

# Pediatric Status Epilepticus And Intubation

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## Citation

C Babbitt, R Halpern. *Pediatric Status Epilepticus And Intubation*. The Internet Journal of Pediatrics and Neonatology. 2004 Volume 5 Number 2.

## Abstract

Limited data exists on intubation in the setting of pediatric status epilepticus (SE). We reviewed the charts of 78 patients with SE and found a rate of intubation of 35%. 92% of patients pre-medicated for intubation were successfully intubated on the first attempt compared to 33% of those not pre-medicated. Pre-medicating patients with SE prior to intubation facilitates success.

## INTRODUCTION

Status epilepticus (SE) is a common and potentially life-threatening cause of admission to pediatric intensive care units (PICU). Mortality rates have ranged from 3-11% in pediatric status epilepticus.<sup>1,2,3</sup> Endotracheal intubation is often performed in the emergency department in patients with SE. This retrospective study was undertaken due to concerns about the frequency and complications associated with intubation in patients admitted to the PICU with SE.

## MATERIALS AND METHODS

Prior to beginning the study, approval was obtained from the Institutional Review Board and the need for informed consent was waived. A retrospective chart review was performed on patients admitted to the PICU with SE during a 2-year period. The following information was collected on patients by chart review: demographic data, etiology of status epilepticus, laboratory results, duration of seizure, computer tomography and magnetic resonance imaging of the brain results, treatments, complications, and length of stay. For intubated patients the indication for intubation, intubation medications, size of endotracheal tube, and number of attempts was collected. Statistics are presented as mean +/- standard deviation. Statistical analyses was performed using student's T testing and Fisher's exact test and P values < 0.05 were considered significant.

## RESULTS

We identified a total of 47 non-intubated patients with 51 episodes of SE and 25 intubated patients with 27 episodes of intubated SE admitted to the PICU. The demographic data for the two groups of patients is shown in table one. There was no difference in the age, seizure duration, or length of

stay. More patients originating at referral hospitals were intubated than in our ED. (P = 0.03, Fisher's exact) There were no deaths in either group.

## Figure 1

Table 1: Demographic data of PICU patients with status epilepticus.

|                          | Intubated  | Non-Intubated | p value |
|--------------------------|------------|---------------|---------|
| Number of patients       | 25         | 47            |         |
| Number of episodes       | 27         | 51            |         |
| Age, years               | 4.17       | 2.95          | NS      |
| Gender, M/F              | 16/11      | 30/21         | NS      |
| Transported patients     | 20         | 24            | 0.03    |
| Duration of seizure, min | 54.5+/-23  | 56.1+/-29     | NS      |
| PICU LOS, days           | 2.3+/-1.95 | 1.5+/-1.48    | NS      |

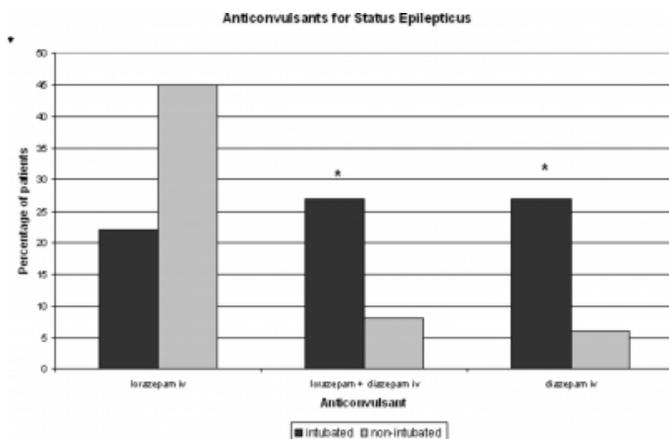
Patients, episodes, and transported patients are expressed as a total number and not a percentage. P value by Fisher's exact test

The two most common etiologies for SE were underlying seizure disorder and complex febrile seizures. There was no difference in the percentage of patients with seizure disorder or complex febrile seizures that required intubation when compared to those that did not require intubation.

All patients were treated initially with benzodiazepines. A greater percentage of patients who received either intravenous diazepam or a combination of intravenous diazepam and lorazepam were intubated than those who received lorazepam alone, as shown in figure 1. (P < 0.05 by Fisher's exact).

**Figure 2**

Figure 1: The intravenous benzodiazepines given for status epilepticus to intubated and non-intubated patients, as shown as a percentage of patients receiving the medication. Patients receiving phenobarbital before intubation were analyzed separately and are not included.



35% of the patients admitted to the PICU for SE were intubated. 16 of 27 patients (59%) were intubated on the first attempt and only 44% received medications to facilitate the procedure. 92% of the patients were successfully intubated on the first attempt following intubation medications compared to only 33% of the patients receiving no medications. (P = 0.003 by Fisher's exact) No difference was found in the mean number of attempts at a teaching hospital compared to a non-teaching hospital. 26% had inappropriately sized endotracheal tubes based on the formula of size = age in years / 4 + 4.

Two patients (7%) developed aspiration pneumonia and six patients (22%) developed stridor after extubation. Five responded to nebulized racemic epinephrine and one required 24 hours of heliox. No patients required re-intubation.

**DISCUSSION**

The reported incidence of respiratory depression with pediatric seizures and SE varies from 9-45%.<sup>4,5,6</sup> Some studies have reported less risk from lorazepam than diazepam.<sup>5,6</sup> Our study also found that a greater percentage of patients who received either intravenous diazepam or a combination of intravenous diazepam and lorazepam were intubated than those who received lorazepam alone.

We chose to focus particularly on intubated patients because we were concerned about the high number of intubated patients with SE admitted to the PICU. We found one other study that reported an intubation rate of 58% for patients

admitted to a PICU with SE.<sup>3</sup> Most concerning to us was the difficulty in performing endotracheal intubation in pediatric patients with SE. Other pediatric studies have shown the benefit of rapid sequence intubation for pediatric emergency airway management,<sup>7,8</sup> yet less than half of the intubated patients in this study received such medications for the procedure. This study found a low rate of success for endotracheal intubation without the use of intravenous medications to facilitate the procedure. All of the patients subsequently intubated had intravenous access at the time of the procedure, so that was not a contributing factor. Fortunately, all of the patients were successfully intubated and none appeared to suffer any long-term complications from multiple attempts. Although a significant number did develop stridor after extubation, there were not enough patients to see any trend in the patients with more than one intubation attempt.

In conclusion, pediatric SE continues to be a challenging problem seen in the emergency department and the PICU and a substantial number of these patients require intubation. Intravenous lorazepam appears to be the safest medication for acutely treating pediatric SE. Intubation is more likely to be successful on the first attempt when specific medications are given prior to the procedure. Training and expertise in pediatric airway management is essential for physicians in emergency departments.

We recognize the many limitations of a retrospective study. Due to a large referral base, multiple physicians were involved in the care of these children. There is a large variation in physician comfort in managing pediatric airways and SE and more experienced physicians may have been comfortable with maintaining the airway without intubating until SE resolved. We felt it was important to discuss our findings because physicians with various levels of pediatric experience take care of these patients in emergency department's everyday.

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