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| Question |
| **Question: In adults and children with cardiac arrest treated out-of-hospital, does dispatcher-assisted continuous chest compressions without ventilations compared with dispatcher-assisted standard CPR with ventilations improve patient outcomes?** |
| **Population:** | Adults and children in out-of-hospital cardiac arrest |
| **Intervention:** | Dispatcher-assisted chest compression-only CPR (CCO-CPR) |
| **Comparison:** | Dispatcher-assisted conventional CPR (C-CPR) with compressions and ventilations |
| **Main outcomes:** | Favourable neurological survival (as measured by cerebral performance category or modified Rankin Score) at discharge or 30-days and at any time interval after 30-days; Survival to discharge or 30 days survival; Survival to any time interval after discharge or 30 days survival; Return of spontaneous circulation (ROSC); Quality of life as measured by any indicator or score. |
| **Setting:** | Out-of-hospital setting |
| **Perspective:** |  |
| **Background:** | This topic was prioritized for review due to the time since the previous systematic review (Ashoor 2017 112) |
| **Conflict of interests:** | The following Task Force members and other authors declared an intellectual conflict of interest and this was acknowledged and managed by the Task Force Chairs and Conflict of Interest committees: Theresa Olasveengen |

# Assessment

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| ProblemIs the problem a priority? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yesX Yes○ Varies○ Don't know | Conventional cardiopulmonary resuscitation (CPR) consists of manual chest compressions and positive-pressure ventilation to maintain oxygenation until spontaneous circulation is restored. Ventilations result in frequent interruptions in chest compressions, however, which can reduce coronary and aortic blood flow during cardiac arrest and has been associated with poorer survival in animal models. Similarly, higher chest compression fraction (total resuscitation time spent performing chest compressions) has been associated with improved outcomes in observational studies. One strategy to improve chest compression fraction and reduce interruptions in chest compression is to perform continuous chest compressions. However, there is also concern that continuous chest compression may be harmful for patients who require more effective ventilations, such as asphyxial arrests or drowning.  | To improve bystander response, there is value in limiting the steps required for the dispatcher to review. Further, chest compression-only CPR can be learned quickly, even during an event via dispatcher instructions. |
| Desirable EffectsHow substantial are the desirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ○ TrivialX Small○ Moderate○ Large○ Varies○ Don't know | Interruptions in chest compressions have been associated with poorer clinical outcomes in observational studies (Christenson 2009 1241). Pauses for ventilations are a significant source of interruptions in chest compressions and may have negative impacts on coronary and aortic blood flow (Berg 2001 2465). ***For the critical outcome of favorable neurological function,*** we identified one RCT (Rea 2010 423), one observational study limited to only DA-CPR (Goto 2021 408), and three observational studies with combined B-CPR and DA-CPR cases (Javaudin 2021 812, Kitamura 2018 29, SOS-Kanto Study Group 2007 920). Indirect evidence of very-low certainty (downgraded for risk of bias and indirectness) from two cohort studies of combined bystander and DA-CPR suggests favorable neurological function with CCO-CPR compared to 15:2 CPR (adjusted OR 2.22, 95%CI: 1.17 to 4.21; SOS-Kanto Study Group 2007 920) and combined 15:2 and 30:2 CPR (adjusted OR 1.12, 95%CI: 1.06 to 1.19; Kitamura 2018 29). The remaining three studies, including the RCT, reported no difference between the two CPR strategies for survival with good neurological outcomes and either 15:2 CPR (e.g., risk difference 1.50, 95%CI: -1.40 to 4.40; Javaudin 2021 812) or 30:2 CPR (e.g., adjusted OR 0.92, 95%CI: 0.78 to 1.08; Goto 2021 408).***For the critical outcome of survival to hospital discharge or 30 days,*** we identified low to very-low certainty of evidence (downgraded for risk of bias, imprecision and indirectness) from 2 RCTs (Hallstrom 2000 1546, Svensson 2010 434), both using a 15:2 comparison, and three cohort studies (Goto 2021 408, Javaudin 2021 812, Kitamura 2018 29, Olasveengen 2008 914, Wnent 2021 101) that suggested improved survival or no difference in outcomes. One observational study in 143,500 presumed medical-origin OHCAs of all ages (Kitamura 2018 29) reported significantly higher odds of 30-day survival with CCO-CPR compared to C-CPR of either 15:2 or 30:2 (adjusted OR 1.05, 95%CI: 1.01 to 1.10). The remaining two RCTs and two observational studies reported no differences between the two CPR strategies for survival to hospital discharge (e.g., risk difference 4.20, 95%CI: -1.50 to 9.80; Hallstrom 2000 1546) or 30-day survival (e.g., risk difference 1.70, 95%CI: -1.20 to 4.60; Svensson 2010 434).  |   |
