



An “Iceless” Operating Room Container Capable of Keeping Red Blood Cells at 1-6°C for Over 11 Hours



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Background

The transport and storage of RBCs in the operating room requires a monitored refrigerator or a validated container capable of keeping RBCs between 1-6°C. A validation study to test and evaluate the storage efficiency and capacity of a new iceless container was performed.

Methods

A pre-conditioned and removable Thermal Isolation Chamber (TIC) with phase change material was used to store the RBCs inside the container during evaluation. The TIC was pre-conditioned with the lid on at -28°C for a minimum of 6 hours. Five minutes after the TIC was removed from the freezer, 3 RBCs were loaded on top of each other inside the TIC. The container was kept at room temperature and one or two RBCs were removed during testing (n = 3). All temperatures were recorded using a calibrated scanning thermocouple thermometer. Readings were recorded and stored every 15 minutes. Four thermocouple probes were placed inside the container with one on each unit and one on the TIC inside wall. Another probe was placed outside the box to monitor the ambient temperature.

Results

The container was capable of holding the temperature of the RBCs between 1-6°C for over 11 hours when exposed to room temperature. When the top unit was removed, the middle and bottom units maintained RBCs between 1-6°C an average of 11.3 and 13.8 hours respectively. When two units were removed, the bottom unit maintained RBCs between 1-6°C an average of 11.4 hours, a decrease of 2.4 hours from when only one unit was removed.



Figure 1. Pre-conditioning of TICs at -28°C.



Figure 3. TIC at room temperature for five minutes before loading RBCs.



Figure 2. Container loaded with TIC and 3 RBCs.

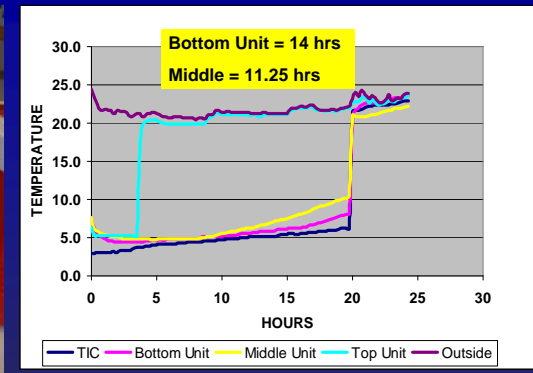


Figure 4. Results when top RBC was taken out of container after 4 hours at room temperature.

Conclusions

An energy-efficient container designed for use in the operating room maintained RBCs at 1-6°C for over 11 hours without the need for ice, ice packs, batteries, or an external power source.