Nevada COVID-19 Associated Hospitalization Trends

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Abstract

Recent studies suggest that Native Americans/Alaskans, Blacks, and Hispanics are at higher risk for infection, hospitalization, and death; men are at higher risk for death, and older age groups are at higher risk for hospitalization and death from COVID-19 (*Risk for COVID*-19, 2020b; Griffith et al., 2020; *Risk for COVID*-19, 2020a) Data of confirmed hospitalized cases were obtained from the Nevada Compare Care Corona Virus Cases dashboard (Greenway, 2021). Findings based on the data in this study indicate that symptomatic White patients had the highest admission rates, Native American/Alaskan patients had the highest length of hospitalization and ventilation rate, males are affected more than females by the virus as evidenced by higher numbers of records, and the 60+ age group had the highest number of hospitalizations. The findings of this study support the contention that the minority community in Nevada could benefit from awareness of available resources to receive affordable healthcare.

Keywords

COVID-19 trends, COVID-19 hospitalizations, minority

Introduction

From March 2020 to March 2021, Nevada had 324,891 COVID-19 positive cases, 29,445 hospitalizations, and 3,745 deaths (*Coronavirus*, 2021; Greenway, 2021). According to the CDC, American Indians/Alaskans, Blacks, and Hispanics are 3.2, 2.5, 2.4 times more likely than Whites to be hospitalized, respectively, and 2.2, 1.7, and 1.9 times more likely than Whites to result in a fatal outcome, respectively (*Risk for COVID-19*, 2020b). Recent data indicate that in 41 out of 47 countries, more men have died in comparison to women and the case-fatality ratio in men is approximately 2.4 times higher than in women (Griffith et al., 2020). Although older age groups (65-74, 75-84, 85+) are just as likely as 18-29 year olds to contract COVID-19, 65-74 year olds are 5 times more likely to be hospitalized and 65 times more likely to result in death, 75-84 year olds are 8 times more likely to be hospitalized and 140 times more likely to result in death, and 85+ year olds are 10 times more likely to be hospitalized and 340 times more likely to result in death (*Risk for COVID-19*, 2020a). Thus, recent studies report that Native Americans/Alaskans, Blacks, and Hispanics are at higher risk for infection, hospitalization, and death; men are at higher risk for death; and older age groups are at higher risk for hospitalization and death in comparison to their counterparts. The purpose of this descriptive study was to find if the trends of these populations can be

applied to Nevada's COVID-19 associated hospitalization trends regarding the number of symptomatic case admissions, length of hospitalization of symptomatic patients, length of hospitalization of deceased symptomatic patients, ventilation rate of symptomatic patients, and mortality rate of symptomatic patients among race, sex, and age.

Methods

This study drew data from the Nevada Compare Care Corona Virus Cases dashboard. Line graphs of the data were created using Microsoft Excel. The data of confirmed hospitalized cases of all four quarters of 2020 and the first quarter of 2021 were obtained. Confirmed cases were identified by the patient's billing record containing a positive COVID-19 diagnosis. The diagnostic symptom criteria for COVID-19 is upper respiratory disease, pneumonia, bronchitis, asthma, acute respiratory distress, respiratory failure with hypoxia, respiratory infection, cough, shortness of breath, hypoxemia, fever, and abnormal finding of lung field (Greenway, 2021).

To avoid clustering on the figures regarding age groups, the age group were reclassified from 0-17, 18-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80+ to 0-19, 20-39, 40-59, 60-79, and 80+. The weighted average of two adjacent groups was found and used as the data for the condensed group. For example, the data for the 0-19 group was calculated by finding the weight of the 0-17 and 18-19 age group, multiplying the weight by the data of each group, and adding the products together.

The admitted symptomatic cases data was drawn from selecting "confirmed" COVID-19 evidence level, "had symptoms" patient condition, and its corresponding breakout (race, gender, age group). By selecting the "had symptoms" patient conditions, patients who are only diagnosed with respiratory symptoms listed earlier are filtered out. In addition to having respiratory symptoms, the symptomatic patients' possible symptoms include diabetes mellitus type 1 or type 2, chronic obstructive pulmonary disease, cardiovascular disease, cerebrovascular disease, hypertension, hypertensive heart disease, hypertensive kidney disease, acute embolism and thrombosis of an unspecified vein, and dependence on a ventilator (Greenway, 2021).

