

# Examining the Impact of Type 2 Diabetes Status and Severity on In-Hospital Outcomes Amongst Patients Hospitalized with Covid-19 in a Southwest Virginia Healthcare System



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## INTRODUCTION

- Patients with type 2 diabetes mellitus (T2DM) who develop COVID-19 are at increased risk of hospitalization, longer hospital stays, ICU admission, and death<sup>1-6</sup>
- Additionally, measures of T2DM severity (e.g., hemoglobin A1c, fasting plasma glucose) have been found to be predictive of severe COVID-19<sup>7-8</sup>
- The present analysis was conducted to determine whether T2DM status and severity may be predictive of COVID-19 severity outcomes amongst patients hospitalized with COVID-19 in a southwest Virginia healthcare system

## MATERIALS & METHODS

### Inclusion/Exclusion Criteria

- 18 years of age or older
- Non-pregnant
- Hospitalized with COVID-19 on or before 6/11/2021
- No past diagnosis of non-T2DM diabetes mellitus

### Exposure Variables

- T2DM status (Yes/No)
- Diabetes Complications Severity Index (DCSI) score
  - 13-point summary score covering 7 discrete categories of diabetes complications<sup>9-10</sup>

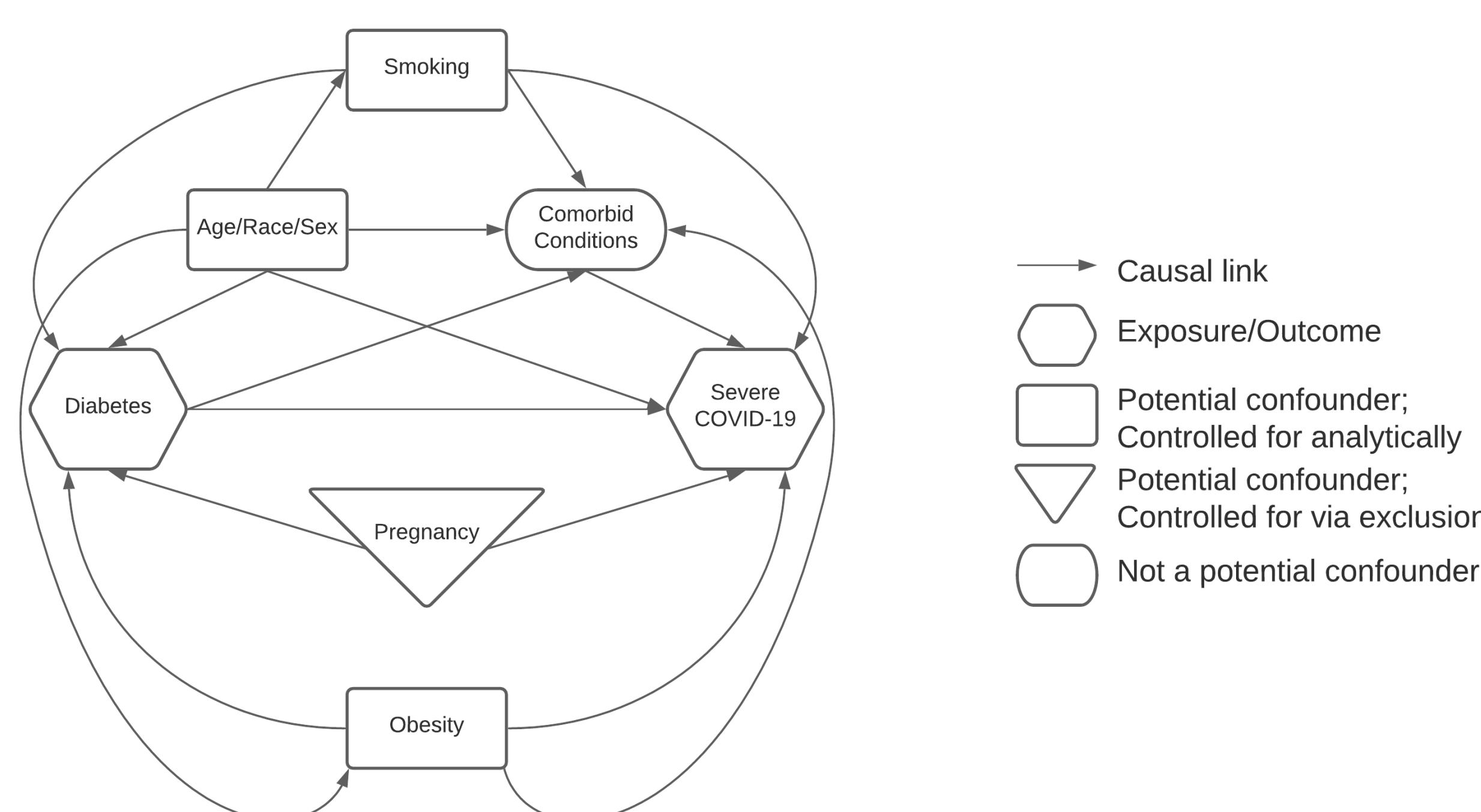
### Outcome Variables

- Progression to ICU admission, ventilatory assistance, and/or death (Yes/No)
- In-hospital mortality (Yes/No)

### Statistical Methods

- Binary logistic regression was used to assess the relationship between T2DM status and COVID-19 severity
- Multivariate logistic regression was used to assess the relationship between DCSI score and COVID-19 severity amongst diabetics
- Propensity score weighting was used to adjust for covariates including age, sex, race/ethnicity, BMI, and smoking status; covariates were selected according to the directed acyclic graph included in Figure 1

Figure 1: Hypothesized Causal Mechanism



## RESULTS

Figure 2: Diabetes Status and Severity Data (n = 2,099)

