Improvement Cymru Academy Toolkit Guide

Human Factors

Introduction

Human Factors is defined as '*Human Factors is a broad, scientific, evidence-based discipline that can help people solve a wide range of problems that they face in what they do, every day*.' (https://www.hee.nhs.uk/sites/default/files/documents/Health%20Education%20England%20and%20CIEHF%20%20Human%20Factors%20and%20Healthcare%20Report.pdf). The World Health Organisation (WHO) defined human factors as examining *'the relationship between human beings and the systems with which they interact, and focuses on improving efficiency, productivity, creativity and job satisfaction, with the goal of minimizing errors'*. Human Factors focus on optimising human performance through better understanding the behaviour of individuals, their interactions with each other and with their environment. By acknowledging human limitations, Human Factors offer ways to minimise and mitigate human frailties. Applying Human Factors aims to get the best out of human capabilities by taking account of our limitations and strengths when designing equipment, processes and creating work environments that are efficient and effective while minimising safety issues and mitigating risk. The term was widely used and promoted by Professor James Reason. He was a Professor in Safety Psychology at Manchester University and published a complex-linear safety model known as the Swiss Cheese model in his book Human Error in 1991 (See our Swiss Cheese toolkit guide). The model focused on there being more than one cause of accidents and safety issues and the model encompasses how human factors can play a role in those issues. A Human Factors approach focuses on how to make the best use of these capabilities: by designing jobs and equipment which are fit for people. This not only improves their health and safety, but often ensures a better managed, more effective organisation.

(https://iris.who.int/bitstream/handle/10665/252273/9789241511612-eng.pdf;sequence=1#:~:text=Human%20factors%20and%20ergonomics%20are%20scientific%20disciplines%20concerned,optimize%20human%20well-being%20and%20overall%20system%20performance%E2%80%9D%20%281%29)

Rationale

The aim of Human Factors is to understand and improve the interaction between humans and the systems they work within to minimise human error, improve productivity, and strengthen safety. Within healthcare, you need to understand human factors because they affect how healthcare staff perform tasks, interact with each other and cope with challenges and risks at work. By understanding human factors within the workplace, you can design systems, processes and equipment that is compatible with human capabilities and limitations. This will in turn help to reduce the risk of error occurring. When you apply human factors to your workplace, you will promote safety, efficiency, improve teamwork and communication and increase staff and patient wellbeing.

Background

The concept of human factors can be traced back to Leonardo Di Vinci, the Wright brothers and Frank and Lilian Gilbreth where they applied scientific knowledge to understand and improve human performance. In the last century, human factors have emerged as a distinct principle from World War Two where specialists from different areas such as psychology, sociology, physiology, and engineering were involved in the design and evaluation of equipment such as aircrafts and tanks. Human factors are widely used in manufacturing and aviation today.

How to apply Human Factors

To apply human factors to your work area, you will need to think about how humans interact within their workplace. All these elements contribute to our jobs.

There are three key areas to consider:

Individual

You need to look at the relationship between the human factors and the individual. This could be looking at individual competence, skills, personality, attitudes, risk perception and health, and how these impact on the task, other work colleagues and the organisation.

Job

You need to consider the relationship between the individual/workforce and the job. This could be examining the task, workload, displays and controls (equipment) and procedures. Human factors tell us that as humans we will make mistakes. Therefore, it is important to design or redesign the task and processes to minimise human error as much as possible.

Organisation

You need to look at the organisation as a whole and think how the workplace/organisational culture and leadership affect individuals doing their jobs. It is also important to look at the resources, work patterns, methods of communication and risk assessments that enable people to do their job.

When to use human factors

You can use human factors knowledge and principles to react to errors that occur through investigation and learning from them. You can also use human factors in a proactive way by performing a risk analysis and involving human factors principles when designing, developing, evaluating, and improving systems, processes, tasks, equipment, and organisations.

Reactive

When reacting to human error it is important to consider the human factors surrounding the incident such as the individual, the task, and the organisation. Human factors can help react to errors through investigating the error and the cause of the error through root cause analysis, incident reporting and a human factors analysis. You can do this by applying patient safety models. There are several safety models you can use such as the Swiss Cheese model (see our toolkit guide), Bow-tie model, Functional Resonance Analysis Method (FRAM), System-Theoretic Accident Model and Processes (STAMP) and Systems Engineering Initiative for Patient Safety 3.0 (SEIPS 3.0).

By understanding how human factors have affected the error that occurred we can learn from it using feedback and debriefing and you can improve the system and its components through redesign and/or retraining.

Profession James Reason quoted: “the paradox at the heart of the patient safety problem.... is that medical education, almost uniquely, is predicated on an assumption of trained perfectibility.” This quote states that no matter how well trained or experienced you are, you cannot train any person to perfection. Traditionally the medical training model appears to believe that we can. It’s important to note that we look at the process not the person who caused the error.

Reason identified four ways in which errors occur:

The first are slips that are failures of attention and the second is lapses that are failures of memory. These are unintended actions that occur during a familiar task. Human factors can assist in designing more error-tolerant systems that can prevent, detect, or correct an error. There are several ways of mitigating against slips and lapses by using checklists, alarms, feedback, or automation systems.

The third type of error is a mistake which is a wrong action that occurs in a new or unfamiliar situation. Human factors can help provide better support and training to the person that made the error. Ways of mitigating against mistakes are to use simulations and scenarios to familiarise people with different types of situations. Having a mentor for support and/or supervision in place can also improve the skills and judgement of the person.

