

HOSPITALIZATION LENGTH AND PROGNOSTIC VARIABLES AMONG COVID-19 PATIENTS

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ABSTRACT

Objective: Aim of current study was to determine the duration of hospital stay and risk factors among patients of Covid-19.

Study Design: Retrospective data

Place and Duration: Tertiary Care Hospital of Punjab Pakistan

Methods: Total 89 patients of both genders with age 24-80 years were included in this study. We obtained written consent for detailed demographics included age, sex and BMI. RT-PCR was used to diagnose coronavirus disease. 5mL blood sample of all the patients were taken for laboratory findings. Patients were both symptomatic and asymptomatic. Frequency of risk factors and clinical outcomes among enrolled cases were recorded. SPSS 20.0 was used to analyze all data.

Results: Among 89 included cases, 53 (59.6%) were males and 36 (40.4%) cases were females. Mean age of the patients was 44.8 ± 12.52 years and had mean BMI 26.7 ± 10.67 kg/m². We found that 42 (47.2%) patients were symptomatic and 47 (52.8%) cases were asymptomatic. Hypocalcemia, hypochloremia, and bilateral pneumonia were the risk factors associated with hospitalization. Hypertension found in 32 (35.95%), diabetes mellitus found in 23 (25.8%) cases and kidney disease found in 14 (15.7%) cases. Mean creatinine of patients was 7.6 ± 2.11 mg/dl, mean albumin was 1.20 ± 1.17 g/dl and CRP was 298 ± 1.17 mg/L. 46 (51.7%) patients had hospital stay >15 days and 43 (48.3%) had hospital stay <15 days. Among 46 cases of prolong hospital stay 30 cases were aged >45 years and had severe coronavirus disease.

Conclusion: Early planning and enhancing the development of multi-level medical facilities are strongly encouraged to deal with COVID-19 epidemics in older, more vulnerable patients in need of basic medical resources.

Keywords: Infectious Disease, Hospital stay, Risk Factors, Symptomatic

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INTRODUCTION

The worldwide spread of coronavirus illness 2019 (COVID-19) has resulted in human casualties and placed a strain on healthcare systems. As COVID-19 continues to spread over the globe, it is posing a significant threat to healthcare systems everywhere^{1,2}. Of most European nations with well-established and well-equipped hospital systems, an epidemic spike in COVID-19 cases requesting admission led to an overload of healthcare services. There is growing concern about the potential impact on healthcare systems in low- and medium-income countries due to this development³. Input for plan and preemptive

preparedness is data on the demand for hospital beds, the availability of staff, and the need for medical supplies³.

Numerous reports have documented COVID-19's epidemiology, clinical characteristics, molecular and biological processes, preventative and control treatment, and more⁴. Researchers and policymakers have benefited from these descriptive investigations because they shed light on SAR-incubation CoV-2's time and its potential to mutate⁵. As the COVID-19 pandemic has expanded over the world, a growing number of regions have expressed worry that it is placing an excessive strain on healthcare systems. Insight of COVID-19 patients' hospital stay

duration and associated risk variables may help with resource allocation by allowing for more forethought into resource use. Eleanor M. Rees et al. conducted a thorough review and advocated using LoS to model the room demand of emergency plans in order to forecast the need for healthcare resources⁶. There is a growing body of literature exploring the variables that influence length of stay (LoS) in hospitals; a subset of this literature has suggested that illness severity, medication, comorbidities, and other factors may impact LoS for COVID-19 patients⁷. While several risk factors for LoS have been identified, most of them have been clinical predictors, leaving the impact of social determinants largely unexamined.

In order to predict the need for healthcare services, it is necessary to make educated guesses about the number of people who will be admitted to hospitals and the average length of stay for each. There are a variety of clinical manifestations of coronavirus. Patients may be admitted to a variety of different hospital wards, high dependency units, and critical care units throughout their hospital stay⁸.

Infected individuals admitted to the hospital with COVID-19 have different average lengths of stay at the medical facility from country to country. One meta-analysis of 52 studies found that in-country hospital stays averaged 14 days, whereas those outside of China averaged just 5⁹. Age, severity of sickness, patient-to-medical-staff ratio, clinic size, and successful treatment all have a role in how long patients typically stay in the hospital. There may be regional and/or national variations in duration of stay owing to COVID-19 care criteria¹⁰.

In addition, because there was no drug with proven therapeutic benefits, symptomatic therapy was the primary method of care for COVID-19 patients while they were hospitalised. Consequently, COVID-19 patients' recovery times are likely linked to their levels of immunity^{11,12}. Time spent in the hospital for COVID-19 patients of varying severity has been recorded in many studies.

The goal of this research was to better understand the risk factors related with prolonged hospitalisation in patients with COVID-19 by analysing their clinical features and laboratory and radiographic findings while they were hospitalised.

MATERIAL AND METHODS

This retrospective study was conducted at Tertiary Care Hospital of Punjab Pakistan and comprised of 89 patients with positive coronavirus disease. Patients <24 years of age and those did not provide any written consent were excluded.

