

## **PCCs for PharmDs Part II**

Special Guest: Scott Dietrich, PharmD, BCCCP

### **Guidelines**

Greenberg SM, Zial WC, Cordonnier C, et al. 2022 Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2022; 53: e282-e361.

<https://www.ahajournals.org/doi/10.1161/STR.0000000000000407>

Abraham NS, Barkun AN, Sauer BG, et al. American College of Gastroenterology-Canadian Association of Gastroenterology Clinical Practice Guideline: Management of Anticoagulants and Antiplatelets During Acute Gastrointestinal Bleeding and the Periendoscopic Period. *J Can Assoc Gastroenterol*. 2022; 5(2): 100-101. <https://pubmed.ncbi.nlm.nih.gov/35368325/>

### **Articles Referenced**

Dietrich SK, Mixon MA, Rech MA. Fixed-dose prothrombin complex concentrate for emergent warfarin reversal among patients with intracranial hemorrhage. *Am J Emerg Med* 2021; 49: 326-330. <https://pubmed.ncbi.nlm.nih.gov/34224954/>

Gilbert BW, Barlow BL, Dingman JS. Dosing of Prothrombin Complex Concentrate in Factor Xa Inhibitor-Associated Intracranial Hemorrhage. *Neurocritical Care Society CURRENTS*. <https://currents.neurocriticalcare.org/blogs/currents-editor/2022/01/31/dosing-of-prothrombin-complex-concentrate-in-facto>

Langstraat E, Martinelli A, Spoelhof B, et al. Effect of pharmacy management on turnaround time of 4-factor prothrombin complex concentrate. *Am J Health Syst Pharm*. 2017; 74(17 Supplement 3): S61-S66. <https://pubmed.ncbi.nlm.nih.gov/28842519/>

Cicci CD, Weiss A, Dang C, et al. Impact of timing and dosing of four-factor prothrombin complex concentrate administration on outcomes in warfarin-associated intracranial hemorrhage. *Pharmacotherapy* 2022; 42(5): 366-374. <https://pubmed.ncbi.nlm.nih.gov/35384000/>

Margraf DJ, Brown SJ, Blue HL, et al. Comparison of 3-factor versus 4-factor prothrombin complex concentrate for emergent warfarin reversal: a systematic review and meta-analysis. *BMC Emerg Med* 2022; 22(1): 14. <https://pubmed.ncbi.nlm.nih.gov/35073849/>

Peksa GD, Mokszycki RK, Rech MA, et al. Reversal of Warfarin-Associated Major Hemorrhage: Activated Prothrombin Complex Concentrate versus 4-Factor Prothrombin Complex Concentrate. *Thromb Haemost.* 2020; 120(2): 207-215.

<https://pubmed.ncbi.nlm.nih.gov/31837652/>

Bobby L, Westlake E, Esplin N, et al. Activated prothrombin complex concentrate for reversal of oral factor Xa inhibitors at a level 1 trauma center. *Thromb Res.* 2021; 206: 33-35.

<https://pubmed.ncbi.nlm.nih.gov/34399122/>

Smythe MA, Koerber JM, Hoffman JL, et al. Outcomes of activated prothrombin complex concentrate for direct Xa inhibitor bleeding. *Thromb Res.* 2021; 206: 142-144.

<https://pubmed.ncbi.nlm.nih.gov/34481221/>

Panos NG, Cook AM, John S, et al. Factor Xa Inhibitor-Related Intracranial Hemorrhage: Results From a Multicenter, Observational Cohort Receiving Prothrombin Complex Concentrates. *Circulation.* 2020; 141(21): 1681-1689.

<https://pubmed.ncbi.nlm.nih.gov/32264698/>

Cooksey GE, Hamilton LA, McMillen JC, et al. Impact of Factor Xa Inhibitor Reversal with Prothrombin Complex Concentrate in Patients with Traumatic Brain Injuries. *Neurocrit Care.* 2022 May 27. doi: 10.1007/s12028-022-01521-3. Online ahead of print.

<https://pubmed.ncbi.nlm.nih.gov/35624388/>

Karkouti K, Bartoszko J, Grewal D, et al. Comparison of 4-Factor Prothrombin Complex Concentrate With Frozen Plasma for Management of Hemorrhage During and After Cardiac Surgery: A Randomized Pilot Trial. *JAMA Netw Open.* 2021; 4(4): e213926.

