INDICATIONS FOR URGENT ELECTROENCEPHALOGRAPHY

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Please find following a summary of a literature search and relevant results. All articles can be provided in full - email library@monashhealth.org for a list of the articles you require.

QUESTION

What are the indications for urgent EEG.

RESULTS

ONLINE RESOURCES (GREY LITERATURE)

NONCONVULSIVE STATUS EPILEPTICUS

BMJ Best Practice. (2023). **Status Epilepticus**. Link.

- Non-convulsive status epilepticus (NCSE) involves prolonged seizure activity without prominent motor symptoms, leading to non-convulsive clinical signs like confusion or aphasia.
- NCSE can occur after convulsive status epilepticus, and if a non-convulsive seizure lasts more than 2 minutes longer than usual, an emergency management plan should be agreed upon.
- Patients experiencing NCSE should be referred to a neurology team for specialist assessment and management.

UpToDate. (2023). **Nonconvulsive status epilepticus: Classification, clinical features, and diagnosis.** Link.

- Nonconvulsive status epilepticus (NCSE), initially identified in chronic epilepsy patients, is now increasingly recognized in critically ill patients, though its diagnosis and treatment are complex and variable.
- The impact of electrographic activity in NCSE on clinical impairment and neuronal injury is not always clear, complicating management decisions.

STATUS EPILEPTICUS ADULT

American College of Emergency Physicians. (2024). **Clinical Policy: Critical Issues in the Management of Adult Patients Presenting to the Emergency Department With Seizures.** Link

- This policy is not intended to be a complete manual on the evaluation and management of adult patients with seizure, but rather a focused examination of a critical question that has particular relevance to the current practice of emergency medicine.

National Health Service (NHS). (2023). **Status Epilepticus Guideline in Adult Patients**. Link.

- The purpose of this guideline is to standardise the treatment of generalised convulsive status epilepticus in adult patients aged 17 years and over requiring acute admission to hospital.

American Academy of Neurology. (2022). **Neuroimaging in the emergency patient presenting with seizure.** Link.

- Utility of Neuroimaging as screening procedure for altering management of emergency patients.

Canadian Neurological Society. (2022). **Neurology.** Link

- Five tests and treatments to question.

American Clinical Neurophysiology Society. (2021). **Standardized Critical Care EEG Terminology.** Link.

- 2021 ACNS critical care EEG terminology.
- Electrographic and Electroclinical Seizure Activity

National Health Service (NHS). (2021). **Protocol for management of inpatient status epilepticus in adults**. Link.

- Status epilepticus is a life threatening medical emergency. Treatment of suspected status epilepticus should be started immediately and not deferred or delayed for investigations, including EEG.

STATUS EPILEPTICUS PAEDIATRIC

Children's Health Queensland (2023). **Status epilepticus – Emergency management in children.** Link.

- EEG is not routinely recommended in the acute phase if seizures are controlled. For suspected persisting seizure activity or delayed return of conscious state consult a paediatric neurologist.

Queensland Health. (2022). **Neonatal Seizures**. Link.

- Flow Chart: Assessment and management of neonatal seizures

Health Improvement Scotland. (2021). E**pilepsies in children and young people: investigative procedures and management.** Link.

- This new guideline reflects the most recent evidence around current issues. Key issues were agreed after consultation with a wide range of stakeholders. Including appropriate investigation, non-pharmacological management, cognitive, developmental and psychiatric comorbidities, transition to adult services and mortality.

Royal Children's Hospital Melbourne. (2020). **Febrile Seizures.** Link.

- There is no role for EEG in simple febrile seizures and a limited role in complex febrile seizures

PEER-REVIEWED LITERATURE – MOST RECENT FIRST

Articles are grouped by theme:

- Clinical Indications
- Emergency Unit
- Intensive Care Unit
- Paediatric

Each article summary contains excerpts from the abstract and an online link.

CLINICAL INDICATIONS

Bellini. A, et al. (2024). **Predictors of seizure detection and EEG clinical impact in an italian tertiary emergency department.** *Journal of neurology, 271*(8), 5137-5145. Full text.
This study aimed to assess emergency electroencephalogram (EmEEG) utilization, identifying factors predicting seizure detection and its influence on clinical decisions. The study provides insights into the nuanced impact of EmEEG in different clinical scenarios, offering valuable guidance for clinicians in selecting patients for EmEEG, particularly in conditions of limited EEG availability.

Poytakangas. T, et al. (2023)**. Indications for the use of intravenous second-line antiseizure medications in an emergency room setting.** *Epilepsy Research, 196*, 107218. Full text.
We wanted to explore these different indications and assess the actual usage of first- and second-line ASMs for SE with reference to other uses, such as for SE mimics. Even though most of the use of ASMs was justified and administered for SE, it is a diagnostic challenge where a prior diagnosis of epilepsy can be a misleading factor, and EEG is an essential tool when clinical features are often overlapping with other acute seizure disorders.

Zafar. A, et al. (2023). **EEG criteria for diagnosing nonconvulsive status epilepticus in comatose - An unsolved puzzle: A narrative review.** *Heliyon, 9*(11), E22393. Full text.
There is a need for further prospective research to strengthen the diagnostic accuracy of the available diagnostic criteria, the modified Salzburg Consensus Criteria for NCSE (mSCNC) and updated American Clinical Neurophysiology Society (ACNS) 21 criteria, to verify their accuracy to detect NCSE in comatose patients.

Elion. E, et al. (2022). **The A to F of functional status in the acute setting: A scoping review.** *Seizure, 102*, 61-73. Full text.