We obtained written consent for detailed demographics included age, sex and BMI. Age of the patients was between 24-80 years. Patients were both symptomatic and asymptomatic. Comorbidities, length of time from symptom onset to hospitalization, and baseline vitals (respiratory rate, blood pressure, temperature, and pulse oximetry oxygen saturation) are all taken into

account (e.g diabetes, HTN, CKD). Radiology (chest computed tomography, abdominal ultrasound, and bone scan) and blood work (leukocyte count, white blood cell count, haemoglobin, platelet count, C-reactive protein, high sensitive troponin I, B-type natriuretic peptide, globin, creatine kinase project, albumin, aspartate transaminase, aspartate aminotransferase, urea, creatinine

Patients' hospitalization treatments (oxygen therapy, antibiotic agents, antiviral agents) and the severity of COVID-19 at the time of admission were also gathered. Diagnostic and treatment strategy for COVID-19" assigned grades of "general," "severe," and "critical" to COVID-19 cases. Non-pneumonia patients and those with moderate to severe pneumonia are included in the general type. Within 24 to 48 hours, the severe form was defined by (1) dyspnea (respiratory rate 30 beats per minute); (2) low blood oxygen saturation; (3) a low PaO₂/FiO₂ ratio; and/or (4) significant lung infiltrates (>50 percent) (satisfying at least one of the above items). Discharge was the primary outcome because it was the shortest time period, therefore deaths and transfers to other hospitals were excluded.

The analysis was performed in SPSS statistic 20.0. Inter - quartile range (IQR) were calculated for continuous variables, and the Mann-Whitney U test was used to compare the two sets of results. Frequency counts were used to represent categorical values, and the 2 or Fisher's considered test was used to determine statistical significance between the two sets of data. Univariable and multivariate logistic regression analyses were used to further investigate the health risks associated with prolonged hospitalization.

RESULTS

Among 89 included cases, 53 (59.6%) were males and 36 (40.4%) cases were females. Mean age of the patients was 44.8±12.52 years and had mean BMI 26.7±10.67 kg/m². We found that 42 (47.2%) patients were symptomatic and 47 (52.8%) cases were asymptomatic. Hypertension found in 32 (35.95%), diabetes mellitus found in 23 (25.8%) cases and kidney disease found in 14 (15.7%) cases.(Table-1)

Table-1: Covid-19 patients with baseline information

Variables	Frequency	Percentage
Gender		
Male	53	59.6
Female	36	40.4
Mean age (years)	44.8±12.52	
Mean BMI (kg/m ²)	26.7±10.67	
Type of Patients		
Symptomatic	42	47.2
Asymptomatic	47	52.8
Co-morbidities		
Hypertension	32	35.95
Diabetes Mellitus	23	25.8
Kidney disease	14	15.7

Mean creatinine of patients was 7.6 ± 2.11 mg/dl, mean albumin was 1.20 ± 1.17 g/dl, CRP was 298 ± 1.17 mg/L, mean IL-6 was 1350.7 ± 1.745 pg/mL, mean urate was 12.7 ± 4.8 mg/dL, mean lactate was 1.8 ± 1.6 mmol/L.(table-2)

Hypocalcemia, hypochloremia, and bilateral pneumonia were the risk factors associated with hospitalization.(Figure-1)

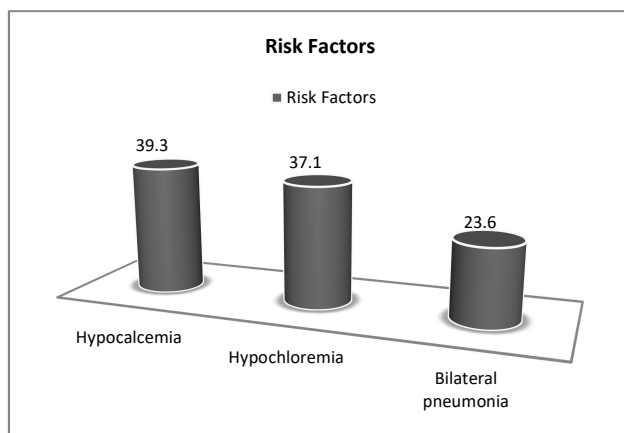


Figure-1: Frequency of risk factors among cases

Table-2: Laboratory results of all cases

Variables	Mean standard Deviation	Ods Ratio	95% CI
Lab Findings			
Creatinine mg/dl	7.6 ± 2.11	1.0	1.415-6.345
Albumin g/dl	1.20 ± 1.17	1.0	1.020-2.142
CRP mg/dl	298 ± 1.17	1.0	1.007-5.301
IL-6 pg/mL	1350.7 ± 1.745	1.0	1.200-1.203
Urate mg/dL	12.7 ± 4.8	1.0	1.117-0.146
Lactate mmol/L	1.8 ± 1.6	1.0	1.637-1.127

