samples received by pathology lab, i.e. checked by lab technician, processed by biochemistry technician, result entered onto IT system and accessed by practitioner.	Baking a cake can be broken down into a number of sub- tasks, i.e. read recipe book, get ingredients and utensils, weigh ingredients, mix in a bowl and cook for specified time.
Team Resource Management (TRM) training / Crew Resource Management (CRM) training	An approach which focuses on non-technical skills and is used to train teams working in safety critical environments to function effectively.	Team training for maternal cardiac arrest on labour ward. All disciplines train together for the rare event of maternal cardiac arrest, working towards the goal of delivering the baby within 4 minutes of cardiac arrest.	An aircrew in the cockpit of a plane receive regular CRM training to help them manage resources in terms of their respective tasks, co-ordinated actions and communication.
Workload Analysis	Analysis to identify the mental or physical tasks that need to be done within a certain time period, and the ability of individuals or teams to complete them.	Analysing the physical workload involved in turning a bed bound patient hourly to prevent pressure sores. Load can be modified by, sliding sheets, tilting bed, or changing staffing numbers.	Workload involved in moving house may vary depending on the number of boxes to be physically lifted into a removal van, the weight of boxes, time to do the task in and how many people to help.

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example	Category
Active Errors	A type of error where an action or decision was not intended but led to an undesired outcome with immediate consequences.	Prescribing a medication for a patient with a documented allergy to that medication.	Putting the wrong fuel in the car.	 [Safety]
Adverse Event	An event that leads to harm which may be preventable or non-preventable.	An instrument left in the patient's abdomen after an operation leads to injury.	An accident at a pedestrian crossing despite that fact that traffic lights are working.	 [Safety]
Anthropometrics	The physical characteristics of people, including static and dynamic dimensions measurements of the body.	Data on variations in stature of different Users ensures operating tables, beds and dentists chair, are adjustable to help people work around them.	An office chair is designed to be comfortable for people of different shapes and sizes. Therefore, it has adjustable height, back support, and arm rests.	 [User Centred Design]
Checklists	A job aid designed to concisely summarise the key elements of a task as an aid to memory and ensure correct procedures are followed.	An intensive care intubation checklist, that includes patient factors, drugs, personnel, equipment, is performed before induction to ensure all resources available to ensure safe intubation	Creating a checklist of essential things for a trip abroad before going travelling, such as vaccinations, medication, money, passport and tickets.	
Cognition	How people think, make judgements and solve problems. This includes thinking, perceiving, remembering, imagining, conceiving, judging and reasoning.	A GP seeing a patient with shortness of breath elicits information about their past history, nature and frequency of symptoms and uses past experience and knowledge to make a judgement on likely diagnosis, and decide on approach to investigate and manage condition.	An architect planning a new house considers the house dimensions, draws on previous knowledge, integrates client's priorities, imagines future layouts and designs, and reasons the best order to approach the build.	 [Individuals]
Cognitive Tasks	Tasks that require the individual to use their mental processes.	A paediatric nurse calculating the correct dose of paracetamol based on weight of the child.	Solving a GCSE maths problem.	 [Individuals]
Communication	The process of passing information or instructions between people so that it is received and understood as intended.	A nurse handing over to their incoming colleague passes instructions that a patient needs a dose of intravenous antibiotic at a set time.	Providing information to a new colleague on the background and status of a project, and informing them of any ongoing tasks, actions and deadlines.	 [Teams]
Competence	The use of the knowledge, skills and attitudes required to perform a specific range of tasks, job or role to a prescribed standard.	Surgeons need knowledge of human anatomy, fine motor skills to perform surgery and positive attitudes to interact with patients.	Knowledge to operate an electric mower, and the right attitude to take precautions not to cut the lead and risk electrocution.	 [Workforce]
Confirmation bias	Tendency to pay attention to information that fits prior experience or expectation and selectively ignore information that does not fit.	Assuming that low oxygen saturation is a result of poor finger probe contact, as this is a common problem with this type of monitoring, when the saturation is genuinely low.	Attributing a child's poor reading to low academic ability without considering variables such as needs glasses, has dyslexia or lacks help reading at home.	 [Safety]

