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Predictors of Mortality among Non Traumatic Non COVID Emergencies during Early COVID-19 Outbreak: An Observational Study on Clinical Profile and Outcome of Patients in North India

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Abstract

Context: Severe acute respiratory distress corona virus 2 (SARS COV 2) unleashed an unprecedented medical emergency and led to exemplary global containment response to limit the Corona Virus disease (COVID-19). These responses began in the initial phase of the pandemic itself and came at the cost of non-COVID hospital services.

Aims: The aim of this study was to highlight the profile of patients, their outcomes and predictors of mortality in non-traumatic emergencies presenting to the non-Covid section of a north Indian tertiary care center during the early phase of COVID outbreak.

Settings and Design: Single center observational study.

Methods: After obtaining Institute ethics committee approval, data of patients presenting in emergency from February 1, 2020 to April 30, 2020 were obtained retrospectively. Patients coming with trauma related emergencies were excluded.

Statistical analysis used: The data was categorized as survivors and non-survivors. Student t test/Mann Whitney test was used to compare continuous variables and Chi square test was used to compare categorical data. Univariate and multivariate binary logistic regression analysis were used to identify the predictors of non-survival.

Results: Out of 800 patients admitted in emergency, 2 were found to be SARS COV2 positive. Of the remaining 798 patients, 27 (3.4%) patients expired. On multivariate analysis, greater age, hemoptysis, oxygen or ventilatory requirement and need of vasopressors at admission were predictors of non-survival.

Conclusions: Greater age, need for oxygen, ventilator and vasopressors at time of admission are harbingers of mortality among non-Covid patients presenting in emergency.

Keywords: Non-Covid; Emergency; Predictors; Mortality.

Introduction

Corona Virus disease (Covid-19)emerged in China in December 2019 and rampantly stormed across the world to be declared a pandemic by World Health Organization in February 2020.[1] The first case in India was recorded on 30th January 2020 in the southern state of Kerala. The virus spreads through direct contact, fomites and droplets.[2] Slow but steady increase in the number of cases throughout the country was noted in February and March 2020.

In order to ensure undivided attention in establishing a healthcare system to fight against Corona virus and to prevent community spread due to crowd in hospitals all routine healthcare activities except for emergency services were curtailed in the early phase of spread of the disease. The outpatient department activities were put on hold (other than malignancy and end stage organ disease). Hospital admissions and elective surgeries were postponed to safeguard the manpower and resources. The essential emergency services however, remained functional. At many centers, a separate health facility was created within a span of 1-2 weeks to handle the confirmed and suspected cases of COVID-19.[3] The response to Corona virus outbreak in our state was swift with creation of dedicated Covid hospitals and a 3-tier system for managing patients with graded severity.[4] A section of our hospital was converted to manage Corona virus positive patients exclusively. All non-COVID emergency services were continued inmain building of the hospital.

Through this study, we intend to highlight the profile of patients, their outcomesand predictors of mortality in non-traumatic emergencies presenting to the non-Covid section of a north Indian tertiary care centre during the early phase of COVID outbreak.

Methodology

This observational study was conducted after obtaining Institute's Ethical Committee approval (IEC/2020-134-IP-EXP-20) at a tertiary care hospital in northern India during the first 3 months of COVID-19 outbreak (February 1, 2020 to April 30, 2020). STROBE guidelines were followed in formulating and conducting the study. All patients who came to the Emergency Medicine department (ED) were initially screened based on a specific history of symptoms that might suggest coronavirus infection.

Table 1: Screening Questionnaire given to patients

Questions at time of presentation	Yes	No
History of foreign travel in last 14 days.		
History of contact with a foreign traveller or their family member in last 14 days.		
Health care worker in triage/isolation/ICU of Covid hospital		
Contact with a known SARS Corona 19 virus positive patient		
History of fever		
History of dry cough		
History of breathlessness		
History of sore throat/nasal discharge		
History of diarrhoea/nausea/ vomiting,/ abdominal pain		
History of Body ache		
History of Haemoptysis		
History of chest pain		
Patient in altered mentation		
Whether patient is requiring oxygenation.		
Requirement of vasopressors present		
Whether patient is requiring ventilatory support		

Those who were suspected to have coronavirus infection were subjected to RT-PCR (Reverse Transcription- Polymerase Chain Reaction)testing and were isolated till the result was negative. Remaining patients, in whom, likelihood of infection based on screening; were managed in the ED ward. The protocol for screening and subsequent patient management has been outlined in Figure 1. Prospectively collected data of all the patients admitted in EDwasobtained from their case files and hospital information system (electronic medical record). The study excluded patients who presented with trauma related emergencies. Patients'age, gender, presenting complaints, diagnosis, comorbidities, emergency severity index (ESI), requirement of mechanical ventilation, vasopressor support, outcome and length of stay in ED were recorded and analyzed.