The length of hospitalization of symptomatic patients' data was extracted by selecting the same fields as the admitted symptomatic cases. However, instead of selecting the "cases" value type, the "avg LOS" was selected.

The length of hospitalization of deceased patients' data were obtained by selecting the same fields as the length of hospitalization of symptomatic patients' data with the addition of "died" as a patient condition.

The ventilation rate was calculated by dividing the number of cases who had the conditions of "had symptoms" and "ventilator" by the number of cases who had the condition of "had symptoms".

The mortality rate was calculated by dividing the number of cases that "had symptoms" and "died" by the number of cases that "had symptoms".

Results

Admitted Symptomatic Cases

Tables 1-3 show an increase in cases from 2020 Quarter 1, peaking at 2020 Quarter 4, then a decrease in cases. In table 1, the White population had the highest number of admissions. On the contrary, the Native American/Alaskan population had the lowest number of admissions. In table 2, the male population had the highest number of admissions. In table 3, a general trend of

as age increases, the number of admissions also increases is present.

Table 1. Admitted Symptomatic Cases among Races and Ethnicities

	Discharge Quarter				
Race	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
Asian/Pacific Islander	24	221	533	881	780
Black	37	283	672	851	718
Hispanic	34	502	1382	1611	1203
Native American/Alaskan		19	48	92	45
Other	26	333	809	1013	657
Unknown	3	61	138	241	185
White	80	764	1997	4625	3318

Table 2. Admitted Symptomatic between Sexes

	Discharge Quarter				
Gender	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
Female	97	964	2406	4077	3033
Male	107	1219	3173	5237	3873

Table 3. Admitted Symptomatic Cases among Age Groups

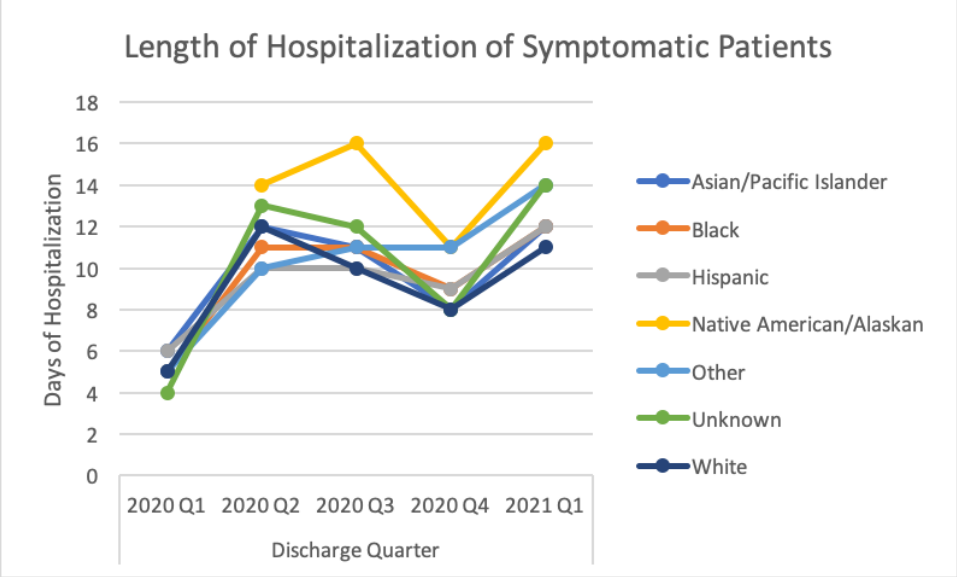
	Discharge Quarter				
Age Group	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
0-19	7	17	34	40	44
20-39	19	169	353	459	304
40-59	30	377	971	1411	938
60-79	39	435	1165	2095	1662
80+	28	259	690	1567	1,283

Length of Hospitalization of Symptomatic Patients

The demographics in Figure 1 display a steep increase in length of hospitalization from 2020 Quarter 1 to 2020 Quarter 2, a decrease to 2020 Quarter 4, and another increase, with an exception to the Native American/Alaskan population and Other population. Although no data for the Native American/Alaskan population was provided for 2020 Quarter 1, an increase was seen from 2020 Quarter 2 to Quarter 3, which is inconsistent with the other populations, a decrease to 2020 Quarter 4, and an increase to 2021 Quarter 1. The Other population saw an increase throughout the quarters, but only slight increase from 2020 Quarter 2 to 2020 Quarter 4. Throughout the quarters, men had a longer hospitalization than women. The same general trend seen in table 3 is also present in the length of hospitalization of

symptomatic patients among age groups; As the age group increases, more days of hospitalization are required.

