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| Question |
| **Should video-based dispatch vs. audio-based dispatch be used for cardiac arrest?** |
| **Population:** | Out-of-hospital cardiac arrest patient |
| **Intervention:** | video-based dispatch |
| **Comparison:** | audio-based dispatch |
| **Main outcomes:** | good CPC at discharge - unadjusted; good CPC at discharge - propensity score matching; survival at discharge - unadjusted; survival at discharge - propensity score matching; prehospital\_ROSC - unadjusted; prehospital\_ROSC - propensity score matching; |
| **Setting:** | out-of-hospital setting |
| **Perspective:** | The target audience for this guideline are clinicians and the patients they treat, the perspective is therefore that of the individual patient rather than a health system perspective. |
| **Background:** | DA-CPR is currently provided through a standard telephone audio-call between caller and dispatcher. As mobile technology evolves, video-calls have become generalized. Video-instructed DA-CPR has the advantage that the dispatcher can see the caller performing CPR and lead CPR by providing real-time feedback. Several simulation studies reported that the video-based dispatch improved CPR quality compared to traditional audio-call based dispatch. |
| **Conflict of interests:** | None |

# Assessment

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| ProblemIs the problem a priority? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no● Probably yes○ Yes○ Varies○ Don't know | Early bystander cardiopulmonary resuscitation (CPR) is a key factor in the chain of survival of OHCA. Dispatcher-assisted CPR (DA-CPR) programs have been recommended to increase the overall provision rate of bystander CPR. As mobile technology evolves and video-calls have become generalized, dispatchers may be able to provide CPR instruction while watching the scene. Video-based DA-CPR has been introduced to improve the quality of CPR provided by dispatcher instruction compared to tranditional audio-based dispatch. Video-based DA-CPR has the advantage that the dispatcher can see the caller performing CPR and lead CPR by providing real-time feedback.  | Video-based dispatch can also play a role in helping call takers to recognize cardiac arrest quickly by allowing them to see patient's status including agonal repspiration. |
| Desirable EffectsHow substantial are the desirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ● Trivial○ Small○ Moderate○ Large○ Varies○ Don't know | A observational cohort study enrolled 1720 OHCA patients (1489 and 231 in the audio and video groups, respectively). The survival to discharge rates were 8.9% in the audio group and 14.3% in the video groups (p < 0.01). Good neurological outcome occurred in 5.8% and 10.4% in the audio and video groups, respectively (p < 0.01). However, the adjusted ORs (95% CIs) for survival to discharge and good neurological outcome of the video group were 1.20 (0.74-1.94) and 1.28 (0.73-2.26), respectively. The propensity score matched population (n=462) showed that the survival to discharge rate was same in the both group (both 14.3%). The rate of good neurological outcome was not significantly different between groups (11.3% in audio vs. 10.4% in video group, p = 0.76). The effect of video dispatch on patient outcomes has nt been assessed in a randomized controlled trial, but baised on the findings from the identified observational study - adjusted analysis suggests the effects might be trivial. Important uncertainty about desirable effects remain.  | There were 13 manikin simulation studies to evaluate the CPR quality and the CPR initiation time between video vs audio-based dispatch. They showed improved CPR quality such as compression rate and time to compression in the video-based dispatch group. |
| Undesirable EffectsHow substantial are the undesirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ○ Large○ Moderate○ Small● Trivial○ Varies○ Don't know | There is no reported evidence about undesirable effect of using video-based dispatch system apart from simulation studies that suggest there might be a potential for delayed bystander CPR. |  |
| Certainty of evidenceWhat is the overall certainty of the evidence of effects? |
| Judgement | Research evidence | Additional considerations |
| ● Very low○ Low○ Moderate○ High○ No included studies | There is only one clinical study. The risk of bias of the retrospective observational study assessed as serious, the certainty of evidence is graded as very low. The results differed according to statistical adjustment. We have to wait for the results of further clinical studies.  |  |
| ValuesIs 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 | There is little uncertainty around the value that people put on the main outcome of neurological survival and/or survival to hospital discharge.  |  |
| 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 comparison○ Probably favors the intervention○ Favors the intervention○ Varies● Don't know | The undesirable effect on video-based dispatch is not known, but the effect of video-based dispatch is also not significant. It is difficult to judge from only one reported observational study.  |  |
| Resources requiredHow 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 | To implement video-based dispatch system, the dispatch center should set up appropriate video-related equipment, and relevant protocols should be developed and trained to the dispachers.The availability of mobile video phones in local communities should be high.Cost and resources needed is expected to vary greatly between systems, and some dispatch systems might have already implemented video communication for other purposes. Still, the BLS task force assessed the likely costs associated with implementation of video dispatch to be moderate. |  |
| 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○ High● No included studies | No research examined the resource requirements for the video-based dispatch. There is a high degree of uncertainty regarding required resources.  |  |
| 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 comparison○ Does not favor either the intervention or the comparison○ Probably favors the intervention○ Favors the intervention○ Varies● No included studies | No research examined the cost-effectiveness for the video-based dispatch. There is a high degree of uncertainty regarding cost effectiveness as both effectiveness and cost of intervention is uncertain.  |  |
| EquityWhat 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 | There is a possibility that video-based dispatch will not be available for the low socioeconomic cardiac arrest patients, who do not have a video-capable telephone at home, since there must be someone on site with a video phone. Dispatch systems with less resources is also likely to be disadvantaged as the cost of implementation is assumed to be moderate.  |  |
| AcceptabilityIs the intervention acceptable to key stakeholders? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yes○ Yes○ Varies● Don't know | There is not yet sufficient evidence to judge whether the stakeholders accept the video-based dispatch compared to audio-based dispatch. |  |
| FeasibilityIs the intervention feasible to implement? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yes○ Yes● Varies○ Don't know | It is likely that the feasibility will be dependent on the setting that it is applied. The included observation study would suggest it is feasible for systems with sufficient resources. |  |

