Preventing thromboembolic events in hospitalized Coronavirus Disease 2019 (COVID-19) patients using heparin or enoxaparin at therapeutic doses.

Deina Khader, PharmD, Jason Moore, PharmD, BCCCP, Haolin Cai, PharmD Candidate, Katherine Foster, PharmD, MS, FCCM, Dima Awad, PharmD, MS

Purpose: Hospitalizations continue to increase during the current COVID-19 pandemic. Patients are presenting with a wide variety of clinical manifestations, including inflammation and hyper-coagulation. Studies have found that COVID-19 positive patients requiring hospitalization are at a higher risk for thromboembolic events. Some studies recommend treatment dose anticoagulation; however, there is inconclusive data to pinpoint appropriate dosing strategies in this patient population. This study will investigate the use of treatment dose enoxaparin or heparin for the prevention of thromboembolic events in hospitalized COVID-19 positive patients. Additionally, this study will assess occurrence of hemorrhagic events in this patient population.

Methods: This study is a single center, retrospective chart review of confirmed COVID-19 positive patients admitted from March 15th, 2020 to September 1st, 2020. The primary outcomes are the occurrence of thromboembolic events and all-cause mortality in hospitalized COVID-19 positive patients while receiving heparin or enoxaparin at treatment doses. The secondary outcomes compare thromboembolic events occurring in hospitalized COVID-19 positive patient population receiving therapeutic anticoagulation dosing versus hospitalized COVID-19 positive patient population receiving prophylactic or intermediate anticoagulation dosing. Treatment doses are: enoxaparin 1mg/kg every 24 hours, enoxaparin 1mg/kg every 12 hours, or enoxaparin 1.5mg/kg every 24 hours, or heparin weight-based infusion. Prophylactic doses are: enoxaparin 30mg every 12 hours, enoxaparin 40mg every 24 hours, enoxaparin 40mg every 12 hours, enoxaparin 60mg every 12 hours, heparin 5000 units every eight hours, heparin 5000 units every 12 hours. Intermediate dosing strategies are subject to provider preference. Patients will be excluded if they are less than 18 years old, were prescribed an anticoagulant prior to hospital admission, or have had a prior thromboembolic or bleeding event. Data to be collected may include, but is not limited to, COVID-19 positive test, age, sex, height, weight, body mass index (BMI), serum creatinine, D-dimer, APTT and anti-Xa levels, CRP, primary admitting diagnosis, allergies/ sensitivities, medical history, length of hospital stay, occurrence of a thromboembolic or bleeding event during hospitalization.

Results: Out of the one hundred and sixty two patients admitted with a COVID-19 positive test, forty three were excluded from this retrospective review. Readmissions/ duplicate patients (n=5, 4%), patients that received prophylactic dose enoxaparin (n=78, 72%), received treatment dose enoxaparin (n=34, 31%), received intermediate dose enoxaparin (n=3, 3%), received prophylactic dose heparin (n=26, 24%), received intermediate dose heparin (n=2, 2%), received treatment dose heparin (n=8, 7%). Patients that received multiple anticoagulation therapies during their hospitalization (n= 43, 39%). Patients with a thromboembolic event (n=5), bleeding event (n=6), both a thromboembolic and bleeding event during hospital admission (n=4). Patients that received dexamethasone (n=61), received remdesivir (n=44), received

convalescent plasma (n=44), received tocilizumab (n=6), received hydroxychloroquine (n=13), received montelukast (n=13).

Conclusion: The majority of patients received prophylactic anticoagulation at some point during their hospital stay. There is inconclusive evidence to suggest prevention in thromboembolic events with therapeutically dosed enoxaparin or heparin and further studies will be needed for intermediate dose therapies.