INCIDENCE OF VENOUS THROMBO-EMBOLISM IN SARS COVID-19 IN A DISTRICT GENERAL CRITICAL CARE UNIT

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Abstract

COVID-19 carries a higher rate of venous thrombo-embolism (VTE) than non-COVID-19 acute respiratory distress syndrome (ARDS), with critical care patients being at highest risk of a VTE event. This service evaluation presents local data on incidence of VTE and mortality in critical care COVID-19 patients and provides a summary discussion of the latest trials on prevention of VTE in COVID-19 and their recommendations. We found a VTE rate of 30.2% for patients admitted to the critical care unit of Barnsley District General Hospital and mortality was found to be significantly different between groups receiving either standard or intermediate dose thromboprophylaxis with low molecular weight heparin (LMWH).

Introduction

SARS COVID-19 is known to produce a hypercoagulable state in which micro and macro-thrombi form, leading to reduced arterial oxygen saturation, organ failure, and increased need for mechanical ventilation – all of which increase mortality.

Currently there is conflicting evidence regarding the efficacy of LMWH anticoagulation on the incidence of venous thrombo-embolism (VTE) in COVID-19 and throughout the pandemic clinical guidance for LMWH use was updated from standard to intermediate dosing for thromboprophylaxis. Studies show rates of 21-31% [1, 2] for symptomatic VTE in ICU COVID-19 patients receiving standard dose prophylactic LMWH.

Methods

A retrospective evaluation was undertaken on patients admitted to Barnsley Hospital Critical Care Unit during March – December 2020 with confirmed COVID-19 during wave one (27/03/20 – 14/06/20) and wave two (15/06/20 – 03/12/20) of the pandemic. The primary outcome was incidence of VTE, which was defined by either: D-dimer ≥ 3 mg/L; a positive ultrasound doppler (USS); or by computed tomography pulmonary angiography (CTPA). Mortality data was also collected.

Table 1. Mortality data for different sub-groups

All patients	Total in group	Died	Mortality as % of group
Both waves	96	35	36.5
Wave 1	39	17	43.6
Wave 2	57	18	31.6
Intubation only			
Both waves	30	17	56.7
Wave 1	16	10	62.5
Wave 2	14	7	50.0
NIV only			
Both waves	51	9	17.6
Wave 1	13	2	15.4
Wave 2	38	7	18.4
Standard dose LMWH			
Both waves	24	16	66.7
Wave 1	23	15	65.2
Wave 2	1	1	100.0
Intermediate dose LMWH			
Both waves	47	9	19.1
Wave 1	10	0	0.0
Wave 2	37	9	24.3

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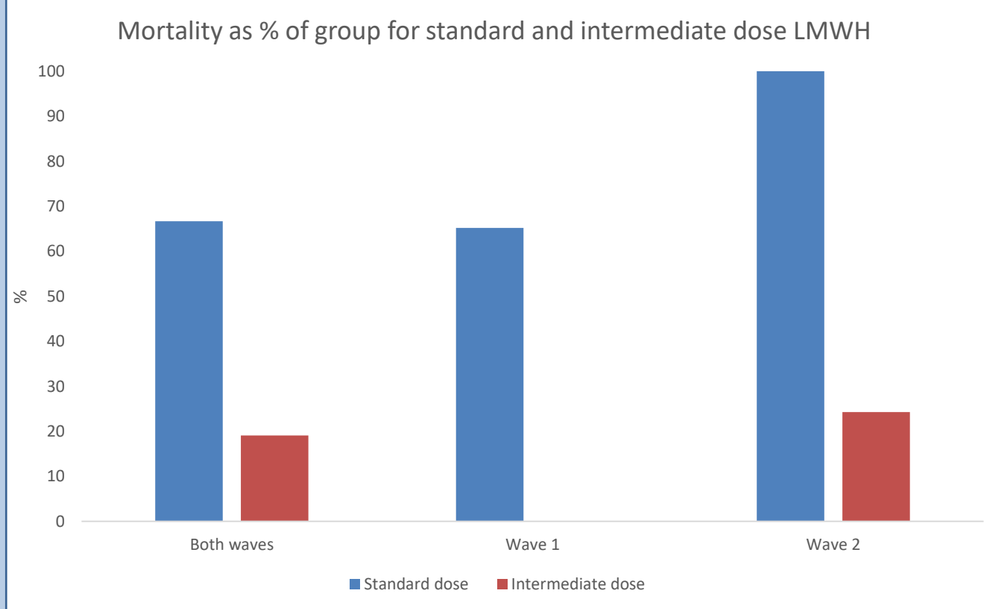
Results

Data was collected on 96 patients (n=73 male, n=23 female). VTE occurred in 30.2% of patients with n=14 confirmed by CTPA, n=1 confirmed by USS, and n=15 with D-dimer ≥ 3 mg/L (but not already confirmed by CTPA or USS). Dexamethasone use increased by 1200% between waves one and two (n=4 and n=52 respectively) representing a significant development in management of the disease. D-dimer values of > 20 mg/L and ferritin values of > 6000 ng/mL were seen which were at the upper limits of the testing parameters, demonstrating the inflammatory and pro-thrombotic nature of COVID-19. The bleeding rate was 6.25% (n=6) and included haemoptysis, haematuria, epistaxis, melaena, and one gastrointestinal bleed which had no obvious cause.

Pooling the data from *both waves*, intubation was required in 46.9% (n=45). Male and female mortality in the intubated (ETT) group was 58.3% and 56.0% respectively. Mortality for those who received non-invasive ventilation only was 18%. Mortality in the standard and intermediate dose LMWH groups was 67% and 19% respectively which was significant at the P<0.01 level.

Between waves one and two there was a 28% decrease in overall mortality however this was not significantly different at the P<0.05 level.



Graph 1. Mortality by group for standard and intermediate dose LMWH

Discussion

Our data shows a VTE rate consistent with the literature. Although the reduction in mortality across both waves from the standard to intermediate dose LMWH groups was significant at the P<0.01 level, there were many other advances in care developed throughout the pandemic, so we can not say that the reduction in mortality is due to the use of intermediate dose LMWH alone, as there are other factors which contribute to a positive patient outcome. Despite this, its use, combined with other treatments, is consistent with an improved outcome in COVID-19 ICU patients.

Current best evidence from INSPIRATION and REMAP-CAP/ATTACC/ACTIV-4a trials [3, 4] recommends giving treatment dose LMWH to all COVID-19 hospitalised patients, but to reduce to intermediate dose if admitted to critical care/ICU providing there is no evidence of VTE, as defined above. Trials currently show no benefit of routine treatment dose LMWH over intermediate dose in critical care for COVID-19 patients.

Conclusions

For the last two years COVID-19 has had a devastating effect on families, hospitals and many aspects of the wider community. The inflammatory and thrombotic nature of this disease can produce a clinical picture which is highly challenging to manage.

Our data shows a VTE rate of 30.2%, which was found to fall within the literature range. This service evaluation also gathered mortality data and identified a significant reduction in mortality for those on intermediate vs standard dose LMWH thromboprophylaxis.

Due to a lack of data, during the early stages of the pandemic, there was no clear consensus on the pharmacological prevention of VTE in critical care COVID-19 patients. Current best evidence now recommends to give treatment dose LMWH to all hospitalised COVID-19 patients but to reduce to intermediate dosing if admitted to critical care.

References

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