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Cochise County COVID-19 Symptoms and Comorbidities:

A Descriptive Summary

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COVID-19 has affected countless people across the world in the year 2020. Understanding groups in the local community who are more at risk of the virus may guide interventions to reduce the risk of infection for these individuals. Using data collected by phone interviews conducted by contact tracers of Cochise County and the Arizona Department of Health Services, variables of age, gender, ethnicity, and occupation status are compared with rates of infection, symptom onset, and comorbidities. Information from 2,759 confirmed COVID-19 cases in Cochise County Arizona between March and November 2020 was analyzed. The average age of cases was 42 years, and frequencies were generated and found the largest age group of reported cases were those of 21-30 years (17.29%). The zip code 85706 in Douglas produced 45.81% of Cochise County cases. The percentage of each 10-year age group that reported experiencing symptoms of COVID-19 increases with age, culminating with 52.94% of individuals age 90 years and above reporting experiencing symptoms. Individuals who reported having a chronic illness make up approximately 75% of the cases reporting having symptoms of COVID-19.

Introduction

After the discovery of what later became known as the SARS-CoV-2 virus in December of 2019 in Wuhan City, China, a pandemic of large proportions affected nations the world over (Liu et al., 2020). Common symptoms of fever, cough, sore throat, headaches, or cold-like symptoms could appear after 2-14 days after exposure to the virus (CDC, 2020). More rare but severe symptoms could include difficulty breathing, chest pain, or discoloration of lips or face (CDC, 2020). Symptoms, especially more severe symptoms, can have an increased prevalence among patients with comorbidities of elderly age, kidney, liver, or heart disease (Wang et al., 2020). Higher rates of COVID-19 and resulting symptoms are not limited to age and physical ailments alone, however. Previous studies have suggested that race and gender may play a role in COVID-19 incidence and high-risk onset (Raisi-Estabraugh, 2020).

A more thorough understanding of what COVID-19 symptoms community members experience and what comorbidities they have may help public health professionals plan policies and interventions for protecting these individuals. Statistical understanding of the prevalence of long-term illnesses can also help in preparing for medical facility needs. Since different geographics locations serve different populations, it is important for county health departments to review demographic, symptom, and comorbidity statistics for residents of their community.

The following is a descriptive analysis of the demographics, symptoms, and comorbidities of COVID-19 patients in Cochise County, Arizona.

Methods

Information on individuals diagnosed with COVID-19 was given to the Arizona Department of Health Services (ADHS) via electronic laboratory report after PCR tests were conducted at medical provider offices, hospitals, or pharmacies. This information was then shared with the appropriate county health department, based on the patient's location of residence. Members of the Cochise County Health and Social Services COVID-19 Case Investigations Team contacted COVID-19 patients to conduct contact tracing interviews and collect information on their demographics, symptoms, comorbidities, close contacts, and final disposition of the case. This information was logged into the ADHS Medical Electronic Disease Surveillance Intelligence System (MEDSIS) for future analysis or follow-up.

Statistical software used for this descriptive summary was SAS University Edition. After COVID-19 case information was exported from MEDSIS and de-identified, patients that were marked as "not a case," "suspect," or "probable" were excluded to utilize data from only confirmed cases. Furthermore, since not all confirmed cases were successfully interviewed (lost to follow-up, incorrect phone numbers, etc.), cases that were marked as "lost to follow-up," "not able to investigate," "not enough information to investigate," "report received too late to investigate," and symptoms marked "unknown" were excluded to focus in on data collected from interviewed cases. The MEDSIS system was designed for interviewers to enter "yes" if a patient did experience a particular symptom or comorbidity, or "no" if they did not, though this was not always performed by the interviewer as designed. Therefore, symptoms or comorbidities that were left blank were presumed a "no" response and was analyzed accordingly. Ages of patients were grouped into bins of 10 years, beginning with <11 years, 11-20 years, etc., and for statistical simplicity the last four digits of the extended 10-digit zip codes were dropped, leaving only six-digit zip codes. Records analyzed were those with confirmed COVID-19 diagnosis prior to December 2020.

