

## QUESTION

Is targeting basic life support (BLS) training to the likely rescuers of those at high-risk of out-of-hospital arrest (OHCA) effective?	
POPULATION:	For Adults and children at high-risk of OHCA
INTERVENTION:	Focused BLS training of likely rescuers (e.g. family or care-givers)
COMPARISON:	no such BLS training targeting
MAIN OUTCOMES:	<p>Patient outcomes: Good neurological outcome at hospital discharge/30-days; Survival at hospital discharge/30-days; Return of spontaneous circulation (ROSC); Rates of bystander CPR; Bystander CPR quality during an OHCA (any available CPR metrics); Rates of automated external defibrillator (AED) use.</p> <p>Educational outcomes at the end of training and within 12 months: CPR quality (chest compression depth and rate; chest compression fraction; full chest recoil, ventilation rate, overall CPR competency) and AED competency; CPR and AED knowledge; Confidence and willingness to perform CPR; and secondary training.</p>
SETTING:	Lay person BLS training
BACKGROUND:	Significant numbers of out of hospital cardiac arrest (OHCA) occur in the home. Targeting basic life support (BLS) training to bystanders who are most likely to witness an OHCA may be a promising intervention to improve patient outcomes.
CONFLICT OF INTERESTS:	The following Task Force members declared an intellectual conflict of interest and this was acknowledged and managed by the Task Force Chairs and Conflict of Interest committees: Janet Bray and Judith Finn.

## ASSESSMENT

<b>Problem</b> Is the problem a priority?		
JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Probably yes</li> <li><input checked="" type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p>Out-of-hospital cardiac arrest (OHCA) is a significant cause of death. Bystander CPR rates are low.</p> <p>ILCOR last reviewed the evidence for this question in 2015 and there have been 11 studies conducted since that time.</p>	<p>Institutions treating CA-patients have the opportunity to reach these group and can teach them CPR with low effort</p>

## Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>● Moderate</li> <li>○ Large</li> <li>○ Varies</li> <li>○ Don't know</li> </ul>	<p>There are now 43 studies reporting relevant outcomes for this PICO –including 12 new studies since the 2015 ILCOR review.</p> <p>In brief, there is insufficient evidence on subsequent use of BLS skills and patient outcomes following the training of family members and significant others at high-risk of cardiac arrest. Existing evidence suggest likely rescuers are unlikely to seek training on their own, but are willing to receive training. Most studies examining educational outcomes following training demonstrate improvements to skills and knowledge. Those trained were also likely to share training with others.</p> <p><b>For the critical patient outcomes of survival with favorable neurologic outcome at discharge/30 days, survival at discharge/30 days, return of spontaneous circulation (ROSC), rates of bystander CPR, bystander CPR certainty during an OHCA and rates of automated external defibrillator,</b> the certainty of evidence from 12 studies (3 RCTS) for these outcomes remains very low to low with too few OHCA events in individual studies during follow-up to be confident in the direction of effect.</p> <p><b>For the important outcome of BLS skills at completion of training,</b> the low to moderate certainty of evidence from 23 studies (3 RCTS) for these outcomes supporting the previous COSTR findings that providing BLS training improve skills and knowledge in these groups.</p> <p><b>For the important outcomes of BLS skills and knowledge retention to one-year,</b> we identified six non-RCTs of very low certainty evidence which were subject to high risk of bias due to high loss-to-follow-up. Overall, there was some degradation in some skills compared to post-training, but an improvement in skills and knowledge compared to most baseline measurements</p> <p><b>For the important outcome of willingness to provide CPR,</b> all 10 studies (2 RCTs, moderate certainty of evidence) showed an increase in willingness to provide CPR following training</p> <p><b>For the new important outcome of confidence to perform CPR,</b> we identified very low certainty of evidence from five non-RCTs studies reporting an increased confidence to perform CPR following training.</p> <p><b>For the important outcome of secondary training</b> we identified a low certainty of evidence from 9 studies. All studies with reported sharing of training materials with others.</p>	<p>These groups are willing to be trained and are unlikely to have any or recent BLS training. They are also unlikely to seek training on their own.</p>

