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| Question |
| **Should post-event debriefing vs. no post-event debriefing be used for treatment of cardiac arrest patients?** |
| **Population:** | Health care professionals who treat patients in any clinical setting in cardiac arrest of any age (adult, children, neonates) |
| **Intervention:** | post-event debriefing |
| **Comparison:** | no post-event debriefing |
| **Main outcomes:** | Favourable neurological outcome; Survival to discharge; ROSC; Chest compression depth; Chest compression rate; Chest compression fraction; Adherence to guidelines; |
| **Setting:** | Any clinical setting |
| **Perspective:** | Post-event debriefing may improve survival and quality of cardiopulmonary resuscitation. |
| **Background:** | Despite cardiopulmonary resuscitation training, clinical outcomes of patients remain limited. Rates of patients surviving with favourable neurological outcomes, survival to hospital discharge and ROSC are low after cardiac arrest and guideline-conform cardiopulmonary resuscitation. Strategies to provide debriefing to cardiopulmonary resuscitation teams for optimized CPR delivery are available and often common practice. Intra-event real-time defibrillator feedback is used in various institutions. Despite this, we do not have solid evidence that these practices improve patient outcomes, or if there are any negative side effects, like increased cost, emotional impact on the professional team etc. However, to learn from the information provided, post-event debriefing might be a way to address this information to improve the resuscitation performance for the next patient, via improving team communication, teamwork and help increase error detection during cardiopulmonary resuscitation attempts as well as mitigating any psychological negative effects on the team. |
| **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 | ROSC, survival to discharge, survival with favourable neurologic outcome and cardiopulmonary resuscitation quality (e.g. chest compression depth, chest compression rate, chest compression fraction) as well as adherence to guideline is often low. Use of debriefings after the event therefore has been implemented in various settings clinically to improve outcome and CPR quality. | However if this implementation helps the desirable outcomes is not known. |
| Desirable EffectsHow substantial are the desirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ○ Trivial○ Small● Moderate○ Large○ Varies○ Don't know | For the critical outcome of favourable neurological outcome:* Couper (2020)1 found a 77% probability that hot debriefings increased the odds of favourable neurological outcome, with an odds ratio of 1.11 (95% credible interval 0.83-1.44); however the also found a 1% probability that cold debriefings increased the odds of favourable neurological outcome, with an odds ratio of 0.69 (95% credible interval 0.49-0.93).
* Wolfe (2014)2 found that the intervention was associated with improved survival with favorable neurologic outcome on both univariate (50% vs 29%, p = 0.036) and multivariable analyses (aOR, 2.75; 95% CI, 1.01–7.5; p = 0.047).

For the critical outcome of survival to hospital discharge:* Couper (2020)1 found a 67% probability that hot debriefings increased the odds of survival to hospital discharge, with an odds ratio of 1.06 (95% credible interval 0.81 - 1.37); and an 11% probability that cold debriefings increased the odds of survival to hospital discharge, with an odds ratio of 0.83 (95% credible interval 0.62 - 1.11).
* Wolfe (2014)2 found that the intervention was associated with a trend toward improved survival to hospital discharge on both univariate analysis (52% vs 33%, p = 0.054) and after controlling for potential confounders (age, gender, first documented rhythm, and presence of vasoactive infusions at index arrest; adjusted odds ratio [aOR], 2.5; 95% CI, 0.91–6.8; p = 0.075).

For the critical outcome of ROSC:* Couper (2020)1 found a 48% probability that hot debriefings increased the odds of ROSC, with an odds ratio of 0.99 (95% credible interval 0.80-1.21); and a 89% probability that cold debriefings increased the odds of ROSC, with an odds ratio of 1.15 (95% credible interval 0.90-1.43).
* Edelson (2008)3 showed ROSC: 59% in intervention, 45% in comparator group (p=0.03). No effect size reported.
* Heydarzadeh (2020)4 showed a returning duration of neonate's color to normal state: debriefing 144.8±88.6, NRP workshop 256.6±178.5, control 232.3±128.1 (p=0.004), and Apgar scores at 1, 5, and 10 min were higher in the debriefing group compared to those reported for other groups; however, these changes were not statistically significant. No effect sizes reported.

For the important oucome of chest compression depth:* Edelson (2008)3 showed a chest compression depth: 50 mm (10) in the intervention, 44 mm (10) in the comparator group (p<0.001). No effect size reported.

For the important outcome of chest compression rate:* Bleijenberg (2017)5 showed a mean chest compression rate that was 93 (9) /min with the intervention, and 81 (13) in the comparator group (p=0.03). No effect size reported.
* Edelson (2008)3 showed a chest compression rate: 105/min (10) in the intervention, 100/min (13) in the comparator group (p=0.003). No effect size reported.