The early differentiation between epileptic and functional status is crucial in order to avoid unnecessarily invasive and costly medical escalation in the latter group, including the hazards of overmedication, intubation and intensive care admission. We offer an A-F step management plan for the immediate and longer-term assessment and treatment of functional status.

Wright. N.M.K, et al. (2021). **Evaluating the utility of rapid response EEG in emergency care.** *Emergency medicine journal, 38*(12), 923-926. Request article.
Timely management of non-convulsive status epilepticus (NCSE) is critical to improving patient outcomes. However, NCSE can only be confirmed using electroencephalography (EEG), which is either significantly delayed or entirely unavailable in emergency departments (EDs). Widespread adoption of Rapid-EEG may lead to earlier diagnosis of NCSE, reduced unnecessary treatment and expedited disposition of seizure mimics.

EMERGENCY UNIT

Tedrus. G.M.A.S. (2024). **Ictal EEG: Etiology and Mortality in Older Adults With Nonconvulsive Status Epilepticus.** *Clinical EEG and Neuroscience, 55*(2), 278 - 282. Request article.
The study characterized the clinical-EEG and prognostic data in the subtypes of NCSE in older adults consecutively admitted to the emergency room. There was no relationship between EEG patterns and the etiology and subtypes of NCSE in older adults.

Prud'hon. S, et al. (2024). **EEG and acute confusional state at the emergency department.** *Neurophysiologie Clinique, 54*(4), 102966. Request article.

Acute confusional state (ACS) is a common cause of admission that is related to numerous etiologies. In our cohort, EEG was a key examination in the management strategy of ACS in 11% of patients admitted to the ED. It resulted in a diagnosis of epilepsy in these patients admitted with unusual confounding presentations.

Trinka, E. et al. (2022). **Management of Status Epilepticus, Refractory Status Epilepticus, and Super-refractory Status Epilepticus.** *Continuum, 28*(2), 559-602.Full text.
The successful management of status epilepticus includes both the early termination of seizure activity and the earliest possible identification of a causative etiology, which may require independent acute treatment. Outcome prediction is a soft tool for estimating the need for intensive care resources.

INTENSIVE CARE UNIT

Rossetti. A, et al. (2024). **Status epilepticus in the ICU.** *Intensive care medicine, 50*(1), 1-16. Full text.
Management that follows published guidelines is best suited to improve outcomes, with the most severe cases frequently being managed in the intensive care unit (ICU). Short-term mortality ranges from 10 to 15% after SE and is primarily related to increasing age, underlying etiology, and medical comorbidities. Refractoriness of treatment is clearly related to outcome with mortality rising from 10% in responsive cases, to 25% in refractory, and nearly 40% in super-refractory SE.

Cavusolgu, D, (2023). **Evaluation of Nonconvulsive Status Epilepticus and Nonconvulsive Seizures in a Pediatric Intensive Care Unit.** *Clinical pediatrics, 62*(8), 879-884. Request article.
The findings suggest that younger age, epilepsy, acute structural brain abnormalities, abrupt cessation of AED, and clinically overt seizures before NCSE/NCS are associated with significant risk for NCS/NCSE.

PAEDIATRIC

Dedolgu. O, et al. (2023). **Management of Status Epilepticus by Different Pediatric Departments: Neurology, Intensive Care, and Emergency Medicine.** *European neurology, 86*(5), 315-324. Full text.
The aim of this study was to explore the differences in status epilepticus (SE) management among pediatric neurology, emergency medicine, and intensive care specialists. There was no consensus among neurologists, intensive care specialists, and emergency medicine specialists in the management of SE.

Simma. L, et al. (2023). **Integrating Neuromonitoring in Pediatric Emergency Medicine: Exploring Two Options for Point-of-Care Electroencephalogram (pocEEG) via Patient Monitors-A Technical Note.** *Journal of Personalized Medicine, 13*(9), 1411. Full text.
In patients with altered mental status, non-convulsive SE (NCSE) is often underrecognized and critically impacts the neurological outcome and duration of hospitalization. A simplified, rapid response EEG like the pocEEG enables neuromonitoring of patients with CNS disorders in pediatric emergency settings, facilitating timely diagnosis and treatment initiation when standard EEG is not readily available.

APPENDIX

SEARCH METHODOLOGY

A systematic search was conducted for literature. The results were screened by librarians using Covidence.

SEARCH LIMITS

- Published within the last 5 years

DATABASES SEARCHED

- Medline – index of peer reviewed articles across health sciences and medicine.
- Embase – index of biomed and pharmacological peer reviewed journal articles.
- Cochrane Library – collection of databases containing high-quality independent evidence.
- UpToDate & BMJ Best Practice – synthesised evidence for patient care.
- Grey literature – Google, Google Scholar, Trip database, Biomed Central Proceedings.

SEARCH TERMS

Concept	MeSH headings	Keywords
Urgent EEG	Electroencephalography	Urgent EEG or stat EEG or electroencephalography
Status Epilepticus	Status Epilepticus	Status epilepticus, nonconvulsive status epilepticus, NCSE
Guidelines	Guidelines as Topic, Guideline	Guideline, indication, criteria

MEDLINE SEARCH STRATEGY

Ovid MEDLINE(R) ALL <1946 to August 21, 2024>

1	Electroencephalography/	166147
2	(urgent EEG or stat EEG or electro?encephalography).tw.	26695
3	1 or 2	175538
4	Status Epilepticus/	9784
5	(status epilepticus or nonconvulsive status epilepticus or NCSE).tw.	15461
6	4 or 5	16765
7	"Guidelines as Topic"/ or Guideline/	58340
8	(guideline* or indication* or criteria).tw.	842790
9	7 or 8	877205
10	3 and 6 and 9	199
11	limit 10 to last 5 years	62

PRISMA CHART