Results

Table 1 presents the number of COVID-19 cases stratified by age group, gender, zip code, race, ethnicity, and high-risk occupation status, and their corresponding percentages out of all cases in Cochise County. Note that the zip codes presented represent only the top five zip codes in Cochise County for COVID-19 cases, the remaining others are grouped into "other." High-risk occupations were recorded as those who worked in healthcare facilities, schools, prisons, or other facilities serving vulnerable populations. Table 2 presents the average age of COVID-19 patients in Cochise County, Arizona. To represent the distribution of ages for COVID-19, the median, mode, minimum, and maximum ages are presented as well.

Table 1: Demographic summary of number and % of Cochise County COVID-19 patients between March – November 2020 stratified by age, gender, zip code, race, ethnicity, and high-risk occupation status.

	Number of Cases	%
Age (years)		
<11 years	137	4.97
11-20 years	296	10.73
21-30 years	477	17.29
31-40 years	466	16.89
41-50 years	420	15.22
51-60 years	379	13.74
61-70 years	268	9.71
71-80 years	200	7.25
81-90 years	99	3.59
91-97 years	17	0.62
Gender		
Female	1422	51.54
Male	1337	48.46
*Zip Code**		
85607 (Douglas)	1234	45.81
85635 (Sierra Vista)	345	12.81
85643 (Willcox)	301	11.17
85650 (Sierra Vista)	132	4.90
85603 (Bisbee, Naco)	111	4.12
Other	571	21.19
Race		
White	2057	81.27
Black	73	2.88
American Indian/Alaska Native	33	1.30
Asian	17	0.67
Hawaiian/Pacific Islander	5	0.20
Other	346	13.67
Ethnicity		
Hispanic/Latino	1645	64.28
Non-Hispanic/Latino	914	35.72
High-Risk Occupation		
Yes	245	8.88
No	2514	91.12

* Top 5 Zip Codes in Cochise County with COVID-19 cases

Table 2: Distribution summary of patient ages in years for Cochise County COVID-19 patient between March – November 2020.

Mean Age (SD)	Median	Mode	Minimum	Maximum
42.34 (20.79)	41.00	28.00	<1.00	97.00

Abbreviations: (SD) Standard Deviation

Table 3 presents the distribution of symptoms for interviewed COVID-19 patients. To report symptoms with sufficient representation, only the most common symptoms with a 10% reporting rate or greater were analyzed. The exception to this is the report of runny nose/cold-like symptoms, which was close to 10% (9.71%) and therefore was included. Seven symptoms total met this criterion.

Table 3: Summary of symptoms of Cochise County COVID-19 patients that 10% or greater patients reported experiencing.

	Number of Cases	%
*Experienced Symptoms**		
Yes	863	31.28
No	1896	68.72
Fever		
Yes	424	15.37
No	2335	84.63
Cough		
Yes	448	16.24
No	2311	83.76
Headache		
Yes	471	17.07
No	2288	82.93
Muscle Aches		
Yes	365	13.23
No	2394	86.77
Runny nose/Cold-like Symptoms		
Yes	268	9.71
No	2491	90.29
Fatigue		
Yes	291	10.55
No	2468	89.45
Loss of Sense of Taste/Smell		
Yes	393	14.24
No	2366	85.76

*See discussion for explanation of low symptom count

Table 4 shows the distribution of comorbidities among interviewed COVID-19 patients. For statistical simplicity, only the top five comorbidities are represented.

Table 4: Summary of top five comorbidities of Cochise County COVID-19 patients.

	Number of Cases	%
Comorbidity		
Immunocompromised		
Yes	111	4.02
No	2648	95.98
Diabetes		
Yes	120	4.35
No	2639	95.65
Hypertension		
Yes	177	6.42
No	2582	93.58
Allergies		
Yes	190	6.89
No	2569	93.11
History of Smoking		
Yes	99	3.59
No	2660	96.41

Frequency comparison of both symptoms and comorbidities between ethnicities produced little change (< 3% difference) between Hispanic/Latino vs non-Hispanic/Latino groups. Comparison of comorbidities between genders similarly produced little change, and the only variables that did experience a > 3% difference in was their self-report of headaches and runny nose/cold-like symptoms as shown in Figure 1.

