Introduction

- Prothrombin Complex Concentrate (PCC) and vitamin K are required for the emergency reversal of anticoagulation with inhibitors of the vitamin K-dependent pathway.
- PCC is a 4 factor concentrate (II, VII, IX, X). It is highly expensive, allergy inducing, and harbours a risk of VTE (up to 1.4%).
- There is limited information available on the precise appropriate indication for PCC with regards to reversal, timing between presentation and administration, as well as patient outcomes.

Aims

The aim of this audit was to review the indication and use of vitamin K and PCC in a large tertiary referral centre and compare these to Trust guidelines.

Methods

- Audit proposal approved by Guy’s and St Thomas’ for data review on the use of PCC over 12 months (Jan – Dec 2013)
- Retrieval of patient notes for which PCC requests were made to haematology
- Extraction from notes of indication for PCC, INR at time of request, and dosage of vitamin K and of PCC for each INR
- In addition, timings between the following were noted: patient presentation and initial INR check, presentation and vitamin K/PCC administration, request and administration of PCC, administration and post-administration INR check
- Instances of further administration of reversal agents was recorded
- Comparison was made against current Trust guidelines on use of PCC
- Outcomes including bleeding cessation, mortality and VTE were recorded

Results

- There were 93 patients with documented requests for PCC.
- Of those, 48 patient charts were available and 41 patients were included. 7 patients were excluded due to lack of documented receipt of PCC.
- Patient demographics and indications for anticoagulation for included patients are demonstrated in table 1:

<table>
<thead>
<tr>
<th>Sex</th>
<th>24 male</th>
<th>17 female</th>
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<tbody>
<tr>
<td>Age</td>
<td>Mean: 67.7 years</td>
<td>Range: 21 – 91 years</td>
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<tr>
<td>Indication for anticoagulation</td>
<td>Atrial fibrillation: 29</td>
<td>Secondary TE prevention: 9</td>
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</tbody>
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- Figure 2 (overleaf) shows requests with indications for PCC. These included urgent surgery (n=22), acute bleeding (n=15) and inappropriate requests (n=4).
- Mean INR at presentation was 3.8 (range 1.5-12.5). Mean INR change following reversal agents was -2.4.
- 34/41 had received prior vitamin K, 5 had not. Information was absent for 2.
- All patients had INR tested prior to administration of PCC and vitamin K.
- Graphical representations (figure 3) of timing include: time from presentation to first INR, time from presentation to vitamin K administration, time from presentation to PCC administration, time from request of PCC to administration, and time from PCC administration to further INR.
- Initial dosage was less than Trust guidelines in 38/41 cases. Mean dosage was 18.8 IU/kg (the Trust recommends 25-50 IU/kg according to indication of acute bleeding or emergency surgery). 3 patients required a second dose.

Results (cont’d)

- Figure 2: Requests for PCC and indication

Patient outcomes

- 37/41 patients received PCC with appropriate indication.
- All patients had timely INR prior to administration but there was significant delay in INR post administration (which should be <1 hour).
- Bleeding cessation occurred in 40/41 patients. 2/41 patients died (1 due to kidney failure and 1 due to catastrophic bleed). 1 patient had a thrombotic complication as a likely result of receiving PCC.

Conclusions

- Although PCC use has steadily decreased within the Trust (see figure 4) and most patients receive it appropriately, further clinician education is required.
- 4 cases had PCC ordered and prepared but not administered, therefore ordering policy from storage to release should be stringent. A dose typically costs £1,500 for an adult and unused orders have significant cost.
- Delays in administration at the St Thomas’ site, mainly out of hours, indicate that storage policy may require revision at multisite Trusts.
- Concomitant use of vitamin K needs reviewing as this was not used in 5 cases of PCC administration, potentially reducing efficacy.
- We propose a further audit to include PCC use in the reversal of newer oral anticoagulant agents (direct thrombin inhibitors and anti-factor Xa agents).

References