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| Question | |
| **Should [Emergent or early CAG with PCI if indicated] vs. [Delayed CAG or no CAG] be used for [Unresponsive adults (> 18 years old) with return of spontaneous circulation (ROSC) after cardiac arrest with ST-segment elevation (STEMI) on ECG]?** | |
| **Population:** | [Unresponsive adults (> 18 years old) with return of spontaneous circulation (ROSC) after cardiac arrest] |
| **Intervention:** | [Emergent or early CAG with PCI if indicated] |
| **Comparison:** | [Delayed CAG or no CAG] |
| **Main outcomes:** | Survival at 24 hours-RCTs; Survival to hospital discharge-RCTs; Survival to hospital discharge-no STEMI-RCTs; Survival to hospital discharge-shockable-RCTs; Survival at 30 days-NRCTs; Survival at 90 days-RCTs; Survival at 1 -3 years-NRCTs; Favorable Neurologic Outcome at ICU discharge -RCTs; Favorable Neurologic Outcome at hospital discharge-NRCTs; Favorable Neurologic Outcome at hospital discharge-noSTEMI-NRCTs; Favorable Neurologic Outcome at hospital discharge-shockable-NRCTs; Favorable Neurlogic Outcome at 90 days-RCTs; Favorable Neurologic Outcome at 90 days-noSTEMI-RCTs; Favorable Neurologic Outcome at 90 days-shockable-RCTs; PCI ITT-RCTs; PCI PP-RCTs; Successful PCI ITT-NRCTs; Successful PCI PP-NRCTs; CABG ITT-RCTs; Stroke-ICH-NRCTs; Stroke-ICH-RCTs; Recurrent arrest; Sepsis; Pneumonia; Bleeding; Renal replacement therapy; Acute renal failure; Brady arrhytmias-Pacing; Shock; Survival to hospital discharge-STEMI-NRCTs; Favorable Neurologic Outcome at hospital discharge-STEMI-NRCTs; |
| **Setting:** |  |
| **Perspective:** |  |
| **Background:** |  |
| **Conflict of interests:** |  |

# Assessment

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| Problem Is the problem a priority? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ○ Probably yes ● Yes ○ Varies ○ Don't know | Survival from cardiac arrest is low (~10%). The majority of cardiac arrests are of presumed cardiac etiology amendable to cardiac intervention. |  |
| Desirable Effects How substantial are the desirable anticipated effects? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Trivial ○ Small ● Moderate ○ Large ○  Varies ○ Don't know | Improving patient outcomes after cardiac arrest is of utmost importance. Urgent angiography may be most important in post-cardiac arrest patients with STE on ECG. There are no RCTs on urgent coronary angiography specific to this population. We identified two observational studies examining patients with post-ROSC STEMI on ECG. Neither study identified benefit with urgent coronary angiography | Urgent coronary angiography and PCI, when indicated, is recommended for patients who have a ST-segment myocardial infarction without cardiac arrest. |
| Undesirable Effects How substantial are the undesirable anticipated effects? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Large ○  Moderate ● Small ○ Trivial ○ Varies ○ Don't know | RCTs of post-ROSC patients (Lemkes, Elfwen) did not identify any risk of adverse events such as bleeding, stroke, or re-arrest with early coronary angiography. | Coronary angiography for post-cardiac arrest patients requires considerable resource utilization, cost and may detract from other important intervetnsions such as TTM in undifferentiated post-cardica arrest patients.  Timing of ECG post-ROSC may help to avoid false positive activations (Baldi 2020) |
| 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 | The certainty of evidence is very low for post-cardiac arrest patients with ST elevation on ECG. A single observational study (Garcia 2016) met our pre-determined criteria for inclusion and found no improvement in survival [OR 1.89 (95% CI 0.48, 7.43)] or neurological outcome [OR 1.12 (95% CI 0.30, 4.19)] at hospital discharge with urgent coronary angiography. |  |
| 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 | Survival and neurological outcome are both patient-oriented outcomes that are considered highly important for cardiac arrest research. COSCA statement [Haywood 2018] include these as core outcomes for reporting of cardiac arrest. |  |
| 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 | While the outcome of survival would be valued more than the undesirable effects the effect estimate and certainty of evidence suggests no benefit for early CAG for post-cardiac arrest STEMI patients. This evidence comes from a single observational study. |  |
| 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 | Costs were not evaluated in this systematic review. Resource costs, however, are substantial for this intervention and will most likely vary across countries. This would include both costs to the prehospital system and in-hospital system. |  |
| 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 | We did not include any studies to determine the certainty of evidence around the cost associated with early CAG. |  |
| 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 | We did not include any studies that examined the cost-effectiveness of this intervention. |  |
| 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 |  |  |
| Acceptability Is the intervention acceptable to key stakeholders? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know | The intervention is widely accepted in non-cardiac arrest patients and in post-cardiac arrest patients with ST-segment elevation no ECG and is currently recommended in cardiac arrest guidelines. |  |
| Feasibility Is the intervention feasible to implement? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ○ Probably yes ○ Yes ● Varies ○ Don't know | Feasibility of this intervention may vary between jurisdictions. While the intervention is a common treatment for both post-cardiac arrest and non-cardiac arrest patients the feasibility of early angiography for post-cardiac arrest patients would depend on system resources to transport patients to a centre capable of performing the intervention and on the accessibility of a PCI centre. This will vary across regions. |  |

# 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 early coronary angiography in comatose post-cardiac arrest patients with ST segment elevation. (good practice statement) |
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| Justification |
| For comatose patients with ST segment elevation there is no randomized clinical evidence for the timing of coronary angiography. The Task Force acknowledges that early coronary angiography, and percutaneous intervention if indicated, is the current standard of care for patients with STEMI who did not have a cardiac arrest. We found no evidence to change this approach in patients with ST segment elevation following cardiac arrest. |

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| Subgroup considerations |
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| Implementation considerations |
| The ability to implement coronary angiography for post-cardiac arrest patients will vary across systems. It will depend on prehospital resources, distance to cath lab and ability of hospitals to perform intervention. Regional variations may also differ in terms of whether patients are transported directly from the field (“Bypass directive”) or if they are transported to local hospitals and then transferred to a cardiac centre at a later time (“inter-facility transfer”). |

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| Monitoring and evaluation |
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| Research priorities |

* Future trials should consistently define what are the comparable time intervals to treatment for early compared to late angiography and PCI.
* Whether early coronary angiography improves survival/survival with favorable neuro outcome for post-arrest patients with ST elevation
* Whether angiography, compared to no angiography, improves outcomes in post-arrest patients
* Whether angiography and PCI may improve outcomes in the no ST elevation cohort who present in shock
* No studies identified evaluated this question for cardiac arrest in the in-hospital setting.
* No RCTs compared angiography and PCI vs thrombolysis and early vs late time to treatment interval.
* Most randomized trials have focused on short term survival and functional outcomes so data on longer term outcomes is relatively more limited.
* Relatively few studies examining health related quality of life (HRQoL) outcomes
* There may be newer or alternative endpoints such as functional or biochemical measures that may show a benefit with timing of coronary angiography in cardiac arrest patients