The Philippine Coronavirus Disease 2019 (COVID-19) Profile Study: Clinical Profile and Factors Associated with Mortality of Hospitalized Patients

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ABSTRACT

Introduction: The coronavirus disease 2019 (COVID-19) have spread globally and reached the Philippines in late January 2020. This study is the first local and nationwide research on admitted COVID-19 adult patients: their clinic-demographic profiles, managements, and clinical outcomes. We aim to determine the associated factors with mortality among COVID-19 patients.

Methods: This was a retrospective, multicenter, observational cohort study of rt-PCR confirmed and admitted COVID-19 adult patients in 89 hospitals in the Philippines from February to July, 2020. The data on admission of patient's demographic, clinical, laboratory, pre-hospital and during hospital treatment management and in-hospital clinical outcomes were gathered. The data were described and analyzed using multiple logistic regression analysis.

Results: There were 2884 rt-PCR confirmed and admitted COVID-19 adult patients included in the study. Majority were Filipinos (99·4%), with slightly more males (54.4%) than females. 21% were healthcare workers (HCWs). Mortality was higher among non-HCWs at 16% versus 2% among HCWs. 63% of the patients had a co-morbidity, which included hypertension (69%), diabetes mellitus (48%) and chronic kidney disease (26%). The significantly associated factors with mortality in this Philippine cohort were: age >60 years, hypertension as co-morbidity, tachypnea (> 22/minute), WBC count > 10 x 10^9/L, and elevated serum lactate dehydrogenase (LDH) (all $p<0.05$). Elevated serum LDH was the strongest factor associated with mortality (OR of 8.74, $p=0.004$).

Conclusion: This study identified that age, hypertension, tachypnea, elevated WBC count, and elevated serum LDH were associated with mortality among COVID-19 adult patients and results were consistent with results from studies done in other countries. We recommend that early detection and awareness of exposures and symptoms will improve the management and clinical outcomes of COVID-19 adult patients. Also, a long follow-up of the outcomes of COVID-19 to determine the effectiveness of treatment is recommended for further study.

Keywords: Philippines, COVID-19 adults, hospitalized, mortality

Introduction

The Coronavirus Disease 2019 or COVID-19 continues to affect the whole world. Around 60 million people have tested positive with 1.4 million deaths so far. The Philippines, as of the time of this writing, has 459,789 cases, and over 8,947 deaths.[1]

Early in this global health threat, reports from Wuhan, China showed that significant risk factors included: leukocytopenia, thrombocytopenia and diabetes mellitus. They were associated with higher risk of in-hospital deaths in severe cases.[2] In New York, a 21.5% hospital mortality was reported in a retrospective cohort between March to April, 2020 and risk factors identified were age > 50 years, systolic BP < 90mmHg, RR of > 24 bpm, SPO_2 < 92%, EGFR < 30ml/min, Interleukin 6 > 100pg/ml, D-dimer > 2mg/ml and Troponin >

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0·03ng/ml.[3] In Italy, a prospective cohort from March to April 2020 the case fatality rate reached 20.7% in 4 weeks among patients with any of the following: age > 80 years old, being a migrant from another country, presence of heart failure, arrhythmia, dementia, coronary heart disease, diabetes mellitus and hypertension.[4] In India, a retrospective case series showed that diabetes mellitus, hypertension and COPD were associated with serious COVID-19 cases.[5,6] In Brazil, patients with diabetes mellitus, neurologic, kidney, respiratory, and heart disease, were most likely to die and to be admitted in ICU.[7]

There are limited published studies on the profile of patients with COVID-19 in the Philippines. This study aims to provide Philippine data on COVID-19 morbidity features and factors associated with mortality. This study aims to describe the clinical profile and outcomes of RT-PCR confirmed COVID-19 hospitalized adult patients in the Philippines.

METHODS

Study design, participants, procedures. This was a retrospective, multicenter, observational cohort study among all symptomatic and asymptomatic adult rt-PCR confirmed COVID-19 patients admitted in 89 participating hospitals across the Philippines from February 1, 2020 to July 15, 2020. The study excluded COVID-19 patients who were discharged against medical advice or with unknown outcome after data collection has been stopped (patient still in-hospital or was lost to follow up due to transfer to another undocumented medical facility). The study was reviewed and approved by the Philippine Council for Health Research and Development (PCHRD) for technical merit, and by the Department of Health Single Joint Research Ethics Board (SJREB) for its ethical merit. Some of the institutions also conducted their own ethics review and approval.

Data collection. All co-investigators underwent orientation and training prior to the study in 1) data extraction from medical records to a data collection form (DCF) and 2) encrypted electronic mailing with an assigned password for data protection to a designated research assistant. All research assistants were also oriented and trained in review and encoding of DCFs in Google Forms. Missing data or any data with potential error were verified by the research assistants with the respective co-investigators to ensure accuracy of data.

Patient information on the following variables were collected: demographics, exposure history, presenting signs/symptoms/qSOFA scores on admission, initial laboratory exams, in-hospital treatment practices, final outcome upon discharge, and causes of death for those who did not recover. For laboratory results that can be expressed both in qualitative and quantitative values (i.e., D-dimer, C-reactive protein, LDH, ferritin, and procalcitonin), only the last item was considered for analysis. Kidney function was assessed by computing eGFR using the CKD-EPI equation. qSOFA score was determined using three criteria, assigning one point for low blood pressure (SBP ≤ 100 mmHg), high respiratory rate (≥ 22 breaths per min), or altered mentation (Glasgow coma scale < 15). Chest X-ray and chest CT scan findings were classified as mild (transient areas of consolidation), moderate (unilateral or bilateral ground glass opacities), or severe (bilateral segmental consolidation) as assessed by the radiology consultant of the institution. Information on electrocardiogram (ECG) and ejection fraction by echocardiography were also noted if available. Treatment practices such as use of antivirals, antibiotics, corticosteroids, tocilizumab, anticoagulation, and nutritional supplementation were recorded. Oxygen supplementation, type of ventilatory support, prone positioning maneuver, hemoperfusion, and convalescent plasma therapy were also documented.

Outcomes. The primary outcome measured was all-cause in-hospital mortality of rt-PCR confirmed COVID-19 asymptomatic and symptomatic adult patients in the Philippines. The secondary outcomes included rate of admission to an intensive care unit (ICU) or any unit with close monitoring (if ICU is full), usage of mechanical ventilation, length of ICU stay, and length of hospitalization.

Statistical analysis. *Epi Info 7* and *SPSS 20* software were used in the analysis. All categorical variables were described using frequencies and percentages, while continuous variables were described using mean and standard deviation for normally distributed data and median and interquartile range (IQR) for non-normally distributed data. All subjects who were lost to follow-up and with missing data on primary outcome were excluded in the analysis. Subgroup analysis of the clinical factors of COVID-19 in-patients who recovered and died were compared. Chi-square test for categorical variables and independent t-test or ANOVA for normally distributed data and Kruskal-Wallis test for skewed factors were used to determine the significant clinical variables associated with all-cause in-hospital mortality. Crude odds ratios with 95% confidence interval were determined for the risk factors of mortality based on previous relevant studies. Backward elimination multiple logistic regression analysis was performed to generate a reduced model predictive of all-cause in-hospital mortality and to control the effect of the confounders. Adjusted odds ratio and 95% confidence interval were the measures of association and p-value of less than 0.05 is statistically significant.

RESULTS

Demographic and clinical characteristics. The study retrieved data from 3,004 admitted COVID-19 patients, but only 2,884 (96%) were included in the final analysis. Those excluded were: less than 19 years of age (21), dead on arrival (2), and with unknown final outcome (97). *Figure 1* shows the distribution of the study population according to administrative regions of the Philippines. When we clustered the administrative regions into the three major island groups in the country, the distribution was: Luzon (76%), Mindanao (15%) and Visayas (9%).

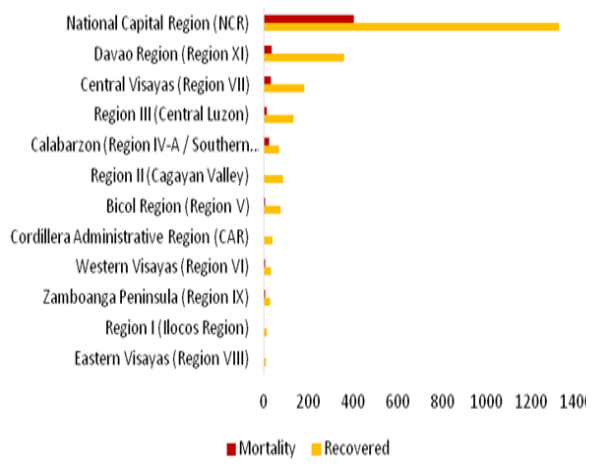

Figure 1. Regional distribution of the COVID-19 adult patients (n=2884)

Since this retrospective study relied on chart review, some variables were not completely filled up in the Data Collection form (DCF). Descriptive and univariate analysis were done for the whole cohort, but with varying sample sizes for some variables. For those able to fill up all entries of the DCF (339 out of 2884 COVID-19 cases), multiple logistic regression analysis was done.