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example	Category
Decision-making	The process of reaching a judgment, choosing an option or course of action to meet the needs of a given situation.	Triage nurse in the emergency department prioritising a patient for urgent medical attention based on discussions with paramedics, patient history and physiological variables.	Deciding how to travel and where to stay for a meeting abroad based on times, transport, budgets, location and previous experience.	 [Individuals]
Devices	A tool or piece of equipment that has a specific purpose.	Inhalation devices for the treatment of Asthma, and injection devices for the treatment of Type 1 Diabetes Mellitus or anaphylaxis (allergic reactions), are designed for patients to use easily.	A TV remote control is a device that is often simple and intuitive to use.	 [User Centred Design]
Distractions and Interruptions	Concentration and attention being diverted from primary task to a secondary event. May interfere with the ability of the individual to perform effectively.	A nurse checking medicines on the drug round is interrupted for a conversation about another patient.	A mobile phone ringing in the car diverts the driver's attention from the road.	 [Contributory Factors]
Ergonomics	Ergonomics is about designing for people as they interact with or use systems, processes or equipment. Good design is based on knowledge and understanding of the Users. (Synonymous with Human Factors.)	Understanding the skills and abilities of paramedics, i.e. Users, and their emergency care tasks, informs the design of new ambulances and of mobile treatment units.	Everyday items are designed for the people who use them including office chairs, car seats and controls, computers, phones and IT systems.	 [User Centred Design]
Failure Mode and Effect Analysis (FMEA)	A prospective method to examine all the steps in a process to determine what may go wrong or fail. It attempts to identify risks before harm is done.	An acute hospital examines it's stroke pathway to identify where an element of care may be missed or significant delays may occur, as well as the likelihood of this happening and the potential impact on their treatment and outcome.	Designers of a new car consider situations such as the driver can't see an object and reverses into it. The consequence could be damage to car and injury to driver. The car is then designed with 'parking assistance'.	
Fatigue	Tiredness associated with prolonged effort or activity resulting in a person being unable to continue to function at normal levels.	Surgical team members experience tiredness when having to stand for long periods when carrying out long cases with a full theatre list.	Not being able to stay alert whilst driving on the M25 after a long haul flight, and experiencing tiredness from jet lag and insufficient sleep.	 [Contributory Factors]
Followership or team member behaviours	Behaviour of individual members of the team that facilitate good team functioning. Completing tasks set, updating task status, indicating when they are unable to complete a task, and supporting each other.	During trauma call for a patient with multiple injuries, a team member updates the leader when the task of examining the chest is complete and reports on findings.	Fire fighters take direction from the commander and provide status updates, e.g. enter building if safe to do so, search inside and rescue people or report back if it is all clear.	 [Teams]

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example	Category
Function Allocation	The distribution of functions between users and technology, or between different team members.	During assessment, the functions to collect and analyse a blood sample are allocated i.e. Professional orders test, patient comes to hospital, blood is taken by phlebotomist, sample is processed by pathology lab and results accessed via IT system by practitioner.	The functions of choosing a route, navigating and giving directions used to be done by the driver or the passenger. Now that function may be given to technology i.e. the Sat Nav.	 [System]
Functions	Activities that have a specific purpose and are required to achieve a goal.	To order, perform and interpret a blood test result, different people have specific functions e.g. Clinicians formulate a diagnosis and select appropriate tests, the phlebotomist collects samples from patients, the porters provide transport, the pathology lab analyses samples and the clinicians interpret results and make a diagnosis.	There are different functions to support the goal of driving a car. The motor provides energy, the breaks stop the car, the dashboard gives status information, the driver provides navigation, and makes decisions.	 [System]
Health hazards	Conditions inherent in the use of a device or workspace that may cause death, injury, illness, and disability or reduce the performance of personnel.	Risk of cumulative radiation exposure if regularly present in an orthopaedic operating theatre where X-rays are used frequently.	Frequently using noisy DIY power tools without the use of hearing protection could lead to hearing loss over time.	 [Health and Safety]
Heuristics	A simple, efficient, mental shortcut based on innate learning or past experience, such as following a 'rule of thumb'. It allows people to solve problems and make judgements quickly and efficiently.	Selecting salbutamol nebuliser and oxygen as first line treatment for wheeze, as it is the most common treatment administered.	Diagnosing the problem with your car based what went wrong the last few times or common known faults.	 [Individuals]
Hierarchical Task Analysis	Tasks are broken down into a hierarchy of goals, operations, tasks, sub tasks and plans.	Inserting a urinary catheter. Goal is insertion of a tube into the bladder, operation is 'insertion of catheter, tasks include, collecting equipment, cleaning, inserting catheter, securing, connecting to collection bag. Sub tasks include choosing correct items, applying cleaning solution, inserting lubricating jelly, inflating balloon in bladder, and connecting tubing.	To be able to write a letter on a computer, there are a number of actions that you need to do in the right order e.g. turn on computer, input password select documents, select folder, open file and write letter.	
Human Error	An action or decision which was not intended. This can be due to factors such as time pressure, workload, fatigue, communication, or lack of knowledge.	A paediatric patient receiving 10 times the normal dose of a drug due to reading 100 milligrams instead of 100 micrograms on the prescription chart.	The confusing design of a website leads to the customer selecting two items by mistake on the internet shopping site and receiving a large bill.	 [Safety]

