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CARDIOLOGY®

ACC Clinical Bulletin

Cardiac Implications of Novel Wuhan Coronavirus (COVID-19)

Background on Coronavirus epidemic ^{i,ii}

- COVID-19 was first reported in late December 2019, originating in Wuhan, China
- COVID-19 is a betacoronavirus, like SARS and MERS, presenting as viral pneumonia with a wide range of acuity
- As of February 12, there are 45,204 confirmed cases and 1,117 confirmed deaths across 28 countries; COVID-19 appears to have greater infectivity and a lower case fatality rate when compared to SARS and MERS
- 99% of all cases are in mainland China, where despite aggressive containment efforts, case counts continue to rise rapidly

Early cardiac implications from case reports on Wuhan Coronavirusⁱⁱⁱ

- Early case reports suggest patients with underlying conditions are at higher risk for complications or mortality from COVID-19; up to 50% of hospitalized patients have a chronic medical illness
- 40% of hospitalized patients with confirmed COVID-19 patients have cardiovascular or cerebrovascular disease
- In a recent case report on 138 hospitalized COVID-19 patients, 19.6% of patients developed acute respiratory distress syndrome^{iv}
 - 16.7% of patients developed arrhythmia; 7.2% developed acute cardiac injury
 - 8.7% of patients developed shock; 3.6% developed acute kidney injury
 - Rates of complication were universally higher for ICU patients

- The first reported death was a 61-year-old male, with a long history of smoking, who succumbed to acute respiratory distress, heart failure, and cardiac arrest
- Early, unpublished first-hand reports suggest at least some patients develop myocarditis

Potential cardiac implications from analog viral respiratory pandemics

- **Influenza analog:** In all influenza pandemics other than the 1918 flu, cardiovascular events surpassed all other causes of mortality, including superimposed pneumonia^v
- **General viral analog:** Viral illness is a well-known destabilizing factor in chronic cardiovascular disease, a general consequence of the imbalance between infection-induced increased metabolic demand and reduced cardiac reserve. The viral infection along with superimposed pneumonia will directly and indirectly affect the cardiovascular system^{vi}
 - Both coronary artery disease and heart failure patients are at increased risk of acute events or exacerbation; viral illness can potentially destabilize coronary plaques through several mechanisms including systemic inflammatory responses which have been recently documented with COVID-19
 - Multiple co-morbidities (DM, obesity, HTN, COPD, CKD) further increase risk
- **SARS/MERS analog:** Although published literature on CV implications of SARS/MERS is limited, in the absence of more detailed reporting on COVID-19, it may prove instructive
 - 60% of MERS cases had one or more pre-existing comorbidity, resulting in a poorer prognosis; expert guidance suggests patients with diabetes, CVD, or renal disease should be prioritized for treatment^{vii}
 - Both SARS and MERS have been linked to acute myocarditis, acute myocardial infarction, and rapid-onset heart failure
 - In one early published report, 2 out of the 5 deaths were attributed to MI^{viii,ix}
 - These data should be interpreted cautiously—indicative of the increased CV risk in coronavirus patients, but not generalizable to broader outcomes
 - Reversible, sub-clinical diastolic LV impairment in acute SARS even among those without underlying cardiac disease appears common, likely the result of systemic inflammatory immune response and is not unique to SARS; however, lower EF upon admission was predictive of later mechanical ventilation^x

- In one study of cardiovascular complications of SARS in 121 patients:^{xi}
 - 71.9% of patients developed persistent tachycardia, including 40% with continued tachycardia during outpatient follow-up
 - 50.4% of patients developed sustained asymptomatic hypotension during hospitalization; one patient required inotropic support
 - 14.9% of patients developed transient bradycardia
 - 10.7% of patients developed transient cardiomegaly, without signs or symptoms of heart failure
 - One patient experienced transient paroxysmal AF, with spontaneous resolution
 - Cardiovascular complications appeared statistically uncorrelated with oxygen desaturation or ICU admission

Clinical guidance given current COVID-19 uncertainty

- COVID-19 is spread through droplets and can live for substantial periods outside the body; containment and prevention using standard public health and personal strategies for preventing the spread of communicable disease remains the priority
- In geographies with active COVID-19 transmission (mainly China), it is reasonable to advise patients with underlying cardiovascular disease of the potential increased risk and to encourage additional, reasonable precautions
- Older adults are less likely to present with fever, thus close assessment for other symptoms such as cough or shortness of breath is warranted
- Some experts have suggested that the rigorous use of guideline-directed, plaque stabilizing agents could offer additional protection to CVD patients during a widespread outbreak (statins, beta blockers, ACE inhibitors, ASA)^v; however, such therapies should be tailored to individual patients
- It is important for patients with CVD to remain current with vaccinations, including the pneumococcal vaccine given the increased risk of secondary bacterial infection; it would also be prudent to receive influenza vaccination to prevent another source of fever which could be initially confused with coronavirus infection
- It may be reasonable to triage COVID-19 patients according to the presence of underlying cardiovascular, respiratory, renal, and other chronic diseases for prioritized treatment
- Providers are cautioned that classic symptoms and presentation of AMI may be overshadowed in the context of coronavirus, resulting in underdiagnosis

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- For CVD patients in geographies without widespread COVID-19 emphasis should remain on the threat from influenza, the importance of vaccination and frequent handwashing, and continued adherence to all guideline-directed therapy for underlying chronic conditions
- COVID-19 is a fast-moving epidemic with an uncertain clinical profile; providers should be prepared for guidance to shift as more information becomes available

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