<https://pubmed.ncbi.nlm.nih.gov/33792729/>

Bartoszko J, Callum J, Karkouti K, et al. The association of prothrombin complex concentrates with postoperative outcomes in cardiac surgery: an observational substudy of the FIBRES randomized controlled trial. *Can J Anaesth.* 2021; 68(12): 1789-1801.

<https://pubmed.ncbi.nlm.nih.gov/34523108/>

Khurram M, Ditillo M, Obaid O, et al. Four-factor prothrombin complex concentrate in adjunct to whole blood in trauma-related hemorrhage: Does whole blood replace the need for factors? *J Trauma Acute Care Surg.* 2021; 91(1): 34-39. <https://pubmed.ncbi.nlm.nih.gov/33843830/>

Barra ME, Das AS, Hayes BD, et al. Evaluation of andexanet alfa and four-factor prothrombin complex concentrate (4F-PCC) for reversal of rivaroxaban- and apixaban-associated intracranial hemorrhages. *J Thromb Haemost.* 2020; 18(7): 1637-1647.

<https://pubmed.ncbi.nlm.nih.gov/32291874/>

Vestal ML, Hodulik K, Mando-Vandrick J, et al. Andexanet alfa and four-factor prothrombin complex concentrate for reversal of apixaban and rivaroxaban in patients diagnosed with intracranial hemorrhage. *J Thromb Thrombolysis*. 2022; 53(1): 167-175.

<https://pubmed.ncbi.nlm.nih.gov/34101050/>

Pham H, Medford WG, Horst S, et al. Andexanet alfa versus four-factor prothrombin complex concentrate for the reversal of apixaban- or rivaroxaban-associated intracranial hemorrhages. *Am J Emerg Med*. 2022; 55: 38-44. <https://pubmed.ncbi.nlm.nih.gov/35272069/>

Parsels KA, Seabury WR, Zyck S, et al. Andexanet alfa effectiveness and safety versus four-factor prothrombin complex concentrate (4F-PCC) in intracranial hemorrhage while on apixaban or rivaroxaban: A single-center, retrospective, matched cohort analysis. *Am J Emerg Med*. 2022; 55: 16-19. <https://pubmed.ncbi.nlm.nih.gov/35245776/>

Costa OS, Connolly SJ, Sharma M, et al. Andexanet alfa versus four-factor prothrombin complex concentrate for the reversal of apixaban- or rivaroxaban-associated intracranial hemorrhage: a propensity score-overlap weighted analysis. *Crit Care*. 2022; 26(1): 180.

<https://pubmed.ncbi.nlm.nih.gov/35710578/>

Huttner HB, Gerner ST, Kuramatsu JB, et al. Hematoma Expansion and Clinical Outcomes in Patients With Factor-Xa Inhibitor-Related Atraumatic Intracerebral Hemorrhage Treated Within the ANNEXA-4 Trial Versus Real-World Usual Care. *Stroke*. 2022; 53(1): 532-543.

<https://pubmed.ncbi.nlm.nih.gov/34645283/>

Gerner ST, Kuramatsu JB, Sembill JA, et al. Association of prothrombin complex concentrate administration and hematoma enlargement in non-vitamin K antagonist oral anticoagulant-related intracerebral hemorrhage. *Annals of Neurology*. 2013; 83(1): 186-196.

<https://onlinelibrary.wiley.com/doi/full/10.1002/ana.25134>

Liu J, Elsamadasi P, Philips E, et al. Four-factor prothrombin complex concentrate plus andexanet alfa for reversal of factor Xa inhibitor-associated bleeding: Case series. *Am J Health Syst Pharm*. 2022; 79(16): 1323-1329. <https://pubmed.ncbi.nlm.nih.gov/35291008/>

## **Future Studies**

Bouzat P, Bosson JL, David JS, et al. Four-factor prothrombin complex concentrate to reduce allogenic blood product transfusion in patients with major trauma, the PROCOAG trial: study protocol for a randomized multicenter double-blind superiority study. *Trials*. 2021; 22(1): 634. <https://pubmed.ncbi.nlm.nih.gov/34530886/>

Trial of Andexanet Alfa in ICH Patients Receiving an Oral FXa Inhibitor. <https://clinicaltrials.gov/ct2/show/NCT03661528>

## **Social Media**

@ rxtoriarsenault

<https://twitter.com/rxtoriarsenault/status/1520208950834126853?s=20&t=tHLO68gqW5Rw0OYSXLv3cQ>

@gmjones09

<https://twitter.com/gmjones09/status/1247855152423460866?s=20&t=eTzoO4RmTKfFMnarsReTAQ>