

Correlation between Profile and Outcomes of COVID-19 Patients

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ABSTRACT

The study assessed the outcomes of COVID-19 and its relationship with patients' demographic and clinical profile. A descriptive correlational design was utilized in this investigation. Results revealed a significant relationship on patients' severity of symptoms and underlying conditions in relation to outcomes. Patients with prior conditions such as Hypertension, Diabetes Mellitus and Chronic Obstructive Pulmonary Disease, and those manifesting shortness of breath were associated with worse clinical outcome. This variable becomes a determinant of the severity of the disease and its outcomes. The implication of the study provides knowledge of the disease and the classification of risks that impact the outcomes of COVID-19 patients.

Keywords: SARS-CoV2; COVID-19; Pandemic

INTRODUCTION

Chinese authorities reported an outbreak of a severe pneumonia of an unknown cause last December 2019 (Zhu *et al.*, 2020). In January 2020, the WHO formally registered a SARS-CoV-2 case and subsequently named it Corona Virus Disease-19, or COVID-19 (World Health Organization, 2020). On March 11, 2020, the WHO proclaimed COVID-19 a pandemic.

As countries such as the Philippines continue to grapple with the pandemic, a clearer understanding of variations in COVID-19 risks and possible outcomes after confinement is necessary for numerous reasons. It can help clinicians refine their triage decisions, prioritize patients who need hospital admissions the most, and provide appropriate holistic management. It can also assist policymakers in reviewing interim guidelines responsive to current evidence. Finally, it can help epidemiologists improve the reliability of projections on the demand for hospital beds and staffing requirements in certain areas given their demographic profile (Lipsitch, 2020). Lim *et al.*, (2020) contends that the need to characterize the risks and symptoms of COVID-19 is important for early detection and successful treatment of patients.

Furthermore, there is a need to conduct further investigations on the threats of COVID-19 and its correlation with patient outcomes to design a basis for a more responsive vaccine deployment strategy. The lack of local data on the relationship of common risk factors and patient outcomes in COVID-19 steered the researchers' interest to initiate this research undertaking. This study will benefit clinicians by helping them understand better the clinical progress of COVID 19 patients after risk stratification based on their profiles. Likewise, the findings can guide hospital administrators in tailor fitting national interim guidelines into their local setting.

Objectives of the Study:

This study sought to determine the correlation between profile and outcomes of COVID-19 patients. Specifically, it sought to determine the following:

1. Demographic Profile of COVID-19 confirmed admitted patients in terms of:
 - a. Age
 - b. Sex

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- c. Civil Status
- d. Social Service Classification
2. Clinical Profile of COVID-19 confirmed admitted patients in terms of:
 - a. Body Mass Index
 - b. Smoking
 - c. Alcohol Consumption
 - d. COVID-19 Classification
 - e. Signs and symptoms; and
 - f. Underlying Conditions
3. Outcomes of COVID-19 confirmed patients.
4. Relationship between the outcome and the profile of admitted patients.

Hypothesis

There is no significant relationship between patients' profile and outcomes.

METHODOLOGY

Research Design

This study utilized a descriptive correlational design to describe the relationship between the patients' profiles and their outcomes. This design is appropriate because it only sought to describe the relationship between variables rather than support causal inferences (Polit & Beck, 2017).

Sampling

The study utilized a total enumeration of medical records of patients admitted from March 1, 2020, to March 31, 2021. Out of the total 203 retrieved cases, 191 (94.08%) were included based on the completeness and inclusion criteria.

Participants

All admitted confirmed COVID-19 patients in Cebu South Medical Center with a positive result of the reverse transcription-polymerase chain reaction through a respiratory specimen were included starting from January 1, 2020, up to March 31, 2021. The study only involved patients' charts from the Medical Records Section.

Inclusion Criteria

The study included complete medical records of admitted Filipino patients in Cebu South Medical Center from March 1, 2020, to March 31, 2021, who were diagnosed as COVID-19 confirmed based on a positive Reverse Transcription-polymerase Chain Reaction coming from a Department of Health accredited or licensed testing laboratory.

