

Interruptions, distractions and situation awareness in advanced display studies

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Background

Advanced monitoring displays can help anesthesiologists detect clinical events faster and improve their situation awareness of the patient¹. However, anesthesiologists must be aware of more than just the patient's physiology. For example, if while monitoring the patient the anesthesiologist can detect errors made by other staff, then patient safety can be improved. Some displays help anesthesiologists perform multiple tasks better, but tests of handling multiple tasks are seldom part of display evaluations². Recent research suggests that interruptions can make clinicians more prone to error⁴. We present an example of how anesthesiologists' management of an interruption can affect their situation awareness of non-patient but clinically relevant events.

Methods

We manually reviewed video recordings of 12 anesthesiologist participants from the Royal Adelaide Hospital who were presented with a "failure to check blood" event in a simulator study of head-mounted displays³, illustrated below:

Previously in the scenario...



15 mins before the event:
Participant notes evidence of major hemorrhage



12 mins before the event:
Participant arranges for blood from blood bank



10 mins before the event:
IV fluids administered to treat hypovolemia



Event: Blood arrives in OR while surgeon requests transfer to High Dependency Unit (concurrent)

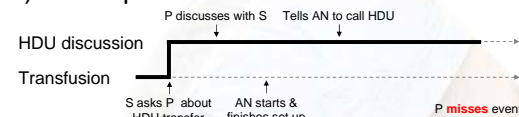
We classified participants' strategies for handling the surgeon's interruption into categories adapted from the taxonomy of distractions described by Collins et al.⁴ (Interruption, Multitasking, Deferred Task) and added a further category, Blocking.

Results

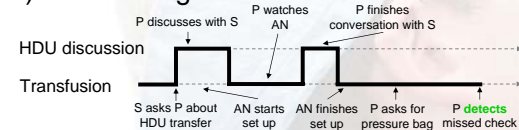
As the far right table shows, the only two participants who missed the event both immediately agreed to organise an HDU transfer and then became engaged in doing so (Interruption). One participant initially missed the event because he was organising the HDU transfer and directing the nurse to apply a pressure bag (Multitasking) and he only detected the event later after the transfer was complete. Four participants immediately agreed to the transfer, either performed or delegated the blood check, and then organised the HDU transfer (Deferred Task). The remaining five participants provided justifications for denying the surgeon's request and closed the conversation (Blocking).

Strategies for handling distraction:

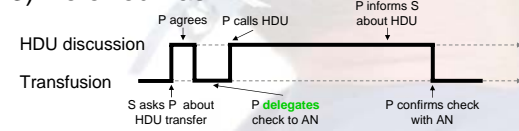
1) Interruption



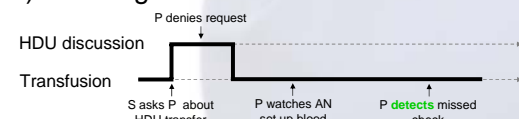
2) Multitasking



3) Deferred Task



4) Blocking



P = Participant, S = Surgeon, AN = Anaesthetic Nurse

Strategy	Number of participants	
	Detected	Missed
Interruption	0	2
Multitasking	1 (late)	0
Deferred Task	4	0
Blocking	5	0

Conclusions

Anesthesiologists' strategies for responding to interruptions and handling multiple tasks can directly affect their detection of clinically relevant events. Few studies of the impact of advanced displays have manipulated multitasking, interruptions and distractions¹ but effective displays should mitigate the effects of interruptions. Overall, broader test scenarios are needed to determine whether a display will affect anesthesiologists' awareness of safety-critical but non-physiological events in the operating room.

References

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