## Undesirable Effects

How substantial are the undesirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li>○ Trivial</li> <li>○ Small</li> <li>○ Moderate</li> <li>○ Large</li> <li>● Varies</li> <li>○ Don't know</li> </ul>	<p>Some studies showed CPR skills were not at guideline standards 6-months after training, particularly with training without a manikin (e.g. Blewer 2016 740; Blewer 2020 28).</p>	<p>No increase in anxiety after training (Macken 2017 572).</p> <p>Degradation in BLS skills and knowledge is seen in all trained groups without further training.</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"> <li>○ Very low</li> <li>○ Low</li> <li>● Moderate</li> <li>○ High</li> <li>○ No included studies</li> </ul>	<table border="1"> <thead> <tr> <th>Outcome</th> <th colspan="2">Certainty of evidence</th> </tr> </thead> <tbody> <tr> <td>Patient outcomes</td> <td>Very low</td> <td>⊕</td> </tr> <tr> <td>Educational outcomes immediate to one-month</td> <td>Low to Moderate</td> <td>⊕⊕⊕</td> </tr> <tr> <td>Educational outcomes to one-year</td> <td>Very low</td> <td>⊕</td> </tr> <tr> <td>Willingness to provide CPR</td> <td>Moderate</td> <td>⊕⊕⊕</td> </tr> <tr> <td>Confidence to perform CPR</td> <td>Low</td> <td>⊕⊕</td> </tr> <tr> <td>Secondary training</td> <td>Low</td> <td>⊕⊕</td> </tr> </tbody> </table>	Outcome	Certainty of evidence		Patient outcomes	Very low	⊕	Educational outcomes immediate to one-month	Low to Moderate	⊕⊕⊕	Educational outcomes to one-year	Very low	⊕	Willingness to provide CPR	Moderate	⊕⊕⊕	Confidence to perform CPR	Low	⊕⊕	Secondary training	Low	⊕⊕	<p>Most studies were downgraded due to loss to follow-up (&gt;95%) for both short and long term outcomes.</p> <p>Most non-RCTs did not adjust for differences in characteristics and confounders (e.g. prior CPR training) at baseline between groups.</p> <p>Studies of video only education (compared to CPR kits with a manikin, or instructor-led training) showed inferior educational outcomes.</p> <p>The overall Judgement was upgraded for consistency.</p>
Outcome	Certainty of evidence																						
Patient outcomes	Very low	⊕																					
Educational outcomes immediate to one-month	Low to Moderate	⊕⊕⊕																					
Educational outcomes to one-year	Very low	⊕																					
Willingness to provide CPR	Moderate	⊕⊕⊕																					
Confidence to perform CPR	Low	⊕⊕																					
Secondary training	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"> <li>○ Important uncertainty or variability</li> <li>○ Possibly important uncertainty or variability</li> <li>● Probably no important uncertainty or variability</li> <li>○ No important uncertainty or variability</li> </ul>	<p>Main outcome is survival, and neurologically intact survival. COSCA has confirmed importance of these outcomes.</p> <p>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.</p> <p>Educational outcomes were decided and prioritised by the EIT Task Force.</p>	

## 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"> <li><input type="radio"/> Favors the comparison</li> <li><input type="radio"/> Probably favors the comparison</li> <li><input type="radio"/> Does not favor either the intervention or the comparison</li> <li><input checked="" type="radio"/> Probably favors the intervention</li> <li><input type="radio"/> Favors the intervention</li> <li><input type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p>Balance of effect favours BLS training in these groups.</p> <p>Higher value on:</p> <ul style="list-style-type: none"> <li>• the improvements in BLS skills when compared to baseline data or no training groups;</li> <li>• the potential benefits of patients receiving early CPR/BLS by a family-member or caregiver in the case of OHCA;</li> <li>• the willingness of this group to be trained and to use skills if required.</li> <li>• The multiplier effect of trainees training others.</li> </ul>	<p>BLS training in high-risk groups is already adopted.</p>

## Resources required

How large are the resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li><input type="radio"/> Large costs</li> <li><input type="radio"/> Moderate costs</li> <li><input type="radio"/> Negligible costs and savings</li> <li><input type="radio"/> Moderate savings</li> <li><input type="radio"/> Large savings</li> <li><input checked="" type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p>Varies. There are a number of resources required to set-up CPR training and refresh BLS skills (e.g. personnel, equipment). These costs are potentially reduced with self-instruction (e.g. CPR-kits self-training).</p>	<p>In one study recommendation by a healthcare professional to attend CPR training was an important contributing factor in prompting persons to participate.</p> <p>Encouragement, rational and providing direction or resources to refresh skills during initial training may support BLS skill and knowledge refreshment.</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"> <li><input type="radio"/> Very low</li> <li><input checked="" type="radio"/> Low</li> <li><input type="radio"/> Moderate</li> <li><input type="radio"/> High</li> <li><input type="radio"/> No included studies</li> </ul>	<p>Low quality evidence.</p>	<p>Self-training kits are now reasonably priced.</p>