# Summary of judgements

|  | **Judgement** |
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| **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 |
| ○  | ○  | ○  | **●**  | ○  |

# Conclusions

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| Recommendation |
| We suggest that the usefulness of video-based dispatch system be assessed in clinical trials or research initiatives (weak recommendation, very-low-certainty evidence). |
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| Justification |
| Only a single human observational study was identified, so the evidence informing the guideline is very uncertain. As new communication technologies offer promising new avenues in emergency medical dispatch, the Basic Life Support Task Force felt it was important to encourage research in this important area and therefore provided conditional recommendation for video-based dispatch system to be assessed in clinical trials or research initiatives. Several manikin simulation studies were identified evaluating video vs audio-based dispatch. Lin et al. published a systematic review comparing the effect of video-based and audio-based dispatch on quality of dispatcher-assisted CPR.15 The review included 6 simulation studies that showed that video-based dispatcher-assisted CPR significantly improved the chest compression rate compared to the audio-based dispatch, and a trend for more correct hand position was also observed. However, video-based dispatch caused a delay in the commencement of bystander-initiated CPR.15 While not directly informing clinical practice, these simulation studies provide important information about the aspects that need to be addressed and evaluated in future clinical studies evaluating video-dispatch. |

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| Subgroup considerations |
| To process video-based DA-CPR, more than two persons are needed, one to provide chest compressions and one to view the scene using a mobile phone. Therefore, it is expected that the feasibility and outcome of video-based dispatcher CPR may be differ between crowded public place and cardiac arrest at home.  |

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| Implementation considerations |
| In order to process video-based DA-CPR, the caller also needs to use a mobile phone capable of video telephony. Consideration should be given to whether the rate of penetration of video telephony is sufficient in the community. |

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| Monitoring and evaluation |
| If video-based dispatch system is implemented, the assessment for protocol and performance should be monitored. |