There were 2,351 recoveries and 533 mortalities; overall in-hospital mortality rate was 18.5%. The first table shows the demographic profile of the cohort among which 21% were healthcare workers with 2.4% mortality rate.

The rest of the study results are shown in Tables 2-10 (see Appendix).

The five leading causes of death among 476 COVID-19 cases: acute respiratory distress syndrome (64%), septic shock (21%), acute coronary syndrome (5%), cardiogenic shock from viral myocarditis (2%), and ventricular tachyarrhythmia (2%). Unfortunately, 57 cases had no recorded clear causes of death in the medical charts during the period of data collection of this study. The definition of causes of death was based on early published epidemiologic studies.

DISCUSSION

The associated factors with mortality among adult COVID-19 patients in the Philippines were: age above 60 years, hypertension, respiratory rate of > 22 per minute, WBC > $10x10^9$/L, and LDH>250 U/L. The ICU admission, mechanical ventilation, length of ICU stay, length of hospital stay, and presence of organ failure were associated with mortality with p-values of less than 0.05. There were 5.2% who had mechanical ventilation. Among those who died, 69.6% had mechanical ventilation and 46% were admitted in the ICU. Those who died (6 days) had shorter ICU and hospital stay as compared to those who recovered. Organ failure was more frequent among those who died; pulmonary (21%), renal (11%) and cardiac failures (8%) were the most common.

The multiple logistic regression analysis of 339 cases of hospitalized COVID-19 in our Philippines study had data similar to our international counterparts, but with some surprising differences. Our study showed that the older population was the most at risk for COVID-19 mortality with adjusted OR of 3.4 (95% CI 1·20-9·64, *p=0.022*). Among the Chinese, the largest cohort study of 44,672 cases showed overall case fatality rate (CFR) of 2.3%. In this study, CFR was 8% and 14.8% among the 70-79 years, and 80 years and above groups, respectively. At cut-offs of 60 years or older, reported odds ratios for mortality range from 1.3 to 10.6.[2-6]

Table 1. Comparison of the demographic and clinical profile of recovered and died hospitalized COVID-19 adult patients

Characteristics	Recovered (n = 2351)	Died (n = 533)	Overall (n = 2,884)	Test	p-value
Age, mean (SD)	46.7 (16.7)	64.2 14.4)	50.0 (17.6)	t-test	0.001*
Sex, male, n (%)	1249 (53.1%)	320 (60.0%)	1569 (54.4%)	x^2	0.004*
Filipino, n (%)	2337 (99.4%)	530 (99.4%)	2867 (99.4%)	x^2	0.929
Body mass index, kg/m^2, mean (SD)	24.50 (4.1)	24.74 (5.2)	24.54 (4.4)	ANOVA	0.364
<18.5, n (%)	55 (3.6%)	17 (5.3%)	72 (3.9%)	x^2	0.118
18.5 - 24.9, n (%)	898 (58.9%)	181 (56.6%)	1079 (58.5%)		
25 – 29.9, n (%)	431 (28.3%)	82 (25.6%)	513 (27.8%)		
≥ 30, n (%)	140 (9.2%)	40 (12.5%)	180 (9.8%)		
Occupation, n (%)					
Employed	1282 (54.5%)	97 (18.2%)	1379 (47.8%)	x^2	0.001*
Healthcare worker	588 (25.01%)	13 (2.44%)	601 (20.8%)	x^2	0.001*
Smoking History n (%)				x^2	0.001*
Non-smoker	1768 (78.5%)	323 (64.3%)	2091 (75.9%)		
Current smoker	235 (10.4%)	56 (11.2%)	291 (10.6%)		
Previous smoker	250 (11.1%)	123 (24.5%)	373 (13.5%)		
Living in an urban area, n (%)	2023 (86.0%)	471 (88.4%)	2494 (86.5%)	x^2	0.015*

Note: *Chi square (x^2) test* and (*) p < 0.05 is statistically significant

Various co-morbidities have been reported to increase the risk of mortality from COVID-19, including hypertension, diabetes mellitus, and ischemic heart disease. Our study showed hypertension as significantly correlated to COVID-19 mortality with adjusted OR of 3.26 (1.09–9.75), p=0.034. Liang et al. conducted a meta-analysis of 19 studies covering 15,302 patients, and recorded adjusted hazard and odds ratios for hypertension of OR = 1.44, 95% CI 1·24 – 1.66. They concluded that hypertension was an independent risk factor for predicting the severity and mortality of COVID-19.[7] Other meta-analyses consistently reported the same severe outcomes among COVID-19 hypertensives versus non-hypertensives.[8-10]

Our study reported that diabetes mellitus (DM) (adjusted OR of 2.90 (0.94–8.94), p=0.06) has less association with COVID-19 mortality, though international data shows otherwise. A significant proportion of COVID-19 patients have DM, with estimates ranging from 5·3-20% in China and 25·2-33·8% in the United States.[11] A whole population study in England covering 61.4 M subjects and 23,698 COVID-19 related-deaths revealed that compared to non-diabetics, people with type 1 diabetes mellitus and type 2 diabetes mellitus had 3.5 times and twice the odds of in-hospital death respectively.[12] A meta-analysis of 40 studies involving 18,012 patients showed that DM was moderately associated with both severity and mortality for COVID-19.[8] In contrast, a multicenter retrospective study done among 6,493 COVID-19 patients of New York City (much like the protocol of our own Philippine cohort) concluded after multivariate analysis, that diabetes mellitus did not have a profound impact on COVID-19 mortality.[5] Similarly, a comparison of age- and sex-matched DM versus non-DM cohorts from Wuhan, China showed a higher proportion of ICU admissions among diabetics, but insignificant for association with mortality.[13]

Cardiovascular disease is prevalent among COVID-19 patients with estimates ranging from 2.5-15% in Chinese and 11.1-13.7% in U.S. cohorts.[11] Moreover, patients with severe COVID-19 were found to be three times more likely to have cardiovascular disease than non-severe cases.[14] Several meta-analyses have shown that cardiovascular disease increases the risk of death several-fold, with reported ORs ranging from 2.25 to 6.34.[8-10] However, cardiovascular and ischemic heart disease was not associated with mortality in our Philippine cohort (adjusted OR 0.79 (0.15–4.21), *p=0.79*. The difference with the results of this study can be due to the limited sample size of COVID-19 patients included in the multiple logistic regression analysis. The range of the 95% confidence interval is very wide. Thus, we recommend to continue the study to increase the population to generate conclusive results.

Majority of admitted COVID-19 cases in our Philippine cohort were afebrile at presentation. Fever (adjusted OR 1.60 (0.38–6.66), *p=0.52*) and tachycardia (adjusted OR 1.63 (0.58–4.62), *p=0.36*) were not observed to increase the risk of in-hospital mortality. However, tachypnea (> 22 breaths per minute) was associated with a 3.4-fold higher mortality risk. This is consistent with the findings of Bahl et al., wherein respiratory rate was significantly associated with in-hospital mortality.[15] This risk is further elevated when specific cut-offs are applied: adjusted odds ratios for mortality of 1.43 at RR of 25-30, and 1.69 at RR > 30/min.[3]

In the Philippine cohort, WBC was significantly higher among those who died versus the recoveries (11·4 ± 6·7 x 10^9/L versus 8·7 ± 5·4 x 10^9/L, *p=0·001*). Leukocytosis (OR 5·94, 95% CI 1·87–18·85) was found to be associated with increased in-hospital death. A study in Iran of 74 patient with severe COVID-19 admitted in the ICU observed that mortality was high (10·5 ± 5·6 x 10^9/L versus 7·6 ± 3·5 x 10^9/L, *p = 0·008*) among those with higher WBC count versus recoveries.[16] A retrospective study of 52 out of 619 patients with leukocytosis in Wuhan, China reported higher mortality in this sub-group, and more likely to develop critical illness, receive mechanical ventilation and be admitted at the ICU.[17] A Japanese meta-analysis focused on leukocytosis and elevated CRP as predictors of severe COVID-19 outcomes. It concluded that WBC > 9·5 x 10^9/L was associated with poorer outcomes (OR 4·51, 95% CI 2·53-8·04) which included: mortality, ICU admission, and use of mechanical ventilation, among others.[18]

