Introduction

- Physiologic waveform data is collected, displayed and used for triggering alarms in Intensive Care Unit (ICU).
- There is an overabundance of false alarms due to waveforms artifact and noise [1].
- Intracranial pressure (ICP) alarms represents 14.4% of total alarms in Neuro ICU [2].
- The purpose of this study is to reduce false alarms by developing an algorithm to detect artifact and noise in ICP waveforms.

Methods

- An algorithm was recently developed to automatically analyze the signal quality of ICP data that was collected from neural ICU patients over the last two years, and a way to judge its performance has yet to be developed.
- Locations of artifacts and noise within the ICP data were manually adjudicated by two people, using a GUI designed for annotation.
- Annotation-based and index-based MATLAB algorithms were developed to quantify the degree of consensus between two adjudications using the Cohen's Kappa statistic, and these values were compared to evaluate the more representative algorithm.

Results

- Qualitative results were obtained through observation of each person's manual adjudications, and demonstrated satisfactory observational consensus between the annotations, while sometimes illustrating noticeable differences between each person's adjudication style.
- Quantitative results were obtained through MATLAB computation of the Cohen's Kappa statistic, and reflected the bittersweet conclusion from the qualitative observations.

Conclusions

- Qualitative observations and quantitative MATLAB calculations demonstrated fair consensus between annotation sets.
- Index-based algorithm surpasses annotation-based algorithm in comparing ICP waveform quality adjudications.
- Future work entails implementing the index-based algorithm with the automatic adjudication algorithm to lessen false alarm count.

Acknowledgements

MIT, MSRP, IMES, Prof. Thomas Heldt, Dr. Andrea Fanelli, Dr. Minoru Matsushima, and Jennifer M. Barletta

Bibliography