

PREPARE, REPAIR, RECOVER: APPLYING THE AVIATION THREAT AND ERROR MANAGEMENT FRAMEWORK TO CLINICAL PRACTICE

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Threat and error management (TEM) is a safety management approach within aviation that assumes that pilots will naturally make errors and encounter threats, or risky situations during flight operations. Rather than try to avoid these threats and errors, the TEM framework focuses on teaching pilots to manage these issues, minimising impact on safety. Its goal is to maintain safety margins by training pilots to detect and respond to events that are likely to cause damage (threats) as well as mistakes that are most likely to be made (errors) during flight operations. Much like aviation, the healthcare industry also encounters inherent risk and high pressure. Despite the success and ubiquity of TEM in aviation, there has been no formal implementation of this framework into healthcare.



COMPONENTS OF TEM

Threats

Events that occur outside your control which require your attention to maintain safety. Threats are beyond your influence and they increase the complexity of the flight.

Errors

Errors are actions or inactions causing an unwanted or unsafe deviation from the plan. This has the potential to reduce safety margins which could then lead to unforeseen issues.

Undesired aircraft state (UAS)

An operational condition due to threats and errors which leads to an unintended deviation in an aircraft's position, reducing safety margins.



CLINICAL IMPLEMENTATION

The TEM framework applies particularly to surgical scenarios. Surgical environments have borrowed much from aviation already, such as checklists and the "sterile cockpit", which minimises talking in the operating theatre during critical phases, just like in the cockpit there is no discussion that is irrelevant to flight operations below 10,000ft.

A surgical example could include a patient having particular risk factors, such as a bleeding disorder. The threat is the increased risk of bleeding. Errors could be not having the equipment and blood needed to be ready for this, not noticing any extra bleeding, or being prescribed inappropriate anti-coagulation post-operatively.

Incorporating discussions that identify threats and errors, and how to mitigate them, primes action to face undesirable scenarios and would improve patient safety. The above points would be acknowledged in a brief and mitigated for.



AVIATION EXAMPLE



Threat

An issue with the hydraulic system



Error

Pilots become distracted by the issue, and do not follow standard operating procedures of one pilot flying the aircraft at all times



UAS

The aircraft descends below minimum safe altitude without pilots noticing, potentially causing an accident through controlled flight into terrain



DISCUSSION

The TEM framework provides a safety management system, which would be naturally implemented into the standard brief to discuss what threats there are for the surgical patient, what potential errors could be, and how these threats and errors would be mitigated for.

Uniquely, the TEM framework treats errors as natural consequences of working in complex environments, as opposed to something exceptional. This approach moves away from the blame culture often present in healthcare and into a just culture which is not afraid to confront mistakes honestly, therefore improving healthcare outcomes.



REFERENCES

Civil Aviation Authority "Threat and Error Management (TEM)" <https://infringements.caa.co.uk/tutorial/threat-and-error-management-tem/>
Transport Canada "Introduction to Threat and Error Management" Issue 4/2023 <https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/issue-4-2023/introduction-threat-error-management>