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Original Article

A Comparison by Ethnicity of Usage of Medication, Intubation Use, and Mortality Rates of COVID-19 Patients in an Urban Hospital

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ABSTRACT

Objectives: The study took place at a central Queens Hospital and answered a total of three research questions. The research wanted to know whether the patients differed in the medications that they took, whether they were placed on a ventilator, and their survival based on their ethnicity while controlling for covariates such as the patients age, gender, and comorbidities while being managed and treated for COVID-19. **Materials and Methods:** Data was collected from 1188 patient charts from January 1, 2020 to January 1, 2021, and binary logistic regression was used to test hypotheses. **Results:** The analysis showed non-statistically significant differences in medication use, intubations, or mortality outcomes by ethnicity. The *p*-values for all the ethnic groups was far greater than 0.05 which indicated that for all the ethnic groups there were no differences that were statically significant for medication use, ventilator use, or survival for all ethnicities thus the null hypothesis must be considered. **Conclusion:** Ethnicity had no bearing on treatment modalities or mortality among patients admitted and diagnosed with COVID-19 symptoms. Patients at this hospital received equitable care despite ethnic differences that can help alleviate the ill-effects of treatment disparities.

Keywords: COVID-19, Intubation use, Medication use, Mortality, Urban Hospital.

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INTRODUCTION

The study had a total of 3 research questions. Research question 1 determined whether there was an association between a group of patients of a particular ethnicity and medication use. Research question 2 looked to see if there was an association between a group of patients of a particular ethnicity and ventilator use. Research question 3 examined if there was an association between a group of patients of a particular ethnicity and mortality. The variables controlled for in the research were the age of the patients, whether they were a male or a female, any pre-existing medical conditions, the length of stay in the medical facility, and the floor of the medical facility among patients admitted to a central Queens hospital for COVID-19.

The research demonstrated that patients who differed from the majority received treatment of a lower-quality compared with Caucasians and that Caucasians received preferential or better treatment than non-Caucasians.[1] The purpose of the research study was to explain why ethnic minorities had the worst health outcomes with COVID-19.[2] Patients of a specific age, gender, or ethnicity with underlying medical conditions received different treatment modalities at the central Queens hospital. The aim was to determine if non-Caucasians received different treatment regimens compared with Caucasians and if they did respond to various treatments and whether this was based on the age of the patients, whether they were a male or a female, any pre-existing medical conditions, and the length of stay in the medical facility in the central Queens hospital.

A hospital located in central Queens was chosen for the research because the disease was a primary issue for a diverse patient population—African Americans or Blacks, Asians, and those with multiethnic backgrounds—with pre-existing medical problems.[3] The total number of patients that did not survive at the medical facility and who died from COVID-19 increased each week at the hospital, contributing to the increased mortality rate.[4] In this study, the association between several risk factors (i.e., age, gender, ethnicity, comorbidities, and geographic location) that contributed to the treatment modality used and the fatality rate were explored.

The study period of this dissertation was from January 1, 2020, to January 1, 2021, which was the peak and the initial stages of the COVID-19 crisis.[5] During this time period the disease spread throughout the world. As a result, it caused many people to become ill, and it increased the mortality rate.[5] According to the statistics, within this length of time during the COVID-19 crisis, 5,657,529 cases of COVID-19 were recorded, and 356,254

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deaths were confirmed globally.[5] Throughout the initial phase of the COVID-19 crisis, the WHO said that the pandemic was an infectious disease outbreak. Disease preparedness strategies and an emergency management plan were carried out to help mitigate the impact of the disaster.[5]

The World Health Organization (WHO) named the virus SARS-CoV-2. Coronavirus was identified through its transmission, certain clinical manifestations, and by being exposed by a person who had the virus. The disease was spread through being coughed or sneezed at which contaminated the environment.[2] Since COVID-19 was first identified in the marketplace in China in the year 2019, it has become a worldwide dilemma to the whole population and especially to sick patients in emergency departments and intensive care units (ICUs) of medical facilities.[6] Patients in these hospital floor levels required medications and the assistance of ventilatory support strategies to treat their underlying clinical manifestations Furthermore, given the transmission of the disease, some medical interventions were carried out to eradicate the effects of the epidemic.[6]

MATERIALS AND METHODS

The studies approach was quantitative to examine methods of treatments based on disease outcomes and their association to various factors surrounding patients with the virus.[7] The study had a secondary dataset that was created by conducting a chart review at a central Queens hospital. The data was obtained from the patient's electronic medical records.

