

Developing a Four Factor Prothrombin Complex Concentrate (4FPCC) Administration-at-Bedside Protocol in the Emergency Department

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INTRODUCTION

Several small studies describe the benefits of pharmacist-related time-reduction strategies for four factor prothrombin complex concentrate (Kcentra; 4FPCC) administration (Table 1). However, the clinical benefits have not been fully elucidated.

In 2018, pharmacist preparation and administration of alteplase at bedside for acute stroke management showed:

- Improved door-to-needle times
- Reduced time to bolus doses from 20 minutes to 6 minutes.

Since “time is brain” in acute stroke management, could this process apply to 4FPCC in hemorrhagic stroke?

Pre-intervention utilization review of 4FPCC (Table 2) displays:

- Median total time from CT scan read to 4FPCC administration of 60 minutes
- Goal time per Regions Hospital Stroke Expert Advisory Panel is < 45 minutes.

Table 1: Overview of background studies.^{1,2,3}

Authors	Design of Retrospective Cohort Study	Median order to administration time without pharmacists (minutes)	Median order to administration time with pharmacists (minutes)
Alarfaj et al	Assessing pharmacist presence (N = 90)	42	24
Masic et al	Assessing pharmacist presence (N = 116)	206.5	66.5
Corio et al	Assessing pharmacist-driven protocol (N = 48)	70	35

Table 2: Average and Median time frames for various points throughout the 4FPCC process.

Step in Process (N = 39)	Average Time (minutes)	Median Time (minutes)	Pharmacist Involved
Admission to CT scan read	53	45	✗
CT scan read to 4FPCC order	32	28	✗
Order verification by pharmacist	7	4-5	★
Product preparation in IV pharmacy	17	15	★
Product administration	16	11	★
Total Time from order entry to administration	39	31	★
Total Time from CT scan read to administration	63	60	
Goal time from CT scan read to administration	< 45	< 45	

OBJECTIVES

Reduce the 4FPCC time from order entry to administration at Regions Hospital ED.

Primary outcomes:

1. Time from CT scan read to 4FPCC administration in head bleeds
2. Time from 4FPCC order entry to administration for all bleeds

RESULTS

Figure 1: 4FPCC process change from darker shaded purple to lighter shaded purple.

4FPCC Process Change

• Current 4FPCC process:

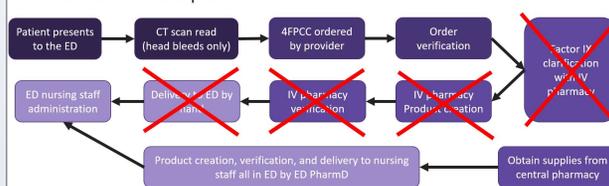


Table 3: Median time frames for both pre and post-intervention groups.

Step in Process	Median Time Pre-Intervention Group (minutes)	Median Time Post-Intervention Group (minutes)	Pharmacist Involved
Admission to CT scan read	45	32	✗
CT scan read to 4FPCC order	28	65	✗
Order verification by pharmacist	4.5	4	★
Product preparation and administration	26	16	★
Total time from order entry to administration	31	25	★
Total time from CT scan read to administration	60	88	
Goal Time from CT scan read to administration	< 45	< 45	

★ = pharmacist involved in process ✗ = pharmacist not involved

METHODS

For this quality improvement project, study subjects were identified by retrospective chart review. Timing data was extracted via a third-party software and evaluated against a pre-intervention comparison group (Table 2).

Inclusion:

- Regions ED patients who received 4FPCC for a life-threatening bleed

Exclusion:

- 4FPCC administration outside the ED
- Patients seen for a non-emergent scenario
- Patients with work-up that lasts 1+ hours with subsequent decompensation or need for emergent surgery requiring 4FPCC

Study groups:

- Pre-intervention group (1/2019-5/2020, N = 39)
- Post-intervention group (2/28/2022-present, N = 12)

CONCLUSIONS

ED pharmacist intervention reduced:

- 4FPCC median total time from order entry to administration by 6 minutes
- 4FPCC median preparation and transport to ED by 10 minutes

Observations of increased times for:

- Median time from CT scan read to 4FPCC order entry
- Median total time from CT scan read to 4FPCC administration
- Due to sample size, no meaningful conclusions could be made specifically regarding head bleeds at this time.

LIMITATIONS

Small sample size (12)

- 3 patients seen with head bleeds
 - Two had delays in 4FPCC order
 - One due to awaiting an anti-Xa level
 - Another due to ruling out differential diagnoses

Data for Regions Hospital and patient population

- May not be generalizable to other locations

4FPCC administration by pharmacists in the ED is a new and fluid process

- Process optimization via staff feedback
- Variable staff prior experience with 4FPCC preparation
- With more experience, staff efficiency will increase

FUTURE DIRECTIONS

This project shall continue to collect and assess time data with the possibility of expanding data collection to analyze other factors, such as mortality, length of stay, 4FPCC waste, etc.

REFERENCES

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3. Corio, Jessica L., et al. Impact of a Pharmacist-Driven Prothrombin Complex Concentrate Protocol on Time to Administration in Patients with Warfarin-Associated Intracranial Hemorrhage. *The Western Journal of Emergency Medicine*, vol. 19, no. 5, Sept. 2018, pp. 849–54. PubMed, <https://doi.org/10.5811/westjem.2018.6.37932>.

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