The fourth type of error is a violation, and this occurs when there is deliberate deviation away from a rule, policy, or standard operating procedure. Human factors can help understand the individual’s motivation and reasons for the deviation and address them. Ways to mitigate against future violations would be to use surveys, team discussions and interviews to identify the influencing factors. These factors could be culture, incentives, and workload.

Proactive

Taking a proactive approach towards human factors means that you will anticipate and prevent potential errors and risk rather than waiting for them to happen and react to them. To take a proactive approach you will need to engage with staff and understand their preferences, needs and involve them in the design and improvement of the task or process.

You can take a proactive approach by using risk analysis tools such as Failure, Modes, and Effects Analysis (FMEA) to perform a risk assessment and you can also use some safety models such as the Bow-tie mode (See our Bow-Tie toolkit guide). By taking a proactive approach to human factors you will improve safety, efficiency, productivity, and the well-being of the staff as well as patients.

There are other elements to consider when trying to increase patient safety in relation to human factors.

Accountability

The Institute of Healthcare Improvement (IHI) (https://www.ihi.org/resources/Pages/IHIWhitePapers/Framework-Safe-Reliable-Effective-Care.aspx) describe accountability as holding '*people accountable for their actions and not from flaws in the process or system*.' For individuals this means being accountable as a team member to be committed, self-managing, competent and courageous and for the organisation this means being accountable for treating individuals fairly and justly when things go wrong. The concept of a 'Just Culture' fits into accountability. The NHS England Just Culture guide (https://www.england.nhs.uk/patient-safety/a-just-culture-guide/) states that '*A just culture considers wider systemic issues where things go wrong, enabling professionals and those operating the system to learn without fear of retribution'*. Whilst it is important not to blame staff for errors that happen that are out of their control, a just culture holds staff appropriately to account where there is evidence of gross negligence or deliberate acts. A 'Just Culture' is a fair culture for both staff and patients (See our Just Culture Guide).

Teamwork and Communication

Teamwork and communication are defined by the Institute of Healthcare Improvement (IHI) (https://www.ihi.org/resources/Pages/IHIWhitePapers/Framework-Safe-Reliable-Effective-Care.aspx) as '*developing a shared, understanding, anticipation of needs and problems and agreed-upon methods to manage these as well as conflict situations*'. Teamwork and communication are vital to mitigate against human error. You can improve teamwork and communication by planning with the team, using safety briefs, outlining next steps, identifying potential risks, and working collaboratively to agree on the best course of action. Reflecting back with the team can help improve communication and teamwork through the use of safety huddles, debriefs and also by reflecting culturally – did the team cohere well? Was psychological safety present?

There are several tools you can use to communicate clearly with the team. High-functioning teams use structured communication in which they consistently, concisely, and respectfully share critical information.

- Situation, Background, Assessment, and Recommendation (SBAR) where team members can rapidly communicate a comprehensive set of facts based on which team members can make decisions.
- Read back/call back12 where the person hearing the message reads back what he or she heard to prevent miscommunication and encourage accuracy.
- Designated word/phrase. To manage risk in teams you could use a designated word or phrase that indicates there is perceived risk, and which gives the team permission to stop what they're doing and take stock of the situation. Perhaps the team is not following the agreed-upon plan, or the dynamics of the situation have changed.
- Failure Modes and Effects Analysis tool to manage risk using a step-by-step approach for identifying all possible failures within a process and ways to mitigate against them (See our FMEA toolkit guide)

Psychological Safety

The definition of psychological safety is described by (Edmondson 2018) "*The belief that the work environment is safe for interpersonal risk taking and that people feel able to speak up with relevant ideas, questions, concerns or mistakes without fear of*

being punished or humiliated". The Institute of Healthcare Improvement (IHI) (https://www.ihi.org/resources/Pages/IHIWhitePapers/Framework-Safe-Reliable-Effective-Care.aspx) define psychological safety as '*creating an environment where people feel comfortable and have opportunities to create concerns or ask questions'*. Psychological safety is an important element of culture and in vitally important for establishing a positive patient safety culture. Staff need to be able to raise concerns around potential patient and staff risks and error without fear of retribution. Research tells us that when psychological safety is high individuals can speak about errors more often, there is a reduction in workarounds, team-based learning in quality improvement is more likely to happen, engagement and performance are more likely to be high and organisations are more able to **learn from failure**.

Helpful tips

When considering Human Factors there are several considerations to think about. It is important to seek out the root cause of the problem by applying human factors knowledge and principles to the incident.

Apply a 'Just Culture' in your workplace. It is important to look towards processes and system unless there is evidence of gross negligence or deliberate acts. By applying a just culture to your working environment this will help increase levels of psychological safety.

Conduct healthy working relationships in the workplace, making it psychologically safe for all team members, regardless of band or grade, to feel comfortable to report anything they notice. Although in healthcare you must take a reactive approach to incidents, try using our FMEA toolkit guide to take a proactive approach to risk and apply human factors to it.

Additional resources

If you are interested learning more about improvement please visit our website https://phw.nhs.wales/services-and-teams/improvement-cymru/improvement-cymru-academy/ or email us improvementcymruacademy@wales.nhs.uk

Further resources

CLCH-QI- Quality Improvement- Family of Measures by Sid Beech- [online] Available at: Bitesize QI - Family of measures - YouTube [Accessed 25 November 2022]

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