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Human System Interface (HSI)	The actions, reactions, and interactions between Users and other system components.	GP refers a patient with a skin lesion, to a skin cancer specialist for assessment through a booking website.	A customer ordering their food shopping online accesses a complex system of supply networks, via the website that allows them to interface with the system.	 [User Centred Design]
Information processing	The ability to process the type and amount of information within the required timeframe, i.e. memory, attention and decision-making.	A clinician receives information about a patient's current condition, history, and regular medication, then compares similar cases and decides on a course of action.	Receiving a voicemail on where and when to meet a friend, listening to directions, looking at a map and making a decision about how to get there on time.	 [Individuals]
Job design	The balance of tasks and responsibilities that make up a job. The allocation of tasks and roles to a job that are appropriately structured, achievable and can be performed by an individual.	A healthcare assistant may do basic tasks to support an Occupational Therapist in treating patients, but would require supervision to deal with complex tasks outside their capability.	A lecturer's role may involve a range of tasks, e.g. administrative tasks, managing staff in an office, giving a lecture at a university or writing a policy paper.	 [Workforce]
Lapse	A type of error caused by an action or plan not being executed, often the result of memory failures.	Forgetting to call a patient's GP surgery for a patient's past history and medication summary.	Forgetting to take the shopping list to the supermarket.	 [Safety]
Latent Error	A type of error, or defect in a system, which does not have immediate consequences but increases the potential for harm later. The error may not become apparent until certain other conditions occur.	Two different drugs with very similar labels. Conditions for an error only occur with addition of time pressure and stressed practitioner selecting and administering wrong drug.	A parent buys a shampoo product that looks similar to a drink. It has an opaque pink colour and berries on the packaging. Later, a child mistakes it for a milkshake and drinks it.	 [Safety]
Link Analysis	A method used to optimise design and identify 'links' between physical items such as information, displays, equipment, workstations and communication points.	Determining the space requirements for clinical activities based on the activities and movement of staff can improve the design of an emergency department layout.	Analysis of the activity and layout in a barista coffee shop, steps involve taking an order, making a coffee with individual steps and delivering to the customer, this allows arrangement of the equipment needed in the most efficient manner.	 [User Centred Design]
Memory	The ability to store, retain and subsequently recall information. Memory is classified based on duration, nature and retrieval of information.	Remembering features from a patient history, data points including blood pressure and heart rate, or instructions provided at shift handover.	Remembering the story of a film you saw at the weekend, a food order in a restaurant, or a PIN number.	 [Individuals]
Near miss	An unexpected event that had the potential to cause harm, but did not, either by chance or timely intervention.	A patient is about to be discharged when the doctor notices that vital blood thinning medicine needed to prevent clotting of their metallic heart valve has not been prescribed to take home.	A decorator, painting a shop in a busy street, drops a tin of paint off the ladder, which could injure someone, but luckily no-one was passing at that moment.	 [Safety]

