Extracorporeal membrane oxygenation (ECMO) to aid cardiopulmonary resuscitation in children for cardiac arrest occurring on the paediatric cardiology ward

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INTRODUCTION The use of ECMO rescue therapy for children suffering cardiac arrest (ECPR) has been mostly limited to arrests occurring within the ICU, operating room or catheterisation laboratory. At present, published evidence does not support ECPR for arrest occurring on the ward. We hypothesised that with good quality CPR and rapid ECPR deployment, similar survival would be achievable in patients with cardiac disease who arrest on the ward. Since 2005, we have had a policy of activating ECPR for paediatric cardiology ward arrests. Our objective is to review the outcome in this population.

METHODS Freeman Hospital is a paediatric cardiac surgical centre that undertakes 250-300 open surgical cases per year and one of two centres in UK undertaking heart transplantation. Ward nursing and medical staff underwent simulation training in ECPR and were taught to activate the team for cardiac arrest of duration >5min. Perfusion and surgical staff were in-house during weekdays and on-call during weekday out-of-hours and weekends. Patients were transferred to ICU or operating room for cannulation.

Patients aged<16 years who suffered cardiac arrest on paediatric cardiology ward and received ECPR between 2005 and 2015 were identified. ECPR was defined as ECMO established during CPR. In addition, a patient suffering intermittent multiple arrests during cannulation was also defined as ECPR. Survival and Paediatric Cerebral Performance Category at hospital discharge were determined from the medical record.

RESULTS Five children, aged 2d to 13y, received ECPR after cardiac arrest on the cardiology ward during 10-year period. Of these, 2 had end-stage heart failure complicating congenital heart disease, 2 were medical patients and one was post-surgery. The median duration of CPR prior to ECMO was 57min (range 45-93min). Of the five patients, 2 (40%) survived to discharge. The two survivors were neurologically intact at hospital discharge (PCPC 1). Both survivors underwent transplantation during the admission following ECPR. Two patients developed brain death complicating cerebral oedema and one patient died due to VAD-related haemorrhage during bridge to transplantation.

CONCLUSION Although a rare event, children who suffer cardiac arrest on cardiology ward can survive neurologically intact with ECPR despite prolonged periods of resuscitation.