Reducing Skin Injury In Adult Patients During Long Term EEG Monitoring

THE UNIVERSITY OF CHICAGO UChicago Medicine | Center for Healthcare Delivery Science and Innovation

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Problem

- Electroencephalography (EEG) is a commonly used diagnostic test in the diagnosis and characterization of seizures, evaluation of change in mental status and cerebral function.
- Up to 81.7% of EEG electrode-related skin irritation has been previously reported and the incidence increases as the duration of the EEG monitoring increases.
- The severity of the skin irritation varies from erythema to skin breakdown, or even pressure skin ulcers. The skin injury not only causes pain, itchiness, cosmetic issues but may also cause infection.

Goal

- The project is to determine the incidence of electrode-related skin irritation in patients undergoing elective long-term video EEG in our Adult EEG Monitoring Unit (EMU) and implement interventions to reduce the incidence of skin injury and improve patient comfort.

Strategy

- Between January 2020 and June 2021, EEG technologists evaluate and document EMU patient's skin condition after 3 to 5 days of continuous EEG monitoring.
- Review literature regarding the incidence of skin injury in other EEG labs and strategies to prevent the skin injury.
- Apply skin barrier prior to the standard EEG electrode application.
- Skin irritation is graded as follows:
    - None: normal intact skin.
    - Mild: mild redness without loss of skin integrity.
    - Moderate: loss of skin integrity but without blood or pus discharge.
    - Severe: loss of skin integrity with blood or pus discharge.

Results to Date

- Electrode placement using the International 10/20 measuring system and standard electrode application.

Picture 1. Measuring electrode positons Picture 2. Electrode placement

Picture 3. Skin irritation grading

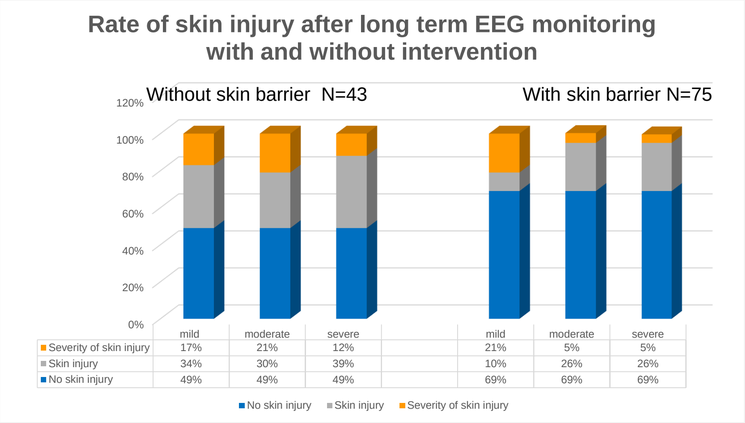
Mild

Moderate

Severe

- The skin condition of 108 patients was evaluated after removal of EEG electrodes.
- The rate of skin injury, without the use of barrier, was observed to be 51% after 3-5 days of continuous EEG monitoring using the standard application method, 33% of the patients had moderate to severe skin injury.
- Adding a skin barrier can reduce skin injury by 20%, of which only 10% had moderate to severe injury.

Results to Date



Conclusions

- We perform approximately 3500 EEGs each year in our institution. More than 450 of them are long term recordings (≥3 days).
- Skin injury can occur in 51% of patients after 3-5 days of continuous EEG monitoring without intervention.
- The electrode-related skin injury can be caused by mechanical injury occurring during the process of skin preparation, prolonged direct pressure from the electrodes on the head during monitoring or chemical injury from the conductive paste. Skin protective wipe (skin barrier) forms a clear film on the skin that protects against irritants.
- EEG technologist-driven observation and intervention can help reduce skin injury (from 51% to 31%) and increase patient comfort.
- Further effort to reduce pressure to electrodes using different wrapping material, change to less abrasive product in skin preparation and reeducate skin prep techniques are planned to further reduce the skin injury by using Plan-Do-Study-Act strategy.