Setting and Study Population

The current research took place at an Urban hospital, where young and older adults were managed for the virus in the emergency department, ICU, and different hospital floor levels. The period of the study ran from January 1, 2020 to January 1, 2021. The study involved patients who were placed on a device to assist with their ability to breathe, or were given medications at the urban hospital due to a COVID-19 prognosis.[8] The bulk of the hospital's patient population comprised of 13.3% African Americans or Blacks, 34.3% Whites, 9.3% Asians, and 0.7% Native Americans or Alaskans, and 42.4% had diverse multiethnic backgrounds. The estimated size of the target population was 1,188. Compared with other hospitals, this medical facility had an ethnically diverse patient population.

Variables

The covariates which acted as independent variables were age, gender, comorbidities, and hospital floor level, The primary independent variable was ethnic minority status. The predictor or explanatory independent variable was the patient's the number of days that they stayed in the medical facility, and the dependent variables were treatment modalities and the survival of the patient.

Data and Statistical Analysis

The current research used a method called binary logistic regression to examine the relationship of different approaches to treatment, which included medication administration or placing the patient on a device to assist with their breathing and the survival of the patient and ethnic minority status where multiple covariates, such as the age of the patient, whether they are a male or a female, pre-existing medical conditions, length of hospital stay, and hospital floor level where COVID-19-positive patients were treated were looked at in terms of a variable that has a possibility of two outcomes.[9] The logistic regression model where the target variable is binary was used in this research to examine the factors for developing the virus in patients who tested positive for the disease. The methods used in the study looked at variables , such as the age of the patient, whether they were a male or a female, COVID-19 clinical manifestations, the disease severity, and pre-existing medical conditions, to help determine whether a patient with the virus who tested positive would survive.[9] The method which tests for goodness of fit called the Hosmer Lemeshow test is a logistic regression model which was used to aid in determining patient survival. The adjusted odds ratios were used to account for other predictor variables in the model.[9] A *p*-value of 0.05 indicated that the independent predictor variables were significantly associated with a high risk for not surviving the disease after adjusting for confounders.[9]

RESULTS

The results have "variables in the equation tables" which reflects representative ethnicities as a (sig.) category with p-values greater than 0.05. This clearly shows for each research question that there is no statistically significant difference between the ethnic groups i.e., Caucasians when compared with minorities for each research question. Research questions 1, 2, and 3 were taking into account age, gender, comorbidities, length of hospital stay, and the hospital floor levels.

To address research question 1, a binary logistic regression was performed to investigate the relationship between ethnic minority status and medication use.

In Table 1 the White (Caucasian) (p value= 0.272) was used as the reference category. The other ethnic categories (1-4) which included African American or Black (0.985) (cat 1), Multiethnic (0.111) (cat 2), Asian (0.418) (cat 3) and Native American or Alaskan (0.129) (cat 4) have (sig.) p-values far greater than 0.05 which indicated that there is no statistically significant difference in medication given to all ethnicities thus the null hypothesis must be considered.

A binary logistic regression method was carried out, and the overall model with all the predictor variables was shown to be statistically significant. According to the Wald test, the variables age (p = 0.003), hospital floors (p = <0.001), length of hospital stay (p = <0.001), and the comorbidities pneumonia (p = 0.001) and respiratory failure (p = <0.001) added significantly to the model but gender (p =

