

Mortality related to pulmonary embolism in the United States before and during the COVID-19 pandemic: an analysis of the CDC Multiple Cause of Death database

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Background: The COVID-19 pandemic caused a large number of excess deaths. COVID-19 emerged as a prothrombotic disease often complicated by pulmonary embolism (PE). In light of this, we hypothesized that PE-related mortality rates (stable before the pandemic) would be characterized by an increasing trend following the COVID-19 outbreak.

Purpose: To investigate the mortality rates associated with PE among deaths with or without COVID-19 during the 2020 pandemic in the United States (US).

Methods: For this retrospective epidemiological study, we analyzed public medically certified vital registration data (death certificates encompassing underlying and multiple causes of death) from the Mortality Multiple Cause-of-Death database provided by the Division of Vital Statistics of the US Centers for Disease Control and Prevention (CDC; US, 2018–20). We investigated the time trends in monthly PE-related crude mortality rates for 2018–2019 and for 2020 (the latter associated vs. not associated with COVID-19), utilizing annual national population totals from the US Census Bureau. Second, we calculated the PE-related proportionate mortality among COVID-19 deaths (overall and limited to autopsy-based diagnosis). We performed subgroup analyses based on age groups, sex and race.

Results: During 2020, 49,423 deaths in association with PE were reported, vs. 39,450 in 2019 and 38,215 in 2018. The crude PE-related mortality rate

without COVID-19 was 13.3 per 100,000 population in 2020 compared to 11.7 in 2018 and 12.0 in 2019 (Figure 1A). The PE-related mortality rate with COVID-19 was 1.6 per 100,000 population in 2020. Among non-COVID-19-related deaths, the crude PE-related mortality rate was higher in men; among COVID-19-related deaths, it was higher in men. PE-related mortality rates were approximately two-fold higher among black (vs. white) general population irrespective of COVID-19 status (Figures 1B and 1C). Among COVID-19 deaths, PE-related deaths corresponded to 1.4% of total; the value rose to 6.0% when an autopsy was performed. This figure was higher in men and its time evolution is depicted in Figure 2A. The proportionate mortality of PE in COVID-19 deaths was higher for younger age groups (15–44 years) compared to non-COVID-19-related deaths (Figure 2B).

Conclusion: In 2020, an overall 20%-increase in PE-related mortality was reported, not being limited to patients with COVID-19. Our findings could be interpreted in the context of undiagnosed COVID-19 cases, uncoupled late sequelae, and possibly sedentary lifestyle and avoidance of healthcare facilities during the pandemic that may have prevented timely diagnosis and treatment of other diseases. Whether vaccination programs had an impact on PE-associated mortality in the year 2021, remains to be determined.

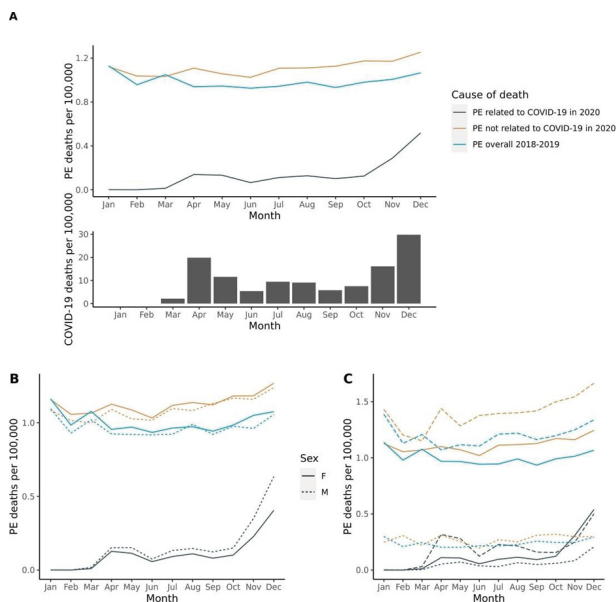


Figure 1

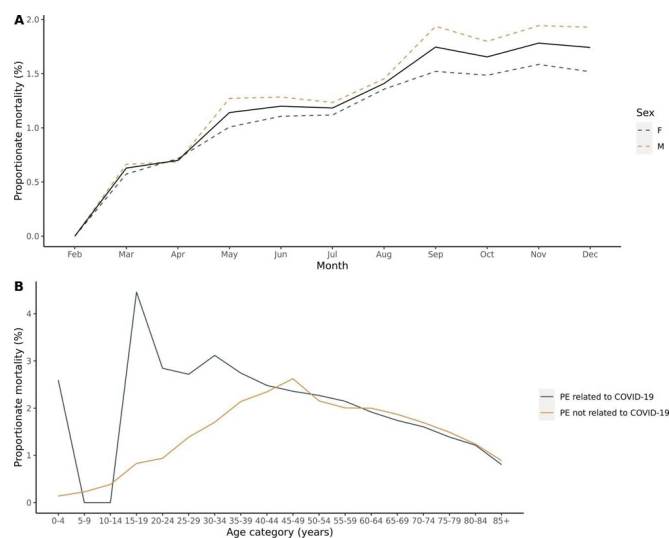


Figure 2