

Severe obesity is a risk factor for mortality in patients with COVID-19

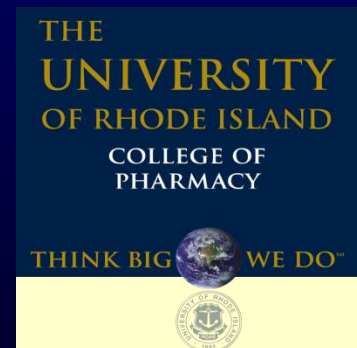
ICPE 2021, Virtual

Aisling R Caffrey¹⁻², J. Xin Liao¹⁻², Vrishali Lopes¹, Kerry L LaPlante¹⁻²



¹Infectious Diseases Research Program,
VA Providence Healthcare System

²College of Pharmacy, University of Rhode Island



Disclosures

- Views expressed are those of the authors and do not necessarily reflect the position or policy of the United States Department of Veterans Affairs. Material is based upon work supported, in part, by the Office of Research and Development.
- Funding of study: None.
- Conflicts
 - ARC: Gilead, Pfizer, Merck, and Shionogi research funding. Merck Speaker.
 - JXL, VVL: None.
 - KLL: Gilead, Pfizer, Merck, and Shionogi research funding. Paratek Consultant.

Background

- High prevalence of obesity and obesity-related complications among patients with severe COVID-19, and among patients dying from COVID-19
- Conflicting findings as to whether obesity independently predicts severe disease and mortality

Background

- COVID-19 vaccination eligibility criteria for individuals with “underlying medical conditions”
 - Factors independently predictive of severe disease and death in various populations should be prioritized
- Highly varied priority groups for vaccination in the United States
 - Some did not include any form of obesity
 - Some only included severe obesity

Objective

- To evaluate the impact of obesity on in-hospital mortality among patients hospitalized in the national Veterans Affairs (VA) Healthcare System with COVID-19

Data Source

- VA COVID-19 databases and other national VA databases created from electronic medical records

Methods

- Population: hospitalized Veterans with positive COVID-19 PCR tests from Mar 1, 2020 – Nov 30, 2020
 - Obesity assessed at the time of the index date (the earliest of the first positive COVID-19 PCR test date or hospital admission date)

Methods

- Impact of severe obesity on in-hospital mortality, defined as body mass index (BMI) ≥ 40 kg/m²
 - Multivariable logistic regression model, controlling for variables significantly associated with severe obesity and mortality
- Sensitivity analyses
 - Obesity (BMI ≥ 30 kg/m²)
 - Sleep apnea (which affected 32.2% of our cohort)

Demographics

Characteristics	Overall N = 16,551	Inpatient mortality N = 1,940 (11.7%)	Inpatient survival N = 14,611 (88.3%)
Age (years), mean (SD)	68.8 (13.5)	76.2 (10.5)	67.8 (13.6)
BMI, mean (SD)	29.9 (7.1)	28.9 (7.3)	30.0 (7.0)
Male	15,712 (94.9%)	1,903 (98.1%)	13,809 (94.5%)
White	9,739 (58.8%)	1,183 (61.0%)	8,556 (58.6%)
Admit source: outpatient	8,783 (53.1%)	877 (45.2%)	7,906 (54.1%)
Intensive care	5,627 (34.0%)	1,464 (75.5%)	4,163 (28.5%)
Hospitalization 30 days prior to admission	624 (3.8%)	94 (4.9%)	530 (3.6%)

Data are n (%), unless otherwise specified. SD = standard deviation. Bolded indicates p-value <0.05 for comparison of inpatient mortality and inpatient survival (chi-square test or t-test were appropriate).

Medical History

Medical History	Overall N = 16,551	Inpatient mortality N = 1,940 (11.7%)	Inpatient survival N = 14,611 (88.3%)
Charlson score, median (IQR)	2 (1-5)	3 (2-6)	2 (1-5)
Diabetes with complications	6,488 (39.2%)	854 (44.0%)	5,634 (38.6%)
Diabetes without complications	7,308 (44.2%)	912 (47.0%)	6,396 (43.8%)
Heart disease	6,609 (39.9%)	945 (48.7%)	5,664 (38.8%)
Acute respiratory failure	1,245 (7.5%)	201 (10.4%)	1,044 (7.2%)
Acute kidney failure	3,109 (18.8%)	464 (23.9%)	2,645 (18.1%)
Cancer	4,565 (27.6%)	596 (30.7%)	3,969 (27.2%)
Congestive heart failure	2,860 (17.3%)	443 (22.8%)	2,417 (16.5%)
Chronic lung disease	6,957 (42.0%)	871 (44.9%)	6,086 (41.7%)
Chronic obstructive pulmonary disease	4,436 (26.8%)	612 (31.6%)	3,824 (26.2%)
Obstructive sleep apnea	5,335 (32.2%)	568 (29.3%)	4,767 (32.6%)
Septic shock	1,260 (7.6%)	187 (9.6%)	1,073 (7.3%)

Data are n (%), unless otherwise specified. IQR = interquartile range. Bolded indicates p-value <0.05 for comparison of inpatient mortality and inpatient survival (chi-square test or non-parametric Wilcoxon test were appropriate).