Figure 1: Comparison of the % each gender reporting experiencing headaches and runny nose/cold-like symptoms.

Table 5 and Table 6 compare rates of working at a high-risk occupation, presence of COVID-19 symptoms, and the presence of an immunocompromising condition by age groups and race, respectively. The percent column in these tables differ from tables 1, 3, and 4 in that this percent value represents the percentage of patients within the age/race group who report experiencing the corresponding risk factor/symptoms compared with other COVID-19 patients in the same age/race group who do not experience the corresponding risk factor or symptoms. For example, Table 5 shows us 19.71% of children under the age of 11 who are diagnosed with COVID-19 report experiencing symptoms, and so forth.

A frequency comparison was made between COVID-19 patients who suffer the top three reported symptoms (headaches, loss of taste & smell, and muscle aches) with both patients who do and do not experience the top three reported physical comorbidities (allergies, hypertension, and immunocompromised) to determine what extent comorbidities play on symptom onset. These results are presented in Figure 2.

Table 5: High Risk Occupation, experience of COVID-19 symptoms, and reported immunocompromising illness of Cochise County COVID-19 patients stratified by age, number reported per age group, and corresponding % of each age group experiencing this factor.

	Number of Cases	%
High-Risk Occupation		
<11	4	2.92
11 – 20	23	7.77
21 – 30	42	8.81
31 – 40	47	10.09
41 – 50	48	11.43
51 – 60	26	6.86
61 – 70	16	5.97
71 – 80	21	10.50
81 – 90	15	15.15
91 - 97	3	17.65
Experienced Symptoms		
<11	27	19.71
11 – 20	75	25.34
21 – 30	144	30.19
31 – 40	50	32.19
41 – 50	134	31.90
51 – 60	127	33.51
61 – 70	84	31.34
71 – 80	70	35.00
81 – 90	43	43.43
91 - 97	9	52.94
Immunocompromised		
<11	5	3.65
11 – 20	8	2.70
21 – 30	21	4.40
31 – 40	20	4.29
41 – 50	17	4.05
51 – 60	11	2.90
61 – 70	7	2.61
71 – 80	13	6.50
81 – 90	9	9.09
91 - 97	0	0

Table 6: High Risk Occupation, experience of COVID-19 symptoms, and reported immunocompromising illness of Cochise County COVID-19 patients stratified by race, number reported, and corresponding % of the race experiencing this factor.

	Number of Cases	%
High-Risk Occupation		
American Indian/Alaska Native	4	12.12
Asian	1	5.88
Black	12	16.44
Hawaiian/Pacific Islander	1	20
White	180	8.75
Other	27	7.80
Experienced Symptoms		
American Indian/Alaska Native	7	21.21
Asian	5	29.41
Black	32	43.84
Hawaiian/Pacific Islander	2	40.00
White	38	31.02
Other	88	25.43
Immunocompromised		
American Indian/Alaska Native	3	9.09
Asian	0	0.00
Black	7	9.59
Hawaiian/Pacific Islander	0	0.00
White	82	3.99

Other	11	3.18

Figure 2: Percentages of headache, loss of taste & smell, and muscle ache symptoms among patients who do and do not experience allergies, hypertension, or immunocompromising conditions.

Discussion

Table 1 shows the highest percentage of cases among those interviewed in Cochise County were between the ages of 21 and 40 years old (17.29% of all cases among 21-30-year-old and 16.89% among 31-40-year-old adults). These results are consistent with general findings that young-to-mid aged adults are among the most frequently diagnosed patients, indicating an increased risk of spreading the virus among these age group members. Table 2 interestingly suggests the average age among patients is 42.34 years, but the mode (most frequently reported) age among those diagnosed with COVID-19 is 28 years, further supporting the findings in Table 1. Females are slightly more likely than males to be diagnosed with COVID-19 (3.08% increase), and the zip code 85607 in Douglas accounts for 45.81% of all COVID-19 cases in Cochise County. Whites and Hispanics/Latinos make up the highest percentages of COVID cases among race and ethnicity groups (81.27% and 64.28%, respectively.)

