

Abstract Submission Acknowledgement

Dear Dr. Pravin Thiruchelvam,

Thank you very much for submitting an abstract for the ICEM 2019.

We are pleased to inform that your abstract has been successfully submitted. Note that you can modify your abstract until the submission deadline.

You can modify your abstract on My Page after logging in.

Presenting Type: Poster Session Topic: Disaster & Mass Gathering

No of Abstract: 0884

Abstract Details

A Pilot Study to Evaluate the Potential of Using a CarbonCool Vest in Reduction of Heat Stress among First Responders Donned in CLD500 Decontamination Suit

Pravin Thiruchelvam¹, Jimmy Kock Keng Goh¹, Priscilla Kah Huimin¹, Ejaz Latiff², Priscilla Ting Zi Yin²

¹A&E, Changi General Hospital, Singapore

²Medical Student, National University of Singapore, Singapore

Decontamination of Hazmat casualties requires donning of personal protective equipment (PPE) e.g. CLD500, to prevent cross-contamination. PPE are made from chemically-impermeable material, which inadvertently prevents heat loss by evaporative cooling of sweat. Prolonged PPE usage causes heat injury. Mitigation strategies include cooling vests with heat-absorbing gel or phase-change material. A recently-developed CarbonCool vest utilizes EMCOOLS FlexPads, based on HypoCarbon, a material comprising graphite and water, known for greater thermal conductivity than water and ice, capable of achieving cooling rates of 3.4°C/hour.

This pilot study aims to evaluate the potential of CarbonCool vest in reduction of heat stress among first responders donned in CLD500 decontamination suit while carrying out moderate-intensity functional exercises.

A convenience sample of 10 volunteer staff from the Emergency Department were recruited. Estimated core body temperature, body surface heat signature and heart rate were parameters measured as reflective effects of heat stress placed upon participants. 5 sets of moderate-intensity physical exercises were performed over a duration of 20 minutes, with intermittent short rest periods between each set of exercise.

There was a gradual increase of estimated core body temperature among trial participants without vest at T-5 min and T-20 min, $36.2 \pm 0.3^\circ\text{C}$ and $36.7 \pm 0.4^\circ\text{C}$ respectively. Trial participant with CarbonCool vest displayed a gradual reduction of estimated core body temperature at T-5 min and T-20 min, $36.0 \pm 0.4^\circ\text{C}$ and $35.9 \pm 0.8^\circ\text{C}$ respectively.

The average captured estimated core body temperature among trial participants without vest was $36.5 \pm 0.3^\circ\text{C}$ and with the CarbonCool vest was $35.9 \pm 0.6^\circ\text{C}$.

These preliminary results exhibit gradual reduction and lower estimated core body temperature when trial participants are engaged in moderate physical activity whilst donned in the CLD500 Hazmat decontamination suit with CarbonCool vest.

There are potential benefits in utilizing CarbonCool vest during Hazmat disaster requiring PPE, to reduce risk of heat injury among hospital staff first responders.