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VIEWPOINT

The invisible gorilla in the cath lab: can we fly away from it?

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It may seem improbable to encounter a gorilla in a catheterisation laboratory (cath lab) and it is natural to assume that it would be immediately noticeable. Yet, this figurative gorilla conceals itself in plain sight within our cath labs, eluding detection. Based on the principles outlined in "The Invisible Gorilla" by Christopher Chabris and Daniel Simons[1], here, we specifically focus on the cognitive illusions and perceptual errors that impact interventional cardiology practice, rather than the broader pitfalls that may affect clinical judgment. Those "invisible gorilla" scenarios contribute to medical error, and combined with a lack of uniform reporting systems and inconsistent training protocols, lead to discrepancies in performance across the globe. To address these challenges, we look for solutions in a field renowned for its safety protocols and error management strategies: aviation.

Cognitive illusions and perceptual errors in interventional cardiology

In a well-known video experiment[2], viewers are asked to count the passes of basketball players. A person wearing a gorilla costume walks across the scene but nearly half the viewers fail to notice him. Overlooking unexpected events when focusing on a task is termed inattentional blindness. The illusion of attention is the result of overestimating the scope of our awareness. We can recognise its impact in the cath lab. Examples include missing a distal wire perforation when positioning a stent or not noticing a dissection caused by deep catheter intubation while retrieving a device. Also, not uncommonly, overall patient status is overlooked when managing a procedural complication.

Daniel Kahneman and Amos Tversky's seminal work revealed that heuristics used to simplify judgments can lead to biases[3] that may impact clinical decisions. Finding a stable coronary stenosis is frequently regarded as implying the need for intervention despite clinical trials questioning routine angioplasty; this illustrates the representativeness heuristic. Though intravascular imaging outperforms angiography for guiding stenting, angiography remains dominant, illustrating the availability heuristic, where ease of access influences decisions.

Intuitions about the persistence and detail of memories may also influence cath lab performance under high-pressure conditions. The illusion of memory reflects the contrast between what we think we remember and what we actually do.

While interventional cardiology requires a high skillset, operators may overestimate their knowledge. This leads to overclaiming expertise, overlooking contributions from colleagues and undertaking procedures without full preparation. In fact, assertiveness in the cath lab may be erroneously regarded as knowledge and may impact team performance.

In the cath lab, success can inadvertently fuel overconfidence. This attitude can lead to a disregard for inherent procedural uncertainties, or hinder one from seeking peer advice or considering alternative strategies. A recent survey among trainees[4] demonstrated overconfidence in performing two-stent bifurcation techniques. Overconfidence in the early phase of the learning curve can be particularly concerning because it may create complications when operators are least prepared to manage them. In contrast, high-volume chronic total occlusion operators can achieve high success but may also face increased complications including mortality[5]. They are among the most skilled operators, however, their pursuit for success, possibly fuelled by overconfidence, may compromise patient safety.

IMPROVING PRACTICE THROUGH AWARENESS AND MITIGATION STRATEGIES

Improving practice in the cath lab starts with increasing awareness of the limits of perception and by devising strategies to mitigate their impact. It should include a comprehensive

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approach that encompasses both individual and systemic changes.

Full prevention of inattentional blindness may be unattainable, but contributing factors can be minimised. A strategy that includes team-based monitoring is essential. This approach involves assigning specific roles to team members, where some have focused tasks while others maintain broader vigilance. To achieve this, communication is key. Whoever identifies a possible risk must have a voice. Expertise may also help in noticing unexpected events. Therefore, simulation training can enhance the team's ability to monitor unexpected events effectively.

To mitigate the risks associated with the illusion of memory, implementing a system for double-checking is essential for a rigorous culture of verification. Refining this approach with digital tools and electronic health records can streamline the verification process. Also, training programmes emphasising verification can further engrave this into the cath lab's culture.

To counteract the illusion of knowledge, fostering an environment that prioritises continuous learning and case discussions is essential. This can be achieved through regular participation in educational activities. Engaging with the latest research and technological advancements ensures that patient care remains at the forefront of medical practice.

The key to mitigating overconfidence lies in maintaining a balanced perspective, valuing both successes and failures. Here again, simulation-based training emerges as a powerful tool. By engaging in a variety of challenging and unexpected simulated scenarios, clinicians can better align their confidence with their actual competencies.

Integration of the principles of aviation into interventional cardiology practice

Aviation is renowned for its rigorous safety standards, systematic training, and robust error management systems. By borrowing from aviation's playbook, interventional cardiology could significantly improve in areas affected by cognitive illusions and perceptual errors and decrease variability in procedural performance. Patients expect no less than excellence from cardiovascular interventions and they will demand it. Consequently, interventional cardiology boards and associations should take measures that lead to a regulatory process, or it may be externally enforced.

During flight, the synergistic collaboration between the pilot and co-pilot sets a benchmark for teamwork and shared responsibility by improving situational awareness and decision-making. This model offers valuable insights for the cath lab environment, particularly during complex procedures. A second operator can offer critical insights, assume procedural tasks, and alleviate the cognitive and physical load on the primary operator. Alternation of roles is also possible. This practice accelerates skill acquisition for less experienced operators in a controlled, safe environment.

Aviation relies heavily on standard operating procedures and checklists. Similarly, implementing checklists in the cath lab can help perform tasks efficiently and consistently, minimising error. We need a consensus on the basic steps to include in such procedural checklists so they can be disseminated and widely adopted. While traditional checklists may be impractical for operators, emerging technologies and teamwork can bridge this gap.

Crew resource management is used for improving air travel safety by focusing on effective team communication, leadership, and decision-making processes in stressful situations. It focuses on cognitive and interpersonal skills rather than on technical knowledge. The same principles can be applied in the cath lab environment to improve teamwork, communication, and situational awareness.

Pilots undergo extensive simulation training to prepare for a variety of scenarios, including rare emergencies. Incorporating high-fidelity simulations in cardiology training can provide hands-on experience in managing complex cases and complications without risking patient safety[6]. These practices may improve technical skills and problem-solving capabilities. Simulation can focus on both individual and team training. Scientific knowledge on quality cardiac care should be periodically assessed, just as requirements are in place to ensure that aviators remain proficient throughout their career. In this regard, simulators can offer a standard environment to test technical and teamwork capabilities that can be used for certifying operators and interventional teams.

Aviation promotes the reporting of errors and near-misses without fear of retribution. Establishing a non-punitive error reporting system can also facilitate learning from mistakes and implementing strategies to prevent future error events in interventional cardiology.

Air transport recognises that human factors such as fatigue, stress, and cognitive overload can significantly impact performance. These factors are frequently overlooked in clinical practice, where clinicians frequently face heavy workload and limited resting time. By recognising these factors, the cath lab schedule can be optimised to reduce the cognitive burden.

Aircraft have become increasingly safer and more efficient using technology. Likewise, technological innovations have the potential to assist interventional cardiologists. Augmented and mixed reality can be used to increase situational awareness and highlight critical changes in a patient's condition. They can also integrate checklists in a non-intrusive manner. Additionally, artificial intelligence algorithms may help recognise emerging complications.

In conclusion, the cath lab serves as a fertile ground for cognitive illusion and perceptual errors. Raising awareness is crucial, yet there remains a notable absence of specific training programmes addressing these issues. By drawing parallels with aviation, we propose an integrated approach which develops tools to improve practice and enhance consistency in the delivery of care.

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Conflict of interest statement

The authors have no conflicts of interest to declare regarding this article.

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