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### Extracorporeal membrane oxygenation in severe accidental hypothermia

Accepted: 29 October 2014  
 Published online: 11 November 2014  
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Dear Editor,  
 We read the article ‘What’s new in ECMO: scoring the bad indications’ [1] with the utmost interest and we appreciate how detailed and thoroughly the authors have covered the topic, in accordance with latest recommendations and evidence based medicine. As was mentioned the evidence is scarce, yet with the increasing availability of ECMO and the indications being extended we share the opinion that we are witnessing the beginning of the ‘ECMO era’.

However we would like to point out one more group of patients that could benefit from ECMO implantation as the last therapeutic resort: patients in accidental hypothermia leading to severe circulatory instability and/or cardiac arrest.

Extracorporeal rewarming techniques seem to be an attractive and recognized therapeutic modality in this particular group of patients, allowing for both temperature restoration and hemodynamic and respiratory support; therefore it is recommended that all hypothermic patients (core body temperature below 28 °C) presenting symptoms of cardiac instability (e.g., systolic blood pressure less than 90 mmHg or ventricular arrhythmia) or who suffered cardiac arrest should be subjected to extracorporeal rewarming [2].

Although the evidence supporting this treatment is limited and for obvious reasons based on case studies, the available data is very promising. In comparison with conventional treatment, extracorporeal rewarming shows high clinical efficiency and a good safety profile, with low mortality rates and fewer complications including improved

neurological outcome, even in patients with prolonged CPR [3].

The low frequency of utilization of extracorporeal rewarming in accidental hypothermia stands in stark contrast to its high availability in cardiac centers and with statistical data concerning hypothermia in the general population. In Poland in the years 2009 to 2012, a total of 1,836 deaths were associated with exposure to excessive natural cold [4]. Even more strikingly, 489 (26.6 %) of those patients died in hospital, most likely from reversible hypothermic cardiogenic shock.

In our opinion this large number of in-hospital deaths should encourage one to apply advanced methods of active recognition and treatment of severely hypothermic patients. Such a rationale led us to found the Severe Accidental Hypothermia Center, to our knowledge the only such dedicated center worldwide. It works as a part of the Intensive Care Unit of the Cardiac Surgery Department in John Paul II Hospital in Cracow, Poland. It serves all patients in the Małopolskie voivodship (area 15,100 km<sup>2</sup>, population 3.3 million). We have appointed an on-call severe hypothermia coordinator, who consults all

**Table 1** Summary of patients subjected to extracorporeal rewarming as the Severe Accidental Hypothermia Center

Sex/age (years)	Accident date	Type of accident	Core temperature/esophageal (°C)	Cardiovascular arrest	Rewarming rate (°C/h)	Mean duration of ECMO (h)	GCS on arrival at hospital	Best ICU GCS/CPC	ICU stay duration (days)	On discharge from ICU
M/56	15 November 2013	Urban	25	Yes, after 15 min circulation was restored	6	23	10	GCS 15 CPC 1	8	Fully recovered
M/55	31 January 2014	Urban	22.2	Yes, 140 min of CPR till venoarterial ECMO implantation	4	22	3	GCS 15 CPC 1	11	Fully recovered
F/83	23 February 2014	Urban	25.7	No	3	15	5	GCS 15 CPC 1	3	Fully recovered
M/54	17 April 2014	Urban	24.7	No	4.5	18	7	GCS 15 CPC 1	2	Fully recovered
F/48	13 September 2014	Water	32	Yes, 107 min of CPR till venoarterial ECMO implantation	4	Not weaned/death	3	GCS 3 CPC 5	3	Died

hypothermic patients reported by prehospital emergency teams [5].

From 29 July 2013 to 24 October 2014, we consulted 17 hypothermic patients and accepted five for extracorporeal rewarming, the remaining being rewarmed less invasively because of cardiac stability. After venoarterial ECMO implantation we managed to restore cardiac stability and full neurologic recovery with Glasgow coma scale (GCS) 15, cerebral performance category (CPC) 1 in four patients, one patient died (see Table 1).

In light of the relatively high incidence of this medical event and wide availability of ECMO in cardiac centers, these patients should be consulted by specialists with knowledge of extracorporeal techniques, and thus many deaths can be possibly prevented.

**Conflicts of interest** For none of the authors was any declared.

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