

CADTH Reference List

Bispectral Index Monitoring in Patients Post-Cardiac Arrest

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Key Messages

- No evidence was found regarding the clinical utility or diagnostic accuracy of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients post-cardiac arrest.
- No evidence-based guidelines were identified regarding the use of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients with a hypoxic brain injury.

Research Questions

1. What is the clinical utility of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients post-cardiac arrest?
2. What is the diagnostic accuracy of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients post-cardiac arrest?
3. What are the evidence-based guidelines regarding the use of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients with a hypoxic brain injury?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international HTA database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were bispectral index monitors and epileptic activity. No search filters were applied and the search was limited to English language documents published between January 1, 2011 and April 5, 2021. A separate search was done with a filter applied to limit retrieval to guidelines. This search was limited to English language documents published between January 1, 2016 and April 5, 2021. Where possible, retrieval was limited to the human population. Internet links were provided, where available.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications.

Table 1: Selection Criteria

Criteria	Description
Population	Q1 and Q2: Adult patients post-cardiac arrest treated in intensive care units who are sedated, ventilated, and under targeted temperature management (also known as therapeutic or protective hypothermia) Q3: Adult patients with a hypoxic brain injury due to any cause (e.g., cardiac arrest, hemorrhagic or septic shock, drug overdose, traumatic vascular injury, smoke inhalation, acute lung injury)
Intervention	Bispectral index monitor (any brand) for the detection of epileptic activity or subclinical seizures
Comparator	Standard electroencephalogram (reference test)
Outcomes	Q1: Clinical utility (e.g., additional testing for epilepsy, subsequent pharmacological therapy for epilepsy, surgery for epilepsy, prevention of recurring seizures, prognosis, hospitalization, mortality) Q2: Diagnostic accuracy (e.g., sensitivity, specificity, positive predictive value, negative predictive value, detection rate for epileptic activity, or subclinical seizures) Q3: Recommendations regarding the use of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients with a hypoxic brain injury due to any cause
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

Results

No relevant literature was found regarding the clinical utility or diagnostic accuracy of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients post-cardiac arrest. Furthermore, no evidence-based guidelines were identified regarding the use of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients with a hypoxic brain injury.

References of potential interest that did not meet the inclusion criteria are provided in Appendix 1.

Overall Summary of Findings

No evidence was found regarding the clinical utility or diagnostic accuracy of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients post-cardiac arrest. Additionally, no evidence-based guidelines were identified regarding the use of bispectral index monitoring for the detection of epileptic activity or subclinical seizures in adult patients with a hypoxic brain injury; therefore, no summary can be provided.

References

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

No literature identified.

Guidelines and Recommendations

No literature identified.

Appendix 1: References of Potential Interest

Non-Randomized Studies

Unclear or Alternative Population

1. Eertmans W, Genbrugge C, Haesen J, et al. The Prognostic Value of Simplified EEG in Out-of-Hospital Cardiac Arrest Patients. *Neurocrit Care*. 2019 Feb;30(1):139-148. [PubMed](#)
2. Haesen J, Eertmans W, Genbrugge C, et al. The validation of simplified EEG derived from the bispectral index monitor in post-cardiac arrest patients. *Resuscitation*. 2018 May;126:179-184. [PubMed](#)
3. Ochiai K, Shiraishi A, Otomo Y, Koido Y, Kanemura T, Honma M. Increasing or fluctuating bispectral index values during post-resuscitation targeted temperature management can predict clinical seizures after rewarming. *Resuscitation*. 2017 May;114:106-112. [PubMed](#)
4. Hernandez-Hernandez MA, Fernandez-Torre JL. Color density spectral array of bilateral bispectral index system: Electroencephalographic correlate in comatose patients with nonconvulsive status epilepticus. *Seizure*. 2016 Jan;34:18-25. [PubMed](#)

Review Articles

5. Feng G, Jiang G, Li Z, Wang X. Prognostic value of electroencephalography (EEG) for brain injury after cardiopulmonary resuscitation. *Neurol Sci*. 2016 Jun;37(6):843-849. [PubMed](#)
6. Bigham C, Bigham S, Jones C. Does the bispectral index monitor have a role in intensive care? *JICS*. 2012;13(4):314-319. <https://journals.sagepub.com/doi/pdf/10.1177/175114371201300410> Accessed 2021 Apr 09.

Additional References

Poster Presentation

7. Haesen J, Desteghe L, Meex I, et al. Use of bispectral index EEG monitoring for a fast and reliable detection of epileptic activity in postcardiac arrest patients. *Crit Care*. 2015;19:P434. <https://ccforum.biomedcentral.com/articles/10.1186/cc14514> Accessed 2021 Apr 09.

Case Reports

8. Fernandez-Torre J, Hernandez-Hernandez MA. Utility of bilateral bispectral index (BIS) monitoring in a comatose patient with focal nonconvulsive status epilepticus. *Seizure*. 2021 Jan;21(1):61-64. <https://www.sciencedirect.com/science/article/pii/S1059131111002391> Accessed 2021 Apr 09. [PubMed](#)
9. Ntahe A. Early Diagnosis of Nonconvulsive Status Epilepticus Recurrence with Raw EEG of a Bispectral Index Monitor. *case report*. 2018 Sep 12;2018:1208401. [PubMed](#)