Exclusion Criteria

The study excluded records of patients who: (1) had positive results based on other diagnostic tests (Rapid Antibody/Antigen or Nucleic Acid Test); (2) were categorized as COVID-19 probable or COVID-19 suspect; (3) had been confirmed through RT-PCR but were referred to other institutions or discharged against medical advice for admission; and (4) had patient records that are incomplete.

Data Collection

The researchers submitted a letter to the office of professional education, training, and research to ask permission to pursue the study. The study was evaluated by the hospital's Technical Board Review and Ethics Committee. The next step after the approval involved securing permission from the Medical Records Section head to gain access to their paper records. A retrospective approach was utilized through the retrieval of patient records.

Statistical Analysis

For statistical treatment, this study utilized descriptive statistics to analyze the results. A simple percentage was applied to describe the clinical profile of the participants. Pearson Product-Moment Correlation was employed to analyze categorical data and determine the significant relationship between the clinical profile and the patient outcome.

Ethical Consideration

The study obtained ethical clearance from Cebu South Medical Centre with the number CSMS-REC-2021-06-07 dated 16 July 2021

RESULTS

Table 1: Profiling of Patients Were Done Based on The Demographic Factors Age, Sex, Civil Status and Social Services

Demographic Profiles	Frequency n = 191	Percentage (%)
Age		
0-18 months-infant	7	3.7
2-3 years-early childhood	0	0
3-5 preschooler	0	0
6-11 school age	1	0.5
12-18 adolescents	5	2.6
19-40 young adult	105	55
40-65 middle adult	54	28.3
65 and above adulthood	19	9.9
Sex		
Male	56	2.3
Female	135	70.7
Civil Status		
Single	107	56.2
Married	76	39.79
Widow	8	4.18
Social Service Classification		
A	0	0
B	0	0
C1	5	2.6
C2	9	4.7
C3	38	19.9
D	139	72.8

In view of the 191 cases studied, the majority belong to the age group of 19-40 years old (Young adult) which comprises 55% (f=105). The second largest group is that of the middle adults aged 40-65 years which make up 28.3% (f=54). This was followed by those who are 65 years and above (9.9%, f=19). There have been no recorded cases of patients aged 2-3 (early childhood) and 3-5 (preschooler) from March 2020 to March 2021. More infants (0-18 months) were admitted for COVID-19 (3.7%, f=7) than school age children (0.5%, f=1) and adolescents (2.6%, f=5). Furthermore, female respondents (70.7%, f=135) outnumbered males (29.3%, f=56) based on recorded admission due to COVID-19 within the study period. More single individuals (56%, f=107) have been admitted for COVID-19 than that of married (39.8%, f=76) or widowed persons (4.2%, f=8). In terms of social service classification based on the classification set by A.O. 51-A s. 2000. A vast majority of the recorded cases came from those who have been classified as Class D which make up 72.8% (f=139) of the admissions due to COVID-19, followed by Category C (19.9%, f=38).