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Non-technical skills	The cognitive and social skills that contribute to safe and efficient task performance. This includes task management, teamwork, situation awareness, decision making and communication. It also involves managing one's own levels stress and fatigue.	As well as mastering the surgical technique, an obstetrician performing a caesarean section is able to make effective decisions, prioritize tasks, know what else is happening around them, and interact effectively with their team to deliver a healthy baby.	A footballer may be very good at tackling and shooting but in team they need to be able to communicate with their teammates, maintain awareness, anticipate future events, as well as perform task of kicking the ball well.	 [Teams]
Omissions	A type of error due to a failure to do something, such as 'missing out a task step'.	Failing to prescribe aspirin therapy, known to improve outcome, for a patient that has presented with a heart attack.	Making a change to driving habits and failing to amend the insurance, hence making it invalid.	 [Safety]
Operational scenario	A description or vignette of a likely event or activity in an operational context that can be used for analysis.	A scenario such as routine hip operation can be used to analyse the pathway for elective operations.	An operational scenario to test a Smartphone before deciding to buy it could be 'I want to buy a train ticket.'	
Organisation	A group of people working to a common goal with formal structures, processes and methods created to enable work to be done efficiently and effectively.	Healthcare involves organisation structures, processes and methods to deliver care services along Patient pathways in primary and secondary care.	To operate an airport involves the organisation of a group of people and a common goal. It requires structures and processes to manage check-in, passport control and methods to transport luggage to planes.	 [Organisation]
Packaging, Labelling and Signage	A short word, phrase or image that gives information such as contents, instructions, warnings.	Packaging for a sterile suture set, with symbols to indicate date of manufacture, single use only, method of sterilisation and other specific instructions about intended use.	Washing instructions on clothes are often symbols instead of words so people who speak different languages can understand.	 [User Centred Design]
Personnel	People employed in an organisation. Their aptitudes, experience and other human characteristics necessary to deliver a service, operate equipment, maintain, sustain and provide training.	Healthcare professionals and their aptitude and capacity to acquire and maintain high levels of knowledge to interpret clinical data images.	People recruited to jobs based on their aptitude experience and qualifications, e.g. A lorry driver needs an HGV driving licence.	 [Workforce]
Physical Environment	The physical aspects of a workspace, e.g. heat, light, noise, may degrade task performance or be detrimental to health and safety if not maintained within acceptable limits.	The temperature of a burns theatre that is required to be heated for the patients benefit, requires special cooling jackets for the staff working in the environment to be able to function effectively.	An office environment is difficult to work in if it is noisy, making it difficult to communicate or concentrate on a task.	 [User Centred Design]

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Redundancy	Multiple systems, resources, or steps in a procedure, which may compensate for an error or a system malfunction after it has happened but before it causes harm.	Before surgery patient identity, procedure and allergies are checked on the ward and in theatre. If an error is missed by the first check, it can be picked up by the second.	To reduce errors such as deleting a file, a software programme has additional steps to ask 'Are you sure you want to delete this file?' An error is prevented by forcing a response. However, as you may still occasionally make a mistake, the file is put in a 'recycle' bin.	 [Safety]
Resilience	The ability for organisations to function flexibly and adaptively in the face of demands and risks and still be successful. For example, being able to anticipate and adapt to changing conditions and recover from unexpected events.	Reconfiguring resources as part of the emergency response to a major disaster including opening up extra theatres and freeing up ICU beds to deal with the huge and unexpected number of trauma admissions.	Intending to travel from London to Edinburgh and being aware of potential strikes, engineering works or adverse weather, and being ready to make alternative arrangements.	 [Safety]
Root Cause Analysis (RCA)	A retrospective method used to find the underlying causes of a serious safety incident. This method may be used in conjunction with the Yorkshire Contributory Factors Framework to identify systems factors.	A serious incident involving a patient's blocked tracheostomy. Root causes identified are staff training and availability of specialist equipment for emergency use.	Considering the possible causes of a house fire, and sequence of events that led to it. Such as, teenager did hair, placed hair straighteners on carpet, forgot to turn them off and left house.	
Safety Culture	The set of values and priorities placed on safety shared by a group or organisation. Sometimes referred to as 'The way we do things round here'.	Staff take an active role in identifying risks of drug administration, and in the event of a near miss, such as the wrong drug being administered, they can discuss issues openly and put measures in place to reduce this risk in future.	Building sites where the 'zero harm' culture encourages all workers to look for areas that may compromise safety, and reports of risks are welcomed as the means to creating a safer working environment.	 [Safety]
Shared mental models	Team members need to have a common understanding of the task and team goals, and how to achieve them, as well as knowledge of their own individual tasks and the other team member roles and responsibilities.	Team members involved in an operation know the procedure being performed, how it will be carried out in terms of key steps, the roles of everyone in the team, and their own responsibilities.	A group of friends assembling a shed will work better together if everyone, sees instructions and a picture, knows who is going to do specific tasks and what tools are required, so that they can co-ordinate activities.	 [Teams]
Simulation	A representation of a system, event, or situation that is used to test systems, identify potential problems, support learning and provide opportunity for rehearsing skills and knowledge.	A simulation of a patient with anaphylaxis in the CT scanner room provides an opportunity for staff to rehearse management of the condition, and tests systems for responding to a medical emergency in the radiology suite.	A new driver may learn basic skills in a driving simulator prior to getting in a car to avoid the risk of an accident. Practising an emergency stop could be done in a simulator to develop skills needed to respond in a real event	 [Training]