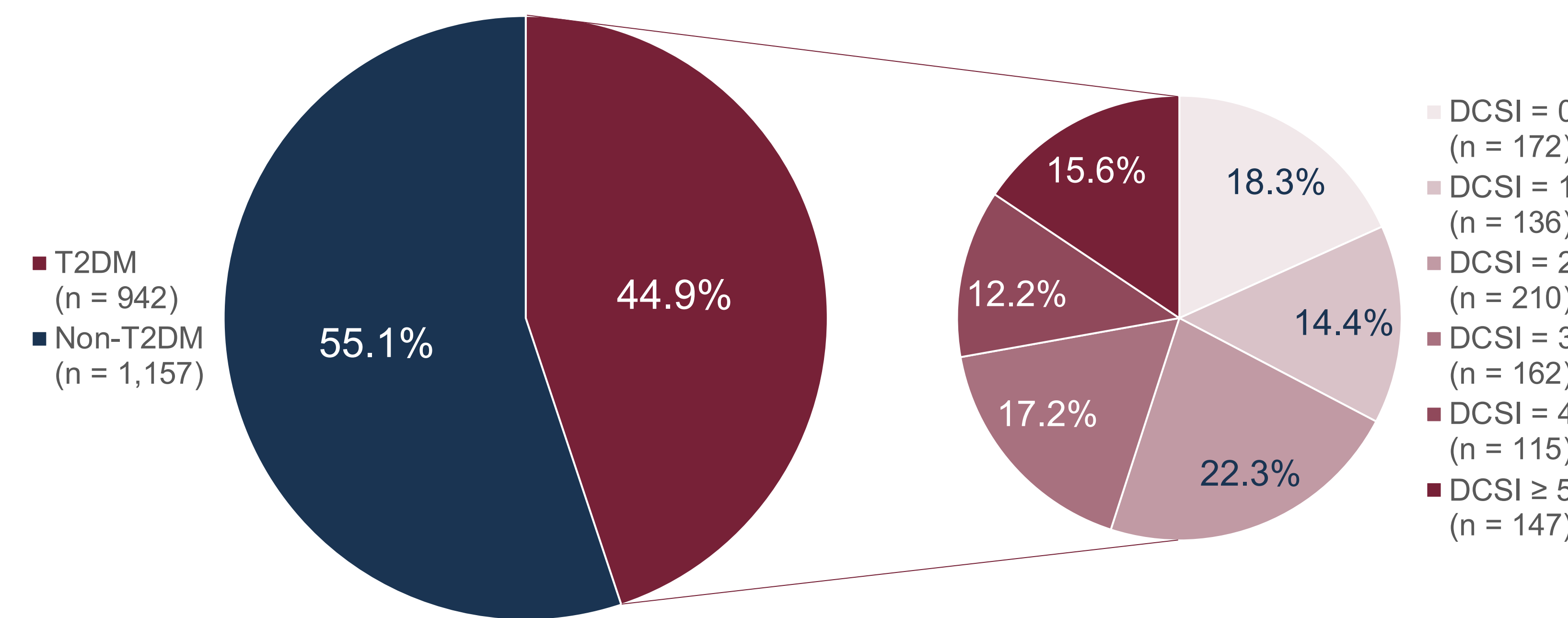


Table 1: Sample Demographics and Covariates

	Total (n = 2,099)		Diabetics (n = 942)		Non-Diabetics (n = 1,157)	
	n	%	n	%	n	%
<b>Sex</b>						
Female	1,070	51.0%	444	47.1%	626	54.1%
Male	1,029	49.0%	498	52.9%	531	45.9%
<b>Race/Ethnicity</b>						
African American	262	12.5%	136	14.4%	126	10.9%
Caucasian	1,711	81.5%	760	80.7%	951	82.2%
Hispanic	82	3.9%	29	3.1%	53	4.6%
Multiracial/Other	44	2.1%	17	1.8%	27	2.3%
<b>Age</b>						
18-29	82	3.9%	10	1.1%	72	6.2%
30-39	104	5.0%	26	2.8%	78	6.7%
40-49	173	8.2%	61	6.5%	112	9.7%
50-59	337	16.1%	159	16.9%	178	15.4%
60-69	471	22.4%	248	26.3%	223	19.3%
70-79	536	25.5%	275	29.2%	261	22.6%
80+	396	18.9%	163	17.3%	233	20.1%
<b>Smoking Status</b>						
Current Smoker	700	33.4%	318	33.8%	382	33.0%
Non-Smoker	1,399	66.6%	624	66.2%	775	67.0%
<b>Body Mass Index</b>						
Underweight (BMI <18.5)	51	2.4%	8	0.9%	43	3.7%
Normal weight (BMI 18.5-24.9)	402	19.2%	143	15.2%	259	22.4%
Overweight (BMI 25.0-29.9)	571	27.2%	248	26.3%	323	27.9%
Obese (BMI 30.0-34.9)	432	20.6%	207	22.0%	225	19.5%
Morbidly obese (BMI ≥35.0)	643	30.6%	336	35.7%	207	18.0%

Figure 3: COVID-19 Severity Amongst Non-Diabetics (n = 1,157)