| Undesirable EffectsHow substantial are the undesirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ○ Large○ ModerateX Small○ Trivial○ Varies○ Don't know | ***For the critical outcome of survival to hospital discharge or 30 days,*** we identified very-low certainty of evidence (downgraded for risk of bias, imprecision and indirectness) from two observational studies, one of 5,406 all-aged OHCAs (Wnent 2021 101) and the other of 24,947 adult bystander-witnessed OHCAs (Goto 2021 408). These studies reported significantly lower odds of survival to hospital discharge for CCO-CPR compared to 15:2 and 30:2 CPR (adjusted OR 0.69, 95%CI: 0.53 to 0.90; Wnent 2021 101) and 30-day survival to CCO-CPR compared to 30:2 CPR (adjusted OR 0.72, 95%CI: 0.59, 0.88; Goto 2021 408).  |  |
| Certainty of evidenceWhat is the overall certainty of the evidence of effects? |
| Judgement | Research evidence | Additional considerations |
| ○ Very lowX Low○ Moderate○ High○ No included studies | The overall quality of evidence was rated as low to very low for all outcomes primarily due to a very serious risk of bias. The individual observational studies were all at a critical risk of bias due to confounding.  |  |
| ValuesIs there important uncertainty about or variability in how much people value the main outcomes? |
| Judgement | Research evidence | Additional considerations |
| ○ Important uncertainty or variabilityX Possibly important uncertainty or variability○ Probably no important uncertainty or variability○ No important uncertainty or variability | There five studies included that considered the impact of DA-CCC and standard DA-CPR on neurologically favourable survival, including one RCT (Rea 2010 423). No studies examined quality of life outcomes or longer-term patient outcomes. |  |
| Balance of effectsDoes 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 comparisonX Probably favors the intervention○ Favors the intervention○ Varies○ Don't know | Despite the theoretical risk of suboptimal ventilations in patients receiving DA-CCC, there is limited data suggesting a negative impact on survival. Conversely, there is some observational data to indicate potential patient harm from interruptions in chest compressions or bystander refusal to initiate chest compressions. Furthermore, standard CPR involving a compression-to-ventilation ratio is hard to achieve for bystanders, with or without dispatcher assistance. |  |
| Resources requiredHow large are the resource requirements (costs)? |
| Judgement | Research evidence | Additional considerations |
| ○ Large costs○ Moderate costsX Negligible costs and savings○ Moderate savings○ Large savings○ Varies○ Don't know | Negligible impact on resources as both treatment strategies require similar investment in staff and resources. |  |
| Certainty of evidence of required resourcesWhat is the certainty of the evidence of resource requirements (costs)? |
| Judgement | Research evidence | Additional considerations |
| ○ Very low○ Low○ Moderate○ HighX No included studies | There were no economic evaluations of the two treatment strategies. |  |
| Cost effectivenessDoes the cost-effectiveness of the intervention favor the intervention or the comparison? |
| Judgement | Research evidence | Additional considerations |
| ○ Favors the comparison○ Probably favors the comparisonX Does not favor either the intervention or the comparison○ Probably favors the intervention○ Favors the intervention○ Varies○ No included studies | CCC is likely to be as cost-effective as standard CPR. |  |
| EquityWhat would be the impact on health equity? |
| Judgement | Research evidence | Additional considerations |
| ○ Reduced○ Probably reduced○ Probably no impactX Probably increased○ Increased○ Varies○ Don't know | Bystanders may be more willing to provide care to a cardiac arrest victim when ventilations are not required. Bystander CPR rates are also known to be lower among certain populations and for victims of certain characteristics.  |  |
| AcceptabilityIs the intervention acceptable to key stakeholders? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yesX Yes○ Varies○ Don't know | Many systems around the world have already implemented dispatcher instructions using CO-CPR. |  |
| FeasibilityIs the intervention feasible to implement? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yesX Yes○ Varies○ Don't know | The Task Force placed high value on the importance of providing high-quality chest compressions and simplifying bystander instructions. |  |

