The Patient State Index Is an Indicator of Inadequate Pain Management in the Unresponsive ICU Patient.

Ramsay M.A., Huddleston P., Henry C., Marcel R., Tai S. *Anesthesiology* 2004; 101: A349

Introduction

A prospective blinded study was undertaken to determine if the patient state index (PSI) derived from the PSA 4000 (Physiometrix, Billerica, MA) processed eeg monitor, could provide an indication when the deeply sedated ICU patient was experiencing pain.

Methods

After institutional review board approval and informed patient consent, 30 patients about to undergo open heart surgery were enrolled in the study. Immediately after surgery the patients were transported to the ICU and the PSI was recorded in a blinded fashion until the patient was wide awake and extubated. In the responsive moderately sedated patient, each time that they required morphine for analgesia the event was marked on the disc that was storing the PSI data. The data was later analyzed to determine if there was a typical pattern developed that was associated with the need for pain medication. Patients were sedated with either dexmedetomidine, which has some analgesic properties, or propofol that has none.

Results

16 of the 30 patients received propofol sedation and this group required significantly more morphine than the dexmedetomidine sedated group. (p= 0.016). The archived PSI data was reviewed and the episodes of pain medication need in the moderately sedated periods were correlated with changes recorded in the PSI. This review revealed a sharp increase in PSI on the order of 20 points just prior to the morphine delivery. This observation lead to the hypothesis that a "spike" in the PSI might be used to predict pain in the deeply sedated patient. An analysis was performed to see if an increasing number of "spikes" was associated with an increased dose of morphine being delivered. A general trend of increasing doses of morphine with the number of "spikes" is evident. The equation of the fitted model is: morphine = 1.83 + 2.54 Profiles. Since the p-value is 0.0074 and is smaller than 0.01, there is evidence of a statistically significant relationship between total dose of morphine delivered and the number of PSI "spikes" met the 99% confidence level.

Therefore the PSI maybe an effective tool for managing pain when the patient is unable to verbally communicate their state.

Figure 1

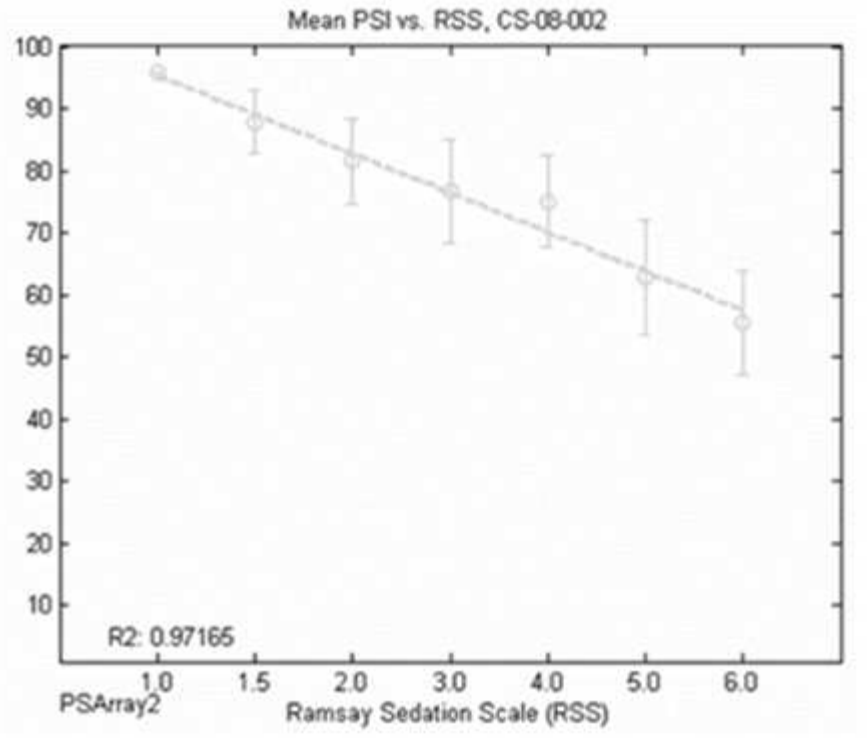

Figure 2