Table 2: Clinical Profile

Clinical Profiles	Frequency n = 134	Percentage (%)
Body Mass Index		
Underweight (<18.5)	5	2.6
Normal Weight (18.5-24.9)	93	48.7
Overweight (25.0-29.9)	67	35.1
Overweight Grade 1 (30-34.9)	25	13.1
Overweight Grade 2 (35-39.9)	1	0.5
Overweight Grade 3 (>40)	0	0
Smoking		
Smokers	22	11.5
Non-smokers	169	88.5
Alcohol Consumption		
Drinkers	42	22
Non-drinkers	149	78
COVID-19 Classifications		
Mild Risk	133	69.6
Moderate Risk	29	15.2
High Risk	2	1
Severe/Critical Risk	27	14.1
Signs and Symptoms		
<i>Symptomatic</i>	147	77
<i>Asymptomatic</i>	44	23
Types of Coughs		
Dry Cough	4	2.1
Fever	74	38.7
Shortness of breath	70	36.6
Loss of Smell	63	33
Loss of Taste	4	2.1
Nasal Congestion	3	1.6
Body Malaise	2	1
Diarrhea	26	13.6
Sore Throat	5	2.6
Coryza	11	5.8
Fatigability	4	2.1
Loss of Appetite	32	16.8
Headache	4	2.1
Hemoptysis	4	2.1
Chills	3	1.6
Underlying Conditions		
<i>With Comorbidity</i>	96	50.3
<i>Without Comorbidity</i>	95	49.7
Status Asthmaticus	11	5.8
Presumptive Tuberculosis	4	2.1
Hypertension	74	38.7
Diabetes Mellitus	36	18.8
Chronic Obstructive Pulmonary Disease	1	0.5
Hyperthyroidism	1	0.5
Psychiatric disorder	1	0.5
Cardiovascular Disease	7	3.7
Sepsis Neonatorum	1	0.5
Cancer of all Forms	2	1
Seizure Disorder	1	0.5
Benign Prostatic Hyperplasia	1	0.5
Community Acquired Pneumonia	1	0.5

Among the 191 patient records reviewed in this study, 48.7% (f=93) showed a Body Mass Index (BMI) within normal limits. Sixty-seven, or 35.1%, are classified as overweight, while 13.1% are categorized as overweight G1, and 0.5% are overweight G2. Combining the percentage of those who were classified as overweight (overweight G1 and G2), a total of 48.7% are considered to be above normal BMI, which is equal to those within normal limits. This may suggest that BMI is not a significant criterion for COVID-19 risk and hospitalization. The majority of the 191 patient cases reviewed in this study comprised patients classified as "mild risk" (69.6%) based on physician diagnosis. There were 15.2% who were considered moderate-risk, and 14.1% were high-risk. Only 1% were categorized as severe or critical risks. This may be influenced by the fact that the institution catered only to mild to moderate cases and were referring severe COVID-19 patients before July 11, 2021. This finding contrasts with the results of Abad (2021), where 67.5% were moderate risk, 57.5% were high risk, and only 10% were low risk.

The table shows that among the 191 admitted patients diagnosed with confirmed COVID-19, 77% (f=147) were symptomatic and 23% were asymptomatic (f=44). Among the 23% asymptomatic admitted were health workers of the hospital who were infected with COVID-19 without symptoms, as a protocol on the first months of the pandemic to contain the transmission and obstetrics and gynecological cases that came into the hospital for maternal delivery and emergency surgery. The manifestations of COVID-19 in patients varied individually from symptomatic to asymptomatic, requiring a specific approach to treatment.

The table shows that 50.3% of the admitted patients had one or more underlying conditions upon admission. However, it is also important to note that 49.7% of the 191 patients under study had no pre-existing conditions upon admission.

The analysis of data from the patient infected with COVID-19 from March 1, 2020, to March 31, 2021, shows a pattern of common underlying conditions among patients with the same pattern with multiple data reviews. The study revealed that 38.7% (f-74) were diagnosed with hypertension, followed by diabetes mellitus, which comprised 18.8% (f-36), asthma, 5.8% (f-11) and cardiovascular diseases, which accounted for 3.7% (f-7). Respiratory conditions also emerged in the analysis of the data; presumptive tuberculosis comprised 2.1% (f-4) and chronic obstructive pulmonary disease accounted for 0.5% (f-1). The wide range of pre-existing conditions among admitted patients revealed that the virus can be transmitted to any individual, regardless of whether they are healthy or sick.

Table 3: Outcomes of COVID-19 Patients

Patient Disposition	Frequency n = 191	Percentage (%)
Improved	179	93.7
Expired	12	6.3

Only 6.3 % (f=12) of the 191 reviewed cases included in this study died, while the remaining 93.7% (f=179) were discharged as improved. This result may suggest that, despite the number of deaths, a good majority of patients admitted to the institution are still able to go home with an improved condition.