Figure 1. Length of Hospitalization of Symptomatic Patients among Races and Ethnicities



Length of Hospitalization of Deceased Symptomatic Patients

Unlike Figure 1, no general trend can be seen across all races and ethnicities in Figure 2. However, when compared to Figure 1, Figure 2 shows a greater length of hospitalizations. The p-value of <.05 was found by an independent samples t-test. The average length of hospitalization of deceased symptomatic patients was 14 days (SD = 4.36) while the average length of hospitalization of symptomatic patients was 10.3 days (SD = 3.04). Men appear to be impacted more than women by having a longer hospitalization, which is consistent with the trends found in the admission rates and length of hospitalization. Unlike the previous age group graphs, no clear trend can be seen in Figure 3. However, it is quite clear that the 80+ age group is the fastest to result in a fatal outcome among all deceased patients. In 2020 Quarter 1, the 0-19 group shows an extremely high number of days of hospitalization while in 2020 Quarter 2, the group shows an extremely low number of days of hospitalizations in comparison to the other age groups.

Figure 2. Length of Hospitalization of Deceased Symptomatic Patients among Races and Ethnicities

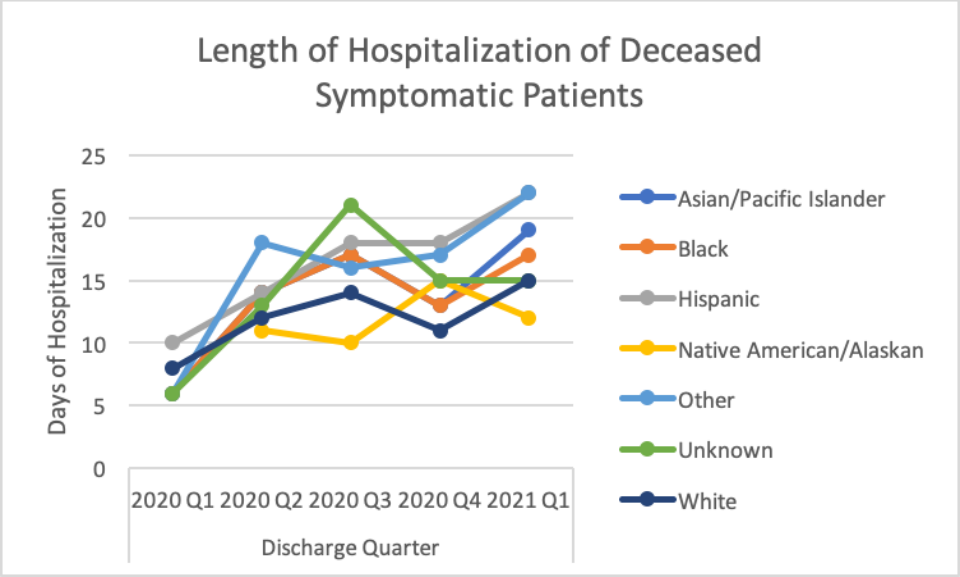
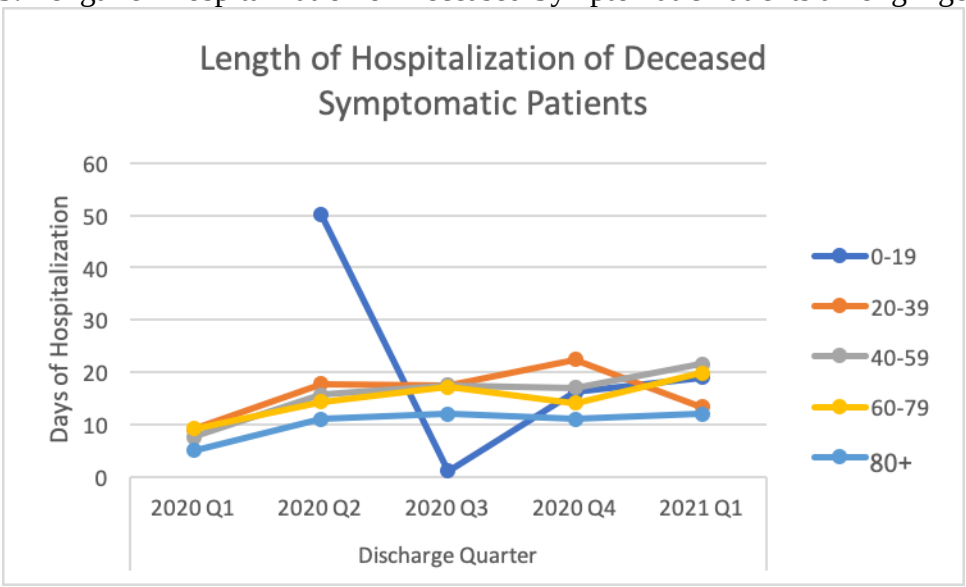