Lactate dehydrogenase (LDH) is one of several laboratory examinations recommended in the Philippine guidelines for managing adult COVID-19 cases as a predictor of poor outcome.[19] In our multivariate model, elevated LDH (> 250 U/L) was the strongest factor associated with the highest risk of mortality (OR 8·74, 95% CI 1·98–38·50). The evidence behind LDH as a predictor of poor outcomes in COVID-19 is robust. A pooled analysis of early studies from China showed > six-fold increase in odds of severe disease and > 16-fold increase in odds of death in patients with elevated LDH.[20] Subsequent studies from three Chinese and one Korean cohort showed hazard ratios for mortality associated with elevated LDH ranging from 2·00 to 40·50. This was defined as levels greater than several cut-offs, ranging from 214 to 445 U/L.[3,21-23] In a group of 350 patients from the U.S. that were not admitted at the ICU, LDH was shown to be associated with the composite endpoint of death, ICU transfer or increased oxygen requirement (OR 1·006 per 1 U/L, 95% CI 1·001-1·012). These adverse outcomes were five-fold higher in patients with LDH in the fourth quartile (≥ 354 U/L) compared to those in the first quartile (≤ 232 U/L).[24] Moreover, high LDH has also been demonstrated to predict disease progression in patients with mild COVID-19.[25]

Study Limitations

This study is a retrospective cohort study which is limited by the available records. These were several missing data and only few patients had complete records. There were only 339 out of 2884 COVID-19 cases that were included in the multiple logistic regression analysis. This affected the generalizability of the results.

CONCLUSION

This final report of the hospitalized COVID-19 patients in the Philippines has comprehensively confirmed factors associated with the disease and its mortality and was found to be consistent with results from studies done in other countries. Factors associated with an increase in mortality include the following: age > 60 years old, presence of tachypnea, hypertension as a comorbidity, WBC >10x10^9/L, and an elevated serum LDH.

Recommendation

We recommend to improve the completeness of hospital medical records by using a standardized electronic medical records system for all hospitals in the country to generate big data on COVID-19 registry that will collect relevant clinical, treatment and clinical outcomes. The completeness and quality medical records system will provide high power for analysis and generalizability for the country. This will provide up-to-date national baseline information for healthcare workers, on the profile, management, and clinical outcomes of COVID-19 patients. Moreover, future epidemiologic studies on COVID-19 patients should come up with a system to standardize data collection, units of measure, and reporting among all participating hospitals. A national registry with continuous support and budget from the Department of Health and cooperation from all local government health surveillance units should give us a more accurate and comprehensive profile of COVID-19 in the country.

In addition, prospective cohort or follow-up of COVID-19 cases with regards to long-term outcomes is recommended for future study. The results of this study can assist in making practice guidelines in the management of COVID-19 in the Philippines. This eventually can be utilized for the revision of policies on COVID-19 by the health governing bodies in the country.

Declaration of interests: None

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APPENDIX

Table 2. Comparing the co-morbidities and vaccine history of COVID-19 adult patients who recovered and died

Factors	Recovered (n = 2351)	Died (n = 533)	Overall (n = 2,884)	p-value
Co-morbidities				
None	1009 (42.9%)	53 (9.9%)	1062 (36.8%)	0.001*
Hypertension	871 (65.9%)	338 (79.7%)	1209 (69.2%)	0.001*
Diabetes mellitus	488 (42.8%)	227 (62.4%)	715 (47.5%)	0.001*
Chronic renal disease	154 (15.5%)	116 (37.7%)	270 (26.1%)	0.001*
Known ischemic heart disease	131 (13.4%)	69 (24.2%)	200 (15.8%)	0.001*
Bronchial asthma	125 (12.7%)	35 (13.0%)	160 (12.8%)	0.889
Previous stroke or chronic neurological or neuromuscular disease	62 (6.6%)	44 (15.9%)	106 (8.7%)	0.001*
Malignancy	41 (4.4%)	54 (19.0%)	95 (7.8%)	0.001*
Chronic obstructive pulmonary disease	36 (3.9%)	35 (13.0%)	71 (6.9%)	0.001*
Active tuberculosis	53 (5.7%)	25 (9.7%)	78 (6.6%)	0.023*
Pregnancy	48 (5.2%)	3 (1.2%)	51 (4.3%)	0.006*
Immunodeficiency	10 (1.1%)	5 (1.9%)	15 (1.3%)	0.276
Chronic liver disease or chronic hepatitis	15 (1.6%)	13 (5.0%)	28 (2.4%)	0.001*
Hematologic disease	14 (1.5%)	6 (2.4%)	20 (1.7%)	0.368
Immunodeficient state	6 (0.65%)	8 (3.1%)	14 (1.2%)	0.001*
Vaccinations				
Influenza vaccine given in the past or current year, n (%)	151 (18.8%)	8 (9.3%)	159 (17.9%)	0.001*
BCG vaccination, n (%)	582 (77.7%)	38 (53.5%)	620 (75.6%)	0.001*

Note: Chi square (x^2) test and p-value < 0.05 is statistically significant

Table 3. Comparison of the exposure history of hospitalized COVID-19 patients who recovered and died

Exposure characteristics	Recovered (n = 2351)	Died (n = 533)	Overall (n = 2884)	p-value
Uncertain exposure history	725 (31.3%)	275 (52.4%)	1000 (35.2%)	0.001*
Residence in area with reported local transmission	455 (19.7%)	139 (26.5%)	594 (21.0%)	0.002*
Exposure as a HCW handling COVID-19 cases	421 (18.2%)	6 (1.2%)	427 (15.1%)	0.001*
Contact with a confirmed case	475 (20.6%)	35 (6.7%)	510 (18.1%)	0.001*
History of travel to an area of reported local transmission	234 (10.2%)	38 (7.3%)	272 (9.7%)	0.124*
Contact with a suspect or probable case	187 (8.1%)	27 (5.2%)	214 (7.6%)	0.070
History of travel outside the Philippines	114 (5.0%)	13 (2.5%)	127 (4.5%)	0.043*
No history of travel but with contact with a traveler from an area of reported local transmission	31 (1.4%)	7 (1.3%)	38 (1.3%)	0.972

Note: Chi square (x^2) test and p-value < 0.05 is statistically significant

Table 4. Initial presenting signs, symptoms, and qSOFA scores of hospitalized COVID-19 patients who recovered and died

