Original Contribution

Impact of addition of propofol to ED formulary

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Abstract

Study Objectives: Access to propofol remains a challenge for many emergency physicians. This report examines changes in patient care after the introduction of propofol to an emergency department formulary.

Methods: The Procedural Sedation in the Community Emergency Department registry is a prospective multicentered database of community emergency physician–directed procedural sedation cases. Medication selection and patient outcome were compared at a single Procedural Sedation in the Community Emergency Department registry study site before and after credentialing of emergency physicians for the use of propofol. Analysis was done through analysis of variance and \( \chi^2 \) test.

Results: Over a 36-month period, 573 patients were entered into the registry from the single study site, 255 before and 318 after propofol introduction. The percentage of propofol use increased from 26\% of procedural sedation cases in the first 3 months of availability to 69\% in the final 3 months analyzed. Before propofol use, 46\% of cases were completed with a single agent compared with after propofol use, in which 66\% were completed with a single agent (\( P < .001 \)). Complications decreased from 9\% of patients before propofol use to 3\% of patients after propofol use (\( P < .05 \)), whereas sedation failures decreased from 5.1\% to 4.1\% (\( P < .02 \)).

Conclusion: Granted access to propofol, emergency physicians will preferentially use this medication over prior procedural sedation agents with fewer procedural sedation complications and greater procedural success.

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1. Background

Propofol administration by emergency physicians (EPs) for procedural sedation and analgesia remains a controversial practice. Credentialing for use of this drug is variable and autocratic at best [1-3]. This report examines the impact on patient safety and medication use after the introduction of propofol into a community emergency department’s (ED’s) formulary.

2. Methods

The Procedural Sedation in the Community Emergency Department (ProSCED) registry is a prospective categorical database of EP-directed procedural sedation cases. The registry tracks patient and physician characteristics, medication use, complications, and patient outcomes of eligible ED patients. Specific details of the ProSCED registry’s composition and operation are detailed in a prior report [4]. At present, the registry contains more than 1700 consecutive sedations from 17 community hospital EDs. One contributing site introduced propofol into its ED 22 months after it
began entering patients into the registry. This timing permitted a natural experiment to examine the impact of the use of this drug on physician preferences and patient outcomes in patients undergoing procedural sedation at this site. After the introduction of propofol, all previously available procedural sedation agents remained in the ED formulary and no endorsement for use of propofol over existing medication options was presented to the EPs.

Williamsport Hospital is a rural community hospital with an annual ED census of approximately 52,000 annual visits. All ED patients of any age are managed by attending EPs with access to specialty consultants as needed. Procedural sedation case data are recorded contemporaneously on a hospital-specific “Conscious Sedation” data form completed by a bedside nurse that becomes part of the ED medical record. All ED nurses caring for ED patients undergoing sedation use a preprepared sedation packet that includes the Conscious Sedation data form. Clerical personnel flag all of these charts for further review, which is done by a performance improvement nurse and the ED medical director. Data from these ED records are then used to populate the ProSCED database. The EP staff are aware that the hospital participates in the ProSCED registry and that its information comprises part of the department’s performance improvement activities.

Introduction of propofol to the ED staff was performed through nursing in-services and physician education. A protocol for the use of propofol for brief procedures was approved by the ED after input from the Department of Anesthesia. In the study ED, all sedated patients are placed on a cardiac monitor with continuous pulse oximetry monitoring. The propofol dose recommended by the protocol is 1.0 mg/kg intravenous, followed by supplemental 0.5 mg/kg intravenous boluses as needed. Continuous propofol infusions were not used for any cases.

A before-and-after analysis of procedural sedation medication use and patient outcomes was conducted of ProSCED cases entered from the study site into the registry. For the purposes of data summarization, the minor and major complications were defined as listed in Table 1. Data analysis was performed with χ² test and regression modeling using JMP Statistical Discovery Software (SAS, Cary, NC). The ProSCED registry and analysis of its contents were approved by the institutional review board at Our Lady of Lourdes Medical Center, the principle site for the ProSCED registry.

