

# Anticoagulated Patients with Suspected Haemorrhage in Pre-Hospital Care: a review of Kent Surrey Sussex Air Ambulance patients in 2016

Dr Anthony Hudson<sup>1,2</sup> and Rose Hall<sup>2</sup>

1: Kent, Surrey and Sussex Air Ambulance Trust.

2: St George's University of London

## 1. Aims

- To determine the number of patients attended to by KSSAAT in 2016 that had their anticoagulation with warfarin reversed in the pre-hospital phase.
- To quantify the reduction in time to delivery of a Prothrombin Complex Concentrate if it is given by the attending HEMS team prior to arrival at hospital and compare with predicted time saving<sup>1</sup>.
- To provide an estimate of the proportion of patients taking a DOAC in the HEMS population.

## 2. Introduction

Approximately 1.25 million people are prescribed anticoagulation in the UK<sup>2</sup>, of which warfarin is still the most common. Warfarin is:

- Oral medication to inhibit Vitamin K in the synthesis of clotting factors II, VII, IX, X
- Indications are the treatment and prophylaxis for Deep Vein Thrombosis and Pulmonary Embolism or in the presence of mechanical heart valves or atrial fibrillation<sup>3</sup>.
- A side effect of warfarin is haemorrhage. Therefore anticoagulated patients subjected to trauma are at a much higher risk of developing significant intracranial haematoma, with an increased risk for rapid deterioration and mortality<sup>4</sup>.

Therefore emergency reversal of warfarin with PCC:

- Can slow or prevent the expansion of an intracranial haematoma before the patient reaches neurosurgical care<sup>5</sup>.
- Can rapidly correct coagulopathy in patients taking warfarin
- Should be given as soon as possible to these patients in the pre-hospital phase providing that they satisfy the indications for use of PPC.

KSSAAT Standard Operating Procedures (SOP) for use of PCC<sup>3</sup> are:

1- GCS < 14 due to suspected intracranial haemorrhage (ICH)

2- INR > 2

3- Patient suspected or known to be anticoagulated with warfarin

Since the last study in 2013<sup>1</sup>, it is likely that an increasing proportion of patients are prescribed DOACs instead of warfarin. There is no published incidence of the number of patients HEMS attend that are on DOACs.

## 3. Method

A retrospective review of KSSAAT patient records from 2016 conducted to identify:

- total number of patients in 2016 that are identified as on warfarin
  - patients reversed with PCC
  - patients not reversed with PCC and why
- the number of patients recorded as taking DOACs.

If anticoagulated with warfarin, time to reversal with PCC was recorded (Figure 1) by using:

- the time of 999 call as surrogate for time of incident
- time of arrival on scene as surrogate for time of pre-hospital administration of PCC
- time of arrival in emergency department (ED) as surrogate for time of administration of PCC if given in hospital.

In addition to this, gender, date of birth and initial observations (Glasgow coma scale, INR and type of injury) were also recorded.

## 4. Results for Actual Time to Reversal in Patients on warfarin given PPC by KSSAAT

Throughout 2016 KSSAAT attended a, total of 1614 patients.

- Patients identified as on warfarin = 30 (2% of total patients in 2016)
- Patients on warfarin and **not** reversed with PCC = 18 (60% of all patients on warfarin)
  - Of the patients who were not reversed 7 did not meet the SOP criteria, 6 were in cardiac arrest on HEMS arrival and 5 cases the INR machine failed
- Patients on warfarin and reversed with PCC = 12 (40% of patients on warfarin)
  - an average age of 78 years (range 49-91) and all of which had an INR > 2
- Patients on DOACs = 7 (0.43% of total patients in 2016)
  - Their average age was 75 years (range 62-91). Most had a GCS of 15 and only 14% had a GCS of 14 as a result of suspected intracranial bleed)

Patients attended to by KSSAAT suspected of having intracranial bleeds were:

- 83% of the warfarin anticoagulated patients given PPC
- 28% of those on DOACs

### Benefits of pre-hospital PCC administration:

- The average time to pre-hospital reversal of warfarin was 57 minutes (range 41-87)
- If reversal was not available in the pre-hospital phase, the average time to reversal would have been 131 minutes (range 95-212)
- Average time saved by delivering the PCC in a pre-hospital environment is 74 mins**

## 5. Discussion

Estimated time saving by pre-hospital PCC administration in 2013 pre was 89 mins<sup>1</sup>.

Actual time saved by pre-hospital reversal (post PCC use by KSSAAT) was 74 mins.

Actual time saved is less than predicted 3 years ago.

- This is likely to be due to the time taken to draw up the PCC and take the INR, which can be difficult and time consuming.
- The actual time saved may translate into improved patient outcome and reduced mortality<sup>3</sup>, but more work is needed to define this effect.

Our aim is to collect data relating to patient outcome and quantify the benefit of pre-hospital PCC administration.

These results also demonstrate that those on DOACs had a lower rate of suspected intracranial bleeds than those of warfarin.

- This concurs with research that suggests that patients taking DOACs have been shown to have significantly less intracranial haemorrhage than those on warfarin<sup>7</sup>.
- In fact one study showed that warfarin anticoagulation carries a six-fold increase in mortality due to traumatic brain injuries<sup>6</sup>.

Though despite this smaller risk of ICH associated with DOACs, there is still no effective reversal agent available for use should they suffer a significant injury.

Figure 1. Timeline from 999 call to hospital admission and administration of PCC in this study.

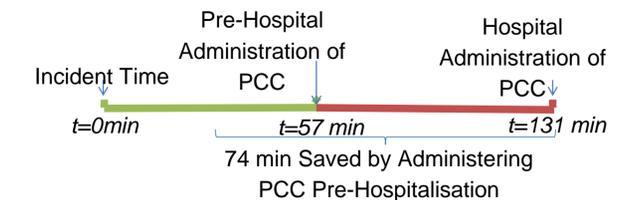
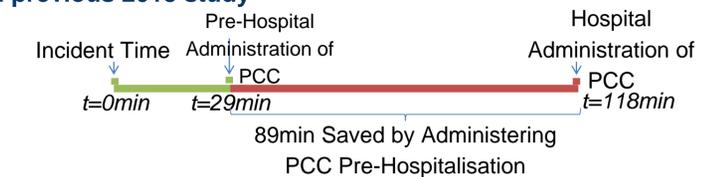


Figure 2. Timeline from 999 call to hospital with predicted time to reversal from previous 2013 study



## 6. Conclusion

In 2016 KSSAAT treated 12 patients on warfarin with PCC. The actual time saved by administering PCC in the pre-hospital environment is 74 minutes.

From these results it is likely that the introduction of PCC and pre-hospital INR measurement into the KSSAAT service represents a benefit to patients. A review of outcome data should be analysed to define this benefit.

This study provides a baseline for DOAC incidence in the HEMS population, which has not been published before. DOACs appear to be an emerging problem in the pre-hospital population as they are being increasingly prescribed. Year on year analysis of these numbers should aid clinicians to quantify the problem and develop solutions for DOAC reversal.

Based on this emerging risk pre-hospital clinicians should be quick to adopt and trial any new drugs available for DOAC reversal.

## References

- (Photo: Kent Surrey Sussex Air Ambulance on St George's Hospital helipad. Used under CC BY license)
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