Drowned children do not benefit from resuscitation beyond 30 minutes

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Children who drown and suffer from cardiac arrest with hypothermia are significantly more likely to die or suffer severe brain damage if resuscitation continues for more than 30 minutes, finds a study published in *The BMJ*.

Drowning is a leading cause of accidental death in children worldwide. It is often associated with hypothermia, which is thought to offer a protective effect by slowing down the brain's metabolism.

Current guidelines suggest that if spontaneous circulation is not reached within 30 minutes, prolonged resuscitation should continue until a body temperature of 32-34 °C is achieved. But to date only a few case reports have included clinical outcomes.

In the largest study of its kind, a team of Dutch researchers carried out a retrospective analysis to identify outcomes of resuscitation in all children who drowned and suffered cardiac arrest with hypothermia.

In total, 160 children were included in the study, all of whom drowned outdoors between 1993 and 2012. Children were excluded if drowning involved a traffic or boating accident. Length of resuscitation, season and other variables were analysed.

Prolonged resuscitation beyond 30 minutes was performed in 61% (98) of children, but did not result in a good outcome: 89% (87) died and only 11% (11) survived in a vegetative state or with severe neurological damage.

Overall, 39% (62) children did not require prolonged resuscitation and 17 (11%) survived with good outcome: 10 (6%) had a good neurological outcome, 5 (3%) had mild neurological disability and two (1%) had moderate neurological disability. Only 44 (28%) children were still alive at one year following the accident.

Most drowning accidents occurred in spring, summer and autumn months. But 5 of the 17 (29%) children who drowned in winter had good outcome compared to 12 of the 143 (8%) children who drowned in the other seasons.

The maximum duration of resuscitation with good outcome was 25 minutes.

"These findings suggest that there is no therapeutic value of restitution beyond 30 minutes for drowned children with cardiac arrest and hypothermia," write the authors. "Our findings challenge the current recommendation."

Based on these results, existing guidelines should be revised, they argue. They put forward a new strategy for the discontinuation of prolonged resuscitation after 30 minutes.

But they note that established recommendations should be followed in winter months and in exceptional circumstances, such as, drowning that involves a motor vehicle or boat. This is because in exceptional circumstances hypothermia might possibly precede asphyxia and the present study does not provide data for these situations.

In an accompanying editorial, experts from Imperial College London and Southampton University Hospital explain that the study is relatively small because the numbers are "a fraction of the total number of drownings worldwide" and the results should "be interpreted with caution."

They point out that "we still have no clear idea of the absolute limits of survival," and that parents "need the reassurance that every effort has been made to resuscitate their child."

Since outcomes are so poor and most accidents occur far from medical assistance, they suggest the main priority should be prevention management to reduce mortality.

They also call for greater use of national registries of cardiac arrests to inform national and international guidelines, and to assess the effectiveness of measures such as teaching school aged children swimming, water safety and safe rescue skills, increasing public awareness, and training bystanders in safe rescue and resuscitation .

More information: *The BMJ*, www.bmj.com/cgi/doi/10.1136/bmj.h418
The BMJ, www.bmj.com/cgi/doi/10.1136/bmj.h535

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