QUESTION

Should EMS systems where dispatch assist is offered vs. EMS systems where dispatch assist is not offered be used for children with presumed cardiac arrest?	
POPULATION:	Children with presumed cardiac arrest
INTERVENTION:	EMS systems where dispatch assist is offered
COMPARISON:	EMS systems where dispatch assist is not offered
MAIN OUTCOMES:	Survival with CPC 1-2 -unadjusted data; New outcome Survival with CPC 1-2 -adjusted data; Survival-unadjusted data ; Survival-adjusted data; Provision of bystander CPR-unadjusted data; Provision of bystander CPR-adjusted data; Shockable initial 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 out of 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
○ No ○ Probably no ○ Probably yes ● Yes ○ Varies ○ Don't know	Out-of-hospital cardiac arrest (OHCA) is a significant cause of death worldwide with an annual rate of over 400,000. Survival rates for OHCA victims, the current average rate remains very low at approximately 10%. 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. Unfortunately, bystander CPR rates have remained astoundingly low over the past decade, rarely exceeding 35%.	

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Trivial ○ Small ● Moderate ○ Large ○ Varies ○ Don't know	Unfortunately the desired outcome (survival of the event) is not guaranteed and rescuers may suffer trauma either way (not studied). Survival with good neurological outcome 1 mo: adjusted and unadjusted: OR 1.03 (0.72-1.48); RR 1.03 (0.73-1.47); p=0.87) and OR 1.45 (0.98-2.15); RR not applicable; p=0.06 Survival at 1 mo: unadjusted analysis OR 1.17 (0.95-1.45); RR 1.15 (0.95-1.40); p=0.14; adjusted **OR 1.46** (1.05-2.03); RR not applicable; p=0.02 Provision of bystander CPR: unadjusted OR **4.05** (2.43-6.75); RR 2.25 (2.05-2.47); p=0.001; adjusted **OR 7.51** (6.58-8.57); RR not applicable; p<0.0001 Additional outcomes: Shockable initial rhythm: unadjusted OR 0.81 (0.60-1.11)); RR 0.82 (0.61-1.10); p=0.19 Arrest to CPR-initiation time: shorter times to CPR in systems with dispatch-assisted CPR (median 4 min (inter quartile range 1-9); vs. 11 min (inter quartile range 7-16), p<0.0001	Additional considerations include: rates of recognition of OHCA, motivation of dispatchers, time to deliver DA-CPR, time to arrival of EMS, existing bystander CPR rates, willingness of bystanders to commence CPR, and quality of CPR delivered.

Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large ○ Moderate ● Small ○ Trivial ○ Varies ○ Don't know	Unfortunately the desired outcome (survival of the event) is not guaranteed and rescuers may suffer trauma either way (not studied). Survival with good neurological outcome 1 mo: adjusted and unadjusted: OR 1.03 (0.72-1.48); RR 1.03 (0.73-1.47); p=0.87) and OR 1.45 (0.98-2.15); RR not applicable; p=0.06 Survival at 1 mo: unadjusted analysis OR 1.17 (0.95-1.45); RR 1.15 (0.95-1.40); p=0.14; adjusted **OR 1.46** (1.05-2.03); RR not applicable; p=0.02 Provision of bystander CPR: unadjusted OR **4.05** (2.43-6.75); RR 2.25 (2.05-2.47); p=0.001; adjusted **OR 7.51** (6.58-8.57); RR not applicable; p<0.0001 Additional outcomes: Shockable initial rhythm: unadjusted (OR 0.81 (0.60-1.11)); RR 0.82 (0.61-1.10); p=0.19 Arrest to CPR-initiation time: shorter times to CPR in systems with dispatch-assisted CPR (median 4 min (inter quartile range 1-9); vs. 11 min (inter quartile range 7-16), p<0.0001	

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

● Very low ○ Low ○ Moderate ○ High ○ No included studies	Certainty of Evidence for all outcomes was very low, with the exception of provision of bystander CPR: low for unadjusted, moderate for adjusted. All studies were observational, downgraded for risk of bias and imprecision (select analyses).	

Values

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

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ 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. 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
○ 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 1 mo: adjusted and unadjusted: OR 1.03 (0.72-1.48); RR 1.03 (0.73-1.47); p=0.87) and OR 1.45 (0.98-2.15); RR not applicable; p=0.06 Survival at 1 mo: unadjusted analysis OR 1.17 (0.95-1.45); RR 1.15 (0.95-1.40); p=0.14; adjusted **OR 1.46** (1.05-2.03); RR not applicable; p=0.02 Provision of bystander CPR: unadjusted OR **4.05** (2.43-6.75); RR 2.25 (2.05-2.47); p=0.001; adjusted **OR 7.51** (6.58-8.57); RR not applicable; p<0.0001 Additional outcomes: Shockable initial rhythm: unadjusted OR 0.81 (0.60-1.11)); RR 0.82 (0.61-1.10); p=0.19 Arrest to CPR-initiation time: **shorter times to CPR** in systems with dispatch-assisted CPR (median 4 min (inter quartile range 1-9); vs. 11 min (inter quartile range 7-16), p<0.0001	

Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

○ Large costs ○ Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ● Varies ○ Don't know	No relevant published data was identified for review. Existing systems may be in place, but additional training will be required to introduce Dispatch Assist instructions. Widespread availability of phone equipment (landline/mobile), phone reception, and loudspeaker mode may be a limitation and require resources. Community education may increase likelihood of following instructions.	

Certainty of evidence of required resources

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

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Very low ○ Low ○ Moderate ○ High ● No included studies	No relevant published data was identified for review so unable to provide any certainty here.	

Cost effectiveness

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

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ 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	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] No relevant published data was identified for review.	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.

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ○ Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ● Don't know	No relevant published data was identified for review. There may be populations that reflect geographical and cultural issues where the interventions may be less effective (widening the potential gap between outcomes).	

Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know	No relevant published data was identified for review. Rescuers have requested assistance and could expect instructions for them to carry out. Unaware of any perverse community implications (other strategies to promote CPR are widely accepted).	

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know	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.	

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

	JUDGEMENT						
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	Conditional recommendation against the intervention	Conditional recommendation for either the intervention or the comparison	Conditional recommendation for the intervention	**Strong recommendation for the intervention**
○	○	○	○	●

CONCLUSIONS

Recommendation

We recommend emergency medical dispatch centers offer dispatch-assisted CPR instructions in comparison to no dispatch-assisted CPR instructions for presumed pediatric cardiac arrest patients (strong recommendation, low certainty evidence).

Justification

In making a strong recommendation for dispatch centers to offer DA-CPR in the face of very low certainty evidence, we considered the benefit for the critical outcome of survival in the adjusted analyses, as well as the large positive magnitude of effect for the likelihood of provision of BCPR and reduced time to initiation of CPR when dispatch assistance was offered.

We do not have evidence to persuade us that this intervention is not acceptable or feasible given that many jurisdictions have successfully implemented DA-CPR. However, its cost effectiveness and impact on health equity have also not been evaluated and until known, may present barriers to implementation in under-resourced regions.

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