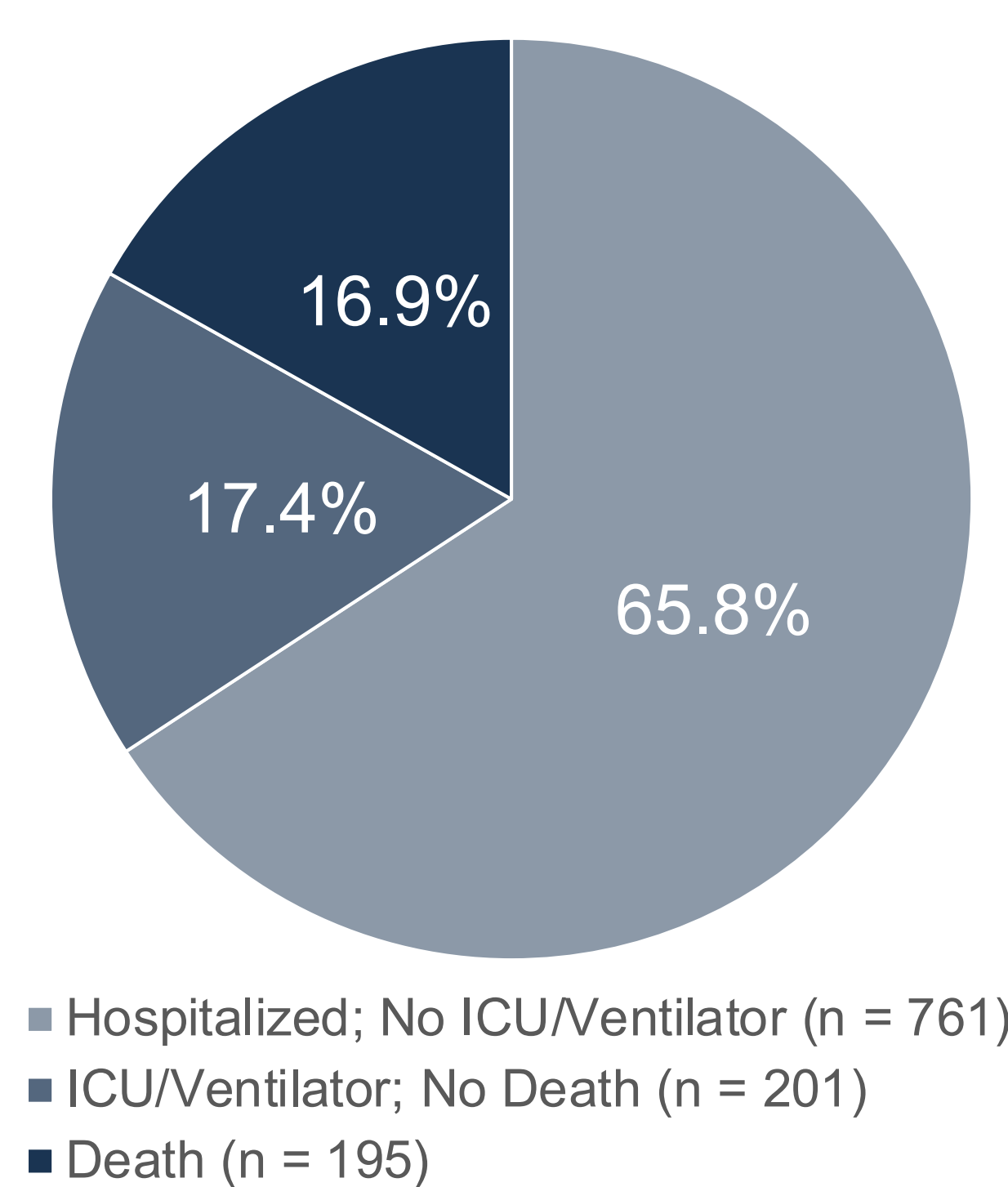
