

QUESTION

Should patients/cases where DA-CPR is offered vs. patients/ cases where no CPR is offered be used for children with cardiac arrest in out of hospital settings?

POPULATION:	Children with cardiac arrest in out of hospital settings
INTERVENTION:	Patients/cases where DA-CPR is offered
COMPARISON:	Patients/ cases where no CPR is offered be used
MAIN OUTCOMES:	Survival with CPC 1-2-unadjusted data; Survival with CPC 1-2 -adjusted data; Survival with CPC 1-2-unadjusted data (to hospital discharge); Survival with CPC 1-2-adjusted data (to hospital discharge); Survival-unadjusted data; Survival-adjusted data; Survival-unadjusted data (hospital discharge); Survival-adjusted data (hospital discharge); Sustained ROSC-unadjusted data; Shockable rhythm-unadjusted data; Time to CPR.
SETTING:	Out of hospital cardiac arrest (OHCA)
PERSPECTIVE:	This topic was prioritized by the Pediatric Life Support Task Force following publication of several new studies since the previous systematic review was published in 2011. The 2011 review found limited evidence to support dispatch-assisted CPR (Bohm, 2011 1490). In considering the importance of this topic, the Pediatric Life Support Task Force noted that bystander CPR significantly improves the likelihood of survival from OHCA but bystander cardiopulmonary resuscitation (CPR) rates remain very low. In developing the consensus on science and treatment recommendations, the Pediatric Life Support Task Force agreed that consideration of both unadjusted and adjusted analyses was essential to provide a full picture of the evidence. We recognize that unadjusted analysis might be confounded by temporal changes, systematic and patient care differences between and within EMS systems.
BACKGROUND:	The evidence base compared with adult data is limited, but the publications since 2011 provided the stimulus to re-examine the scientific literature.
CONFLICT OF INTERESTS:	None

ASSESSMENT

Problem

Is the problem a priority?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Probably yes <input checked="" type="radio"/> Yes <input type="radio"/> Varies <input type="radio"/> Don't know	<p>Out-of-hospital cardiac arrest (OHCA) is a significant cause of death worldwide with an annual rate of over 400,000.</p> <p>The current survival rates for OHCA victims rate remains very low at approximately 10%.</p> <p>A victim is almost 4 times more likely to survive a cardiac arrest event when someone witnesses their arrest and performs CPR while emergency personnel are en route.</p> <p>Unfortunately, bystander CPR rates have remained astoundingly low over the past decade, rarely exceeding 35%.</p>	<p>These data relate to adult data as there is a paucity of evidence for pediatric cardiac arrests.</p>

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> ○ Trivial ○ Small ○ Moderate ● Large ○ Varies ○ Don't know 	<p>Survival with good neurological outcome at 1mo: unadjusted OR 1.49 (1.05-2.11); RR 1.47 (1.05-2.07); p=0.03; adjusted OR 1.81 (1.23-2.67); p=0.003)</p> <p>Survival with good neurological outcome at hospital discharge: unadjusted OR 3.63 (2.18-6.03); RR 3.43 (2.10-5.59); p<0.0001; adjusted OR 2.22 (1.27-3.88); p=0.005).</p> <p>Survival at 1mo: unadjusted OR 1.42 (1.16-1.74); adjusted OR 1.63 (1.32-2.01); p<0.0001).</p> <p>Survival at hospital discharge: unadjusted OR 3.14 (2.16-4.58); RR 2.87 (2.02-4.06); p<0.0001; adjusted OR 2.23 (1.47-3.38); p=0.002).</p> <p>Sustained ROSC: unadjusted OR 2.95 (2.07-4.20).</p> <p>Shockable initial rhythm: unadjusted OR 1.59 (0.78-3.21); RR 1.52 (0.81-2.86); p=0.20.</p> <p>Arrest to CPR-initiation time: Shorter times: Goto: median 1 min (inter quartile range 0-5 minutes); vs. 11 min (inter quartile range 7-15), no p-value; Ro: median 4 min (inter quartile range 0-13 minutes); vs. 10 min (inter quartile range 6-18; p=0.01).</p>	

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> ○ Large ○ Moderate ○ Small ● Trivial ○ Varies ○ Don't know 	<p>Survival with good neurological outcome at 1mo: unadjusted OR 1.49 (1.05-2.11); RR 1.47 (1.05-2.07); p=0.03; adjusted OR 1.81 (1.23-2.67); p=0.003).</p> <p>Survival with good neurological outcome at hospital discharge: unadjusted OR 3.63 (2.18-6.03); RR 3.43 (2.10-5.59); p<0.0001; adjusted OR 2.22 (1.27-3.88); p=0.005).</p> <p>Survival at 1mo: unadjusted OR 1.42 (1.16-1.74); adjusted OR 1.63 (1.32-2.01); p<0.0001).</p> <p>Survival at hospital discharge: unadjusted OR 3.14 (2.16-4.58); RR 2.87 (2.02-4.06); p<0.0001; adjusted OR 2.23 (1.47-3.38); p=0.002).</p> <p>Sustained ROSC: unadjusted OR 2.95 (2.07-4.20).</p> <p>Shockable initial rhythm: unadjusted OR 1.59 (0.78-3.21); RR 1.52 (0.81-2.86); p=0.20.</p> <p>Arrest to CPR-initiation time: Shorter times: Goto: median 1 min (inter quartile range 0-5 minutes); vs. 11 min (inter quartile range 7-15), no p-value; Ro: median 4 min (inter quartile range 0-13 minutes); vs. 10 min (inter quartile range 6-18; p=0.01).</p>	

