

# Anticoagulation for COVID Associated Coagulopathy: The Experience of a Singular Community Hospital

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## Introduction

Thrombotic events despite prophylactic anticoagulation are a well-recognized complication in patients diagnosed with severe COVID-19. The appropriate dosage and clinical indications for anticoagulation remains controversial and thus anticoagulation protocols can vary greatly between institutions. This study aims to describe the demographics and general outcomes of critically ill COVID-19 patients receiving therapeutic anticoagulation guided by our expert-driven protocol at a large community hospital.

## Methodology

This retrospective cohort study includes patients admitted to the intensive care unit between March 3, 2020 and April 12, 2020 at Advocate Christ Medical Center, a Level 1 trauma and tertiary care center with greater than 750 beds. Patients who were taking oral anticoagulants prior to arrival and patients started on therapeutic anticoagulation to prevent extracorporeal membrane oxygenation (ECMO) circuit thromboses were excluded. The initiation and dosing of anticoagulation, as well as all other medical treatments and laboratory testing, was at the discretion of the treating clinicians. Informal, institutional indications for initiation of therapeutic anticoagulation were: d-dimer > 6x ULN, SIC  $\geq$  4, and clinical evidence of thrombotic disease. Demographic, laboratory, and clinical outcomes data were collected. Thrombotic and bleeding events were adjudicated by two trained clinicians or pharmacists. Results are descriptive.

TABLE 1: Baseline Characteristics of Subjects

Age, median (IQR), yr	61 (56-71)
Age category - no. (%)	
< 50	7 (11%)
50-69	40 (60%)
$\geq$ 70	20 (30%)
Sex	
Male	40 (63%)
Female	9 (37%)
Race, non-white - no. (%)	44 (66%)
BMI, median (kg/m <sup>2</sup> ) (IQR)	32.8 (29.0 - 36.7)
Current Tobacco Use, no. (%)	13 (19%)
Medical Comorbidities	
Active malignancy	0
Atrial fibrillation	0
Cardiomyopathy	3 (4.5%)
Chronic kidney disease	10 (15%)
Chronic liver disease	0
History of major bleeding	1 (1.5%)
Hypertension	50 (75%)
Obesity	46 (69%)
Stroke	8 (12%)
Venous thromboembolism	2 (3.0%)

Table 2: Clinical Indication for Therapeutic Anticoagulation

Indication for Therapeutic Anticoagulation	
D-dimer > 6x ULN alone, n (%)	50 (75%)
D-dimer > 6x ULN and thromboembolic event:	
Ischemic stroke	1 (1.5%)
ST-elevation myocardial infarction	1 (1.5%)
Non-ST elevation myocardial infarction	2 (3.0%)
Deep venous thrombosis	2 (3.0%)
Pulmonary embolism	2 (3.0%)
D-dimer 1-6x ULN and general clinical worsening	4 (6.0%)
Thromboembolic events alone	
Ischemic stroke	1 (1.5%)
Non-ST elevation myocardial infarction	2 (3.0%)
Deep venous thrombosis	1 (1.5%)
Atrial fibrillation alone	1 (1.5%)

## Results

Of 145 subjects identified, 67 (46%) received therapeutic anticoagulation. The median [IQR] age being 61 [56-71] years, BMI 32.8 [29 - 36.7] kg/m<sup>2</sup>, 42 [62%] male, 44 [66%] patients' race was non-white. The most common comorbidities were hypertension 50 (75%) and obesity 46 (69%). The initial therapeutic anticoagulation method was unfractionated heparin (UFH) infusion in 63 (94%) and subcutaneous enoxaparin in 4 (6%) patients. The most common indication for initiating therapeutic dose anticoagulation was a d-dimer > 6x ULN in 58 (87%) patients, while only 4 (6%) patients were started on anticoagulation for thrombotic events alone. The median (IQR) time to initiation of therapeutic anticoagulation was 5 (1.5-8) days; 43 (64%) of patient's required invasive mechanical ventilation at the time of therapeutic anticoagulation initiation. At follow-up, 44 (65%) were discharged alive, and 23 (34%) had expired. After initiating therapeutic anticoagulation, 4 (6%) patients were diagnosed with 5 new thrombotic complications; 3 (4.5%) deep vein thromboses, 1 (1.5%) pulmonary embolism with hemodynamic compromise and 1 (1.5%) ischemic CVA were discovered. Two (3%) patients experienced clinically overt gastrointestinal bleeding accompanied by a decrease in the hemoglobin level of at least 2 g/dL. No other major bleeding complications were identified, and no bleeding events were deemed to be fatal. Minor bleeding events were identified in 12 (18%) patients.

## Conclusion

In this study, critically ill adults initiated on therapeutic anticoagulation for COVID-associated coagulopathy had a low incidence of new thrombotic complications and low incidence of major bleeding.