IMMERSIVE VIRTUAL OPERATING ROOM TEAM EXPERIENCE (VORTeX ©): SIMULATOR FOR TENSION PNEUMOTHORAX

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Introduction

VORTeX is an immersive, networked virtual reality platform for training and assessing surgical teams to handle an intraoperative tension pneumothorax. Using the VORTeX team simulator, trainees will work together to improve their non-technical abilities such as Clinical Decision Making, Team Communication, and Crisis Management.

Methods

Dynamic Patient Physiology (See Figure 1).

- Realtime human physiology engine
- Realistic visual and auditory monitors
- Physiologically accurate patient avatar that responds to user interactions
- Customizable patient profiles that influence performance

VR & Multi-User Interactions (See Figure 2).

- Custom network protocol for efficient and reliable communication
- Multi-user interactions and real-time voice chat communication
- Fully interactable, real-time physics based operating room and patient
- Real world movements reflected in full-body human avatars

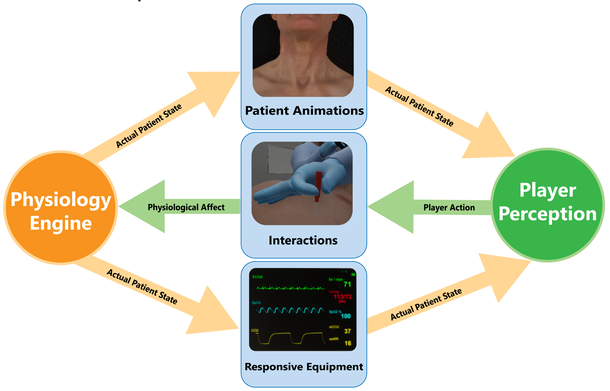


Figure 1. A diagram illustrating the feedback loop of observations and influence that drives player perception and decision making throughout the simulator.

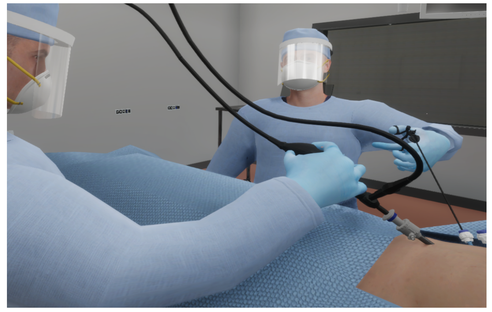


Figure 2. Full-body, responsive player avatars with high-fidelity interactions enable a strong sense of immersion and presence.

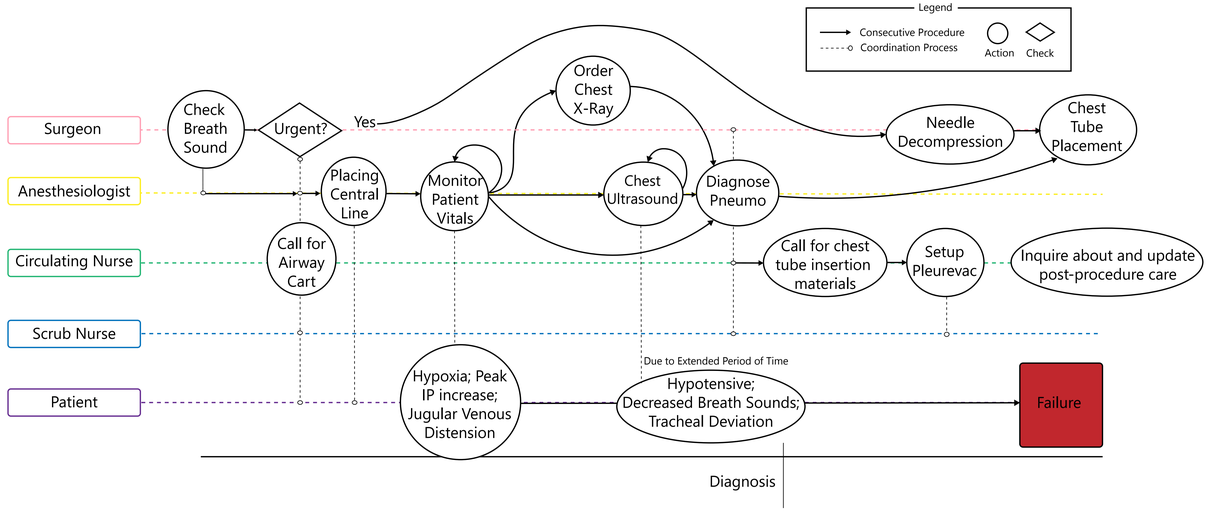


Figure 3. A state diagram representing the surgical team roles, responsibilities and timeline of the Tension Pneumothorax scenario.

Assessment. Each trainee will have different responsibilities determined by their role in the simulation. Team and individual performance is determined by metrics measuring what actions were taken, when they were taken, and by whom they were taken. Expected performance will be detailed by a state diagram similar to the one seen in Figure 3.

Future Work

VORTeX is intended to be a general purpose simulation platform that provides a dynamic, collaborative operating room environment. In the future, VORTeX aims to augment and eventually replace expensive mock operating rooms, which will enable individuals to train without the constraints of their financial and geographical situation.

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