Sign or symptom	Recovered (n = 2351)	Died (n = 533)	Overall (n = 2884)	Test	p-value
Fever on admission, n (%)	245 (64.0%)	138 (36.0%)	383 (13.6%)	x^2	0.001*
Temperature, mean (SD)	37.0 (6.9)	37.2(0.9)	37.0 (6.3)	ANOVA	0.554
< 37.8°C	2063 (89.4%)	374 (73.0%)	2437 (86.4%)	x^2	0.001*
37.8-38.5°C	163 (7.1%)	87 (17.0%)	250 (8.9%)		
38.5-39°C	45 (1.9%)	34 (6.6%)	79 (2.8%)		
> 39°C	37 (1.6%)	17 (3.3%)	54 (1.9%)		
Vital Signs on Admission					
Heart rate (bpm), mean (SD)	87.3 (14.9)				
HR > 90 beats/minute, n (%)	742 (31.6%)	98.5 (19.0)	89.4 (16.3)		
HR < 60 beats/minute, n (%)	17 (0.72%)	325 (61%)	1067 (37.0%)	ANOVA	0.001*
Respiratory rate, mean (SD)	20.8 (3.5)	5 (0.94%)	22 (0.8%)	x^2	0.001*
RR ≥ 22/minute, n (%)	495 (21.4%)	25.4 (6.9)	21.6 (4.7)	x^2	0.001*
Systolic blood pressure (mmHg), mean (SD)	120.7 (16.7)	352 (68.2%)	847 (29.9%)	ANOVA	0.001*
Diastolic blood pressure (mmHg), mean (SD)	77.4 (10.2)	125.0 (24.1)	121.5 (18.3)	x^2	0.001*
Blood pressure (mmHg), n (%)		75.9 (12.8)	77.1 (10.7)	ANOVA	0.001*
Low BP (SBP < 90, DBP < 60)	17 (0.73%)			ANOVA	0.003*
Controlled BP (SBP 90-139, DBP 60-89)	1822 (78.0%)	26 (5.0%)	43 (1.5%)	x^2	0.001*
Elevated BP (SBP ≥ 140, DBP ≥ 90)	497 (21.3%)	323 (62.4%)	2145 (75.2%)		
Altered mentation on admission, n (%)	44 (2.09%)	169 (32.6%)	666 (23.3%)		
Symptoms, n (%)					
Cough	1138 62.1%)	132 (36.9%)	176 (7.15%)	x^2	0.001*
Fever (self-reported)	673 (39.9%)	333 (75.5%)	1471 (64.7%)		
Difficulty breathing	273 (17.3%)	198 (49.9%)	871 (41.8%)	x^2	0.001*
Shortness of breath	314 (20.2%)	207 (52.8%)	469 (24.6%)	x^2	0.001*
Sore throat	381 (24.6%)	150 (39.5%)	464 (23.3%)	x^2	0.001*
Sputum production	272 (18.0%)	29 (8.9%)	410 (21.9%)	x^2	0.001*
Anorexia	94 (13.2%)	112 (31%)	384 (20.6%)	x^2	0.001*
Fatigue	196 (13.1%)	37 (31.4%)	131 (15.8%)	x^2	0.001*
Myalgia or arthralgia	196 (13.2%)	78 (23.0%)	274 (15.0%)	x^2	0.001*
Diarrhea	203 (13.6%)	45 (13.6%)	241 (13.3%)	x^2	0.001*
Nasal congestion or colds	209 (14.0%)	39 (11.9%)	242 (13.3%)	x^2	0.001*
Abdominal pain or discomfort	40 (7.9%)	24 (7.43%)	233 (12.9%)	x^2	0.046*
Chills	103 (7.2%)	11 (16.7%)	51 (8.9%)	x^2	0.001*
Headache	94 (6.5%)	38 (11.8%)	141 (8.0%)	x^2	0.018*
Stroke symptoms	26 (4.0%)	13 (4.0%)	107 (6.0%)	x^2	0.006*
Loss of taste	61 (4.2%)	9 (10.1%)	35 (4.7%)	x^2	0.096
Nausea and vomiting	59 (4.1%)	14 (4.4%)	75 (4.3%)	x^2	0.011*
Loss of smell	63 (4.4%)	17 (5.3%)	76 (4.3%)	x^2	0.883
Chest pain	35 (2.5%)	2 (0.6%)	65 (3.7%)	x^2	0.351
Other symptoms	178 (12%)	9 (2.9%)	44 (2.6%)	x^2	0.002*
Quick Sequential Organ Failure Assessment (qSOFA) score, n (%)		79 (24.5%)	257 (14.2%)	x^2	0.706
0	1633 (69.7%)	116(22.1%)	1749 (61.0%)	x^2	0.001*
1	625 (26.7%)	273(51.9%)	898 (31.3%)	x^2	0.001*
2	84 (3.6%)	118(22.4%)	202 (7.0%)		
3	1 (0.04%)	19 (3.6%)	20 (0.7%)		

Note: p-value < 0.05 is statistically significant

Table 5. Initial laboratory findings of COVID-19 admitted patients.

Initial laboratory examination	**Recovered** (n = 2351)	**Died** (n = 533)	**Overall** (n = 2884)	**Test**	**p-value**
Complete blood count, mean (SD)					
Hemoglobin (g/L)	134.4 (22.3)	121.4 (27.5)	132.0 (23.8)	ANOVA	0.001*
Hematocrit (%)	40.2 (9.5)	36.5 (8.0)	39.5 (9.3)	ANOVA	0.001*
WBC count (x10^9/L)	8.7 (5.4)	11.4 (6.7)	9.2 (5.8)	ANOVA	0.001*
Platelet count (X10^9/L)	275.0 (100.3)	242.2 (116.8)	269.1 (104.2)	ANOVA	0.001*
Neutrophils (%)	65.0 (12.9)	79.0 (12.2)	67.5 (13.8)	ANOVA	0.001*
Absolute neutrophil count, median (IQR)	4862 (3517-6660)	7488 (4943-12186)	5158 (3654-7421)	Kruskal-Wallis	0.001*
Lymphocytes (%)	25.0 (11.1)	13.2 (8.7)	22.9 (11.6)	ANOVA	0.001*
Absolute lymphocyte count, median (IQR)	1829 (1240-2506)	1008 (697-1578)	1677 (1078-2366)	Kruskal-Wallis	0.001*
Arterial Blood Gas, mean (SD)					
pH	7.43 (0.1)	7.39 (0.2)	7.41 (0.14)	ANOVA	0.001*
$paCO_2$ (mmHg)	33.9 (9.1)	33.6 (11.6)	33.8 (10.0)	ANOVA	0.631
paO_2 (mmHg)	92.6 (39.6)	95.1 (61.6)	93.4 (47.9)	ANOVA	0.348
HCO_3 (mEq/L)	22.7 (4.9)	21.4 (7.1)	22.3 (5.7)	ANOVA	0.001*
O_2 saturation (%)	95.2 (6.8)	91.6 (11.5)	94.0 (8.8)	ANOVA	0.001*
PF ratio, median (IQR)	357.1 (256.8-443.1)	189 (98.5-328.6)	314.9 (175.9-421.2)	Kruskal-Wallis	0.001*
Creatinine (umol/L)	114.2 (232.0)	214.6 (312.7)	134.2 (253.3)	ANOVA	0.001*
eGFR, mean (SD)	89.1 (45.1)	79.2 (44.6)	87.2 (45.1)	ANOVA	0.001*
ALT/SGPT (U/L), median (IQR)	34.5 (21.1-59.0)	44 (25-73.6)	35.9 (22.1-61.2)	Kruskal-Wallis	0.001*
AST/SGOT (U/L), median (IQR)	32 (22-51)	57.3 (34-90.1)	35.0 (23.1-60.9)	Kruskal-Wallis	0.001*
Prothrombin time (sec), median (IQR)	13 (11.9-14.2)	14 (12.5-16.3)	13.2 (12.2-14.8)	Kruskal-Wallis	0.001*
International normalized ratio, median (IQR)	1.0 (0.93-1.1)	1.1 (1-1.3)	1 (0.96-1.2)	Kruskal-Wallis	0.001*
INR > 1.2, n (%)	83/647 (12.8)	96/250 (38.4)	179/897 (20.0)	X^2	0.001*
Lactate dehydrogenase (U/L)					
Median (IQR)	285 (201-436.3)	497 (346-726)	316.2 (211.7-473.7)	Kruskal-Wallis	0.001*
LDH > 250 U/L, n (%)	915/1540 (59.4%)	261/290 (90%)	1176/1830 (64.3%)	X^2	0.001*
C-reactive protein (mg/L)					
Median (IQR)	3.0 (0 – 7142)	9.6 (0.1-1200)	4.1 (0-7142)	Kruskal-Wallis	0.114
CRP > 3.0 mg/L, n (%)	600/2351 (25.5%)	216/533 (40.5%)	816/2884 (28.3%)	X^2	0.001*
Ferritin (ng/mL)					
Median (IQR)	400.5 (136.9-915.5)	1251 (656-2104)	489 (177.5-1199)	Kruskal-Wallis	0.001*
Ferritin > 248 (male)/> 150 (female), n (%)	833/1230 (67.72%)	244/272 (89.7%)	1077/1502 (71.7%)	X^2	0.001*
D-dimer (mg/L)					
Median (IQR)	291 (1.3-1024)	603.5 (3.3-1892.8)	310 (1.9-1192.5)	Kruskal-Wallis	0.651
D-dimer > 0.5 mg/L, n (%)	455/545 (83.5%)	169/174 (96%)	624/719 (86.8%)	X^2	0.001*
Creatinine kinase (U/L)					
Median (IQR)	60.1 (20.1-112)	45 (7.7-100)	53 (11-109)	Kruskal-Wallis	0.41
Creatinine kinase > 200 U/L, n (%)	14/66 (21.2%)	3/25 (12.0%)	17/91 (18.7%)	X^2	0.314
Troponin, elevated, n (%)	130/236 (55.1%)	128/188 (68.1%)	258/424 (60.8%)	X^2	0.006*
Albumin (g/L)					
Mean (SD)	35.3 (7.4)	29.0 (7.4)	32.9 (8.0)	ANOVA	0.001*
Albumin < 30 g/L, n (%)	89/391 (22.8%)	122/243 (50.2%)	211/634 (33.3%)	X^2	0.001*
Procalcitonin (ng/mL)					
Median (IQR)	0.09 (0.05-0.3)	0.63 (0.18-3.6)	0.12 (0.05-0.5)	Kruskal-Wallis	0.001*

Table 5 (cont'd). Initial laboratory findings of COVID-19 admitted patients.