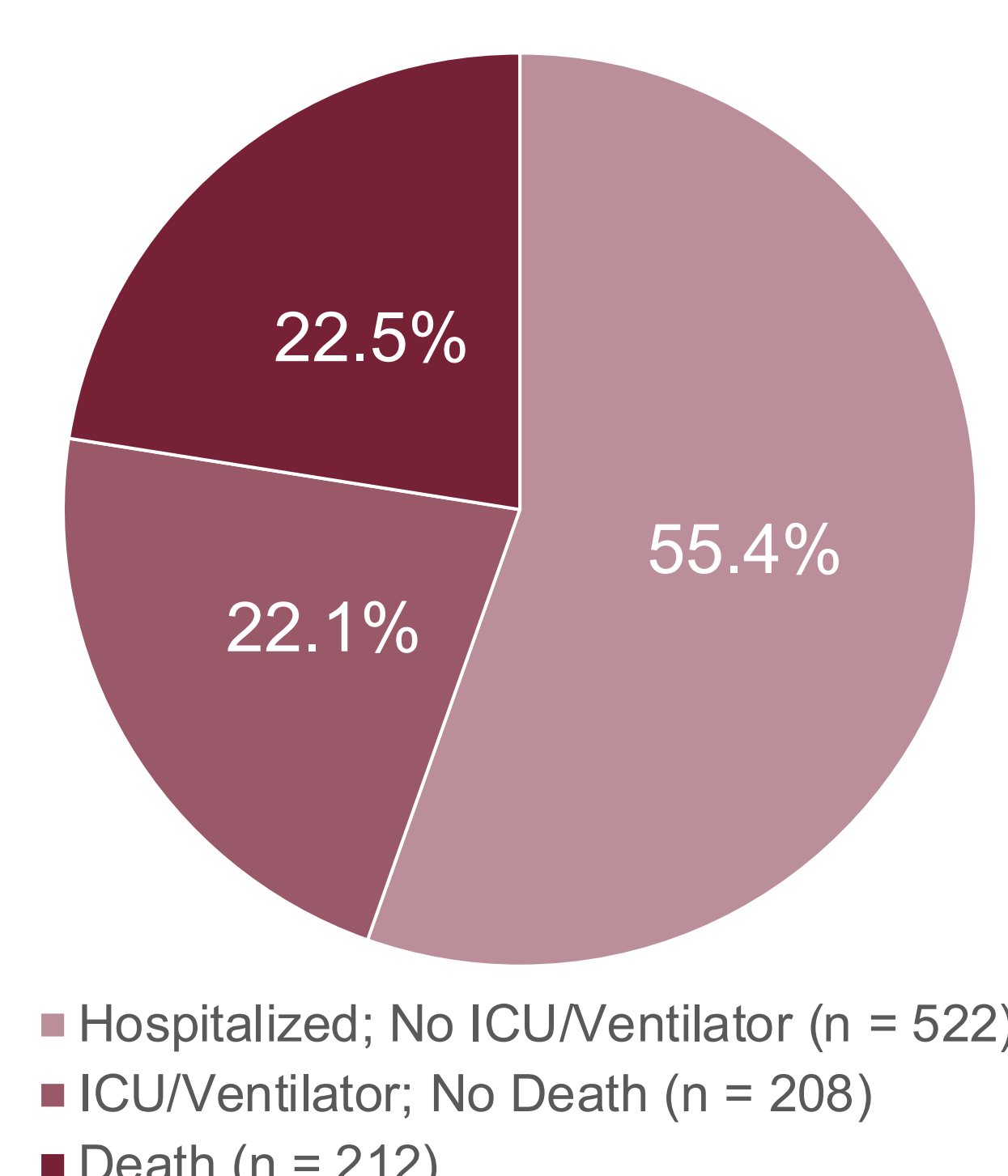