## 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"> <li><input type="radio"/> Favors the comparison</li> <li><input type="radio"/> Probably favors the comparison</li> <li><input type="radio"/> Does not favor either the intervention or the comparison</li> <li><input checked="" type="radio"/> Probably favors the intervention</li> <li><input type="radio"/> Favors the intervention</li> <li><input type="radio"/> Varies</li> <li><input type="radio"/> No included studies</li> </ul>	<p>No evidence was found that examined the cost-effectiveness of this intervention in this group.</p>	

## Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li><input type="radio"/> Reduced</li> <li><input type="radio"/> Probably reduced</li> <li><input type="radio"/> Probably no impact</li> <li><input type="radio"/> Probably increased</li> <li><input type="radio"/> Increased</li> <li><input checked="" type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p>Varies. Could be incorporated into existing programs and sites (e.g. cardiac rehabilitation, hospital discharge education, hospital out-patients) to reduce inequality.</p> <p>There are known BLS training inequities –training high-risk groups may help to reduce these inequities.</p>	

## Acceptability

Is the intervention acceptable to key stakeholders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input checked="" type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p>High proportions of eligible participants took up training. Patients, family members and/or staff have positive feedback about the training.</p>	

## Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
<ul style="list-style-type: none"> <li><input type="radio"/> No</li> <li><input type="radio"/> Probably no</li> <li><input type="radio"/> Probably yes</li> <li><input type="radio"/> Yes</li> <li><input checked="" type="radio"/> Varies</li> <li><input type="radio"/> Don't know</li> </ul>	<p>Varies. Likely to require a local champion until integrated into practice.</p>	<p>Referral to BLS training alone is unlikely to increase training in these groups.</p>

## 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 ○	Conditional recommendation against the intervention ○	Conditional recommendation for either the intervention or the comparison ○	Conditional recommendation for the intervention ○	Strong recommendation for the intervention ●
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<b>Recommendation</b>	<p>We recommend BLS training for likely rescuers of populations at high-risk of out-of-hospital cardiac arrest (strong recommendation, low-to-moderate certainty of evidence).</p> <p>We recommend health care professionals encourage and direct likely rescuers of populations at high-risk of cardiac arrest to attend BLS training (ungraded, good practice statement).</p>
<b>Justification</b>	<p>In making this recommendation, the EIT Task Force placed higher value on:</p> <ul style="list-style-type: none"> <li>• the improvements or competency in BLS skills and confidence when compared to baseline data or guideline standards;</li> <li>• the improvements in confidence;</li> <li>• the multiplier effect of trained individuals training others.</li> <li>• the high proportion of OHCA that occur in the home and the potential benefits of patients receiving CPR by a family-member or caregiver in the case of OHCA;</li> <li>• the willingness of this group to be trained and to use skills if required;</li> <li>• CPR training doesn't increase anxiety in trainees; and</li> <li>• that these groups are unlikely to see training on their own.</li> </ul> <p>Given these facts we considered it important to recommend that health care professionals encourage and direct these groups to attend BLS training even though they may not take up training (Greenberg 2011, 166).</p> <p>We placed lesser value on the associated costs, and the potential that performance of some skills may not be to guideline standard and may not be retained without refresher CPR training.</p>
<b>Subgroup considerations</b>	<ul style="list-style-type: none"> <li>• The majority of the research is in cardiac patients or high-risk infants.</li> </ul>
<b>Implementation considerations</b>	<ul style="list-style-type: none"> <li>• It is important that opportunity to practice BLS skills is provided with training.</li> </ul>
<b>Monitoring and evaluation</b>	<ul style="list-style-type: none"> <li>• N/a</li> </ul>
<b>Research possibilities</b>	<ul style="list-style-type: none"> <li>• Long term follow-up through cardiac arrest registries may resolve the loss to follow-up.</li> </ul>