Confirmation of traumatic cardiac arrest in Children: a literature review to inform the PERUKI PTCA consensus study

Aims
Traumatic cardiac arrest (TCA) is associated with high mortality and poor neurological outcomes. Several methods of confirming cardiac arrest are utilised including auscultation of heart sounds, palpation of pulses and echocardiography. We did a literature review to identify the best method of confirming traumatic cardiac arrest in children.

Methods
A Medline search from 1966 to 1/11/2016 was performed using the search terms: ([Cardiac AND arrest] OR standstill) AND confirm* AND [auscult*OR (palpat* AND pulse) OR ultrasound OR echo*] AND trauma* AND [pediatr* OR paediatr*]. 59 papers were identified, of which 8 were deemed relevant and of sufficient quality; 2 related to palpation of pulses and 6 related to point of care ultrasound (POCUS) in adult TCA. There were no papers related to POCUS in childhood TCA, or to auscultation.

Results
2 papers examined palpation of pulses on ECMO patients, concluding that diagnosis of cardiac arrest by palpation alone was unreliable, and that the most important factor in accuracy was clinical experience. Papers related to POCUS discussed its role in predicting outcomes, and reducing unnecessary procedures or duration of resuscitation efforts. One stated a positive predictive value of 100% for death in the presence of cardiac arrest on POCUS, another stated POCUS increased confidence in decision making, while another discussed its use in a pre-hospital training course. No papers described the performance accuracy of POCUS in confirming cardiac arrest – this may be because its advocates view it as the gold standard test in such situations.

Conclusion
There is little evidence to support which method of confirming paediatric cardiac arrest is optimal, and no evidence specific to cardiac arrest which occurs after energy transfer mechanisms seen in childhood trauma. Further work is needed to determine the optimal combination of methods for identifying cardiac arrest from medical and traumatic conditions, which may be best done through the creation of a robust childhood cardiac arrest registry. It is therefore important to derive consensus in this area to guide clinicians, though this must be pragmatic and may be restricted in part by the availability of emerging technologies such as POCUS.