



MASSACHUSETTS GENERAL HOSPITAL

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Risk Factors for COVID-19 Disease Progression		
Epidemiological	Vital Signs	Labs
Age > 65 ^a	Respiratory rate > 24 breaths/min ^k	D-dimer > 1000 ng/mL ⁿ
Pre-existing pulmonary disease ^b	Heart rate > 125 beats/min ^l	CPK > twice upper limit of normal ^o
Chronic kidney disease ^c	SpO2 ≤ 93% on ambient air ^m	CRP > 100 ^p
Diabetes with A1c > 7.6% ^d	PaO2/FiO2 < 300 mmHg ^m	LDH > 245 U/L ^q
History of hypertension ^e		Elevated troponin ^r
History of cardiovascular disease ^f		Admission absolute lymphocyte count < 0.8 ^s
Obesity (BMI ≥ 30 kg/m ²) ^g		Ferritin > 500 ug/L ^t
Use of biologics ^h		
History of transplant or other immunosuppression ⁱ		
Uncontrolled HIV (viremic or CD4 <200) ^j		

Note abnormalities on chest radiographs are common in both severe and non-severe cases for hospitalized patients with COVID-19. Patients without severe disease may be more likely to have normal radiographs. (1-3)

a: Most studies to date have identified age as one of the main risk factors for severe disease. (1, 3-5). The threshold was adjusted to age 65 on 4/7/2020 to align with literature.

b: Pre-existing pulmonary disease is a risk factor for severe disease with increased mortality. (3, 5)

c: Chronic kidney disease is reported in more patients with severe disease. (3)

d: Diabetes is a risk factor for severe disease according to multiple studies. (3-5)

e: Baseline hypertension seems to be one of the major risk factors predicting worse disease (3-5)

f: Pre-existing cardiovascular disease is thought to be a major risk factor for worse disease severity (3-4, 6)

g: Emerging data show that obesity is a risk factor for severe disease (7)

h: Predicted worse disease severity, existing data are limited

i: Predicted worse disease severity, existing data are limited

j: Possible worse disease outcome, existing data are limited

k: Expected based on physiology and available data, including SOFA score. (3)



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l: Expected based on physiology and available data, including SOFA score. (3)

m: Expected based on physiology, including SOFA score. (3)

n: Multiple studies have shown that elevated D-dimer compared to normal is either associated with ICU versus non-ICU or non-surviving versus surviving outcomes. (2-3, 8)

o: CPK may be elevated in patients with severe disease (3)

p: CRP is commonly elevated above normal for hospitalized patients with COVID-19. (1) Available data suggests it is often higher in patients with worse outcomes (> 100 versus around 50-75 for patients with less severe outcomes). (6)

q: Multiple studies have shown a low absolute lymphocyte count on admission can be associated with worse outcomes. (1-3) Patients may with worse outcomes may also have an elevated total white blood cell count driven by neutrophilia on admission.

r: Elevated LDH is more likely to be seen in patients with severe presentations according to multiple studies (3-4)

s: Elevated troponin is a marker of severe disease (3)

t: Ferritin > 300 ug/L may be a marker of severe disease (3)



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