### 3. Results

Over a 36-month period, 573 patients were entered into the registry from the study ED, 255 before and 318 after propofol introduction. The composition of the patient populations during the 2 observation periods is contained in Table 2. Minor statistical differences were noted between the 2 groups. More men were treated in the postpropofol period (pre, 49%; post, 58%; \(P < .03\)); however, complications occurred equally between the 2 sexes (women, 6.4%; men, 5.2%; \(P = .39\)). Statistical differences were also noted between the types of procedures performed during the 2 periods (\(P < .01\)). On regression modeling, no statistically significant differences in complication occurrences were found between the different procedures performed in the study (\(P = .71\)).

Complication rates and drug utilization for the 2 periods are summarized in Table 3. In the first 3 months in which

### Table 1

<table>
<thead>
<tr>
<th>Major complication</th>
<th>Prepropofol</th>
<th>Postpropofol</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apnea: requiring BVM</td>
<td>87 (3.1)</td>
<td>52 (1.6)</td>
<td>.03</td>
</tr>
<tr>
<td>Hypoxia: definition, pulse oxygen &lt;93%, &gt;60 s</td>
<td>85 (3.0)</td>
<td>27 (0.8)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Hypoxia: requiring reversal agent</td>
<td>2 (0.1)</td>
<td>0</td>
<td>.52</td>
</tr>
<tr>
<td>Hypoxia: requiring assisted BVM ventilation</td>
<td>2 (0.1)</td>
<td>3 (0.1)</td>
<td>.66</td>
</tr>
</tbody>
</table>

| Minor complication | | | |
|--------------------| | | |
| Airway obstruction: responds to repositioning | | | |
| Hypotension: resolves spontaneously | | | |
| Hypotension: responds to saline bolus | | | |
| Hypoxia: resolves spontaneously | | | |
| Hypoxia: responsive to oxygen | | | |

BVM indicates bag valve mask.
propofol was available, it was used in 26% of procedural sedation cases but increased to 69% of cases in the final 3 months of the study period. Over the course of the study period, sedation failures, defined as an inability to complete an attempted procedure, decreased from 5.1% to 4.1% \( (P < .02) \). The mean number of drugs used for each case decreased from 1.6 to 1.3 \( (P < .001) \) after propofol use was permitted. Before propofol introduction, the EP both directed the sedation and performed the procedure in permitted. Before propofol introduction, the EP both directed the sedation and performed the procedure in

### Discussion

The use of propofol by EPs remains controversial [1-3]. Despite multiple reports on its safe use by EPs, some centers still restrict use of the drug in the ED [3-8]. In this report, the introduction of propofol into the hospital’s formulary resulted in a number of objective improvements in patient care and safety. The number of patient complications decreased while the rate of successful completion of procedures increased in the face of a drop in the number of medications used per case.

Previous studies have reported positive patient outcomes after the use of propofol in university EDs [6,8]. To our knowledge, this is the first before-and-after study on this subject examining propofol use in the community hospital ED.

In addition to information on the safety of propofol use, this is the first objective study to demonstrate an EP preference for the use of this drug in ED procedural sedation. Subjective studies have suggested that clinicians favor the characteristics of propofol, but this report is the first to be able to clearly document this fact [9-12]. Over the course of the study, etomidate use decreased from 42.8% to 12% of cases, midazolam use decreased from 53.5% to 32.2% of cases, and fentanyl use decreased from 37.2% to 27.3% of cases. Ketamine was used almost exclusively in pediatric patients, and its use remained essentially unchanged.

Although ample studies on the ED use of propofol have demonstrated its safe and effective use, the majority have been done in university-based EDs. As such, this has led to the reservation that the additional personnel in such settings contributes to its safety and that published reports are not extrapolatable to the community hospital setting [1,4,7,13]. A prior report from the ProSCED registry demonstrated that patient safety was independent of the number of physicians attending the patient [7]. This report confirms the safety of this drug for use by a single EP outside of the university ED environment.

One limitation of this study is the statistical differences noted in Table 2 between the prestudy and poststudy populations. It is possible that the improved outcomes reported in the “Results” section may simply reflect the differences in the patient makeup and not the introduction of the propofol into the department. However, the separate analysis of patient’s sex and the types of procedures performed failed to support either of these as the source of the outcome differences between the study periods.

5. Conclusion

Propofol introduction into the community hospital ED improves the safety and efficacy of procedural sedation administered by EPs.

### References

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