Statistical analysis

The data was categorized as: patients who were treated and discharged (survivors)and patients who succumbed (non-survivors). Normality of the variables was assessed. A variable was considered as normally distributed when Z score lied within ±3.29. Continuous variables were presented in mean ± standard deviation or median (range) while categorical data in frequency (%) as appropriate. Independent samples t test or Mann Whitney U test

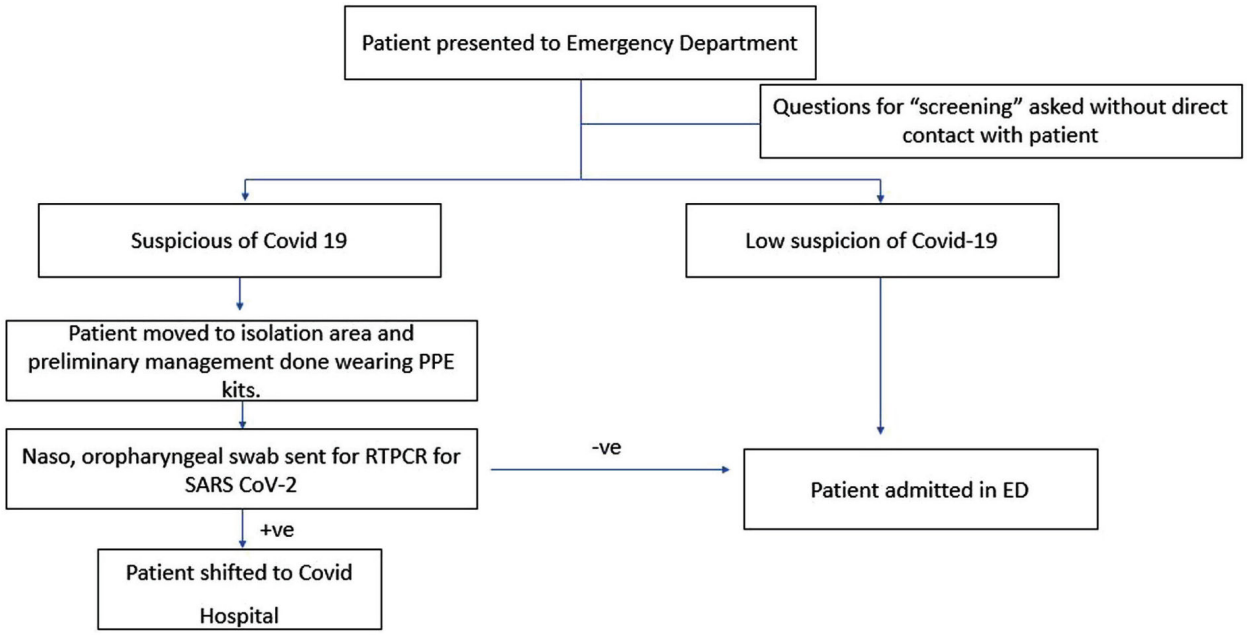

Fig. 1: PPE Personal protective equipment, RT PCR reverse transcriptase polymerase chain reaction, SARS CoV Severe acute respiratory syndrome corona virus 2, ED emergency department.