Table 1: Variables in the Equation.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age Groups	−0.437	0.147	8.892	1	0.003	0.646	0.484	0.861
Sex	0.139	0.135	1.059	1	0.303	1.149	0.882	1.497
Comorbidity	0.446	0.281	2.517	1	0.113	1.562	0.900	2.711
Diabetes	0.009	0.144	0.004	1	0.951	1.009	0.761	1.338
Hypertension	0.181	0.146	1.543	1	0.214	1.199	0.900	1.597
Obesity	−0.257	0.590	0.190	1	0.663	0.773	0.243	2.457
Heart Disease	19.734	40192.969	0.000	1	1.000	371709	0.000	.
Hyperlipidemia	0.083	0.194	0.183	1	0.669	1.087	0.743	1.590
Pulmonary Embolism	−0.648	0.334	3.772	1	0.052	0.523	0.272	1.006
DVT	−0.465	0.442	1.110	1	0.292	0.628	0.264	1.492
Atrial Fibrillation	−0.332	0.211	2.480	1	0.115	0.718	0.475	1.085
Pneumonia	0.449	0.138	10.540	1	0.001	1.567	1.195	2.056
Dyspnea	−0.553	0.532	1.082	1	0.298	0.575	0.203	1.631
Kidney Disease	−0.424	0.247	2.934	1	0.087	0.655	0.403	1.063
CAD	−0.050	0.247	0.040	1	0.841	0.951	0.586	1.545
Anemia	−0.279	0.182	2.357	1	0.125	0.757	0.530	1.080
Asthma	0.209	0.279	0.563	1	0.453	1.233	0.714	2.129
COPD	0.086	0.313	0.075	1	0.784	1.090	0.590	2.013
Respiratory Failure	1.198	0.138	75.079	1	< 0.001	3.315	2.528	4.347
Hospital Floors	0.170	0.034	24.393	1	< 0.001	1.185	1.108	1.267
LOS_IN_DAYS	0.027	0.008	12.147	1	< 0.001	1.027	1.012	1.043
Ethnicity			5.148	4	0.272			
Ethnicity (1)	0.004	0.213	0.000	1	0.985	1.004	0.662	1.523
Ethnicity (2)	0.245	0.154	2.543	1	0.111	1.277	0.945	1.726
Ethnicity (3)	0.197	0.243	0.656	1	0.418	1.217	0.756	1.960
Ethnicity (4)	1.673	1.102	2.302	1	0.129	5.326	0.614	46.204
Constant	−1.592	0.302	27.779	1	< 0.001	0.204		

a. Variable(s) entered on step 1: Ethnicity.

0.303), and all the ethnic groups which included White (p = 0.272), African American or Black (p = 0.985), Multiethnic (p = 0.111), Asian (p = 0.418), and Native American or Alaskan (p = 0.129) did not add significantly to the model (see Table 1).

To address research question 2, a binary logistic regression was performed to examine the relationship between ethnic minority status and being placed on a mechanical ventilator.

In Table 2 the White (Caucasian) (p value= 0.784) was used as the reference category. The other ethnic categories (1-4) which included African American or Black (0.236) (cat 1), Multiethnic (0.836) (cat 2), Asian (0.502) (cat 3) and Native American or Alaskan (0.999) (cat 4) have (sig.) p-values far greater than 0.05 which indicated that there is no statistically significant difference in ventilator use for all ethnicities thus the null hypothesis must be considered.

A binary logistic regression method was carried out, and the overall model with all the predictor variables was statistically significant. According to the Wald test, the variables hospital floors (p = <0.001), length of hospital stay (p = <0.001), and the comorbidities hypertension (p = <0.001) and respiratory failure (p = <0.001) added significantly to the model, but age groups (p = 0.249), gender (p = 0.572), and all the ethnic groups which included White (p = 0.784), African American or Black (p = 0.236), Multiethnic (p = 0.836), Asian (p = 0.502), and Native American or Alaskan (p = 0.999), did not add significantly to the model (see Table 2).

To address research question 3, a binary logistic regression was performed to explore the relationship between ethnic minority status and mortality.

In Table 3 the White (Caucasian) (p value= 0.855) was used as the reference category. The other ethnic categories (1-4) which included African American or Black (0.512) (cat 1), Multiethnic (0.689) (cat 2), Asian (0.587) (cat 3) and Native American or Alaskan (0.603) (cat 4) have (sig.) p-values far greater than 0.05 which indicated that there is no statistically significant difference in mortality for all ethnicities thus the null hypothesis must be considered.

Table 2: Variables in the Equation.