Symptoms

Symptoms	Overall N = 16,551	Inpatient mortality N = 1,940 (11.7%)	Inpatient survival N = 14,611 (88.3%)
Abdominal Pain	960 (5.8%)	83 (4.3%)	877 (6.0%)
Chills	360 (2.2%)	28 (1.4%)	332 (2.3%)
Cough (new onset)	3,281 (19.8%)	368 (19.0%)	2,913 (19.9%)
Shortness of breath	5,125 (31.0%)	666 (34.3%)	4,459 (30.5%)
Malaise (Fatigue)	2,700 (16.3%)	339 (17.5%)	2,361 (16.2%)
Fever (>100.4F)	7,983 (48.2%)	1,005 (51.8%)	6,978 (47.8%)
Headache	280 (1.7%)	21 (1.1%)	259 (1.8%)
Loss of smell	54 (0.3%)	< 5 (<0.3%)	53 (0.4%)
Muscle aches (myalgia)	231 (1.4%)	15 (0.8%)	216 (1.5%)
Nausea/vomiting	1,139 (6.9%)	101 (5.2%)	1,038 (7.1%)
Sore throat	177 (1.1%)	9 (0.5%)	168 (1.2%)

Data are n (%). Bolded indicates p-value <0.05 for comparison of inpatient mortality and inpatient survival (chi-square test).

Severe Obesity

	No. of events / No. of patients (%)		Unadjusted odds ratio	Adjusted odds ratio
Outcome	Severe obesity	Non-severe obesity	OR (95% CI)	aOR (95% CI)
Inpatient mortality	138/1,350 (10.2%)	1,786/15,124 (11.8%)	0.85 (0.71-1.02)	1.43 (1.16-1.75)

Included in model	Adjusted odds ratio (95% CI)
Age at Index	1.07 (1.06-1.07)
Male	1.65 (1.16-2.36)
White	0.87 (0.78-0.97)
Current ICU admit	8.67 (7.73-9.73)
Hospitalization prior 30 days	1.34 (1.03-1.73)
Cancer	0.86 (0.76-0.98)
Charlson comorbidity index	1.07 (1.05-1.10)
Non-alcohol drug dependence	0.68 (0.51-0.91)

Obesity

	No. of events / No. of patients (%)		Unadjusted odds ratio	Adjusted odds ratio
Outcome	Obesity	Non-obesity	OR (95% CI)	aOR (95% CI)
Inpatient mortality	730/7,327 (10.0%)	1,194 /9,147 (13.1%)	0.74 (0.67-0.81)	1.09 (0.97-1.22)

Included in model	Adjusted odds ratio (95% CI)
Age at Index	1.07 (1.06-1.07)
Male	1.63 (1.14-2.34)
White	0.87 (0.78-0.98)
Current ICU admit	8.65 (7.71-9.70)
Hospitalized last 30 days	1.34 (1.04-1.74)
Cancer	0.86 (0.76-0.97)
Charlson comorbidity index	1.07 (1.05-1.10)
Non-alcohol drug dependence	0.69 (0.51-0.92)
Hemorrhagic stroke	0.28 (0.10-0.79)
Hypertension	0.87 (0.75-0.99)
Hyperlipidemia	0.87 (0.77-0.98)

Sleep Apnea

	No. of events / No. of patients (%)		Unadjusted odds ratio	Adjusted odds ratio
Outcome	Sleep apnea	Non-sleep apnea	OR (95% CI)	aOR (95% CI)
Inpatient mortality	568/5,335 (10.7%)	1,372/11,216 (12.2%)	0.86 (0.77-0.95)	0.97 (0.86-1.09)

Included in model	Adjusted odds ratio (95% CI)
Severe obesity	1.44 (1.17-1.77)
Age at Index	1.07 (1.06-1.07)
Male	1.66 (1.16-2.37)
White	0.87 (0.78-0.98)
Current ICU admit	8.68 (7.73-9.74)
Hospitalization prior 30 days	1.34 (1.03-1.73)
Cancer	0.86 (0.76-0.98)
Charlson comorbidity index	1.07 (1.05-1.10)
Non-alcohol drug dependence	0.68 (0.51-0.91)
Hemorrhagic stroke	0.28 (0.10-0.78)
Hypertension	0.87 (0.75-0.99)
Hyperlipidemia	0.87 (0.77-0.99)

Limitations

- Treatment recommendations and COVID-19 epidemiology was rapidly changing
 - Different treatment approaches over time, improved mortality rates
 - Different patient populations affected over time

Conclusions

- In our national cohort study of patients hospitalized with COVID-19 from March to November 2020, severe obesity was an independent risk factor for mortality, increasing the risk of in-hospital death by 43%
- Importance of continued vaccination efforts in this at-risk population

Severe obesity is a risk factor for mortality in patients with COVID-19

ICPE 2021, Virtual

Aisling R Caffrey¹⁻², J. Xin Liao¹⁻², Vrishali Lopes¹, Kerry L LaPlante¹⁻²



¹Infectious Diseases Research Program,
VA Providence Healthcare System

²College of Pharmacy, University of Rhode Island