Table 4: Relationship between Demographic Profile and Outcomes

Demographic Profile	r-value	p-value	Interpretation
Age	0.002	0.973	Not Significant
Gender	0.118	0.105	Not Significant
Civil Status	0.009	0.906	Not Significant
Social Service Classification	-0.076	0.294	Not Significant

Table 4 revealed that there is no significant relationship between patient outcomes and demographic profile of the patients. COVID-19 cases admitted in the hospital from March 01, 2020, to March 31, 2021, a normal distribution among age, gender, social service classification, smoking and alcohol habit.

Table 5: Relationship between Clinical Profile and Outcomes

Clinical Profile	r-value	p-value	Interpretation
Body Mass Index	-0.063	0.388	Not Significant
Smoking Habit	-0.026	0.723	Not Significant
Alcohol Habit	-0.033	0.648	Not Significant
Covid-19 Classification	<i>0-.509**</i>	<i>0.000</i>	<i>Significant</i>
Signs and Symptoms			
Productive Cough	0.038	0.602	Not Significant
Dry Cough	-0.060	0.410	Not Significant
Fever	-0.117	0.108	Not Significant
Shortness of breath	<i>-0.185**</i>	<i>0.011</i>	<i>Significant</i>
Loss of Smell	0.038	0.602	Not Significant
Loss of Taste	0.033	0.652	Not Significant
Nasal Congestion	0.027	0.714	Not Significant
Body Malaise	0.040	0.583	Not Significant
Diarrhea	0.042	0.558	Not Significant
Sore Throat	-0.029	0.693	Not Significant
Coryza	0.038	0.602	Not Significant
Fatigability	0.001	0.993	Not Significant
Loss of Appetite	0.038	0.602	Not Significant
Headache	-0.113	0.120	Not Significant
Hemoptysis	-0.141	0.053	Not Significant
Asymptomatic	0.090	0.213	Not Significant
Chills	0.033	0.652	Not Significant
Pre-existing Conditions			
Status Asthmaticus	-0.029	0.694	Not Significant
Presumptive Tuberculosis	0.038	0.603	Not Significant
Hypertension	<i>-0.148**</i>	<i>0.040</i>	<i>Significant</i>
Diabetes Mellitus	<i>-0.151*</i>	<i>0.037</i>	<i>Significant</i>
Chronic Obstructive Pulmonary Disease	<i>-0.280**</i>	<i>0.000</i>	<i>Significant</i>
Hyperthyroidism	0.019	0.796	Not Significant
Psychiatric disorder	0.019	0.796	Not Significant
Cardiovascular Disease	-0.064	0.377	Not Significant
Sepsis Neonatorum	-0.019	0.796	Not Significant
Cancer of all Forms	0.027	0.715	Not Significant
Seizure Disorder	0.019	0.796	Not Significant
Benign Prostatic Hyperplasia	0.019	0.796	Not Significant
Community Acquired Pneumonia	0.019	0.796	Not Significant

Table 5 presents a relationship between patient disposition and clinical profile. Data revealed that shortness of breath has a significant relationship with patient disposition. The most common symptom of admitted patients under treatment on COVID-19 is dyspnea (33%), which is commonly accompanied by hypoxemia and typically requires oxygen supplementation.

DISCUSSION

The results of the study revealed that, of the 191 cases studied, the majority belong to the young adult age group and followed by the middle adults aged. In view of the 191 cases studied, the majority belong to the age group of 19–40 years old (young adult), which comprises 55% (f = 105). The second largest group is that of middle-aged adults, aged 40–65 years, which make up 28.3% (f = 54). This was followed by those who are 65 years and older (9.9%, f=19). There have