	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Age Groups	−0.224	0.194	1.332	1	0.249	0.799	0.546	1.169
Sex	0.108	0.191	0.320	1	0.572	1.114	0.766	1.621
Comorbidity	−0.544	0.382	2.027	1	0.155	0.581	0.275	1.227
Diabetes	−0.005	0.201	0.001	1	0.980	0.995	0.671	1.476
Hypertension	−0.751	0.204	13.601	1	< 0.001	0.472	0.317	0.703
Obesity	0.241	0.829	0.085	1	0.771	1.273	0.251	6.462
Heart Disease	−19.732	40192.970	0.000	1	1.000	0.000	0.000	.
Hyperlipidemia	−0.361	0.317	1.298	1	0.255	0.697	0.374	1.297
Pulmonary Embolism	−0.767	0.641	1.431	1	0.232	0.464	0.132	1.632
DVT	−0.787	0.793	0.983	1	0.321	0.455	0.096	2.156
Atrial Fibrillation	−0.197	0.334	0.349	1	0.555	0.821	0.427	1.580
Pneumonia	−0.103	0.193	0.283	1	0.595	0.903	0.618	1.317
Dyspnea	−0.598	0.846	0.501	1	0.479	0.550	0.105	2.883
Kidney Disease	0.224	0.353	0.402	1	0.526	1.250	0.626	2.496
CAD	−0.509	0.428	1.417	1	0.234	0.601	0.260	1.390
Anemia	−0.290	0.286	1.026	1	0.311	0.749	0.427	1.311
Asthma	0.190	0.380	0.250	1	0.617	1.209	0.574	2.546
COPD	−0.025	0.442	0.003	1	0.955	0.976	0.410	2.321
Respiratory Failure	1.533	0.211	52.681	1	< 0.001	4.634	3.063	7.010
Hospital Floors	0.377	0.046	65.973	1	< 0.001	1.458	1.331	1.597
LOS_IN_DAYS	0.051	0.009	33.533	1	< 0.001	1.052	1.034	1.071
Ethnicity			1.737	4	0.784			
Ethnicity (1)	0.357	0.302	1.403	1	0.236	1.430	0.791	2.583
Ethnicity (2)	0.044	0.213	0.043	1	0.836	1.045	0.689	1.586
Ethnicity (3)	0.222	0.330	0.451	1	0.502	1.248	0.653	2.385
Ethnicity (4)	−19.204	13790.922	0.000	1	0.999	0.000	0.000	.
Constant	−3.351	0.413	65.913	1	< 0.001	0.035		

Variable(s) entered on step 1: Ethnicity.

A binary logistic regression method was carried out, and the overall model with all the predictor variables was shown to be statistically significant. According to the Wald test, the variables age (p = <0.001), hospital floors (p = <0.001), length of hospital stay (p = 0.008), and the comorbidities anemia (p = 0.004), asthma (p = 0.009), and respiratory failure (p = <0.001) added significantly to the model, but all the ethnic groups which included White (p = 0.855), African American or Black (p = 0.512), Multiethnic (p = 0.689), Asian (p = 0.587), and Native American or Alaskan (p = 0.603), did not add significantly to the model (see Table 3).

DISCUSSION

The discharge records for adults 18 years to 65 years and older were searched for patients admitted to the hospital from January 1, 2020 to January 1, 2021, who had COVID-19 confirmed by a positive COVID-19 test. Different risk factors were examined, including the patient's age, gender, ethnicity, comorbidities, and length of hospital stay on a primary outcome, in-hospital mortality. The research goal was to examine patient characteristics and outcomes among those treated for COVID-19 at a central Queens hospital medical center and analyze the mortality of the COVID-19-positive patient over the specified period of the pandemic.[10]

The study's findings revealed that those older than 65 with comorbidities, such as heart disease, diabetes, hypertension, obesity, hyperlipidemia, clotting disorders (e.g., pulmonary embolism and DVT), atrial fibrillation, pneumonia, respiratory failure, dyspnea, kidney disease, COPD, CAD, anemia, and asthma had the most significant in-hospital mortality associated with increasing age. The results also showed that patients older than 65 years had a higher rate of dying than younger adults. Furthermore, the death rate was not statistically significant for the various ethnic groups: African Americans or Blacks, Asians, Native Americans or Alaskans, multiethnic, and White patients treated for COVID-19. The data in the study indicated that the mortality rate differed based on age patterns; however, gender had no bearing on the number of patients dying of the disease.

Table 3: Variables in the Equation.