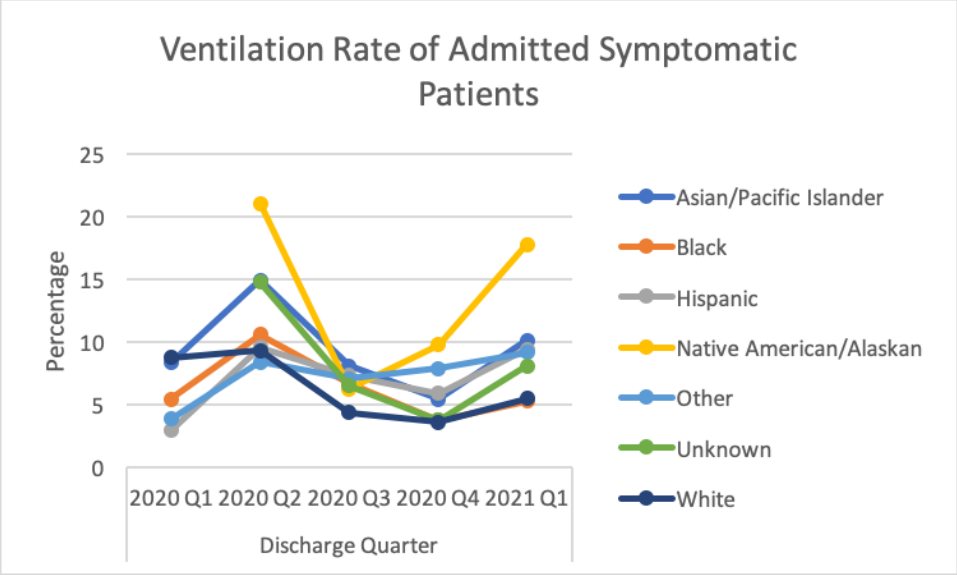
Figure 3. Length of Hospitalization of Deceased Symptomatic Patients among Age Groups



Ventilation Rate of Symptomatic Patients

Figure 4 shows that the majority of races and ethnicities have an increase in ventilation rate from 2020 Quarter 1 to 2020 Quarter 2, a decrease until 2020 Quarter 4, and a slight increase to 2021 Quarter 1. The Native American/Alaskan population displays no data in 2020 Quarter 1, however, a steep decrease in ventilation rate is seen from 2020 Quarter 2 to 2020 Quarter 3 and a steep increase to 2021 Quarter 1. The Other population shows an increase in rates from 2020 Quarter 1 to 2020 Quarter 2, a slight decrease to 2020 Quarter 3, and a slight increase to 2021 Quarter 1. Males have a higher ventilation rate in comparison to females. The 60-69 age group has the highest ventilation rate while the 20-39 age group has the smallest ventilation rate in comparison to the other groups.

Figure 4. Ventilation Rate of Admitted Symptomatic Patients among Races and Ethnicities



Mortality Rate of Symptomatic Patients

No general trend can be seen across all demographics in Figure 5. The Unknown race and ethnicity population had an extremely high mortality rate of 66.67% in 2020 Quarter 1, decreased until 2020 Quarter 4, and a slight increase to 2021 Quarter 1. The White cases' mortality rate remained fairly constant throughout the quarters. Males presented a higher mortality rate in comparison to their female counterparts. The mortality rate among age groups displayed the same general trend as the previous age group data for the majority of the groups. The 0-19 group displayed a high mortality rate of 29.5% in 2020 Quarter 2, a sharp decrease to 2.4%, then a gradual increase to 2021 Quarter 1 (Figure 6).