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Situation, Background, Assessment and Recommendation (SBAR)	A tool used to encourage structured communication and give critical information in a clear and concise way. It uses prompts: Situation, Background, Assessment and Recommendation.	A doctor calling Critical Care about an unwell patient 'I have a patient that has low oxygen saturations and a low blood pressure, they were admitted yesterday with a pneumonia. I think that they have septic shock and need cardiovascular support.'	Calling an plumber in an emergency 'I'm calling because I have leaking pipe, it started this morning and has flooded the kitchen, I think it's the water main that has burst and think it needs immediate attention.'	
Situational Awareness	The ability to identify, process and comprehend the critical elements of information in a dynamic situation, and be able to predict what will happen next. In simple terms, Situational Awareness is being aware of what is happening around you.	Doctor or nurse identifying a change in a patient's condition, understanding that this is a bad sign and knowing that in half an hour it will be in the danger zone so action should be taken now, e.g. detecting a deterioration	Driving requires a constant awareness of what is happening on the road, anticipating how an accident may happen and taking action to avoid it, e.g. before turning right the driver looks in mirror, check cars behind, signals, assesses the speed of oncoming cars and waits until safe to turn.	 [Individuals]
Skills Gap	The difference between the skills of an individual or group compared with the demands of a job or task they may be required to perform. For example, if a change to the system requires a very different way of working, multi-skilling or new technology then there may be a skills gap.	Moving vascular access service for hospital inpatients from critical care to radiology department creates a skills gap. For example Radiology technicians require new training to insert central venous catheters.	If a bank decides to move to only internet banking, a proportion of its customers may not have the IT skills to access and manage their accounts. Therefore, customers would need further training or support.	 [Training]
Slips	A type of error caused by incorrectly executed action or plans, often the result of attention failures.	Selecting a piece of equipment from a store and picking up the adjacent item instead of the one intended, such as a specific suture or needle.	Turning the shower on but not noticing that the shower dial is on red and the water is actually scalding hot.	 [Safety]
Slips, Trips and Falls	Physical instability during movement. Slips and trips result in someone falling. Slips are often caused by a slippery floor or footwear whereas trips often result from an obstruction.	An older patient walking across a ward without footwear slips and falls causing an injury.	Slipping over on wet kitchen floor, tripping over a box left in the hall, or falling off balance whilst carrying heavy bag down stairs.	 [Health and Safety]
Staffing levels	Having the right people in the right place at the right time. Ensuring that they have suitable knowledge, skill and experience to operate safely.	The number of staff, task demands and shift lengths that are balanced to deal with the expected workload, e.g. the ratio and skill mix of registered nurses and healthcare assistants on a ward.	Having the right staff in a supermarket based on the likely number of customers at both quiet and busy times, staff trained to work at the checkout, stack shelves, make deliveries or manage the store.	 [Workforce]