been no recorded cases of patients aged 2-3 (early childhood) and 3-5 (preschoolers) from March 2020 to March 2021. More infants (0–18 months) were admitted for COVID-19 (3.7%, $f=7$) than school-age children (0.5%, $f=1$) and adolescents (2.6%, $f=5$). This may imply that young adults, who are usually the most actively working age group, have the highest predisposition to COVID-19 considering that they are more exposed outside of their residences. On the other hand, the too young and too old are less exposed because of the restrictions of the pandemic; hence, there are fewer hospital admissions in these age groups. Similar to the results of this study, Sobotka (2020) and Ceballos (2021) found that the prevalence of individuals who are in their prime working age (20–59 years old) is significantly higher than the other age groups. In contrast, Liu *et al.*, (2020) found more cases recorded for individuals who are 60 to 65 years of age. Gold (2020), in a study that relates to death and age among COVID-19 cases in the US, found that older persons (65 years of age and older) are more affected.

Females (70.7%, $f=56$) outnumbered males (29.3%, $f=135$) based on recorded admission due to COVID-19 within the study period. Most foreign authors have presented contrasting evidence on the incidence of COVID-19 as compared to the results of this study. Alkundi *et al.*, (2020), Pradhan & Olsson, (2020), and Gomez *et al.*, (2021), among others, propose that the probability of COVID-19 hospitalization is significantly higher among men. However, the local study of Ceballos (2021) showed similar findings, stating that women are more susceptible to COVID-19 infection (54%). The comparable results of this local study may imply that in the Philippines, women are more at risk for hospitalization from COVID-19 than men.

More single individuals (56%, $f=107$) have been admitted for COVID-19 than married (39%, $f=76$) or widowed persons (4.2%, $f=8$). The study of Drefahl *et al.*, (2020) revealed that individuals who never married, divorced, or were widowed experienced higher risks from COVID-19. Unmarried persons may be considered among the socially vulnerable population in the COVID-19 pandemic (Fitzpatrick *et al.*, 2020). This may imply that those who do not have a life partner may be at higher risk for COVID-19 compared to those who are married due to their correspondingly higher risk for social vulnerability. Although most studies suggest that those who are obese and therefore have a higher BMI have a higher risk of hospitalization, as in the studies of Fresan *et al.*, (2021) and Recalde *et al.*, (2021),

There are more non-smokers (88.5%) among the admitted COVID-19 patients from March 2020 to March 2021. According to Neira *et al.*, (2021), former smokers were more at risk for hospitalization due to COVID-19 than those who were current smokers or never smoked. Hamer *et al.*, (2020) and Mendy (2020) have identified smoking as part of the unhealthy lifestyle that puts people at high risk for COVID-19 hospitalizations. Considering the established data on the effect of smoking on respiratory diseases, this may imply that non-smokers may still be at greater risk of contracting COVID-19. In terms of alcohol drinking habits, 78% of the cases are non-alcoholic beverage drinkers, while only 22% are alcohol drinkers based on the patient history sheets. Hamer *et al.*, (2020) identified that, in general, an unhealthy lifestyle is a risk factor for COVID-19 hospitalizations.

The data revealed that from March 1, 2020, to March 31, 2021, symptomatic patients accounted for 77%. The clinical manifestation of COVID-19 patients is highly variable. The symptoms range from mild to severe, and some lead to critical care. The data revealed that admitted patients were experiencing a dry cough (38.7%), fever (36.6%), shortness of breath (33%), fatigability (16.8%), and body malaise that accounted for 13.6%.

Zhang *et al.*, (2020) revealed that the most distinctive clinical symptoms include elevated temperature, dry cough, sore throat, fatigue, diarrhea, conjunctivitis, and loss of smell and taste. Chen *et al.*, (2020) found that the most common manifestations of SARS-CoV-2 infection are fever (83%-98%) in all infected individuals, cough (50%-82%), fatigue (25%-44%), shortness of breath (19%-55%), and muscle soreness (11%-44%). Some patients infected with COVID-19 experienced only mild fever, weakness, or even no symptoms, as in the study of Day (2020). In conclusion, patients admitted with COVID-19 experience varied symptoms or no symptoms at all. The implication is that the causative agent of the disease is virulent in nature and can be fatal.

