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| Question | |
| **Should bicarbonate vs. no bicarbonate be used for pediatric CA caused by hyperkalaemia?** | |
| **Population:** | pediatric CA caused by hyperkalaemia |
| **Intervention:** | bicarbonate |
| **Comparison:** | no bicarbonate |
| **Main outcomes:** | All outcomes |
| **Setting:** | any setting |
| **Perspective:** |  |
| **Background:** |  |
| **Conflict of interests:** | none |

# 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 | No evidence exist for paediatric patients. | Paediatric cardiac arrest is rare and patients with hyperkalaemia are only a minority of these patients. So it is not a problem on population level. However, the optimal management strategy is indeed a priority for the individual patients who might arrest due to acute hyperkalaemia such as patients with renal failure, tumor lysis syndrome, massive tissue damage (crush syndrome), malignant hypertermia etc. |
| Desirable Effects How substantial are the desirable anticipated effects? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Trivial ○ Small ○ Moderate ○ Large ○ Varies ● Don't know | No research evidence for paediatric patients. | Altogether, there is no evidence even in adult patients that the sodium bicarbonate alone is effective in lowering potassium levels (in the meta-analysis performed in the original SR for adult patients there was no effect on potassium levels). |
| Undesirable Effects How substantial are the undesirable anticipated effects? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Trivial ○ Small ○ Moderate ○ Large ○ Varies ● Don't know | No evidence for paediatric patients. | Sodium bicarbonate is generaly associated with worse patients outcomes. The causal effect however was not established and there are possible confounder biases for this effect. |
| 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 | No evidence for pediatric patients. |  |
| 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 |  | The predefined patient outcomes are similar to those defined in P-COSCA dataset, except that quality of life that was not predefined as an outcome. Other clinical outcomes in the original SR performed are standard clinical outcomes in cardiac arrest studies, however, it is not clear which of these outcomes are the most important for the patients and their parents themselves. |
| 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 | No evidence for the population in question. |  |
| Resources required | | |
| Judgement | Research evidence | Additional considerations |
| ○ Large costs ○ Moderate costs ● Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know |  | Sodium bicarbonate is an inexpensive drug. There may be countries where it is not available for all. |
| 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 |  | Sodium bicarbonate is an inexpensive drug. |
| 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 |  | Negligible saving costs if sodium bicarbonate is not used. |
| 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 |  | There may be countries where the availability might differ. |
| Acceptability Is the intervention acceptable to key stakeholders? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ○ Probably yes ○ Yes ● Varies ○ Don't know |  | Sodium bicarbonate was widely used in cardiac arrest and it was also recommended for use in cardiac arrest caused by hyperkalaemia based on patophysiological judgment of its properties. However, there is no scientific evidence for its use in the paediatric population and it was associated with worse outcomes in pediatric cardiac arrest patients. |
| Feasibility Is the intervention feasible to implement? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ○ Probably yes ○ Yes  ○ Varies ● Don't know |  |  |

# 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** | 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 |
| For pediatric patients in cardiac arrest associated with hyperkalaemia, there is insufficient evidence to make a treatment recommendation for or against the use of sodium bicarbonate.  . |
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| Justification |
| There is an absence of evidence on which to base the recommedation. The PLS TF did not feel there are additional considerations on which to make the decision. |

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| Subgroup considerations |
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| Implementation considerations |
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| Monitoring and evaluation |
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| Research priorities |
| The high quality RCTs are difficult to perform for such a rare condition or the acquisition of patients into the study to reach the statistical significance would take a very long time. Therefore, our best evidence in the future will probably come from the paediatric cardiac arrest registries preferably with high numbers of patients. However, such evidence will inevitably be downgraded for confounder and other bias. |