Common Comorbidities in COVID-19 Patients Associated with ICU Admission and Mortality at Saint Catherine of Siena Medical Center

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Introduction

- Between 3/8/20 to 4/29/20, 186,428 COVID-19 tests were administered and yielded positive results in 69,449 individuals (Percent Positivity = 37.3%).
- Since the onset of the pandemic NYS has reported an estimated combined total of 368,940 positive COVID-19 cases in both Nassau and Suffolk counties.
- 7,089 of these cases have resulted in fatal outcomes.
- NYS currently reports 91.7% of all individuals who suffered mortality from COVID-19 have at least one documented comorbidity.
- NYS currently reports Hispanic age-adjusted death rate per 100,000 population as 169.2 and 156.0 in Nassau and Suffolk counties, respectively.
- NYS currently reports White age-adjusted death rate per 100,000 population as 108.3 and 106.0 in Nassau and Suffolk counties, respectively.

Objective

- To determine the role comorbidities play in influencing patient level of care requirements and mortality due to COVID-19 infection. Furthermore, demographic data including age, gender, ethnicity, BMI, and smoking history will be assessed.

Methods

- A cross-sectional study was conducted utilizing electronic medical records from 537 confirmed COVID-19 cases at St. Catherine of Siena Medical Center between 3/8/20 and 4/29/20.
- Comorbidities were selected based on nine CDC reported conditions in adults that increase risk of severe illness in COVID-19 patients.
- Inclusion criteria was defined by admission to the hospital and confirmed positive COVID-19 diagnosis. Only comorbidities that satisfied CDC guidelines were counted.
- Level of care requirements were stratified by standard hospital and intensive care unit (ICU) admissions, the latter representing increased severity of illness.
- Data was categorized by two researchers and analysis was performed in IBM SPSS Statistics.

Results

1. Demographic data of COVID-19 patients and comorbidity prevalence among the study population.

Demographic Information of Hospitalized COVID-19 Patients

	Total (n = 537)	Non-ICU (n = 438)	ICU (n = 99)
Age (med.)	69	69.5	69
Gender			
Female	249	212	37
Male	287	225	62
Ethnicity			
Hispanic or Latino	115	91	24
Not Hispanic or Latino	415	341	74
BMI (avg.)	28.3	28.1	29.2
Number of Comorbidities (avg.)	1.9	1.9	2.2
Smoking History			
Ever Smoker	191	153	38
Never Smoker	315	258	57

Table 1: Demographic information of all 537 patients infected with COVID-19. The data is further stratified based on level of care requirements, standard hospital (Non-ICU) and ICU admission. Males accounted for 53.4% of cases while females represented 46.4%. Of the patients in this group, 21.4% identified as hispanic or latino and 77.3% identified as non-hispanic or latino. The average number of comorbidities per patient was 1.9 (95% CI [1.8, 2.1]). No patient had been previously diagnosed with all 9 measured comorbidities. The average BMI per patient was 28.3 (95% CI [27.8, 29.0]). Ever smoker data included both current and former smokers.

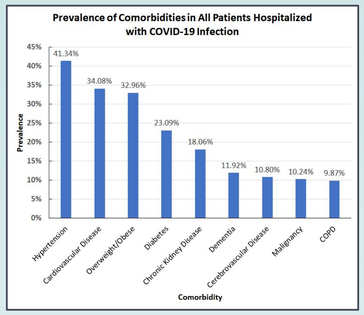

Figure 1: Comorbidity prevalence among all 537 patients. The three most common comorbidities were hypertension (41.34%), cardiovascular disease (34.08%), overweight/obese (32.96%).

2. Level of care analysis shows significance with gender and number of comorbidities.

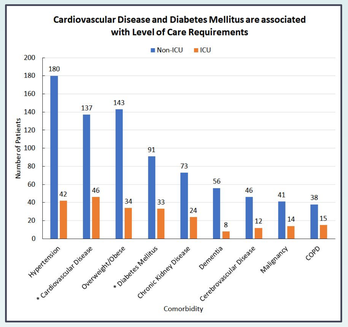

Figure 2: Comorbidities distributed by level of care requirements. Chi-square analysis revealed associations between cardiovascular disease (p=0.004) and diabetes mellitus (p=0.007) on level of care.

Gender and Number of Comorbidities Influence Level of Care

Variable	Sig.	OR	95% C.I. for OR Lower	95% C.I. for OR Upper
Age	0.219	0.990	0.975	1.006
Gender *	0.033	0.600	0.375	0.960
Ethnicity	0.724	1.111	0.619	1.995
BMI	0.236	1.020	0.987	1.053
Number of Comorbidities *	< .01	1.253	1.064	1.474
Smoking History	0.793	0.934	0.561	1.555

Table 2: Binomial logistic regression (X^2 (8, N=537) = 17.58, p<0.025) demonstrating factors influencing level of care requirements in COVID-19 infection. Gender demonstrated an association with level of care (p=0.033). Based on the odds ratio, females were 40% less likely to require ICU level of care than males. Number of comorbidities also demonstrated an association with level of care (p<0.01). Odds ratio showed that patients with greater number of comorbidities were more likely to require ICU level of care.

3. Mortality analysis shows significance with age, gender, BMI, and number of comorbidities.

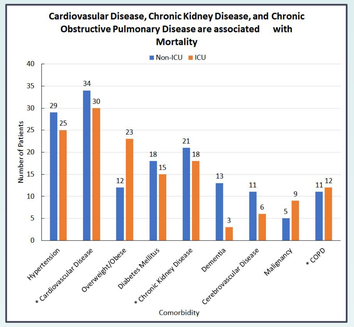

Figure 3: Comorbidities in both Non-ICU and ICU population distributed by mortality. Chi-square analysis revealed associations between cardiovascular disease (p<0.001), chronic kidney disease (p<0.001), and chronic obstructive pulmonary disease (p<0.001) and mortality.

Age, Gender, BMI, Number of Comorbidities, and Smoking History Influence Mortality

Variable	Sig.	OR	95% C.I. for OR Lower	95% C.I. for OR Upper
Age *	< .01	1.050	1.030	1.071
Gender *	0.032	0.600	0.376	0.957
Ethnicity	0.338	1.390	0.709	2.726
BMI *	< .01	1.052	1.017	1.088
Number of Comorbidities *	0.017	1.208	1.034	1.411
Smoking History	0.329	1.280	0.780	2.101

Table 3: Binomial logistic regression (X^2 (8, N= 537) = 68.47, p<0.001) demonstrating factors influencing mortality in COVID-19 infection. Age demonstrated an association with mortality (p<0.01). Odds ratio showed that older patients were more likely to experience mortality. Gender demonstrated an association (p=0.032) where females are 40% less likely to experience mortality than males. Patients with higher BMIs were more likely to experience mortality (p<0.01). Patients with increasing number of comorbidities were more likely to experience mortality (p=0.017).

Conclusion

- Male gender and increased number of comorbidities are both significantly associated with higher level of care requirements by means of ICU admission.
- CVD and DM were significantly associated with level of care requirements.
- Increases in age, BMI, and number of comorbidities are all significantly associated with mortality due to COVID-19 infection. Male gender is also significantly associated with mortality.
- CVD, COPD, and CKD were significantly associated with mortality.

Future Research

- Compare the influence of these high risk comorbidities in patients diagnosed with COVID-19 after this study's timeframe.
- Assess survival data to determine rates at which comorbidities influenced mortality.
- Investigate the role of evolving treatment guidelines on these parameters

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