	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Age Groups	0.957	0.183	27.484	1	< 0.001	2.604	1.821	3.725
Sex	−0.144	0.163	0.787	1	0.375	0.866	0.630	1.191
Comorbidity	−0.311	0.347	0.801	1	0.371	0.733	0.371	1.447
Diabetes	−0.336	0.176	3.636	1	0.057	0.715	0.506	1.009
Hypertension	−0.266	0.173	2.353	1	0.125	0.767	0.546	1.077
Obesity	−19.316	10116.925	0.000	1	0.998	0.000	0.000	.
Heart Disease	21.485	40192.969	0.000	1	1.000	21422620	0.000	.
Hyperlipidemia	−0.473	0.256	3.426	1	0.064	0.623	0.377	1.028
Pulmonary Embolism	−0.337	0.474	0.507	1	0.477	0.714	0.282	1.807
DVT	−0.598	0.661	0.820	1	0.365	0.550	0.151	2.007
Atrial Fibrillation	−0.029	0.244	0.015	1	0.904	0.971	0.602	1.567
Pneumonia	−0.132	0.165	0.640	1	0.424	0.876	0.634	1.211
Dyspnea	−0.499	0.824	0.367	1	0.545	0.607	0.121	3.053
Kidney Disease	0.113	0.304	0.137	1	0.711	1.119	0.617	2.033
CAD	0.260	0.281	0.858	1	0.354	1.298	0.748	2.252
Anemia	−0.714	0.251	8.079	1	0.004	0.490	0.299	0.801
Asthma	−1.135	0.437	6.757	1	0.009	0.321	0.137	0.756
COPD	0.514	0.333	2.383	1	0.123	1.671	0.871	3.208
Respiratory Failure	1.364	0.172	62.640	1	< 0.001	3.913	2.791	5.487
Hospital Floors	0.169	0.039	18.595	1	< 0.001	1.184	1.096	1.278
LOS_IN_DAYS	0.021	0.008	7.046	1	0.008	1.021	1.006	1.037
Ethnicity			1.335	4	0.855			
Ethnicity (1)	−0.177	0.270	0.431	1	0.512	0.838	0.494	1.421
Ethnicity (2)	−0.072	0.181	0.161	1	0.689	0.930	0.653	1.325
Ethnicity (3)	0.154	0.284	0.295	1	0.587	1.167	0.669	2.035
Ethnicity (4)	−0.585	1.125	0.271	1	0.603	0.557	0.061	5.049
Constant	−2.479	0.364	46.355	1	< 0.001	0.084		

a. Variable(s) entered on step 1: Ethnicity.

Older age, one or more comorbidities, and a long hospital stay had more severe COVID-19 disease outcomes.

The research showed no differences in treatments and non-statistical differences in survival rates. Comorbidities were diversified and included heart disease, diabetes, hypertension, obesity, hyperlipidemia, clotting disorders (e.g., pulmonary embolism and DVT), atrial fibrillation, pneumonia, respiratory failure, dyspnea, kidney disease, COPD, CAD, anemia, asthma, and patients without any existing medical conditions. The confounding factors were similar in the cross-section of patients being of Caucasian and non-Caucasian backgrounds and were therefore non-contributory after using a binary logistic regression method. The study's *p* value was greater than 0.05, showing no statistical difference between the two groups of Caucasians and non-Caucasians in treatment modalities used nor in death or discharge outcomes. Therefore, no bias was found in treating patients at the central Queens hospital for the given period nor were any modalities held back from specific groups based on their minority status.

LIMITATIONS

The study has several limitations. The study included only hospitalized patients with COVID-19 at the central Queens hospital.[11] The study evaluated demographic and clinical data in the patient's electronic medical records instead of conducting a comprehensive chart review for each COVID-19-positive patient. The study could not gather enough detail on each hospitalized infected person's individual demographic and clinical characteristics.[11] The study focused mainly on COVID-19-positive adult patients, and minimal data were available on pediatric patients from labor and delivery; therefore, the study results could be biased because of the age groups in the investigated research.[12] During the early phase of the COVID-19 crisis, methods to test COVID-19 were not fully established but became readily available during the later stages of the pandemic.[10] The downside of testing was that the COVID-19 test method gave false positives in which they classified vulnerable people as having the disease when they did not have the illness. The ethnic

categories of the hospital only applied to this single location but lacked consideration of the vast heterogeneity within ethnic groups.[13] Further studies are needed to examine the association between COVID-19, ethnicity, and specific clinical outcomes for patients admitted to a medical facility.[14]

CONCLUSION

At the central Queens hospital, African Americans or Blacks and multiethnic people were more likely to be hospitalized. No statistically significant difference was found between African American or Black patients and patients of other ethnic groups, such as Whites, among those receiving a medication or on ventilator support. African Americans or Blacks were no more likely than Whites to have the worst survival rates once hospitalized at the hospital located in Forest Hills, Queens. Being African American or Black was not associated with an increase in mortality compared with White patients. No differences were observed in the death rate among various ethnic groups of patients hospitalized at the central Queens hospital. All drugs used to treat COVID-19 signs and symptoms were given equally to all ethnic groups of patients at the medical facility. No differences were found in treatments received for ethnic groups of Asians, Hispanics, African Americans or Blacks, and Whites. Since the *p*-value for the ethnic groups was greater than 0.05, the null hypothesis was not defeated and was not statistically significant. Therefore, no bias occurred in ethnicity of who received what treatment, and no differences were found between the various groups in the COVID-19-positive patient's survival. The hospital treated the patient's the same way, and a patient's ethnicity did not affect treatment.

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CONFLICT OF INTEREST

The author declares that there are no conflicts of interest.

ABBREVIATIONS

WHO: World Health Organization; **ICU:** Intensive Care Unit.

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