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Stress	The physical, mental and emotional response in reaction to demands placed upon people. Some stress can improve performance, excessive stress leads to deterioration in performance.	A professional experiencing demands that they feel exceeds their capacity, such as time pressure, high workload, or insufficient support.	Adverse effect on a person on being given more responsibility at work, without the skills to deal with it, insufficient time, resources or supervision.	 [Contributory Factors]
System safety	Focus on all aspects of the system that affect safety, i.e. people, processes, technology and environment. System design, inadequate management systems or poor training can induce errors.	A system for cancer radiotherapy treatment that ensures that the patients receive the correct treatment is designed to reduce risk of incorrect dosing or radiation exposure to staff exposure through equipment, maintenance, procedures and training.	A rail transport system ensures passengers are safe through regular maintenance on trains, track and signalling systems. Staff have the right skills, knowledge and commitment to follow safe working practices e.g. train drivers adhere to signals and speed limits.	 [Safety]
Systems	A set of interdependent elements that interact to achieve a common aim. These may be human, process or procedures, technology, equipment, or policy and regulatory requirements.	Patient referred with a skin lesion for assessment and treatment for skin cancer, interacts with primary care, specialist referral system for diagnosis (clinician, radiology, pathology lab), enters a system for surgical treatment and then enters oncology for chemotherapy and radiotherapy.	A system to support online shopping includes production, transport, warehousing, customers selecting the item on the website, payment transactions and delivery.	 [System]
Systems modelling	Representation of key steps in a process in order to identify factors that influence system performance.	Modelling the Patient journey through an elective surgery pathway to identify points that may present difficulties and factors that influence a Patient's care.	Modelling the factors that influence the numbers of visitors, access and security arrangements for a major sports event to ensure it will go smoothly.	
Target Audience Description	A descriptive profile of the characteristics, skills and abilities of the User for system design.	A description of the typical person intended to operate a portable cot designed for the transfer of unwell babies, their qualifications, skills and experience.	Capturing information about who is going to use a new website in order to understand their needs, capabilities and limitations and design for them.	 [User Centred Design]
Task Analysis	A structured way to break down tasks into different steps and identify all the functions, actions, interactions and cognitive processes involved.	A breakdown of the steps involved in dealing with samples received by pathology lab, i.e. checked by lab technician, processed by biochemistry technician, result entered onto IT system and accessed by practitioner.	Baking a cake can be broken down into a number of sub- tasks, i.e. read recipe book, get ingredients and utensils, weigh ingredients, mix in a bowl and cook for specified time.	

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example	Category
Tasks	The set of physical and mental actions that are required to deliver, or fulfil a function, and achieve a goal.	Treating an asthmatic patient with a nebuliser involves a decision to treat wheeze, drug selection, (prescribing drug and reading prescription), collecting nebuliser, filling with salbutamol solution, connecting to oxygen supply and applying mask to patient.	Making a cup of tea involves a decision to have a drink. Then actions to put water in the kettle and boil water. Put teabag in cup and pour water onto teabag . Finally, adding milk or sugar.	 [System]
Team culture	Set of values, beliefs and patterns of behaviour that the team accept as normal in order to achieve goals.	A team working on a medical ward with a good team culture, reviews management of cases at handover, oversights are acknowledged addressed in a positive way.	A project team may implicitly expect people to regularly work additional hours to meet tight deadlines.	 [Teams]
Team Leadership	The ability to influence, motivate, and enable others to contribute towards the goals of the task, the team and their effectiveness and success within the organisation.	Emergency medicine consultant heading up a team of professionals to set initial assessment, management and definitive treatment priorities for a patient with multiple injuries.	A fire fighting team dealing with a house fire has a firefighter or officer in command to set the strategy and goals for tackling the fire.	 [Teams]
Team Resource Management (TRM) training / Crew Resource Management (CRM)training	An approach which focuses on non-technical skills and is used to train teams working in safety critical environments to function effectively.	Team training for maternal cardiac arrest on labour ward. All disciplines train together for the rare event of maternal cardiac arrest, working towards the goal of delivering the baby within 4 minutes of cardiac arrest.	An aircrew in the cockpit of a plane receive regular CRM training to help them manage resources in terms of their respective tasks, co-ordinated actions and communication.	
Teamwork	Teamwork is where two or more individuals work together with different responsibilities, towards common goals.	A community rehabilitation team caring for a stroke patient where team members are aware of the priorities for care, and communicate information within the team.	Playing football involves a manager to motivate, set strategies. The football team players must all know their dedicated roles, how they fit into the team, what their objective is and who to communicate with.	 [Teams]
Training	Training provides personnel with their essential job skills, knowledge, values and attitudes to perform their function.	Training for clinicians that administer blood transfusions provides knowledge of correct procedure for storing and administering blood. It includes specific training on two person check and positive patient ID to reducing blood patient mismatch events	A plumber responding to a leaking gas main needs correct training in safe procedures, understanding of system to isolate gas supply, and of equipment and techniques to repair a the pipe safely without harming themselves or others.	 [Training]
Usability	A measure of the effectiveness, ease and comfort with which a system or device can be learned or used safely.	Assessing how easy an online appointment booking website system is to use for medical centre admin staff or an older patient.	Choosing a mobile phone people try out the phone to see if it is easy to hold, use the menu and see the screen.	 [User Centred Design]

