The association of Body Mass Index with time to target temperature and outcomes in post-arrest patients treated with therapeutic hypothermia via an external cooling system

Marion Leary[1], Marisa J. Cinousis[1], Kelsey Sheak[1], Stephen Iannacone[1],
Daniel M. Kolansky[2], Mark E. Mikkelsen[3], Benjamin S. Abella[1], Barry D. Fuchs[3]

[1]*Department of Emergency Medicine and the Center for Resuscitation Science;* [2] *Penn Heart and Vascular Center;*
[3]*Pulmonary, Allergy & Critical Care Division, University of Pennsylvania, Philadelphia, Pennsylvania*

BACKGROUND

Preliminary evidence suggests that more rapid attainment of target temperature (32-34ºC) in post-cardiac arrest patients treated with Therapeutic Hypothermia (TH) may improve outcomes. We hypothesized that the time to achieve target temperature is increased as Body Mass Index (BMI) increases and that this may impact clinical outcomes.

OBJECTIVES

To assess for an association of BMI with time to target temperature, skin complications, survival to hospital discharge, and good neurologic outcome in survivors of post-cardiac arrest treated with TH.

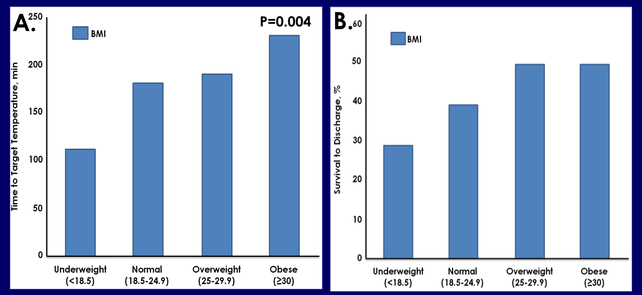
METHODS

A single-center retrospective cohort study of cardiac arrest patients who underwent TH using an external cooling system between 7/2007 - 9/2012. We examined the association between BMI (weight in kilograms divided by height in meters squared) and time from initiation of cooling to attainment of target temperature. The cohort was categorized based on BMI (Table 2).

Table 1.

Demographics	n=163
Age, years	61 (IQR 46,70)
Female, n(%)	73(45)
VF/VT, n(%)	50 (31)
Time to Target Temperature, minutes	195 (IQR 117, 359)

Figure 1.



BMI categories and association with
(A) Time to Target Temperature (B) Survival To Discharge

Table 2.

Body Mass Index	n, %	Initial Temperature, degrees Celsius (IQR)	Time from initiation to target temp, minutes (IQR)	Skin breakdown n, %	Survival to discharge n, %	Good neurologic outcome in survivors n, %
Underweight (<18.5)	7 (4)	36.6 (36.0, 37.0)	110 (20, 254)	1 (14)	2 (29)	1 (50)
Normal (18.5-24.9)	41 (25)	36.5 (36.0, 36.8)	180 (120, 279)	5 (12)	16 (39)	11 (73)
Overweight (25-29.9)	57 (35)	36.5 (35.6, 37.0)	190 (114, 333)	13 (23)	28 (49)	19 (68)
Obese (≥30)	58 (36)	36.4 (35.7, 37.0)	230 (139, 394)	16 (28)	29 (50)	22 (76)

The non-parametric test for trend was used to compare time to target temperature and rate of skin breakdown across BMI groups. Fisher's exact test statistic was used to compare survival and neurologic outcome by BMI category.

RESULTS

Of the 209 patients treated with TH, BMI and time to target temperature were available in 163 (see Table 1 for demographic data). The time to target temperature increased as BMI category increased (p=0.04). Skin breakdown occurred more commonly as BMI category increased, although this difference did not achieve statistical significance (p=0.06). There was no difference in survival (p=0.54), nor neurologic outcome amongst survivors (p=0.77), across BMI category.

CONCLUSIONS

Time to target temperature was prolonged, and skin breakdown appeared to be more common, as BMI category increased. Whether or not outcomes could have been improved in obese patients if time to target temperature was reduced is unknown.

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