Figure 5. Mortality Rate of Symptomatic Patients among Races and Ethnicities

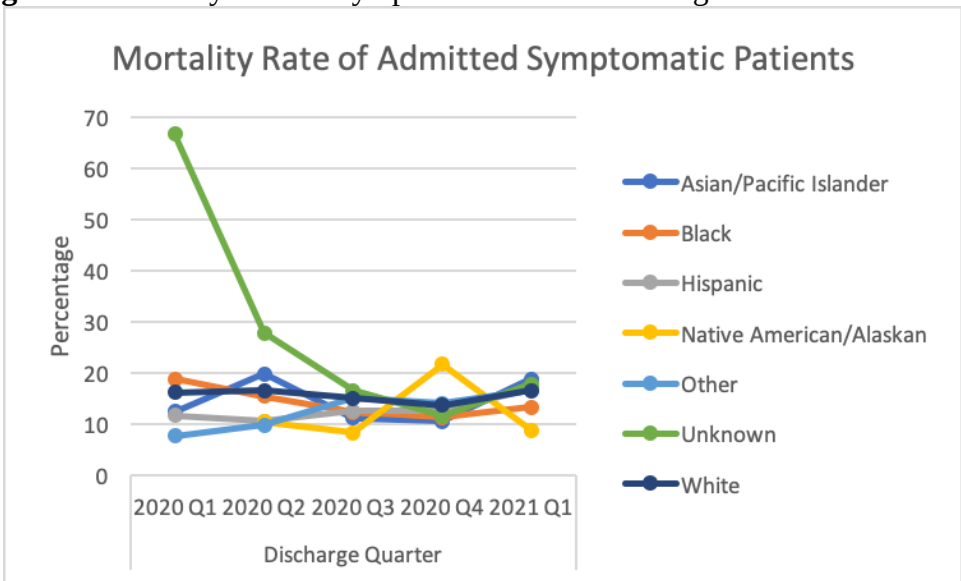
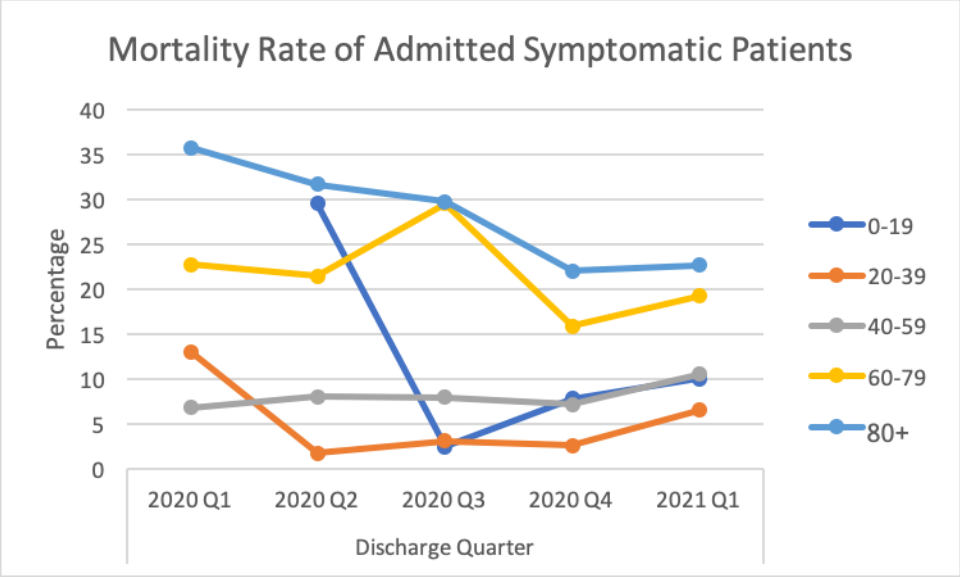


Figure 6. Mortality Rate of Symptomatic Patients among Age Groups



Discussion

Race and Ethnicity

Since the CDC reported Native Americans/Alaskans, Blacks, and Hispanics had a higher rate of hospitalization, it was expected for one of these racial groups to have the highest admission rate. Contrary to expectations, Whites had the highest admission out of all the racial groups. During 2020 Quarter 4, they were admitted at least 2.87 times more than the other racial populations (Table 1). This large disparity in admissions can be attributed to Whites comprising 73.9% of Nevada's population (*Quick Facts Nevada*, 2021). As Whites comprise the majority of Nevada's population, it explains why Whites have the largest admission count. This large disparity in admissions can also be due to minorities being unable to afford medical care. In fact, out of the 14% uninsured population in Nevada, 39.4% are people of color (Guinn Center, 2019). The CDC reports that most minority groups have a higher percentage of patients avoiding medical care due to cost in comparison to their White counterparts (National Center, 2019). A recent study has discovered in comparison to Whites, people of color have a higher percentage of COVID-19 patients that avoid medical care due to cost (Smith et al., 2021). Regardless, findings from this study suggest that more awareness needs to be raised about the resources available to Nevada's minority communities for access to affordable medical care such as the Nevada Office of Minority Health's project to increase health insurance enrollment in racial and ethnic minority populations and the free clinics (Nevada Office, 2020).