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example	Category
User Centred Design	Actively involving Users in the design process. Placing the Users, rather than the technologies, at the centre of the design cycle. It is key to the design of interfaces, equipment, workspaces and systems.	Involving clinicians, maintainers and patients with chronic diseases, at all stages of the design process and evaluation, of home haemodialysis (HHD) technology.	Asking people how they use their current phone and what they need from new one, allowing them to test and evaluate prototype designs and give feedback on a final design.	 [User Centred Design]
User-Interface	A User Interface is the means in which a User controls a software program or hardware device.	The patient interacts with the Arrival screen at GP surgery by reading the instructions and selecting the correct information by touching the screen.	A Smartphone screen is an interface with an intuitive menu. A person reads information or view icons and selects the desired option via a touchscreen.	 [User Centred Design]
Users	A User is anyone that comes into contact with the system, processes or equipment.	Users include frontline staff operating the patient observation devices, staff interacting with computer interfaces to order supplies, those who clean and maintain equipment, and the patients receiving treatment.	Users for a washing machine include, the person doing the washing at the home, the plumber who installs it and repair person who fixes it when it breaks.	 [User Centred Design]
Vigilance	The process of paying close and continuous attention, in order to identify changes in a situation or state.	Observing patients vital signs during a long operation for sudden changes in blood pressure that would need urgent action.	A lifeguard at the beach keeps watch constantly to ensure swimmers are not in difficulty.	 [Individuals]
Workforce	The numbers of people required and available to deliver a service, operate equipment, maintain, sustain and provide training.	The optimum workforce capability to deliver services and best meet the needs of patients.	The optimum number of people required to support the operation of an airport 24 hours a day.	 [Workforce]
Workload	The mental or physical demands placed on a person by the task requirements, workplace environment and organisation.	The number of complex patients to see and diagnose within a short time in a GP surgery. Workload could increase because of more than one seriously ill patient presenting, or a large number of patients waiting. Mental workload might increase if patients have complex or uncommon problems to be managed.	A high workload when your boss sets a lot of high priority tasks to complete in short time. A low workload with few tasks may lead to reduced attention levels. For example, a security guard at night in a quiet warehouse and few tasks has a low workload, causing vigilance problems and boredom.	 [System]
Workload Analysis	Analysis to identify the mental or physical tasks that need to be done within a certain time period, and the ability of individuals or teams to complete them.	Analysing the physical workload involved in turning a bed bound patient hourly to prevent pressure sores. Load can be modified by, sliding sheets, tilting bed, or changing staffing numbers.	Workload involved in moving house may vary depending on the number of boxes to be physically lifted into a removal van, the weight of boxes, time to do the task in and how many people to help.	

Common Term	Human Factors Explanation	Healthcare Example	Day to Day Example	Category
Workspace Design	Designing workspaces, based on the people, equipment and tasks to be carried out, to suit the Users, optimise performance and reduce human error.	The design of the clean preparation room on a ward so that three members of the nursing team can easily prepare medicines at the same time, and still allow other staff easy access to stock and supplies leads to reduced interruptions and increased safety.	A professional restaurant kitchen is designed to enable multiple staff members to work at the same time, use equipment and utensils, prepare food and do their role efficiently to achieve the team goal.	 [User Centred Design]
Workstation Design	Ensures the spatial arrangement of displays, devices, working surfaces, storage and seating are designed so that the user can perform all tasks effectively, efficiently, in comfort.	The control room of a magnetic resonance imaging scanner is laid out to see both screens and the patient in the room, and allow full access to the necessary controls for the scanner and contrast injection.	A workstation could simply be an office desk which includes a desk, chair, screen, keyboard, mouse, phone, storage, and lighting that are arranged for efficient working and comfort.	 [User Centred Design]

Origins and Context

The patient safety movement continues to provide new and innovative approaches to look at how we stop bad things from happening to good people. Nobody wants to end up in hospital sicker than when they arrive and nobody comes to work for that to happen. Mostly this is an unavoidable consequence of illness and disease but often it is preventable. With such talented and committed healthcare staff, there must be a way we can work together for this common aim.

