

Chart showing the number of reversible causes recalled by participants

Only 32% were able to list all 8 reversible causes of cardiac arrest

4Hs and 4Ts: Could you manage them all?

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Background

Cardiac arrests, although rare in paediatrics, are extremely high-pressure, high-stakes situations. Identifying any reversible causes, commonly referred to as the 4Hs and 4Ts, is an important step in the management of cardiac arrest, with the potential to improve outcomes for the patient¹. It is well recognised that hypoxia and hypovolaemia are the most common causes of cardiac arrest within in the paediatric population, unlike adults where primary cardiac events are more common². Although these causes are taught in advanced life support training, there is research which shows that in real scenarios the recall of these causes is reduced³.

Aims & Method

To evaluate how accurately healthcare professionals can recall the reversible causes of cardiac arrest and ability to narrate the management of each of these.

38 APLS providers were asked to recall the 8 reversible causes of cardiac arrest. Using a standardised proforma, the order of recall and time taken were recorded. Participants were also asked to describe management of each of the causes and were asked to comment on their confidence in managing each. To prevent participants from preparing in advance and improving the number of causes they could recall, participants were told this was a competition and asked not to discuss with others members of staff.

Results

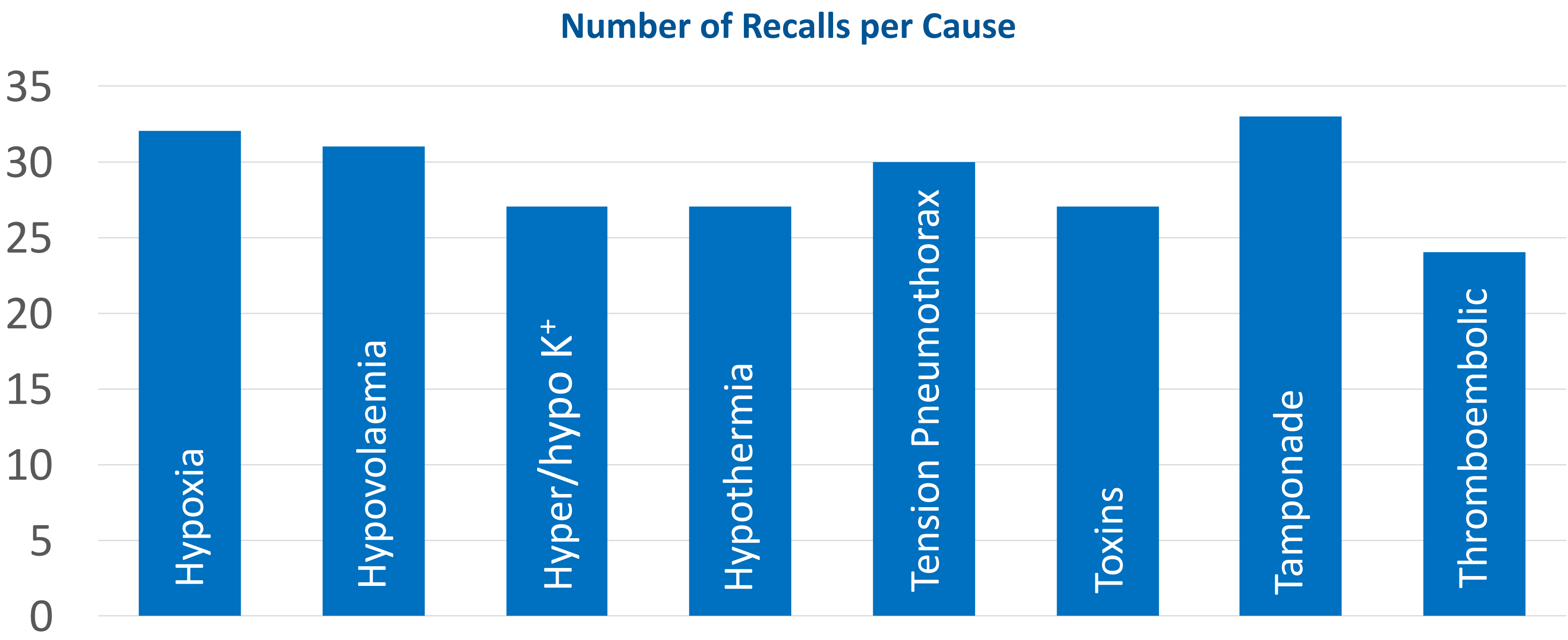
Only 12 of the 38 participants were able to recall all 8 reversible causes with their times ranging from 16 to 95 seconds. There was little correlation between seniority or experience of cardiac arrests; half of those able to recall all causes were foundation or ST1-3 level doctors. Amongst doctors (all grades, n=26), 24 were able to recall 6 or more reversible causes.

Despite hypoxia and hypovolaemia being the most common causes, tamponade was the most commonly recalled (86.6%) in this survey. Qualitative data showed that all participants were able to manage hypoxia confidently, and the majority felt comfortable managing hypovolaemia, hypo/hyperkalaemia and hypothermia. However, participants were less able to recall the management of the 4 Ts and were often vague in their answers. Additionally, on the whole, participants reported they did not feel confident to manage these clinical scenarios. Correlation was noted between confidence to recall and state management and date of last life support course.

Conclusion

Recall of reversible causes is variable amongst healthcare professionals which may lead to treatment delay in emergency situations. A simple aide-memoire, containing reversible causes and initial management, has the potential to improve speed of identification of reversible causes of arrest and possibly save lives and improve outcomes. This aide-memoire is being developed to trial locally.

Causes	Correctly recalled	Causes	Correctly recalled
8	4 Consultants 2 Paeds ST4-8 2 Paeds ST1-3 1 GPST1-2 3 FY2	4	1 APNP 2 Nurses
7	1 Consultant 2 Paeds ST4-8 2 Paeds ST1-3 3 GPST1-2 1 FY1	3	1 Consultant 1 Nurse
6	2 Paeds ST4-8 1 Paeds ST1-3 1 Nurse	2	1 GPST1-2 1 Nurse
5	1 APNP 4 Nurses	1	1 Nurse



References

- 1) Bergum D, Haugen BO, Nordseth T, Mjølstad OC, Skogvoll *Recognizing the causes of In-Hospital Cardiac arrest – A Survival Benefit Resuscitation* (2015)
- 2) Vega RM, Kaur H, Edemekong PF *Cardiopulmonary arrest in Children* StatPearls [Internet] Updated May 2020 available from www.ncbi.nlm.nih.gov/books/NBK436018
- 3) Grzeskowiak M *Knowing potentially reversible causes of cardiac arrest does not influence adequate treatment in PEA* Eur. J. Anaesthesiol (2006)