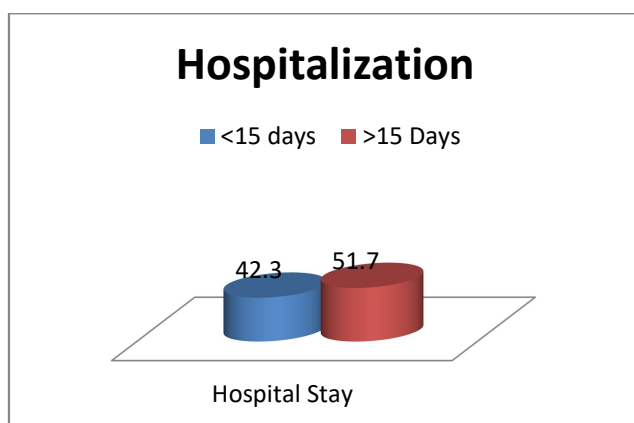


Figure-2: Frequency of prolong hospital stay among all cases

Among all cases, 46 (51.7%) patients had hospital stay >15 days and 43 (48.3%) had hospital stay <15 days.(figure-2)

Frequency of mortality was 22 (24.7%) and ICU admission was 30 (33.7%).(Table-3)

Table-3: Adverse events among enrolled cases

Variables	Frequency	Percentage
Adverse Events		
Mortality	22	24.7
ICU admission	30	33.7

DISCUSSION

New coronavirus infection has arisen as a severe public health event because of its rapid transmission, widespread effect, and considerable demand on medical resources. Preventative and control actions should be planned ahead of time, with consideration given to local demographic characteristics and the availability of healthcare services. Hospital Loss of Service (LoS) due to COVID-19 has been observed by multiple studies in China. According to a morpho of 52 studies,⁹ the median length of stay (LoS) in hospitals was 14 (IQR:10-19, vary: 4-53) days in China and Five (IQR:3-9, range: 4-21) times outside of China. Bordering Hubei, the populous and tourist-heavy Sichuan province has implemented control and prevention measures that may be useful elsewhere¹³.

In current study 89 patients were enrolled, 53 (59.6%) were males and 36 (40.4%) cases were females. Mean age of the patients was 44.8 ± 12.52 years and had mean BMI 26.7 ± 10.67 kg/m². Results were comparable to the previous studies^{14,15}. In our study fever and cough were the most common presented symptoms. Fever was the most common symptom reported in a recent analysis of 45 COVID-19 fatalities¹⁶. Acute respiratory distress syndrome was observed in a patient with COVID-19 by Chen et al¹⁷, and this illness was linked to the patient's elevated temperature. Wu et al. likewise observed that having a fever before to admission was linked to a longer LOS, but this time even in patients who were asymptomatic or only had minor symptoms. Patients with fever had a longer LOS, which may be explained by the fact that fever is linked to a more severe disease and worse prognosis. Patients with COVID-19 appeared with fever, cough, and discomfort, comparable to patients with H1N1, a highly contagious condition, but with less frequent hemoptysis¹⁸. The infections that colonise the nasal cavity, such as Staphylococcus, Streptococci, and Staphylococcus epidermidis, are usually linked with fever, as was demonstrated in a study of individuals with H1N1¹⁹.

In our study most of the patients were aged >45 years and hospital stay >15 days were among 51.7% cases. Hypocalcemia, hypochloremia, and bilateral pneumonia were the risk factors associated with hospitalization. Prior research²⁰ shown that older age and severe pneumonia were the most often reported risk variables connected to Hospital LoS. Longer hospital stays in Vietnam were linked to factors including age, place of residence, and

pollution sources, according to research by Pham and colleagues²¹.

With this finding in mind, it's possible that a larger viral load during a coronavirus infection in the human body would be reflected by a lower calcium concentration, leading to a longer duration of viral shedding. Therefore, patients with COVID-19 will be a key target of future studies. In addition, individuals with a more severe case of COVID-19 may spend more time in the hospital²², since longer hospitalisation times tend to follow patients with more serious conditions. On the one hand, a comprehensive analysis showed that severe COVID-19 patients had a significantly lower calcium concentration than non-severe patients²³, suggesting that hypocalcemia could be linked to increased COVID-19 severity. Patients with gastrointestinal symptoms were more likely to develop a severe/critical form of the disease compared to COVID-19 patient populations without gastrointestinal symptoms²⁴. Patients with the greater propensity to an electrolyte imbalance due to gastrointestinal symptoms were also more likely to develop a severe/critical form of the disease. Third, it has been reported that electrolyte concentrations like calcium and chloride are linked to lung function and the ability to defend against trying to invade pathogenic microorganisms in respiratory tuberculosis²⁵, implying that electrolyte imbalance may induce a delayed recovery from respiratory tuberculosis.

Predicting how many people will need hospitalisation and how long they'll stay there is an important part of demand forecasting for healthcare. Different phases of coronavirus infection manifest themselves in varying degrees of clinical severity. Patients may be admitted to a variety of different hospital units throughout their stay, including regular wards, high dependency sections with oxygen assistance, and critical care units where they may require intubation for mechanical ventilation. Frequency of mortality was 22 (24.7%) and ICU admission was 30 (33.7%) in current study.

CONCLUSION

Early planning and enhancing the development of multi-level medical facilities are strongly encouraged to deal with COVID-19 epidemics in older, more vulnerable patients in need of basic medical resources.

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