

Obesity and COVID-19 Severity

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Severe obesity, defined as having a body mass index (BMI) of 40 kg/m² or higher, has been identified by the CDC as a risk factor for more severe COVID-19 illness.¹ This brief examines the relationship between obesity and severity of illness for adult COVID-19 positive patients.

We define three obesity classes:

- **Class One Obesity:** BMI from 30 to 34.9 kg/m²
- **Class Two Obesity:** BMI from 35 to 39.9 kg/m²
- **Class Three Obesity:** BMI over 40 kg/m²

Data are pooled from 31 health systems representing 300 hospitals that span 18 states and cover 136 million patients, as of May 4, 2020.

In this sample of 119,582 COVID-19 positive patients, 79% have a BMI documented in their electronic medical record. Patients who have been admitted are more likely to have a BMI recorded (92%) than patients who are not admitted (68%). Among those COVID-19 positive patients with a documented BMI, 48% were obese (BMI ≥ 30 kg/m²).

Figure 1 shows the worst severity COVID-19 positive patients reached by obesity class and age. The worst severity level reached for patients 75 and older does not appear to be impacted by obesity. For patients aged 19-74 years of age, it appears that there is a relationship between obesity and worst severity experienced, with higher levels of obesity corresponding to more severe illness. Among obese patients aged 19-74 years old, the most obese patients (Class Three Obesity) tend to fare the worst. It is important to note that approximately 20-45% of patients under the age of 75 have not had COVID-19 long enough to have a known outcome, introducing uncertainty into any potential conclusions based on these data.

Patients with obesity have a higher death rate, except for those 75 years old and above. Factors other than BMI, such as comorbidities, may be more important in outcomes for older patients.

Providers may find this information useful when assessing which patients may be at higher risk for worse outcomes.