Initial laboratory examination	Recovered (n = 2351)	Died (n = 533)	Overall (n = 2884)	Test	p-value
Procalcitonin ≥ 0.5 ng/mL), n (%)	500/846 (59.1%)	259/277 (93.5%)	759/1123 (67.6%)	X^2	0.001*
HbA1c (%)					
Mean (SD)	7.5 (2.3)	7.9 (2.4)	7.6 (2.3)	ANOVA	0.078
HbA1c > 7%, n (%)	185/433 (42.7%)	76/145 (52.4%)	261/578 (45.2%)		0.042*
Electrolytes (mmol/L), mean (SD)				ANOVA	
Sodium	137.1 (6.3)	134.8 (8.2)	136.6 (6.8)	ANOVA	0.001*
Potassium	4.0 (0.8)	4.1 (1.0)	4.0 (0.8)	ANOVA	0.001*
Chloride	102.5 (9.6)	102.1 (10.4)	102.4 (9.8)	ANOVA	0.621
Magnesium	0.91 (0.4)	0.94 (0.3)	0.91 (0.4)	ANOVA	0.293
Total Calcium	1.9 (0.8)	1.9 (0.7)	1.9 (0.8)	ANOVA	0.860
Ionized calcium	1.14 (0.3)	1.1 (0.2)	1.1 (0.3)	ANOVA	0.492
Echocardiogram, n (%)	108 (4.6%)	60 (11.3%)	168 (5.8%)	ANOVA	
Ejection fraction, mean (SD)	61.1 (10.7)	53.1 (14.8)	58.2 (12.9)	ANOVA	0.001*
Electrocardiogram, n (%)	1577 (67.1%)	479 (89.9%)	2056 (71.3%)	X^2	0.001*
Not done	774 (49.1%)	54 (11.3%)	828 (40.3%)		
Normal	1220 (76.1%)	213 (44.5%)	1433 (69.7%)		
Arrhythmia and atrial fibrillation	86 (5.5%)	58 (12.1%)	144 (7.0%)		
Ischemia	39 (2.5%)	43 (9.0%)	82 (4.0%)		
Ventricular tachyarrythmias	5 (0.3%)	7 (1.5%)	12 (0.6%)		
Bundle branch blocks	8 (0.5%)	2 (0.4%)	10 (0.5%)		
Others	218 (13.8%)	158 (33.0%)	376 (18.3%)		

Note: p-value < 0.05 is statistically significant

Table 6. Radiologic and blood culture findings of hospitalized COVID-19 patients

Examination	Recovered	Died	Overall	Test	p-value
Chest x-ray findings, n (%)	*n = 2,296*	*n = 522*	*n = 2818*	X^2	0.001*
Severe (bilateral segmental consolidation)	76 (3.3%)	145 (27.8%)	221 (7.8%)		
Moderate (unilateral or bilateral ground glass opacities)	791 (34.5%)	281 (53.8%)	1072 (38.0%)		
Mild (transient areas of consolidation)	550 (24.0%)	74 (14.2%)	624 (22.1%)		
Normal	784 (34.1%)	12 (2.3%)	796 (28.2%)		
Others	95 (4.1%)	10 (1.9%)	105 (3.7%)		
Not Done	55 (2.3%)	11 (2.1%)	66 (2.3%)		
Chest CT scan findings, n (%)	*n = 503*	*n = 128*	*n = 631*	X^2	0.001*
Severe (bilateral segmental consolidation)	57 (11.3%)	53 (41.4%)	110 (17.4%)		
Moderate (unilateral or bilateral ground glass opacities)	279 (55.5%)	62 (48.4%)	341 (54.0%)		
Mild (transient areas of consolidation)	80 (15.95%)	7 (5.5%)	87 (13.8%)		
Normal	63 (12.5%)	0 (0%)	63 (10.0%)		
Others	24 (4.8%)	6 (4.7%)	30 (4.8%)		
Not done	1847 (78.6%)	405 (76.0%)	2252 (78.1)		
Blood culture, n (%)	*n = 561*	*n = 297*	*n = 858*	Fisher's exact	0.194
Staphyloccocus aureus	4 (0.71%)	2 (0.67%)	6 (0.70%)		
Pseudomonas aeruginosa	2 (0.36%)	0 (0%)	2 (0.23%)		
Streptococcus pneumoniae	2 (0.36%)	2 (0.67%)	4 (0.47%)		
Klebsiella pneumoniae	3 (0.53%)	2 (0.67%)	5 (0.58%)		
Coagulase-negative staphylococcus (CoNS)	8 (1.43%)	8 (2.69%)	16 (1.86%)		
Acinetobacter baumannii	1 (0.18%)	2 (0.67%)	3 (0.35%)		
Burkholderia cepacia	2 (0.36%)	3 (1.01%)	5 (0.58%)		
Stenotrophomonas maltophilia	2 (0.36%)	1 (0.34%)	3 (0.35%)		
Candida sp.	1 (0.18%)	0 (0%)	1 (0.12%)		
Others	8 (1.43%)	4 (1.35%)	12 (1.40%)		
No growth	528 (94.12)	273 (91.92)	801 (93.36)		

Note: p-value < 0.05 is statistically significant

Table 7. Treatment practices among hospitalized COVID-19 patients

Treatment and management	Recovered (n = 2351)	Died (n = 533)	Overall (n = 2884)	Test	p-value
Antipyretics, n (%)	906 (42.0%)	350 (68.3%)	1256 (47.1%)	X^2	0.001*
Chloroquines, n (%)	712 (33.9%)	217 (43.5%)	929 (35.7%)	X^2	0.001*
Antivirals, n (%)	527 (25.0%)	170 (34.4%)	697 (36.5%)		
Oseltamivir	285 (51.5%)	70 (38.5%)	355 (48.3%)		
Lopinavir/ritonavir	223 (40.3%)	105 (57.7%)	328 (44.6%)	X^2	0.001*
Remdesivir	27 (4.9%)	4 (2.2%)	31 (4.2%)		
Favipavir	9 (1.6%)	0 (0%)	9 (1.2%)		
Other anti-viral drugs	9 (1.6%)	3 (1.6%)	12 (1.6%)		
Tocilizumab	108 (5.2%)	79 (16.3%)	187 (7.3%)	X^2	0.001*
Albumin infusion, n (%)	33 (1.6%)	53 (11%)	86 (3.4%)	X^2	0.001*
Antibiotics, n (%)	1666 (74.7%)	515 (96.6%)	2181 (78.9%)	X^2	0.001*
No antibiotics	711 (30.2%)	24 (4.6%)	735 (25.5%)		
1 or 2 antibiotics	1309 (55.5%)	313 (59.5%)	1622 (56.2%)	X^2	0.001*
3 or more antibiotics	338 (14.3%)	189 (35.9%)	527 (18.3%)		
Anticoagulants, n (%)	288 (13.9%)	205 (41.2%)	493 (19.2%)	X^2	0.001*
Corticosteroids, n (%)	175 (8.5%)	143 (29.1%)	318 (12.4%)	X^2	0.001*
Nutritional supplementation, n (%)	218 (10.5%)	66 (13.7%)	284 (11.1%)		
Enteral nutrition formulas	43 (2.1%)	27 (5.5%)	70 (2.7%)	X^2	0.004*
Parenteral nutrition formulas	13 (0.6%)	3 (0.6%)	16 (0.6%)		
Micronutrient supplementation, n (%)	1801 (78.5)	295 (56.6%)	2096 (74.5%)		
Vitamin C	1319 (55.9%)	222 (42.2%)	1541 (53.43%)		
Multivitamins	270 (11.5%)	37 (7.0%)	307 (10.6%)	X^2	0.001*
Zinc	143 (6.1%%)	28 (5.3%)	171 (5.9%)		
Others	91 (7.9%)	20 (3.8%)	111 (3.9%)		
Oxygen therapy/Ventilatory support, n (%)	630 (26.7%)	498 (94.7%)	1128 (39.1%)		
Highest FiO2 requirement (mmHg), median (IQR)	36.0 (28.5-60)	100 (80-100)	60 (32-100)	Kruskal-Wallis	0.001*
Supplemental oxygen given	623 (36.4%)	505 (95.8%)	1128 (39.4%)	X^2	0.001*
Nasal cannula	404 (60.8%)	85 (13.8%)	489 (38.2%)	X^2	0.001*
Face mask	155 (23.3%)	119 (19.4%)	274 (21.4%)	X^2	0.001*
Non-invasive ventilation	38 (5.7%)	37 (6.0%)	75 (5.9%)	X^2	0.002*
Tracheal intubation	66 (9.9%)	371 (60.4%)	437 (34.2%)	X^2	0.001*
ECMO	2 (0.3%)	2 (0.3%)	4 (0.3%)	Fisher's exact	0.461
Prone positioning, n (%)	302 (19.1%)	103 (26.5%)	405 (20.6%)	X^2	0.001*
Hemoperfusion, n (%)	42 (1.8%)	59 (11.1%)	101 (3.5%)	X^2	0.001*
Convalescent plasma therapy, n (%)	14 (0.6%)	12 (2.3%)	26 (0.9%)	X^2	0.001*
Renal replacement therapy for AKI, n (%)	24 (1.9%)	84 (24.3%)	108 (6.8%)	X^2	0.001*
Blood transfusion, n (%)	97 (4.1%)	90 (16.9%)	187 (6.5%)	X^2	0.001*
Packed red blood cells	88 (9.5%)	83 (31.0%)	171 (14.3%)	X^2	0.001*
Platelets	5 (1.1%)	6 (2.5%)	11 (1.0%)	X^2	0.006*
Fresh frozen plasma/cryoprecipitate	4 (0.5%)	9 (3.8%)	13 (1.2%)	Fisher's exact	0.001*