Human factors and ergonomics (or HF/E)¹ has a long tradition of reducing avoidable harms in high-risk industries. It is being spoken about, more and more, as a way of designing a system to support the safe and effective delivery of healthcare. Specifically, the science of human factors and ergonomics examines the way that individuals behave, teams work, equipment and settings are designed, and organisations function, in order to learn how to optimise performance and limit harm.

The key to human factors and ergonomics then, is all about getting a real understanding of the systems that we work in and how we can move forward together to start designing processes, tasks and tools that support safe practice, every time, for every patient. It is about learning and feeding back what goes well and what doesn't. It aims to help those who deliver care to do their best *because* and not in *spite* of the system around them. It should be easy, intuitive, and fit the flow of work to do the right thing, even under varying conditions. The "human" in human factors and ergonomics is the healthcare team, from managers to clinicians, to support workers. These people are our most vital resource to ensuring patients are safe and have positive experiences of their care.

There is a huge amount of optimism around what human factors and ergonomics can do for healthcare. However, there is still some misunderstanding about what it really means for patient safety, what it can offer this complex industry and its core underlying principles. The Clinical Human Factors Group (CHFG) have created an invaluable reference, with the help of human factors and ergonomics experts from healthcare and other sectors, to help demystify human factors and ergonomics' most important and relevant theories and ideas.

By making the terminology of human factors and ergonomics more accessible, we start to create shared understanding around what human factors and ergonomics is and does within the context of healthcare delivery. The partnership between *system experts*, i.e. healthcare professionals, and *method experts*, i.e. human factors and ergonomics professionals, is essential to make progress but first we all need to be speaking the same language.

There are two elements to human factors and ergonomics. The first is a series of fundamental principles, such as

understanding real work and risks; engaging in partnership with frontline staff; believing everyone in the system has a part to play and a right to be informed; and instilling an open, fair and learning culture for all. The second follows on and is about adapting and applying tried and tested tools that can be used to formally assess what we currently do and to inform future design to improve system performance.

You will see in the glossary that there are a series of terms presented which focus on the *fundamental human factors and ergonomics principles*, with specific examples of some of the *human factors and ergonomics tools and techniques* we can use to improve the structure of how we work and train together as whole teams, for instance.

We have to figure out how to make safety easy for people to do, while being realistic that the health service is a difficult system to work in. How do you get the balance right between what we could do, what we should do and what we can do? This is where human factors and ergonomics comes in. It guides us to look across different levels of the system – the *Macro* (organisation), *Meso* (unit/department/speciality) and *Micro* (individual/team). It moves us from a focus on formal rules and procedures (e.g. Standard Operating Procedures), to asking staff what work is like, and using structured tools to observe work as it happens, where it happens, in a variety of scenarios. Human factors and ergonomics can help us to strike the balance between best evidence and common sense.

The human beings within healthcare are its greatest source of strength and the science of human factors and ergonomics is about providing a system which allows them to work to the very best of their ability. But people get tired and stressed. They feel apathy when they don't see change happening or if they feel it's focused in the wrong place or when a new, unexplained science is thrown in! But human factors and ergonomics is useful because it is not just about making what we have work but changing the way we do things so that it works for us. One of the ways to begin to spread this message is to ensure we have a shared sense of language, aims and tools.

I hope if you are someone who cares about patient safety - whether you are a clinician, a manager, a politician, a regulator, a patient, a journalist, or anyone with an interest in how we can optimise safe and effective healthcare – that you will find this CHFG reference to be a helpful one. May it be useful to either start or to continue you along a human factors and ergonomics learning journey.

Enjoy!

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¹ Human factors and ergonomics are interchangeable terms although some industries choose one over the other. So, it is best to refer to human factors and ergonomics (HF/E) to cover all work on designing for performance and well-being.

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