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> ● Very low ○ Low ○ Moderate ○ High ○ No included studies 	Certainty of Evidence for all outcomes was very low, with the exception of: <ul style="list-style-type: none"> - survival with good neuro outcome at hospital discharge: low - survival at hospital discharge: unadjusted- moderate; adjusted: low - sustained ROSC: low 	

Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> ○ Important uncertainty or variability ○ Possibly important uncertainty or variability ● Probably no important uncertainty or variability ○ No important uncertainty or variability 	Main outcome is survival, and neurologically intact survival. COSCA has confirmed importance of these outcomes. There is no published evidence regarding this intervention for quality of life in survivors, and in general, the population varies in how much they value survival (at all costs) vs neurologically-intact survival.	COSCA: Haywood K, Whitehead L, Nadkarni VM, Achana F, Beesems S, Bottiger BW, et al. COSCA (Core Outcome Set for Cardiac Arrest) in Adults: An Advisory Statement From the International Liaison Committee on Resuscitation. Resuscitation. 2018;127:147-63.

Balance of effects

Does the balance between desirable and undesirable effects favor the intervention or the comparison?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> ○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ○ Probably favors the intervention ● Favors the intervention ○ Varies ○ Don't know 	Survival with good neurological outcome at 1mo: unadjusted OR 1.49 (1.05-2.11); RR 1.47 (1.05-2.07); p=0.03; adjusted OR 1.81 (1.23-2.67); p=0.003). Survival with good neurological outcome at hospital discharge: unadjusted OR 3.63 (2.18-6.03); RR 3.43 (2.10-5.59); p<0.0001; adjusted OR 2.22 (1.27-3.88); p=0.005). Survival at 1mo: unadjusted OR 1.42 (1.16-1.74); adjusted OR 1.63 (1.32-2.01); p<0.0001). Survival at hospital discharge: unadjusted OR 3.14 (2.16-4.58); RR 2.87 (2.02-4.06); p<0.0001; adjusted OR 2.23 (1.47-3.38); p=0.002). Sustained ROSC: unadjusted OR 2.95 (2.07-4.20).	

	<p>Shockable initial rhythm: unadjusted OR 1.59 (0.78-3.21); RR 1.52 (0.81-2.86); p=0.20.</p> <p>Arrest to CPR-initiation time: Shorter times: Goto: median 1 min (inter quartile range 0-5 minutes); vs. 11 min (inter quartile range 7-15), no p-value; Ro: median 4 min (inter quartile range 0-13 minutes); vs. 10 min (inter quartile range 6-18; p=0.01.</p>	
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Resources required
How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> Large costs <input type="radio"/> Moderate costs <input type="radio"/> Negligible costs and savings <input type="radio"/> Moderate savings <input type="radio"/> Large savings <input checked="" type="radio"/> Varies <input type="radio"/> Don't know 	<p>No relevant published data were identified for this review.</p> <p>Existing systems may be in place, but additional training will be required to introduce Dispatch Assist instructions.</p> <p>Widespread availability of phone equipment (landline/mobile), phone reception, and loudspeaker mode may be a limitation and require resources.</p> <p>Community education may increase likelihood of following instructions.</p>	

Certainty of evidence of required resources
What is the certainty of the evidence of resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> Very low <input type="radio"/> Low <input type="radio"/> Moderate <input type="radio"/> High <input checked="" type="radio"/> No included studies 		

Cost effectiveness

Does the cost-effectiveness of the intervention favor the intervention or the comparison?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> Favors the comparison <input type="radio"/> Probably favors the comparison <input type="radio"/> Does not favor either the intervention or the comparison <input type="radio"/> Probably favors the intervention <input type="radio"/> Favors the intervention <input type="radio"/> Varies <input checked="" type="radio"/> No included studies 	<p>Pubmed search: (("Cost-Benefit Analysis"[Mesh]) AND ("Heart Arrest"[Mesh] OR "Out-of-Hospital Cardiac Arrest"[Mesh] OR "Death, Sudden, Cardiac"[Mesh])) AND "Emergency Medical Dispatcher"[Mesh]</p> <p>No relevant published data was identified for review.</p> <p>One study identified suggested that bystander CPR appeared “cost-effective”: Geri G, Fahrenbruch C, Meischke H, Painter I, White L, Rea TD, Weaver MR. Effects of bystander CPR following out-of-hospital cardiac arrest on hospital costs and long-term survival. Resuscitation. 2017 Jun 1;115:129-34.</p>	<p>One study identified suggested that bystander CPR appeared “cost-effective”: Geri G, Fahrenbruch C, Meischke H, Painter I, White L, Rea TD, Weaver MR. Effects of bystander CPR following out-of-hospital cardiac arrest on hospital costs and long-term survival. Resuscitation. 2017 Jun 1;115:129-34.</p>