Figure 4: COVID-19 Severity Amongst Diabetics (n = 942)



## RESULTS (CONT.)

Figure 5: COVID-19 Severity Amongst Diabetics by DCSI Score (n = 942)

DCSI Score	Hospitalized; No ICU/Ventilator	ICU/Ventilator; No Death	Death
DCSI = 0	70.9%	25.6%	3.5%
DCSI = 1	66.2%	22.1%	11.8%
DCSI = 2	59.5%	21.0%	19.5%
DCSI = 3	46.3%	19.8%	34.0%
DCSI = 4	41.7%	20.0%	38.3%
DCSI ≥ 5	42.2%	23.8%	34.0%

Table 2: Logistic Regression – Diabetes Status and COVID-19 Severity (n = 2,099)

COVID-19 Severity Indicator	Odds Ratio	95% Confidence Interval
Progression to ICU admission, ventilatory assistance, and/or death	1.51	1.16, 1.96
In-hospital mortality	1.39	1.02, 1.91

Table 3: Logistic Regression – DCSI Status and In-Hospital COVID-19 Mortality Amongst Diabetics (n = 942)

DCSI Score	Odds Ratio	95% Confidence Interval
0	—	—
1	3.229	1.199, 8.697
2	4.910	1.949, 12.372
3	9.824	3.929, 24.560
4	11.076	4.329, 38.338
5+	11.251	4.457, 28.397

Note: All logistic regression analyses utilized propensity score weighting to adjust for covariates including age, sex, race/ethnicity, BMI, and smoking status.

## CONCLUSION

- Amongst this sample of patients hospitalized with COVID-19, diabetes status was associated with in-hospital COVID-19 severity outcomes including ICU admission, need for ventilatory support, and mortality
- Amongst individuals with T2DM, DCSI score was found to predict in-hospital COVID-19 severity outcomes
- A major limitation of this study is that we have not yet been able to parse out how changes in vaccine coverage and strain dominance over time may have affected these relationships; future work will attempt to address these issues

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The researchers would like to acknowledge all of the participants who contributed their data to this research.

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