# 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

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| --- | --- | --- | --- | --- |
| 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 |
| ○  | ○  | ○  | ○  | X  |

# Conclusions

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| Recommendation |
| We recommend that dispatchers provide chest compression-only CPR instructions to callers for adults with suspected OHCA (strong recommendation, low-certainty of evidence). |
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| Justification |
| * In making these recommendations, the task force acknowledged the very-low to low-quality evidence, but strongly endorsed the 2020 ILCOR Consensus on Science that all rescuers should perform chest compressions for all patients in cardiac arrest.
* Bystander CPR more than doubles OHCA survival (Sasson 2010 63). We placed a higher emphasis on the importance of providing high-quality chest compressions and increasing the overall rate of bystander CPR over providing rescue breaths in adults, particularly as these are harder to instruct on the emergency call.
* Increases in rates of bystander CPR and patient outcomes have been reported following the introduction of dispatcher-assisted CCO- or compression-focused CPR in adults (Bray 2011 1393, Iwami 2015 415, Kitamura 2012 2834, Malta Hansen 2015 255). Using a CO-CPR strategy may increase the willingness of bystanders to respond during a cardiac arrest.
* Most bystander CPR for adults is given with DA-CPR instructions, even in the presence of CPR-trained lay-bystanders (Riva 2024 e010027).
* The ongoing TANGO2 (Telephone Assisted CPR. AN evaluation of efficacy amonGst cOmpression only and standard CPR) trial is designed to evaluate whether compression-only cardiopulmonary resuscitation (CPR) by trained laypersons is noninferior to standard CPR in adult out-of-hospital cardiac arrest (NCT03981107). This study will provide additional insight, and likely prompt the task force to revisit this review.
* In making these recommendations, the task force took into consideration heterogeneity in the body of evidence, particularly related to implementation of DA-CPR. Despite this, most included studies suggested either a slight improvement or no difference in patient outcomes for dispatcher-assisted CCO-CPR and C-CPR, regardless of patient population or comparison ratio.
* The task force excluded from this review one observational study previously included (Kitamura 2011 3) due to the study not reporting adjusted data.
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| Research priorities |
| Current knowledge gaps include but are not limited to:* What are the identifying key words used by callers that are associated with cardiac arrest?
* Should there be “trigger” words or phrases from the bystander that are so likely to indicate cardiac arrest that the dispatcher can skip parts of the protocol and shorten the time to dispatch and to CPR instruction?
* What is the impact of adherence to or failure to follow dispatch protocols?
* What is the optimal instruction sequence for coaching callers in dispatcher-assisted CPR?
* What is the impact of telephone CPR instructions on non-cardiac etiology arrests such as drowning, trauma, asphyxia in adult and pediatric patients?
* What is the impact of language barriers to performance?
* How many chest compressions should be given, and for how long, before ventilation instructions are introduced?
* Should resuscitation instructions be modified in the context of advanced directives from the victim asking not to be resuscitated?

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