For the important outcome of chest compression fraction:* Bleijenberg (2017)5 showed a median chest compression fraction that was significantly better with the intervention 79% (70-85%) vs. the comparator group 86% (82-89%). No effect size reported.
* Edelson (2008)3 showed a no-flow fraction: 0.13 (0.10) in the intervention vs. 0.20 (0.13) in the comparator group (p<0.001). No effect size reported.

For the not important outcome of adherence to resuscitation guidelines:* Skare (2018)6 ACTA showed a median total NRPE-score of 89% (86, 93) in the intervention, vs. 77% (75, 81) in the comparator group (p<0.001).
* Skare (2018)7 Resuscitation showed an NRPE-score of 89 (86-92) % in the intervention, vs. 77% (75-81) in the comparator group, p < 0.001.
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| Undesirable EffectsHow substantial are the undesirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ○ Trivial● Small○ Moderate○ Large○ Varies○ Don't know | We did not find any data in the studies reporting undesirable effects of hot debriefing after cardiopulmonary resuscitation. However one study reporting In-hospital cardiac arrest audit data from the National Cardiac Arrest Audit (NCAA) and using a Bayesian hierarchical logistic regression model, adjusted for patient level and trust level confounders was used to explore the association between outcomes and pre-defined quality indicators reported on potential negative effect of cold debriefings on survival with favourable neurological outcome and survival to hospital discharge. However, the definitions of both are unclear And the same study shows a positive effect of hot debriefings. | We do not know what the implications are of additional costs and resources for hot and cold debriefings after cardiac arrests. We also do not know what the cost of training the debriefers are. Since the review was focused on clinical debriefing none of the studies included reported on potential psychological effects on the team being debriefed but focused on patient outcomes and CPR quality and/or adherence to guidelines. A separate review and/or further studies are needed to explore the effects of debriefing on the psychological state and safety of the resuscitation team. |
| 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 | For the critical outcome of favourable neurological outcome we found very low certainty evidence (downgraded for serious risk of bias, and very serious risk of inconsistency).1,2,8-10For the critical outcome of survival to discharge we found very low certainty evidence (downgraded for serious risk of bias, and very serious risk of inconsistency).1,2,5,8-10For the critical outcome of ROSC we found very low certainty of evidence (downgraded for serious risk of bias, and serious inconsistency).1-4,8-10For the important outcome of chest compression depth we found very low certainty of evidence (downgraded for serious risk of bias, serious risk of inconsistency, and serious risk of imprecision).3,8,9For the important outcome of chest compression rate we found very low certainty of evidence (downgraded for serious risk of bias, very serious risk of inconsistency, and serious risk of imprecision).3,5,8,9For the important outcome of chest compression fraction we found very low certainty evidence (downgraded for serious risk of bias, very serious risk of inconsistency and serious risk of imprecision).3,5,8,9For the not important outcome of adherence to guideline we found very low certainty of evidence (downgraded for serious risk of bias). 6,7 | All studies included were non-randomized studies, there was no RCT identified. This means that certainty of evidence is per definition low to begin with. All studies were downgraded for serious risk of bias and serious to very serious inconsistency. |
| 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 | Favourable neurological outcome, survival to hospital discharge and ROSC are important clinical outcomes of effective cardiopulmonary resuscitation. Clinical CPR performance is considered a Kirkpatrick level 3 outcome and generally considered as clinically important and meaningful. Adherence to guidelines is a Kirkpatrick level 2 outcome and generally considered as less important. | The Kirkpatrick model consists of four levels of learning: Level 1: reaction: the degree to which participants find the training favorable, engaging, and relevant to their jobs.Level 2: learning: the degree to which participants acquire the intended knowledge, skills, attitude, confidence, and commitment based on their participation in the training.Level 3: behavior: the degree to which participants apply what they learned during training when they are back on the job.Level 4: results: the degree to which targeted organizational outcomes occur as a result of the training initiative and subsequent support and accountability package.Targeting Kirkpatick level 3 outcomes is important in the context of cardiopulmonary resuscitation interventions to ensure good outcomes for patients and not just an effect of training during the intervention. |
| 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 evidence was mixed either favouring the intervention or showing no effect. There was no evidence favouring the comparator (no debriefing). |  |
| Resources required |
| Judgement | Research evidence | Additional considerations |
| ○ Large costs○ Moderate costs○ Negligible costs and savings○ Moderate savings○ Large savings○ Varies● Don't know | No evidence on required resources for CPR debriefing was found. | In one study the cost of surveillance cameras was given with approximately 125 euros per camera. However, this is just the equipment cost. We do not have evidence for the cost of debriefing or the cost of time for team members to participate in debriefings. Cost and time constraints are a major health care resources constraint worldwide. Low-resource settings might be disadvantaged in implementing a debriefing system. |
| 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 evidence was identified. |  |
| 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 | There was no included studies on cost-effectiveness. | Despite some obvious costs for training debriefers and team members time to attend debriefings, the positive effects of debriefings on patient outcome and CPR performance as well as adherence to guidelines, potentially outweigh those costs. But without reliable studies on cost-effectiveness we cannot rate this as favourable for the debriefing intervention. |
| 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 | No evidence was identified. | We do not know if there is an effect on health equity with or without the use of debriefings. |
| AcceptabilityIs the intervention acceptable to key stakeholders? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yes○ Yes○ Varies● Don't know | We found no evidence on acceptability. | Clinical debriefings are performed in many settings, including in-hospital and out-of hospital settings. The studies we identified did not report on acceptability. There were also no studies from low-resource settings and no study in an out-of-hospital setting. However, debriefing in education and the clinical environment is well established and a widely accepted practice. |
| FeasibilityIs the intervention feasible to implement? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no● Probably yes○ Yes○ Varies○ Don't know | Clinical debriefings are already performed in several in-hospital and out-of-hospital settings. The availability of the resources to perform clinical debriefings (e.g., time, cost etc.) may vary in resource-limited settings and out-of-hospital settings. However there might be even more time to perform debriefings in the out-of-hospital setting compared to busy in-hospital resuscitations with intra-hospital resuscitation teams that might not be able to meet after the event, whereas an out-of-hospital team might be more easily able to debrief the event since the team is potentially working together more frequently.  | For feasibility there are studies that report roadblocks to implementing debriefing programs due to cost, resources or problems with data inclusion from CPR feedback devices. We also know that sustainability of a debriefing program might be difficult. However, general feasibility of performing debriefings should be possible. |

