Therapeutic Hypothermia Simulation App

ALLIANCE FOR INNOVATIVE MEDICAL TECHNOLOGY – AIMTECH / EMERGENCY MEDICINE

Therapeutic hypothermia (TH) is a medical treatment involving the controlled reduction of body temperature to prevent brain injury from cardiac arrest. Physician and nurse training in TH is challenging because of 1) the difficulty of the technique, 2) the multiple interacting clinical elements and 3) the extended 72-hour duration of treatment. The technology is an iPad computer-based simulator for training healthcare providers in the fundamentals of TH.

Technical Readiness Level

TRL 6 (System model demonstration in a relevant environment) A working prototype for the simulator has been developed. It has been evaluated with a select group of ER nurses and physicians. The software is available for limited release by contacting AIMTech.

Inventors

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Competitive Advantages

An important feature of the TH Training Simulator is the ability of the user to accelerate elapsed time. TH treatment in clinical application may span 48-72 hours. By accelerating elapsed time, the user can compress the entire TH treatment course into a much shorter time period (10-15 minutes), allowing the student to experience multiple simulated scenarios within a single short training session.

A risk with time acceleration is that the modeled outputs may vary with the speed of the simulation. An important innovation of this program is the integration of a time-lapse-consistency (TLC) process. The time lapse system works in quantized increments of real time. Using the TLC process, the system solves all required increments at once during each update. Thus, the user can alter the time-lapse rate as needed without concern for floating-point error accumulation.

Market Overview

The annual incidence of cardiac arrest is approximately 500,000. Cardiac arrest outside the hospital is a major cause of unexpected death in developed countries, with survival rates ranging from less than 5 percent to 35 percent. An important cardiac arrest treatment is Therapeutic Hypothermia (TH), the controlled reduction of body temperature to prevent or mitigate brain injury. TH helps cardiac arrest brain injury by reducing cerebral edema, cellular oxygen consumption and neurotoxicity. Randomized trials demonstrate that TH results in higher

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rates of neurologically intact survival after out-of-hospital cardiac arrest. TH is a current standard clinical treatment for cardiac arrest.

TH requires the operator to balance the effects and outcomes of multiple simultaneous interventions. Furthermore, TH treatment occurs over an extended 48-72 hour time frame.

Simulation offers the ability to learn TH by trial-and-error, exploring different strategies for accomplishing body cooling and temperature control under different clinical situations. Because TH efforts may span 48-72 hours, simulation also affords the ability to compress the extended interval to the shorter time spans available for training.

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