Note: Chi square test (X^2) and p-value < 0.05 is statistically significant

Table 8. Outcomes of hospitalized COVID-19 patients.

Outcome measures	Recovered n = 2351	Died n = 533	Overall n = 2884	Test	p-value
ICU admission, n (%)	141 (6.0%)	245 (46.0%)	386 (13.4%)	X^2	0.001*
Mechanical ventilation, n (%)	66 (2.8%)	371 (69.6%)	437 (5.2%)	X^2	0.001*
Length of ICU stay (days)				Kruskal-Wallis	0.001*
Median (IQR)	14.0 (7-19.5)	6.0 (3-12)	9.0 (4.5-15.5)		
Range	0.2-93	0.1-53	0.1-93		
Length of hospital stay (days)				Kruskal-Wallis	0.001*
Median (IQR)	13.0 (8.0-20.0)	6.0 (3.0-13)	12.0 (7-19)		
Range	0.08-93	0.04-75	0.04-93		
Presence of organ failure, n (%)					
Multiorgan failure (2 or more)	58 (2.5%)	396 (74.3%)	454 (15.7%)	X^2	0.001*
Pulmonary	118 (5.0%)	477 (89.5%)	595 (20.6%)	X^2	0.001*
Renal	74 (3.1%)	235 (44.1%)	309 (10.7%)	X^2	0.001*
Cardiovascular	30 (1.3%)	198 (37.1%)	228 (7.9%)	X^2	0.001*
Hepatic	11 (0.5%)	29 (5.4%)	40 (1.4%)	X^2	0.055
Gastrointestinal	7 (0.3%)	30 (5.6%)	37 (1.3%)	X^2	0.003*
Encephalopathy	4 (0.2%)	78 (14.6%)	82 (2.8%)	X^2	0.001*
Others	10 (0.4%)	6 (1.1%)	16 (0.6%)	X^2	0.112

Note: p-value < 0.05 is statistically significant

Table 9. Univariate analysis of factors associated with increased mortality among COVID-19 patients

Factors	OR	95% CI	p-value
Age > 60 years	5.31	4.34–6.49	0.001*
Sex (male)	1.33	1.10–1.60	0.004*
Current smoker	1.08	0.79–1.47	0.633
Co-morbidities			
Hypertension	2.83	2.32–3.45	0.001*
Diabetes mellitus	2.95	2.42–3.58	0.001*
Chronic renal disease	3.97	3.05–5.16	0.001*
Known ischemic heart disease	2.52	1.85–3.43	0.001*
Previous stroke or chronic neurological or neuromuscular disease	3.32	2.23-4.95	0.001*
Malignancy	6.35	4.18–9.65	0.001*
Chronic obstructive pulmonary disease	4.52	2.81–7.27	0.001*
Active tuberculosis	2.13	1.31–3.47	0.002*
Chronic liver disease or chronic hepatitis	3.89	1.84–8.23	0.001*
Immunodeficient state	5.96	2.06–17.24	0.001*
Vaccinations			
Influenza vaccine given in the past or current year	0.44	0.21–0.94	0.029*
BCG vaccination	0.33	0.20–0.54	0.001*
Vital signs on admission			
Temperature ≥ 37.8°C	3.10	2.50–4.00	0.001*
Heart rate > 90 beats/minute	3.40	2.79–4.15	0.001*
Heart rate < 60 beats/minute	1.34	0.49–3.64	0.569
Respiratory rate ≥ 22/minute	7.62	6.17–9.40	0.001*
Low blood pressure (SBP < 90, DBP < 60 mmHg)	7.05	3.78–13.16	0.001*
Symptoms			
Cough	1.83	1.44–2.32	0.001*
Fever (self-reported)	1.56	1.25–1.95	0.001*
Difficulty breathing	5.58	4.39–7.10	0.001*
Shortness of breath	2.67	2.10–3.40	0.001*
Sore throat	0.31	0.21–0.46	0.001*
Sputum production	2.12	1.64–2.75	0.001*
Fatigue	2.04	1.52–2.74	0.001*
Myalgia or arthralgia	1.07	0.76–1.52	0.703
Nasal congestion or colds	0.51	0.33–0.79	0.002*
Diarrhea	0.88	0.61–1.27	0.503
Chills	1.32	0.87–2.01	0.190

Table 9 (cont'd). Univariate analysis of factors associated with increased mortality among COVID-19 patients

Factors	OR	95% CI	p-value
Symptoms			
Headache	0.62	0.35–1.13	0.117
Anorexia	3.32	2.12–5.22	0.001*
Loss of taste	1.08	0.59–1.95	0.810
Nausea and vomiting	1.34	0.77–2.33	0.302
Loss of smell	0.15	0.04–0.59	0.002*
Chest pain	1.19	0.56–2.50	0.652
Stroke symptoms	3.00	1.35–6.64	0.005*
Exposure characteristics			
Uncertain exposure history	2.39	1.98–2.89	0.001*
Residence in area with reported local transmission	1.47	1.18–1.83	0.004*
Contact as a HCW handling COVID-19 cases	0.52	0.02–0.12	0.001*
Contact with a confirmed case	0.28	0.19–0.40	0.001*
Contact with a suspect or probable case	0.62	0.41–0.94	0.022*
History of travel outside the Philippines	0.49	0.27–0.88	0.014*
Complete blood count			
WBC count < 4.0 x 10^9/L	0.70	0.46–1.05	0.083
WBC count > 10 x 10^9/L	2.83	2.32–3.45	0.001*
Absolute neutrophil count > 8000	4.84	3.92–5.97	0.001*
Absolute lymphocyte count < 900	5.44	4.37–6.77	0.001*
Arterial blood gas			
O_2 saturation < 95%	2.55	2.10–3.20	0.001*
PF ratio < 200	5.50	4.30–7.10	0.001*
Creatinine > 133 µmol/L	6.00	4.80–7.70	0.001*
INR > 1.2	4.26	3.02–6.00	0.001*
LDH > 250 U/L	6.15	4.13–9.14	0.001*
CRP > 3.0 mg/L	2.82	2.19–3.63	0.001*
Ferritin > 248 ng/mL (male), > 150 ng/mL (female)	4.15	2.76–6.25	0.001*
D-dimer > 0.5 mg/L	6.69	2.67–16.74	0.001*
Creatinine kinase >200 U/L	0.51	0.13–1.94	0.314
Albumin < 30 g/L	3.72	2.63–5.26	0.001*
Procalcitonin ≥ 0.5 ng/mL)	6.17	4.56–8.34	0.001*
HbA1c > 7%	1.48	1.01–2.15	0.042*
Chest x-ray findings			
Severe (bilateral segmental consolidation)	124.60	66.10–235.0	0.001*
Moderate (unilateral or bilateral ground glass opacities)	23.20	12.90–41.70	0.001*
Mild (transient areas of consolidation)	8.80	4.70–16.30	0.001*
Normal	Reference		
Chest CT scan findings			
Severe (bilateral segmental consolidation)	10.60	4.50–25.10	0.001*
Moderate (unilateral or bilateral ground glass opacities)	2.50	1.10–5.80	0.022*
Mild (transient areas of consolidation)	Reference		
Presence of organ failure			
Multiorgan failure (2 or more)	111.49	80.56–154.32	0.001*
Pulmonary	159.00	114.17–222.33	0.001*
Renal	23.62	17.69–31.52	0.001*
Cardiovascular	46.84	31.37–69.95	0.001*
Hepatic	12.20	6.10–24.70	0.001*
Gastrointestinal	20.31	8.87–46.51	0.001*
Encephalopathy	102.46	37.32–281.28	0.001*

Note: p-value < 0.05 is statistically significant

Table 10. Multiple logistic regression analysis among 339 COVID-19 patients of factors associated with mortality.