Classification of Social Service in this study was based on the classification set by A.O. 51-A s. 2000. A vast majority of the recorded cases came from those who have been classified as Class D, which make up 72.8% ($f=139$) of the admissions due to COVID-19. The majority of the recorded cases are from families that are below the poverty threshold,

which further means that these patients find it difficult to provide for their non-food requirements on a daily basis. Findings suggest that indigent families are more likely to be hospitalized. Drefahl *et al.*, (2020) cited that disadvantaged populations are at higher risk for COVID-19 mortality, while Dragano *et al.*, (2020) found that unemployed individuals are more at risk for hospitalization in COVID-19.

The underlying conditions of an individual contribute to the disposition of the patient; among the list are hypertension, diabetes mellitus, and COPD, which have a significant relationship with disposition. Guan *et al.*, (2020) revealed that 23.7% out of 173 patients in China under study have an underlying condition of hypertension and 16.2% have diabetes mellitus. Zhang *et al.*, (2020) explained that patients with hypertension and diabetes have a worse prognosis during the COVID-19 infection. Chen *et al.*, (2020) noted in their study the significant relationship between hypertension and diabetes as that can influence the severity of an admitted patient with COVID-19 due to the imbalance of angiotensin-converting enzyme 2 (ACE2) and the cytokine storm induced by glucolipid metabolic disorders (GLMD).

The severity and outcome of COVID-19 disease were highly associated with multiple comorbidities, which were most likely associated with cardiovascular conditions (Guan *et al.*, 2020). Another disease that topped the list among patients admitted with COVID-19 was type 2 diabetes, which contributes to the increase in patient risk for critical conditions and intensive care (Zhu *et al.*, 2020). Type 2 diabetes patients have shown a pattern of longer hospital stays and requiring more interventions than those admitted who were not diabetic, since uncontrolled blood glucose may result in higher chances of complications and death (Zhu *et al.*, 2020). Patients admitted with prior conditions such as hypertension and diabetes are at risk of progressing their COVID-19 infection to a critical stage. A thorough assessment and nursing care should be employed in taking extra precautions with patients with underlying conditions. Studies suggest that admitted patients with underlying conditions have worse outcomes.

The coronavirus disease of 2019 is a respiratory and systemic illness that may lead to hypoxemia among infected patients needing oxygenation and accounts for 15–20 admitted cases (Qiu *et al.*, 2020). One of the respiratory conditions that may aggravate the status of COVID-19 patients is COPD, which increases the risk of morbidity and mortality among patients. Pranata *et al.*, (2020) revealed that COPD is linked with poor COVID-19 patient outcomes. COPD is characterized by the dysfunction of the immune system, which affects the function of the pulmonary, cellular, and molecular systems and acts as an inflammatory mediator that impairs lung function.

The underlying conditions of COVID-19 patients have a significant bearing on the outcome of patients admitted with COVID-19. It became a determinant of COVID-19 severity and mortality. The increase in incidence, supported by various meta-analyses of COVID-19 infection among admitted patients, supports the outcome of the study on a significant relationship between the patient's underlying condition and his or her disposition. The findings suggest that hypertension, diabetes mellitus, and COPD have a negative effect on the patient's disposition. Although validation studies may be further intensified, large studies may still be necessary to establish specific mechanisms to assess and monitor predominant underlying conditions to address better approaches that would yield better patient outcomes in this current pandemic.

CONCLUSION

The outcome of a patient admitted with COVID-19 has a significant relationship with the severity of the patient's symptoms and underlying conditions. Hypertension, diabetes mellitus, and COPD were identified as pre-existing conditions in patients with a worse clinical disposition. This variable becomes a determinant of the severity of the disease and its outcomes. Identification of the topmost signs and symptoms and underlying conditions that warrant worsening of the patient infected with COVID-19 gives us an understanding of the nature and the outcome. This is vital in order to define control measures and lay out preventions to minimize the impact of the outbreak, especially on patients with underlying diseases.

Conflict of Interest

The authors declare that they have no conflict of interests.

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