

Human-Centred Visualisation Technologies for Patient Monitoring



Information technology has become integral to perioperative and intensive care medicine, revolutionising patient care. Patient monitoring, crucial for ensuring safe anaesthesia practices and optimising patient ventilation, haemodynamics, and metabolism in critical care, is now widely recognised as a standard practice. Adopting monitoring technologies has greatly improved patient outcomes in these medical fields.

The increasing complexity of patient monitoring, with the addition of new sensors and parameters, poses challenges for clinicians and increases their cognitive load. Humans have limited working memory capacity, making processing and retaining large amounts of data difficult. This can lead to poorer information processing and comprehension. Moreover, clinicians also face emotional burden in critical situations, which affects their mental acuity. The combination of cognitive and emotional load can lead to occupational distress, fatigue, and burnout, impacting the quality of care and patient safety.

It is important to adapt the work environment to address these challenges to support clinicians. User-centred design principles can be applied to patient monitoring technology to improve how clinicians perceive and interpret patient information. The traditional approach of displaying individual parameters as separate numbers and waveforms does not fully utilise human sensory perception or provide optimal awareness of the patient's condition. By integrating multiple parameters derived from multiple sensors into a single indicator, clinicians can assess vital signs in parallel, enhancing their understanding of the patient's overall state.

Computer-based and high-fidelity simulation studies have shown that user-centred design-based systems, which present patient-monitoring data through changing shapes, colours, and animation frequencies, result in higher accuracy in clinical diagnosis, faster decision-making, reduced perceived workload, and increased diagnostic certainty. Implementing these approaches can alleviate the cognitive load on clinicians and enhance their ability to manage critical situations effectively.

Computer-based simulation studies have demonstrated the positive impact of visualisation technologies on healthcare professionals. These technologies enhance clinicians' situational awareness by facilitating their perception and communication of medical issues, improving diagnostic confidence and reducing workload.

Source: [Critical Care](#)

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