



Introduction of extracorporeal cardiopulmonary resuscitation (ECPR) into emergency care: a feasibility study

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Background:

Traditionally, out of hospital cardiac arrests (OHCA) have poor outcomes. Incorporation of extracorporeal cardiopulmonary resuscitation (ECPR) is being used increasingly to supplement ACLS to provide better outcomes for patients. Current literature suggests potentially improved outcomes, including neurological function. We assessed the feasibility of introduction of ECPR to a regional hospital using a 4-phase study. We report phase-1, an estimation of the number of potential candidates for ECPR in our setting.

Methods:

Following development and agreement on local criteria for selection of patients for ECPR using a modified Delphi Technique, inclusion and exclusion criteria were applied retrospectively, to a database comprising 4 years of emergency department (ED) cardiac arrests (n=395) that was supplemented by further chart review. This provided estimates of the number of patients who would have qualified for EMS transport for ECPR and initiation of ECPR in the ED.

Results:

Application of criteria would result in 20.0% (95% CI 16.2-24.3%) of OHCA being transported to the ED for ECPR (18.5 patients per year). Incorporating EMS rhythm criteria, 10% (95% CI 7.3-13.5%) qualify. In the ED 4.9% (95% CI 3.0-7.6%) would be eligible to receive ECPR (5.0 patients per year). Incorporating downtime criteria, 3.8% (95% CI 2.2-6.3%) qualify. After considering local in-house cardiac catheterization hours 9.4% (95% CI 6.8-12.9%) and 5.4% (95% CI 3.5-8.2%), without and with EMS rhythm assumptions respectively, would be eligible for transport. For placement on pump, 3.0% (95% CI 1.6-5.3%) and 2.4% (95% CI 1.2-4.6%), without and with use of total downtime respectively, were eligible.

Conclusion: If conservative historical patterns of CA were to continue, we believe that an ECPR program may be feasible in our regional hospital setting, with a small number of selected cardiac arrest patients meeting eligibility for transportation and initiation of ECPR. These numbers suggest that an ECPR program would not be resource intensive, yet would be sufficiently busy to maintain adequate team competency.

SJRH Cardiac Arrest Database 2010-2014			
Transport Criteria	ECMO Criteria	In-House Cath Lab Hours	
Inclusion Criteria	Inclusion Criteria	Transport to ED	
Witnessed Cardiac Arrest	186 Witnessed Cardiac Arrest	186 Total Events	147
Age <70yo	173 Age <70yo	173 Full Inclusion	39
No Flow <10min	146 No Flow <10min	146 Excluded ≥1 Criteria	59
Full Inclusion Criteria	82 Total Downtime <60min	134 With EMS Rhythm	106
Exclusion Criteria	Refractory Arrest	257 Placement on ECMO	
Unwitnessed Cardiac Arrest	87 Suspected Etiology:	Total Events	147
"Asystole" at Scene	160 Cardiac	No Data Full Inclusion	39
Suspected Etiology:	Select Non-Cardiac	No Data With Downtime	29
Uncontrolled Bleed	No Data Full Inclusion Criteria	80 Excluded ≥1 Criteria	109
Irreversible Brain Dmg	No Data With Downtime	58	
Trauma	10 Exclusion Criteria		
Comorbidity:	Unwitnessed Cardiac Arrest	87	
Disability Limiting ADL	No Data Asystole in ED	189	
Standing DNR Order	0 Suspected Etiology:		
Undergoing Palliation	6 Uncontrolled Bleed	No Data	
Total Excluded ≥1 Criteria	101 Irreversible Brain Dmg	No Data	
With EMS Rhythm	198 Trauma	10	
	Comorbidity:		
	Disability Limiting ADL	No Data	
	Standing DNR Order	0	
	Undergoing Palliation	6	
	Total Excluded ≥1 Criteria	211	

Eligible Candidates For Transport	Total Database (%)	Yearly (#)
Without EMS Rhythm Criteria	20.0 [95%CI 16.2-24.3]	18.5
With EMS Rhythm Criteria	10.0 [95%CI 7.3-13.5%]	9.3
<i>Considering In-House Cath Lab Hours</i>		
• Without Rhythm	9.4 [95%CI 6.8-12.9]	8.8
• With Rhythm	5.4 [95%CI 3.5-8.2]	5.0

Eligible Candidates For ECMO	Total Database (%)	Yearly (#)
Without Downtime Criteria	4.9 [95%CI 3.0-7.6]	4.5
With Downtime Criteria	3.8 [95%CI 2.2-6.3]	3.5
<i>Considering In-House Cath Lab Hours</i>		
• Without Downtime	3.0 [95%CI 1.6-5.3]	2.8
• With Downtime	2.4 [95%CI 1.2-4.6]	2.3

Note: Results presented here are updated from originally submitted abstract as the result of further data collection and analysis