Factors	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Age > 60	5.31 (4.34–6.49)	0.001	3.39 (1.20–9.64)	0.022
Male sex	1.33 (1.10–1.60)	0.004	1.08 (0.35–3.36)	0.894
Diabetes mellitus	2.95 (2.42–3.58)	0.001	2.90 (0.94–8.94)	0.064
Hypertension	2.83 (2.32–3.45)	0.001	3.26 (1.09–9.75)	0.034
Known ischemic or coronary artery disease	2.52 (1.85–3.43)	0.001	0.79 (0.15–4.21)	0.787
Influenza vaccination	0.44 (0.21-0.94)	0.029	1.55 (0.36–6.62)	0.554
Exposure as HCW handling COVID-19 cases	0.52 (0.02-0.12)	0.001	1.29 (0.19–8.78)	0.794
Cough	1.83 (1.44–2.32)	0.001	1.38 (0.412–4.60)	0.604
Sputum production	2.12 (1.64–2.75)	0.001	0.77 (0.208–2.88)	0.702
Fatigue	2.04 (1.52–2.74)	0.001	2.67 (0.75–9.55)	0.130
Temperature > 37.8 °C	3.10 (2.50-4.00)	0.001	1.60 (0.38–6.66)	0.522
HR > 90 bpm	3.40 (2.79-4.15)	0.001	1.63 (0.58–4.62)	0.356
Respiratory rate > 22/minute	7.62 (6.17–9.40)	0.001	3.41 (1.16–10.02)	0.026
CBC WBC > 10 x 10^9/L	2.83 (2.32–3.45)	0.001	5.94 (1.87–18.85)	0.002
LDH > 250 U/L	6.15 (4.13–9.14)	0.001	8.74 (1.98–38.50)	0.004

Note: p-value < 0.05 is statistically significant

Appendix

List of co-investigators per hospital site

Adventist Medical Center Manila: Drs. Melgar Matulac, Patricia Eugenia Delgado, Maria Theresa Kristina Ludovice; **Amai Pakpak Medical Center**: Drs. Hanna Fatima Daud, Jamilah Saga Amerol, Monasir Bantuas Jr, Haina Luma, Samsia Dimapinto, Intanjamerah Berua, Salmah Macabangkit, Hanna Manua, Abdullah Marohomsalic; **Amang Rodriguez Memorial Medical Center:** Drs. Bianca Marie Q. Agustin, Marpe Z. Viray; **Angeles Univerity Foundation Medical Center:** Dr. Jan Axel L Yusi; **Asian Hospital and Medical Center**: Drs Denise Bernadette T. Rivero, Kriselle Felicia L. Lumunsad, Jaime Alfonso M. Aherrera, Ethel D Añonuevo; **Baguio General Hospital and Medical Center**: Drs. Terrence Edward C. Lee, Kerubine Kis-ing, Marie Ellaine Velasquez; **Bataan General Hospital and Medical Center**: Drs. Monica B. Alagon, Bryan Christian Ilagan; **Batangas Medical Center**: Dr. Dan Joseph De Villa Olpindo; **Bicol Medical Center** ; Drs. Jose Manuel T. Rañola III, Gamaliel G. 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Appendix
Data Collection Form

Research Committee

The Philippine Coronavirus Disease 2019 (COVID-19) Profile Study
Clinical Profile and Factors Associated with Mortality of Hospitalized Patients
DATA COLLECTION FORM

STUDY INCLUSION

1. Only data for patients seen from January 30 to July 15, 2020 who required HOSPITAL ADMISSION should be encoded. This includes:
   A. Patients admitted at the ward or ICU.
   B. Patients managed only at the ER with intent for admission to the ward or ICU.
2. Patients discharged as home quarantine cases or transferred directly to quarantine facilities (i.e. not requiring hospital-based management) should NOT be encoded.

INSTRUCTIONS ON FILLING UP THE DATA COLLECTION FORM (DCF)

1. Answer all the items in the form. If not applicable write "**N/A.**" For labs that were not done leave the corresponding fields **BLANK**.
2. For items with CIRCLES only ONE ANSWER should be chosen.
3. For items with BOXES multiple answers that are applicable should be selected.
4. Enter laboratory values with the indicated unit of measure (e.g. mg/dL). If your lab result is stated in another unit kindly convert it to the specified unit of measure.
5. Please review the form for missing data, mismatched data (e.g. patient's age does not coincide with date of birth) and typographical errors prior to submission.

INSTRUCTIONS ON SUBMITTING THE DCF

1. The data collection form should only be submitted if the patient has a final disposition (e.g. recovered, died, transfer to another hospital, etc.).
2. To submit a DCF take a photo or scan it and email to covid19pcprescomm@gmail.com.
3. In the SUBJECT field of the email indicate your institution to facilitate sorting of the submissions.
4. It is NO longer necessary to encode the DCFs in the Google Forms portal.

INSTRUCTIONS ON RESOLVING QUERIES

1. Co-investigators are encouraged to join the study's **VIBER GROUP** for faster communication and resolution of queries. Send an email with your name, institution represented and phone number for inclusion into the group.
2. Alternatively, you may communicate through email at covid19pcprescomm@gmail.com.
3. Every institution is assigned to one of two research assistants (RA). If you have questions or comments please communicate with the assigned RA.
4. The assignments of our research assistants are as follows:
   A. **Maria Feliza Aquino** (0915-316-2067) – National Capital Region, Calabarzon and Mimaropa (Region IV), Bicol region (Region V), Zamboanga Peninsula (Region IX), Northern Mindanao (Region X), Davao region (Region XI), ARMM
   B. **Jenna Gonzalez** (0917-146-6832): Central Luzon (Region III), Western Visayas (Region VI), Central Visayas (Region VII), Eastern Visayas (Region VIII)

DO NOT SUBMIT THIS INSTRUCTION SHEET

The Data Collection Form to be submitted (photo or scan) starts on the next page

Page | 1

The Philippine Coronavirus Disease 2019 (COVID-19) Profile Study

Clinical Profile and Factors Associated with Mortality of Hospitalized Patients

DATA COLLECTION FORM

Name of PCP Accredited Training Institution (ATI):	
If not a PCP ATI, indicate name of hospital:	
Region where hospital is located: ❍ National Capital Region (NCR) ❍ Region I (Ilocos Region) ❍ Cordillera Administrative Region (CAR) ❍ Region II (Cagayan Valley) ❍ Region III (Central Luzon) ❍ Calabarzon (Region IV-A / Southern Tagalog Mainland) ❍ Mimaropa (Southwestern Tagalog Region) ❍ Bicol Region (Region V)	❍ Western Visayas (Region VI) ❍ Central Visayas (Region VII) ❍ Eastern Visayas (Region VIII) ❍ Zamboanga Peninsula (Region IX) ❍ Northern Mindanao (Region X) ❍ Davao Region (Region XI) ❍ SOCCSKSARGEN (Region XII) ❍ Caraga Region (Region XIII) ❍ Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)
Hospital level: ❍ Level 1 ❍ Level 2 ❍ Level 3	
Date of admission (mm/dd/yyyy):	Date of final disposition (e.g. discharge, demise, transfer, DAMA, absconded) (mm/dd/yyyy):
Patient Number: _____ *Start at "1" for the first patient encoded, "2" for the second one, then sequentially thereafter. Every patient encoded must have a UNIQUE patient number.*	

DEMOGRAPHIC AND CLINICAL PROFILE		
Age:	Date of Birth (mm/dd/yyyy):	
Place of residence (town and/or city only):		
Sex: ❍ Male ❍ Female	Nationality: ❍ Filipino ❍ Other (specify):	
Weight (kg):	Height (cm):	Occupation: _____ ❍ Unemployed
Smoking history: ❍ Current smoker ❍ Non-smoker/Previous smoker		