¹ <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html>

Worst Severity in COVID-19 Patients

by Obesity Class and Age Group

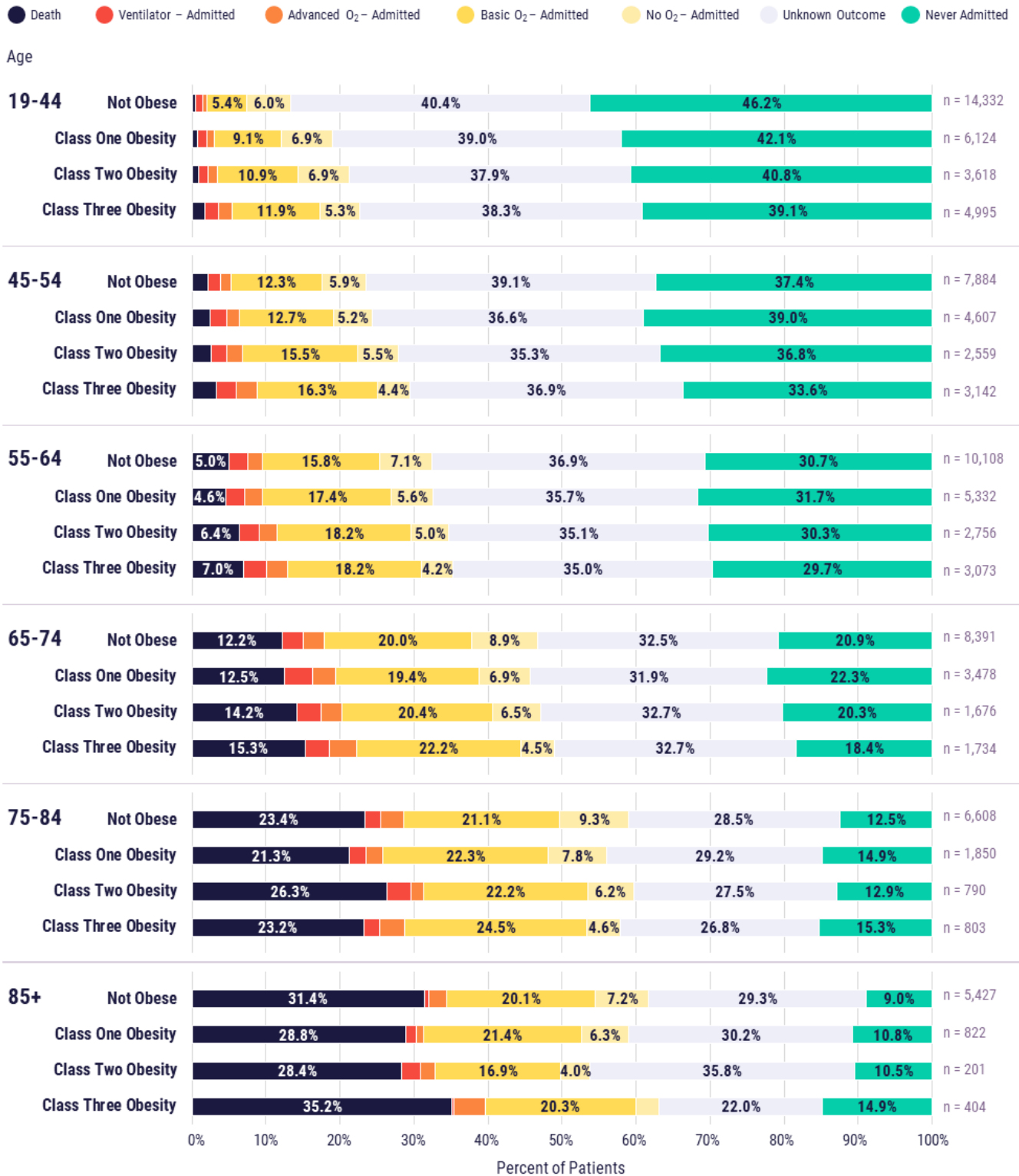


Figure 1: COVID-19 severity by obesity class and age group

Term	Definition
COVID-19 Patient	Patient with a positive SARS-CoV-2 lab result or a COVID-19 diagnosis. Start Date: The earlier of the earliest positive SARS-CoV-2 lab result collection date or earliest diagnosis noted date
Positive COVID-19 Lab Result	A final result flagged as abnormal for one of the lab components identified by individual health systems for SARS-CoV-2. Positive/Start Date: Date the test was collected/performed
COVID-19 Diagnosis	A patient with one of the following codes for one of the following diagnosis settings. <ul style="list-style-type: none"> • Diagnosis Code: U07.1 (ICD-10), 840539006 (SNOMED) • Diagnosis Setting: Encounter Diagnosis, Billing Diagnosis, Problem List, Hospital Problem, Discharge Diagnosis
Worst Severity	This is defined as the worst severity a patient has attained over all the days assessed for the patient.
Severity Score Index	<p>An ordinal scale from most severe to least severe:</p> <ul style="list-style-type: none"> • Death • Patient on ventilator • Patient on advanced oxygen support • Patient on basic oxygen support • Patient has COVID-19 related admission, no supplemental oxygen • Discharged • No Admission <p>We have purposefully left our numeric values off our description of this scale. We have aligned this severity scale with the severity index scores used by numerous clinical trials, FDA, CDC, and WHO, regardless of which numeric end they have coded as “high severity.”</p> <p>Severity is assessed daily. The most severe score a patient has attained on a calendar date (midnight to midnight) is recorded.</p> <p>Note, if a patient tests positive on Day 0 and is admitted on Day 4, Days 0-3 would be severity=No Admission, Day 4 would be one of the first 5 severity levels. When they are discharged, they would then be severity=Discharged.</p>
COVID-19 Related Death	A COVID-19 patient with a death date or discharge date with discharge disposition of deceased within 6 weeks of their COVID-19 “start date.”
Ventilator Usage	<p>A patient is considered to be on a ventilator on a day if they have a charge dropped for one of the following CPT codes during their COVID-19 related admission. CPT Codes: 94002, 94003, 94004, 94005.</p> <p>Alternatively, a patient is counted as ventilated if on any given calendar day there is documentation other than “Off” in a Vent Mode flowsheet row or an oxygen delivery device of ventilator.</p>
Advanced Respiratory Support	A patient with an O2 flow rate at or above 30 lpm or using a high flow oxygen delivery device (regardless of O2 flow rate) that includes BiPAP, high-flow nasal cannula, T-piece, blow-by, or CPAP if administered between 8am-9pm (to exclude patients who were on nightly CPAP for apnea).
Basic Respiratory Support	A patient on supplementary oxygen with a flow rate under 30 lpm, or using any oxygen delivery device that is not a ventilator or high-flow oxygen device (e.g., ETT, LMA, CPAP, BiPAP, high-flow nasal cannula, T-piece, or blow-by).

COVID-19 Related Admission	<p>A hospital admission during which the patient has a positive SARS-CoV-2 lab test or COVID-19 diagnosis, OR a hospital admission with any respiratory diagnosis which happens within 14 days of the patient's COVID-19 "start date".</p> <p>Respiratory Diagnosis Codes: J00-J99 (ICD-10)</p>
Obesity	<p>Obesity is defined as a patient belonging to Obesity Class One, Two, or Three. We define the following obesity classes as:</p> <ul style="list-style-type: none"> • Not Obese – BMI < 30 kg/m² • Obesity Class One – BMI ≥ 30 kg/m² and BMI < 35 kg/m² • Obesity Class Two – BMI ≥ 35 kg/m² and BMI < 40 kg/m² • Obesity Class Three – BMI ≥ 40 kg/m² • Unknown Obesity – no BMI on file
COVID-19 Unknown Outcome	<p>A patient who is either currently still admitted to the hospital, or has not been admitted but is still within or within 6 weeks of their COVID-19 "start date."</p>

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