# 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** | Trivial | **Small** | Moderate | Large |  | 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 to perform post-event debriefing after adult, paediatric and neonatal cardiac arrest in all settings that have the adequate resources (weak recommendation, very low certainty evidence). |
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| Justification |
| Performance of post-event debriefing was either associated with no effect or with improved outcomes, including critical outcomes (favourable neurological outcome, survival to discharge, ROSC), important outcomes (chest compression depth, chest compression rate, chest compression fraction) and not-important outcomes (adherence to guidelines). However, the certainty of evidence for the included outcomes was very low, because of serious risk of bias and serious to very serious risk of inconsistency. The analysis revealed high heterogeneity across studies, reflecting variation in debriefing design, patient population (adults, children, neonates), and outcome measures evaluated within diverse studies. Therefore no statement can be issued which kind of debriefing (like hot or cold debriefing) might be more effective. Also the studies lack a clear standardized definition if the debriefings can be considered hot or cold debriefings, with only one study reporting on the two different modalities. All other studies need to be considered cold debriefings, as the debriefing was not performed at the time of the resuscitation.This treatment recommendation is based on non-randomized studies. No study compared debriefing with no debriefing after cardiopulmonary resuscitation in a randomized controlled trial, which caused serious risk of bias.We have not identified any undesirable effects (e.g., emotional trauma to the debriefed team, or the needed resources (incl. costs) for debriefing after cardiac arrest in the reviewed studies. However we have identified neutral to positive effects on our critical and important outcomes. Hence, we justify that the reported positive effects outweigh any possible undesirable effects. |

We did not find any study in low resource settings and cannot comment on that setting.

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| Subgroup considerations |
| We did not identify evidence to address any subgroup analyses. |

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| Implementation considerations |
| Defusing emotions of rescuers after stressful or traumatic events should be taken into account when assessing any potential risks related to debriefing.The associated costs to implement debriefings are likely to be low in most institutions. The most important factors might be the time commitment of resuscitation team members and the cost of training the debriefers. However, the reviewed studies did not explore cost-effectiveness of debriefing. This is also applicable when referring to the required resources related with debriefing. Only one study mentioned the cost of surveillance cameras as 125 euros per camera.Successful debriefing programs also will require training of debriefers. Use of video surveillance to inform debriefing might be a resource to consider.Debriefings are likely acceptable to stakeholders (because of potential benefits such as improved teamwork, improved communication, improved identification of latent safety threats) and feasible in most institutions, including in- and out-of hospital settings. However, resource limited settings might be disadvantaged in implementation.The role of CPR feedback device data might be beneficial to inform debriefings. |

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| Monitoring and evaluation |
| Regular evaluation of the effectiveness and acceptability of debriefing programs should be considered. |

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| Research priorities |
| The identified evidence was limited with all studies being non-randomized studies. This suggests the need for further evidence on debriefing after cardiopulmonary resuscitation including randomized controlled trials.We identified insufficient evidence to address subgroup analyses, e.g. adult vs. pediatric cardiac arrest, or in-vs. out-of hospital setting.We identified no study on cost-effectiveness or use of post-event debriefings in low-resource settings.We identified no negative effects of debriefing on the resuscitation team, however minor they might be, they should be investigated in a further review and/or further studies on the effectiveness on resuscitation debriefing. |

# References Summary

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