Co-morbid illnesses or pre-existing condition

- ❒ Diabetes mellitus
- ❒ Hypertension
- ❒ Known ischemic or coronary artery disease
- ❒ Previous stroke or cerebrovascular disease
- ❒ Chronic renal disease
- ❒ Chronic liver disease or chronic hepatitis
- ❒ Any malignancy, specify: _____
- ❒ Hematologic disease, specify: _____
- ❒ Chronic obstructive pulmonary disease (COPD)
- ❒ Bronchial asthma
- ❒ Tuberculosis (untreated, currently being treated or with any history of TB treatment)
- ❒ Immunodeficiency disease (e.g. HIV), specify: _____
- ❒ Immunodeficient state (e.g. intake of corticosteroids or immunosuppressive drugs)
- ❒ Pregnancy

❒ Others (specify): _____

_____

Vaccinations

Influenza vaccination in the past or current year? ❍ Yes ❍ No ❍ Unknown

With BCG vaccination? ❍ Yes ❍ No ❍ Unknown

EXPOSURE HISTORY AND PRE-ADMISSION CASE DEFINITION

Exposure history

❒ Contact as health care worker handling suspect, probable or confirmed cases
❒ Contact with confirmed case
❒ Contact with suspect or probable case
❒ History of travel to an area of reported local transmission (specify): _____
❒ Residence in an area of reported local transmission
❒ History of travel outside the Philippines (specify country): _____
❒ No history of travel but with contact with a traveler from an area of reported local transmission (specify area(s) or country/countries visited by traveler): _____
❒ Uncertain exposure history (does not fulfill ANY of the criteria above)

Pre-admission case definition

❍ SUSPECT case (previously PUI – mild, severe and critical who has not been tested and for testing)
❍ PROBABLE case (previously PUI – mild, severe and critical with inconclusive, inadequate or no available testing)
❍ CONFIRMED case (previously COVID-19 positive)

TEST USED TO DIAGNOSE COVID-19

Was an antibody test done prior to PCR testing?

❍ No
❍ Yes
Brand of antibody test kit: _____
Results: ❒ IgM positive
❒ IgG positive
❍ IgM and IgG negative

PCR testing

Laboratory where PCR test was done: _____

INITIAL PRESENTATION

Vital signs on consultation

Temperature (°C): _____ Heart rate (beats/min): _____
Systolic blood pressure (mmHg): _____ Respiratory rate (breaths/min): _____
Diastolic blood pressure (mmHg): _____

Did the patient have altered mentation upon initial assessment? ❍ Yes ❍ No

Symptoms prior to admission

❒ Cough ❒ Sore throat ❒ Chills
❒ Sputum production ❒ Myalgia or arthralgia ❒ Headache
❒ Shortness of breath ❒ Fatigue ❒ Loss of smell
❒ Nasal congestion or colds ❒ Nausea and vomiting ❒ Loss of taste
❒ Difficulty of breathing ❒ Diarrhea
❒ Others (specify): _____

Intake of medications prior to admission

- ❒ Antivirals (specify): ❍ rimantadine ❍ amantadine ❍ zanamivir ❍ oseltamivir
- ❒ Antibiotics
- ❒ Antipyretics
- ❒ NSAIDs
- ❒ Others (specify): _____

LABORATORY EXAMINATIONS (If not done write "N/A")

Complete blood count (CBC)

Hemoglobin (g/L): _____ Hematocrit (%): _____ WBC (x10^9/L): _____ Platelet (x10^9/L): _____

Arterial blood gas (ABG)

pH: _____ $paCO_2$ (mmHg): _____ paO_2 (mmHg): _____ HCO_3 (mEq/L): _____ O_2 (%): _____

Creatinine (mg/dL)	CRP (mg/dL):	Sodium (mEq/L):
ALT/SGPT (U/L):	Ferritin (ng/mL):	Potassium (mEq/L):
AST/SGOT (U/L):	D-dimer (ng/mL):	Chloride (mEq/L):
Prothrombin time (sec):	Creatinine kinase (U/L):	Magnesium (mEq/L):
PT reference range (sec):	Troponin (ng/mL):	Calcium (mEq/L):
PT Control value (sec):	2D echo ejection fraction (%):	Influenza A/B:
INR:	Albumin (g/L):	
LDH (U/L):	Procalcitonin (ng/mL):	

Chest x-ray

- ❍ Not done
- ❍ Mild (transient areas of consolidation)
- ❍ Moderate (unilateral/bilateral ground glass opacities)
- ❍ Severe (bilateral segmental consolidation)
- ❍ Others (specify): _____

Chest CT scan

- ❍ Not done
- ❍ Mild (transient areas of consolidation)
- ❍ Moderate (unilateral/bilateral ground glass opacities)
- ❍ Severe (bilateral segmental consolidation)
- ❍ Others (specify): _____

12-lead ECG

- ❍ Not done
- ❍ Normal
- ❍ Atrial fibrillation
- ❍ Ventricular tachyarrhythmias
- ❍ Others (specify): _____

Blood culture

- ❍ Not done
- ❒ *Pseudomonas aeruginosa*
- ❒ *Streptococcus pneumoniae*
- ❒ Methicillin-sensitive *Staphylococcus aureus*
- ❒ Methicillin-resistant *Staphylococcus aureus*
- ❒ Others (specify): _____

Sputum, endotracheal aspirate or bronchoalveolar GS/CS

- ❍ Not done
- ❒ *Pseudomonas aeruginosa*
- ❒ *Streptococcus pneumoniae*
- ❒ Methicillin-sensitive *Staphylococcus aureus*
- ❒ Methicillin-resistant *Staphylococcus aureus*
- ❒ Others (specify): _____

TREATMENT PRACTICES (Use GENERIC NAMES for medications, indicating the specific BRAND used is optional)

Medications given during admission

- ❒ Antipyretics (specify): _____
- ❒ Chloroquines
  - ❍ Chloroquine 500 mg/tab 1 tab BID
  - ❍ Hydroxchloroquine 200 mg/tab 2 tabs BID (D1) then 1 tab BID
  - ❍ Hydroxchloroquine 200 mg/tab 3 tabs daily
  - ❍ Others: _____
- ❒ Antivirals
  - ❒ Remdesivir 200 mg IV loading dose (D1) then 100 mg IV OD
  - ❒ Lopinavir/Ritonavir 200 mg/50 mg tab 2 tabs BID
  - ❒ Oseltamivir 75 mg/tab BID
  - ❒ Others: _____
- ❒ Immunosuppressive agents
  - ❍ Tocilizumab 400 mg IV given as 2-hour infusion
  - ❍ Tocilizumab 400 mg IV given as 2-hour infusion with single extra dose after 12 hours
  - ❍ Others: _____
- ❒ Antibiotics (specify regimen): _____
- ❒ Anticoagulants (specify): _____
- ❒ Corticosteroids (specify): _____
- ❒ Nutritional supplements (specify): _____
- ❒ Vitamins (specify): _____
- ❒ Others (specify): _____

Oxygen therapy / ventilatory support

- ❍ No supplemental oxygen given
- ❍ Supplemental oxygen given

  Highest FiO_2 requirement: _____

  Method of O_2 delivery:
  - ❒ Nasal cannula
  - ❒ Face mask

❒ Non-invasive ventilation
❒ Tracheal intubation
❒ Extracorporeal membrane oxygenation (ECMO)

Other interventions
❒ Prone ventilation
❒ Blood transfusion
❒ Convalescent plasma therapy
❒ Others: _____
❒ Hemoperfusion
❒ Renal replacement therapy for acute kidney injury

OUTCOMES OF ADMITTED CONFIRMED COVID-19 PATIENTS

Location and length of stay
❒ Emergency room
Length of stay (hours or days): _____
❒ Ward
Length of stay (hours or days): _____
❒ Intensive care unit
Length of stay (total number of hours or days, including readmission): _____

Final outcome
❍ Recovered
❍ Died
❍ Transferred to another hospital
Name of receiving hospital: _____
Region where receiving hospital is located: _____
❍ Transferred to a quarantine facility
What is the patient's final outcome at the quarantine facility?
❍ Recovered
❍ Died
❍ Transferred to a hospital for admission
❍ Unknown
❍ Discharge against medical advice (DAMA)
❍ Absconded

Presence of organ system failure
❒ Pulmonary
❒ Cardiovascular
❒ Renal
❒ Hepatic
❒ Others (specify): _____
❒ Gastrointestinal
❒ Encephalopathy
❒ Sepsis

Cause of death
❍ Acute respiratory distress syndrome (ARDS)
❍ Acute coronary syndrome (ACS)
❍ Ventricular tachyarrhythmia
❍ Septic shock
❍ Cardiogenic shock from viral myocarditis
❍ Others (specify): _____
_____