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| Research priorities |
| Knowledge Gaps· No RCT has compared video-based vs audio-based dispatch in any patient population.· Further observation studies evaluating the use of video communication in emergency medical dispatch will provide important new insight. · Two rescuers may be needed to effectively process video-based DA-CPR, one to provide chest compressions and one to handle the mobile phone and assist with communication. This might lead to varying feasibility of implementing video-based dispatcher CPR according to location of arrest (crowded public place vs. at home) etc.Note to Webmaster: CoSTR posting should be linked to ETD summary tableReferences1. Lee SY, Song KJ, Shin SD, Hong KJ and Kim TH. Comparison of the effects of audio-instructed and video-instructed dispatcher-assisted cardiopulmonary resuscitation on resuscitation outcomes after out-of-hospital cardiac arrest. *Resuscitation*. 2020;147:12-20.2. Atkinson PR, Bingham J, McNicholl BP, Loane MA and Wootton R. Telemedicine and cardiopulmonary resuscitation: the value of video-link and telephone instruction to a mock bystander. *Journal of Telemedicine & Telecare*. 1999;5:242-5.3. Bang JY, Cho Y, Cho GC, Lee J and Kim IY. Can Mobile Videocall Assist Laypersons' Use of Automated External Defibrillators? A Randomized Simulation Study and Qualitative Analysis. *BioMed Research International*. 2020;2020:4069749.4. Bolle SR, Scholl J and Gilbert M. Can video mobile phones improve CPR quality when used for dispatcher assistance during simulated cardiac arrest? *Acta Anaesthesiologica Scandinavica*. 2009;53:116-20.5. Dong X, Zhang L, Myklebust H, Birkenes TS and Zheng ZJ. Effect of a real-time feedback smartphone application (TCPRLink) on the quality of telephone-assisted CPR performed by trained laypeople in China: a manikin-based randomised controlled study. *BMJ Open*. 2020;10:e038813.6. Ecker H, Wingen S, Hamacher S, Lindacher F, Bottiger BW and Wetsch WA. Evaluation Of CPR Quality Via Smartphone With A Video Livestream - A Study In A Metropolitan Area. *Prehospital Emergency Care*. 2020:1-6.7. Hunt EA, Heine M, Shilkofski NS, Bradshaw JH, Nelson-McMillan K, Duval-Arnould J and Elfenbein R. Exploration of the impact of a voice activated decision support system (VADSS) with video on resuscitation performance by lay rescuers during simulated cardiopulmonary arrest. *Emergency Medicine Journal*. 2015;32:189-94.8. Lee JS, Jeon WC, Ahn JH, Cho YJ, Jung YS and Kim GW. The effect of a cellular-phone video demonstration to improve the quality of dispatcher-assisted chest compression-only cardiopulmonary resuscitation as compared with audio coaching. *Resuscitation*. 2011;82:64-8.9. Marquez-Hernandez VV, Gutierrez-Puertas L, Garrido-Molina JM, Garcia-Viola A, Granados-Gamez G and Aguilera-Manrique G. Using a Mobile Phone Application Versus Telephone Assistance During Cardiopulmonary Resuscitation: A Randomized Comparative Study. *Journal of Emergency Nursing*. 2020;46:460-467.e2.10. Perry O, Wacht O, Jaffe E, Sinuany-Stern Z and Bitan Y. Using a filming protocol to improve video-instructed cardiopulmonary resuscitation. *Technology & Health Care*. 2020;28:213-220.11. Plata C, Stolz M, Warnecke T, Steinhauser S, Hinkelbein J, Wetsch WA, Bottiger BW and Spelten O. Using a smartphone application (PocketCPR) to determine CPR quality in a bystander CPR scenario - A manikin trial. *Resuscitation*. 2019;137:87-93.12. Stipulante S, Delfosse AS, Donneau AF, Hartsein G, Haus S, D'Orio V and Ghuysen A. Interactive videoconferencing versus audio telephone calls for dispatcher-assisted cardiopulmonary resuscitation using the ALERT algorithm: a randomized trial. *European Journal of Emergency Medicine*. 2016;23:418-424.13. Yang CW, Wang HC, Chiang WC, Chang WT, Yen ZS, Chen SY, Ko PC, Ma MH, Chen SC, Chang SC and Lin FY. Impact of adding video communication to dispatch instructions on the quality of rescue breathing in simulated cardiac arrests--a randomized controlled study. *Resuscitation*. 2008;78:327-32.14. Yang CW, Wang HC, Chiang WC, Hsu CW, Chang WT, Yen ZS, Ko PC, Ma MH, Chen SC and Chang SC. Interactive video instruction improves the quality of dispatcher-assisted chest compression-only cardiopulmonary resuscitation in simulated cardiac arrests. *Critical Care Medicine*. 2009;37:490-5.15. Lin YY, Chiang WC, Hsieh MJ, Sun JT, Chang YC and Ma MH. Quality of audio-assisted versus video-assisted dispatcher-instructed bystander cardiopulmonary resuscitation: A systematic review and meta-analysis. *Resuscitation*. 2018;123:77-85. |