The most common symptom reported from COVID patients is headaches (17.07%), of which males are more likely to report than females (19.07% vs. 15.19%, respectively). Most other symptoms were relatively equally reported between men and women, except for runny nose/cold-like symptoms (11.44% of men vs 8.09% of women). The most common comorbidity reported was allergies (6.89%), with no noticeable difference between men and women.

Table 5 shows a general increasing trend in the percentages of each age group that work or volunteer in a high-risk setting, that experience symptoms, and that are immunocompromised. This information supports the widely accepted understanding that risk of symptoms increases as age increases. Table 6 shows that of the patients interviewed, American Indians/Alaskan Natives and Blacks are more likely to report working in a high-risk occupation (12.12% and 16.44%, respectively), and experience some form of immunocompromised condition (9.09% and 9.59%, respectively). Among the different racial groups, Blacks and Hawaiian/Pacific Islander were more likely to report experiencing symptoms (43.84% and 40.00%, respectively). These findings suggest an increased need for safety interventions among elderly and Black, American Indian/Alaskan Natives, and Hawaiian/Pacific Islander races.

Finally, Figure 2 shows that approximately ¾ of patients who experience a comorbidity of allergies, hypertension, or an immunocompromised state report having common symptoms of headaches, loss of taste and smell, or muscle aches. This information is significant because it illustrates the complexity of how symptoms may arise either due to COVID-19 or the

comorbidity, or both. The symptom on the other hand may be exacerbated by a comorbidity. Further research or test development may be needed to understand the mechanism and relationship between symptoms and comorbidities.

It is also interesting to note that Table 5 presents 2.92% of children under 11 and 7.77% of youth teens work or volunteer in a high-risk occupation. Although it is possible older teens may work in a high-risk occupation or children or youth might volunteer in a high-risk occupation, these percentages likely could represent a limitation occurring in the ADHS Qualtrics survey established to help investigators conduct their interviews. On the question asking whether the patient works, does not work, or attends school, if "attends school" is selected the subsequent questions will not only ask which school the child attends, but will then ask which workplace/volunteer setting the patient goes to. Survey validation requires an answer to these questions, so investigators are required to select an option to proceed. This glitch may lead to over-representation of working in a high-risk group setting among age groups.

Strengths of this research include data being recorded directly from patient interviews. Limitations include information may be conflicted with response bias, as those who did not respond may have experienced different or more severe symptoms which prevented them from interviewing. Culture, age, or other social factors may have also played a role in response bias for individuals who did not answer their phones and were subsequently marked as lost to follow-up. The assumption that a blank response for a symptom or comorbidity was a "no" may inadvertently lead to an underrepresentation of symptoms or comorbidities if they were unintentionally left blank but should have been marked "yes."

One potentially major issue occurred with the way symptoms were reported in MEDSIS, which may have resulted in the underrepresentation of the percentage of cases reporting symptoms as seen in Table 3. Towards the end of the summer 2020, ADHS added a "yes/no" question to indicate whether a patient experienced symptoms. Prior to this addition, investigators only checked boxes to indicate any symptoms reported by the patient). With the absence of this question at that time, Arizona went approximately four months of cases only reporting symptoms, and when the system was upgraded to include this question, it did not backtrack and correct old files. This will make the percent of patients who reported experiencing symptoms underrepresented. At the same time this question was added, additional spots for symptoms such as "runny nose/cold like symptoms" were added as well, resulting in the same underrepresentation for these cases for the first four months of the pandemic. Future analysis could look at the cases interviewed prior to this time and qualitatively review if the investigator noted in the open text box any symptoms the patient reported experiencing that were not available on the form at the time.

References

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