Native Americans/Alaskans had the greatest length of hospitalization (Figure 1) and ventilation rate (Figure 4). Their greater length of hospitalization and ventilation rate may be due to a variety of factors. 22.1% of the Native Americans/Alaskans population lives in rural Nevada (*Explore Census Data*, 2019). Thus, they may not have immediate access to healthcare. By the time they arrive at a healthcare center, their condition is severe, leading to a need for more resources such as ventilators and a need for a longer recovery time. Another possible factor is that the hospitalized patients are older and have poorer health in general. Previous research has revealed that the highest rate of hospitalization among Native Americans/Alaskans in the U.S. belongs to

the 65+ age group (Acosta et al., 2021). Moreover, Native Americans/Alaskans are twice as more likely as Whites to have diabetes (Native Americans, 2018). Among the 65-74 age group, 34.7% of Native Americans/Alaskans are diagnosed with diabetes and among the 75+ age group, 32.5% (Bullock et al., 2020). With a comorbidity, patients are more likely to need a longer recovery time and ventilation.

The high mortality rate of the Unknown population in 2020 Quarter 1 (Figure 5) is attributed to having a small sample. The mortality rates were calculated by the number of cases that "had symptoms" and "died" were divided by the number of cases that "had symptoms". The number of Unknown symptomatic cases that died was 2 and the number of Unknown symptomatic cases in 2020 Quarter 1 was 3. The mortality rate was calculated to be 66.7%.

Sex

Unlike the race and ethnicity graphs, a clear trend was found in all data regarding biological sex. Due to previous studies indicating COVID-19 affects males more than females, it was expected for Nevada to follow the same trend. As expected, men had higher admitted symptomatic cases, higher length of hospitalization, higher ventilation rate, and higher mortality rate. Medical professionals and scientists have no explanation for the disproportion. One proposed theory is that men have a higher expression of coronavirus receptors. In general, women are less prone to infection possibly due to a difference in sex hormones and X chromosomes (Bwire, 2020). Another possible theory lies within the difference in behavior between sexes. More men than women engage in unhealthy behaviors such as smoking and drinking. Recent studies have shown women hold a more responsible attitude towards COVID-19 preventative measures than men such as frequent handwashing and wearing masks (de la Vega et al., 2020).

Age Groups

The majority of the age group data suggest that the elderly population (60+) are impacted more by COVID-19. The reason behind this remains unknown (Mueller et al., 2020). Suggested theories include the elderly have slower and less efficient immune responses to infections, are at higher risk of COVID-19 exposure, have limited access to healthcare, are unable to receive respiratory support due to limited resources, and are more likely to have comorbid conditions that hinder recovery (Nikolich-Zugich et al., 2020; Lloyd-Sherlock et al., 2020; Deng et al., 2020). These are also possible factors that can account for the trend found in Figure 3.

Following the trend of length of hospitalization among age groups, the deceased 80+ age group was expected to have the longest length of hospitalization in Figure 3. However, the group was found to have the smallest length of hospitalization. As possible factors include a slower and less efficient immune response and increased likeliness to have comorbidities that hinder recovery, the deceased older age groups are less likely to recover from COVID-19, resulting in a faster fatality.

The relatively high mortality rate for the 0-19 age group in 2020 Quarter 2 (Figure 6) is attributed to having a small sample. The number of deceased symptomatic cases of patients 18-19 years old was 1 and the number of symptomatic cases was 3. Since the average of the 0-17 and 18-19 age groups were used for the figures, the data point presented in the graph is skewed.

Limitations

The data provided in this study is from Nevada's hospital inpatient billings. The data is an underestimate due to the Nevada Compare Care only providing data

of discharged patients. Thus, there were a limited number of severe cases included in the 2020 Quarter 1 data. Additionally, the dashboard does not include Emergency Room visits as it is considered an outpatient visit rather than an inpatient visit. The findings in this study only pertain to the hospitalized COVID-19 patients in Nevada. Thus, these findings cannot be generalized to the whole Nevadan population or the U.S. population.

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