Evaluating the impact of intravenous push levetiracetam in a community hospital emergency department

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Introduction
This retrospective study sought to determine if changing sterile compounded intravenous (IV) levetiracetam to IV push levetiracetam is effective in reducing time to administration for post-ictal patients in the emergency department while maintaining the safety of sterile compounded levetiracetam diluted to 100 mL. This study also sought to evaluate time and cost savings for pharmacy and nursing staff and amount of correspondence required between said staff.

Background
Intravenous levetiracetam’s safety and efficacy profile has been established based on the drug being sterile compounded in 100 mL of normal saline or 5% dextrose and infused over 15 minutes. As levetiracetam has a time to peak of 5-30 minutes, it is an ideal agent for prevention of seizures in post-ictal patients. Time to administration of levetiracetam can be key for these patients, making the efficiency of the compounding process paramount for patients presenting to our emergency department. Wheless et al evaluated rapid administration of ≤ 3,000 mg levetiracetam was well tolerated and achieved desired serum concentrations.1 Morgan et al. 2019 retrospective study, evaluated safety and efficacy of ≤ 1,000 mg levetiracetam rapidly administered through a peripheral line for seizure prophylaxis. It found that 98.5% of patients did not experience an adverse effect and the 1.5% that did experience adverse effects were found to be synonymous with prior levetiracetam therapy.2

Purpose and Endpoints
Hypothesis
Levetiracetam administered via IV push reduces time to administration and cost for the institution while maintaining the efficacy and safety of sterile compounded levetiracetam.

Primary endpoint
Median time to administration of levetiracetam from time order was placed.

Secondary endpoints
• Proportion of orders for which additional nursing communication was required to obtain medication (i.e. missing doses)
• Cost savings for pharmacists’ and IV technicians’ time
• Adverse reactions

Methods
This was a retrospective chart review in a 590-bed community hospital of patients receiving sterile compounded or IV push levetiracetam in the emergency department.

Inclusion Criteria
• Admitted to the ED at an urban hospital for post-ictal status
• Levetiracetam ordered and administered in the emergency department.

Exclusion Criteria
• If a medication was ordered by an emergency physician but not administered in the emergency department.

Results

<table>
<thead>
<tr>
<th>Median Time to Levetiracetam Administration (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>Period 2</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
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Period 1: Prior to implementation of IV push levetiracetam
December 1, 2018 → May 31, 2019

Period 2: Post implementation of IV push levetiracetam
December 1, 2019 → May 31, 2020

• Average patient age was 50 years old.
• In period 1, a total of 51 additional nurse communications were required out of 109 orders (46.8%) versus 6 additional nurse communications required out of 149 total (4%) for period 2.
• Additionally, estimated cost savings per dose (based on average pharmacist and IV technician hourly wage) was found to be $7.50 for the 15 minutes allotted to complete a STAT IV levetiracetam order. This totaled to $1,117.50 in pharmacy cost savings over the course of period 2.
• Adverse reactions such as injection site pain, erythema, or extravasation were not reported.

Conclusions
Conversion to an IV push strategy for levetiracetam resulted in decreased time to administration, decreased pharmacy and nursing time due to missing doses without an increase in documented adverse events. Despite the minor cost savings achieved for the institution, the opportunity cost savings for nursing and pharmacy staff is still a significant benefit for both parties as well as the patient.

References

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