Introduction

- Frontline healthcare staff have to don thick layers of personal protective equipment (PPE).
- To decontaminate patients for Hazmat operations and training.
- Long periods in PPE may trigger heat stress or fatigue.

Aim

- To evaluate if the use of the CarbonCool® System with PPE was useful in reducing physiological stress during Hazmat training.

Methods

- Conducted prospective observational study in Singapore General Hospital.
- Recruited healthcare volunteers who had trained in hospital decontamination.
- Opted to wear or without CarbonCool® Comfort Suit before using standard Hazmat PPE.
- Body weight and vital signs such as temperature, heart rate and blood pressure were measured before donning and after training.

Results

- A total of 11 volunteers were enrolled and 4 volunteered to wear CarbonCool® Comfort Suit.

| Table 1: Basic demographic of enrolled volunteers |
|------------------|------------------|------------------|
|                   | Control group   | Intervention group |
| Age (median, IQR)  | 35 (33 – 38.5)  | 29 (28 – 38)      |
| Gender (Male, %)   | 4 (57.1%)        | 4 (100%)          |
| Race (%)           |                  |                  |
| Chinese            | 2 (28.6%)        | 3 (75%)           |
| Malay              | 2 (28.6%)        | 1 (25%)           |
| Indian             | 1 (14.3%)        | 0                 |
| Others             | 2 (28.6%)        | 0                 |

- Before donning DeconSuit
- Weight, Kg (median, IQR): 73.35 (66.2 – 82.8) vs 71.1 (65.6 – 74.85)
- Temperature, °C (median, IQR): 36.6 (36.1 – 37) vs 36.7 (36.3 – 36.95)
- Heart Rate, bpm: 79 (69 – 88) vs 93.5 (81 - 100)
- Systolic Blood Pressure, mmHg (median, IQR): 131.5 (122 - 140) vs 138.5 (132.5 – 144.5)
- Diastolic Blood Pressure, mmHg (median, IQR): 79.0 (68 – 86) vs 86.5 (79 -89.5)

- After donning DeconSuit
- Weight, Kg (median, IQR): 66.1 (63.65 – 81) vs 70.65 (65.35 – 74.45)
- Temperature, °C (median, IQR): 37.5 (36.8 – 37.85) vs 37.0 (36.95 – 37.1)
- Heart Rate, bpm: 88.0 (85 – 96) vs 101.5 (87.5 – 104.5)
- Systolic Blood Pressure, mmHg (median, IQR): 140.0 (131 – 144) vs 139.0 (135.5 – 141.5)
- Diastolic Blood Pressure, mmHg (median, IQR): 71.0 (65.5 – 82.5) vs 84.5 (83 – 86)

Conclusion

- The volunteers who used the CarbonCool® Comfort Suit had lower body fluid weight loss, slower increase of body temperature, heart rate and blood pressure compared to control group.
- Our results suggest that CarbonCool® Comfort Suit may reduce the risk of heat exhaustion and fatigue with use of PPE with possibility of being able to extend their work rest cycle.

Disclosure Statement

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