Evaluation of 4-factor prothrombin complex concentrate (PCC) in hospitalized patients

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In 2014, the study institution developed reversal guidelines to assist physicians in selection of reversal agents for all available oral and parenteral anticoagulants.

- Primary objective:
  - To evaluate whether 4-factor PCC usage was appropriately designated and dosed for patients experiencing acute bleeds or preparing for invasive procedures
- Secondary objectives:
  - To examine the proportion of 4-factor PCC use on warfarin associated bleeds versus other various oral anticoagulants.
  - To evaluate the effect of 4-factor PCC on bleeding and the effect on INR, PTT, and PT reduction.

Methods
This study was approved by the study institution’s Institutional Review Board.

- Inclusion criteria:
  - All patients who received 4-factor PCC at the study institution
- Dates:
  - October 1, 2014 to October 28, 2015.

A retrospective chart review was performed on these patients to complete the evaluation. Patients were followed until discharge.

- Data collected:
  - Patient demographics (sex, age, weight, IBW, BMI, height, and serum creatinine prior to PCC administration)
  - Ordering physician discipline
  - Drug reversed or indication for PCC
  - Location of bleed
  - Dose administered
  - Baseline and follow up INR, PTT, and PT as appropriate.
  - Other factors or blood products utilized
  - Surgical and procedural interventions required
  - Patient disposition

Patients were followed until discharge. Creatinine clearance was calculated using Cockcroft-Gault equation. This data was evaluated as appropriate or non-appropriate based on the study institution’s developed protocol for anticoagulant reversal.

Results
A report was generated of patients who have received PCC between October 1, 2014 to October 28, 2015.

- N = 36
  - Males: 58% (n=21)
  - Females: 42% (n=15)
- Average age: 71.2 years (Range: 30 – 95)
  - Age <65 years: 25% (n=9)
  - Age 65-75 years: 30.6% (n=11)
  - Age >75 years: 44.4% (n=16)
- Average Weight (kg): 86.9 (Range: 48.5 – 141.5)
  - Weight <60 kg: 5.6% (n=2)
- Patients with active bleeding: 91.7% (n=33)

Table 1. Number of Correct Doses Per Protocol

<table>
<thead>
<tr>
<th>Drug Reversed</th>
<th>Warfarin</th>
<th>NOACs</th>
<th>Trauma</th>
<th>Exenaparin</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>18</td>
<td>9</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Percent Correct</td>
<td>81.8%</td>
<td>90%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Figure 1. 4-Factor PCC Indications

- NOACs: 28%
- Warfarin: 61%
- Trauma: 8%
- Exenaparin: 3%

Figure 2. Comparison of Sites of Bleeds

- Warfarin
- Rivaroxaban
- Dabigatran
- Apixaban

Figure 3. Comparison of Baseline and Follow Up INR, PT, and PTT Levels

Table 2. Mortality Rate Among Each Indication for PCC

<table>
<thead>
<tr>
<th>Drug Reversed</th>
<th>Warfarin</th>
<th>Rivaroxaban</th>
<th>Dabigatran</th>
<th>Apixaban</th>
<th>Trauma</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>27%</td>
<td>20%</td>
<td>0%</td>
<td>33%</td>
<td>66.7%</td>
<td>28%</td>
<td></td>
</tr>
</tbody>
</table>

Conclusions
Based on these results, we conclude that 4-factor PCC was appropriately indicated in 91.7% of the cases between the dates of October 1, 2014 to October 28, 2015.

- It is not indicated for:
  - Warfarin toxicity in the absence of bleeding
  - Reversal of exenaparin

PCC was correctly dosed in 83.3% of total patients included in the review.

- Correct dose by drug:
  - 81.8% of warfarin reversals
  - 90% of rivaroxaban reversals
  - 100% of dabigatran reversals
  - 100% of apixaban reversals

4-factor PCC was mostly used for reversal of warfarin

- 28% of cases involved NOACs

- Comparison of baseline, follow-up, and average levels show a large improvement in INR for warfarin
  - Minimal changes in PT and PTT for rivaroxaban, dabigatran, and apixaban.

- The overall mortality rate among patients receiving 4-factor PCC in our sample was 28%.

- No thrombotic events occurred as a result of administration of PCC.

Overall, we conclude 4-factor PCC is being used appropriately according to the protocol in 78% of patients in the institution based on correct indication and dosing.

Education may be needed on choosing correct dosages for warfarin reversal in life-threatening bleeds based on patient’s INR. We also recommend adding reversal agents for each individual NOAC for appropriate indications as they become FDA approved.

References

Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

- Kacie Waters, kaciesp@pcom.edu: Nothing to disclose
- Mary George, mgeorge@gwinnettmedicalcenter.org: Nothing to disclose