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> Reduced <input type="radio"/> Probably reduced <input type="radio"/> Probably no impact <input type="radio"/> Probably increased <input type="radio"/> Increased <input type="radio"/> Varies <input checked="" type="radio"/> Don't know 	<p>No relevant published data was identified for review.</p> <p>There may be populations that reflect geographical and cultural issues where the interventions may be less effective (widening the potential gap between outcomes).</p>	

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <input type="radio"/> No <input type="radio"/> Probably no <input type="radio"/> Probably yes <input type="radio"/> Yes <input type="radio"/> Varies <input type="radio"/> Don't know 	<p>No relevant published data was identified for review.</p> <p>Rescuers have requested assistance and could expect instructions for them to carry out.</p> <p>Unaware of any perverse community implications (other strategies to promote CPR are widely accepted).</p>	

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

<ul style="list-style-type: none"> <input type="radio"/> No <input type="radio"/> Probably no <input checked="" type="radio"/> Probably yes <input type="radio"/> Yes <input type="radio"/> Varies <input type="radio"/> Don't know 	<p>Some limitations to the maximal benefit of implementation that were identified in existing studies include: how instructions for DA-CPR are delivered (DA protocol, dispatcher handling delays induced by the caller); motivation of dispatcher, the previous training experience and compliance rate of bystanders; and the quality of the CPR provided.</p>	
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SUMMARY OF JUDGEMENTS

	JUDGEMENT						
PROBLEM	No	Probably no	Probably yes	Yes		Varies	Don't know
DESIRABLE EFFECTS	Trivial	Small	Moderate	Large		Varies	Don't know
UNDESIRABLE EFFECTS	Large	Moderate	Small	Trivial		Varies	Don't know
CERTAINTY OF EVIDENCE	Very low	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	Possibly important uncertainty or variability	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	Probably favors the intervention	Favors the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	Moderate costs	Negligible costs and savings	Moderate savings	Large savings	Varies	Don't know
CERTAINTY OF EVIDENCE OF REQUIRED RESOURCES	Very low	Low	Moderate	High			No included studies
COST EFFECTIVENESS	Favors the comparison	Probably favors the comparison	Does not favor either the intervention or the comparison	Probably favors the intervention	Favors the intervention	Varies	No included studies
EQUITY	Reduced	Probably reduced	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	Probably yes	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	Probably yes	Yes		Varies	Don't know

TYPE OF RECOMMENDATION

Strong recommendation against the intervention <input type="radio"/>	Conditional recommendation against the intervention <input type="radio"/>	Conditional recommendation for either the intervention or the comparison <input type="radio"/>	Conditional recommendation for the intervention <input type="radio"/>	Strong recommendation for the intervention <input checked="" type="radio"/>
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CONCLUSIONS

Recommendation

We recommend emergency dispatchers provide CPR instructions in comparison to no CPR instructions to callers for pediatric patients in cardiac arrest when no bystander CPR is in progress (strong recommendation, low quality evidence).

Justification

In making a strong recommendation for emergency dispatchers to provide CPR instructions to callers for pediatric patients in cardiac arrest when no bystander CPR is in progress despite low quality evidence, we valued the consistency of results indicating benefit for all critical and important outcomes, with the exception of shockable rhythm (no benefit). This result for shockable initial rhythm aligns with the adult meta-analysis, but the result for the first analysis (dispatch centers offering DA-CPR, no benefit) contrasted with the adult results which found higher rates of shockable initial rhythm for centers offering DA-CPR. This may be due to the significant difference in etiology of OHCA in pediatrics compared to adults, where the majority of cases of POHCA have a respiratory etiology, in pathophysiology between adult and POHCA, in initial management, and to the delay in recognition of a pediatric arrest. This remains an under-explored area of research.

Subgroup considerations

Implementation considerations

Existing system for DA-CPR

Short response times.

Bystander CPR rates.

Mobile phone uptake and coverage.

Monitoring and evaluation

Research priorities

- 1- only one study adjusted for type of CPR/DACPR provided, all future POHCA should adjust for this important co-variable
- 2- only short term outcomes were evaluated, future studies should document long term outcomes, including QoL outcomes
- 3- future studies of bystander CPR should adjust for bystander characteristics
- 4- all POHCA studies should include data on the quality of bystander CPR and in-hospital (post-arrest) factors
- 5- effect of EMS response times on outcomes with DACPR
- 6- Cost-effectiveness studies of DA-CPR