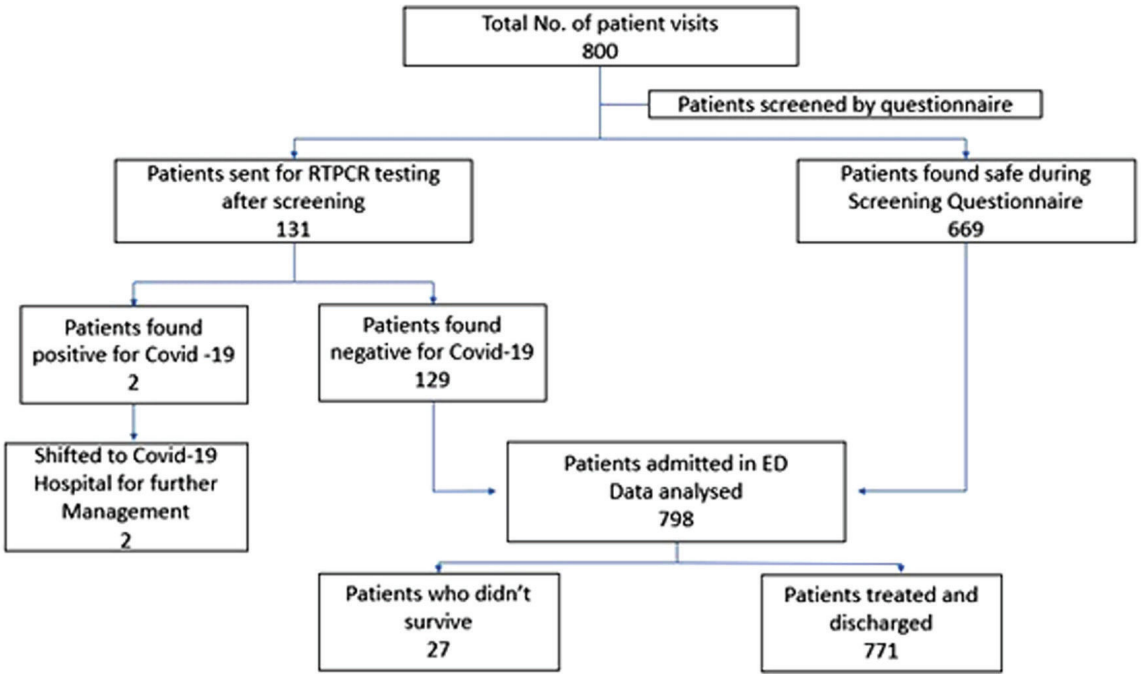

Fig. 2: RTPCR reverse transcriptase polymerase chain reactionn, Covid Corona virus disease 19, ED Emergency medicine.

was used to compare the means/medians between patient´s outcomes (non-survivor and survivor). Chi square test was used to test the association between patient´s outcomes and categorical variables. Univariate and multivariate binary logistic regression analysis wereused to identify the predictors of non-survival. All the significant variables found in univariate analysis were included in multivariate analysis to estimate predictors of mortality. P value <0.05 was considered statistically significant. Statistical package for social sciences version-23 (SPSS-23, IBM, Chicago, USA) was used for data analysis.

Results

During the study period, 800 patients were admitted with mean and median (range) age of

42 years and 44 (0-90) years respectively. Sixty eight percent (n=544) patients were males. As per screening criteria real-time RT-PCR for severe acute respiratory syndrome coronavirus 2 (SARS Cov2) was done in 131(16.37%) patients.Twopatients tested positive for the disease and were shifted to Covid section. (Figure2)They were not includedin the final analysis. Out of remaining 798 patients, 771 (96.6%) recovered and were discharged;while 27 (3.4%) patients died. Mean age among the non survivors was significantly higher (57.59±13.80 Vs. 41.64±18.55, p<0.001). Mortality was common among female patients, however, the difference did not reach statistical significance (40.7% vs 31.6%, p>0.05). Duration of stay, number of comorbidities, gastrointestinal (GI) symptoms, history of fever and sore throat were not different between the two groups. There were significantly higher proportions of symptoms like alteredmentum, body ache, breathlessness, dry cough, haemoptysis, oxygen or ventilatory requirements, indications for COVID testingand vasopressor support in non-survivor group as compared to survivors at admission.

Table 2: Distribution of Demographic and Clinical Variables between Survivor and Non-Survivor patients (N=798)

Variable´s	Non-Survivor (n=27)	Survivor (n=771)	P value
Age*	57.59±13.80	41.64±18.55	<0.001
Gender (Female)†	11(40.7)	244(31.6)	0.319
Duration of Stay (days)‡	3(1-10)	1 (1-21)	0.187
Alerted Mentum†	12(44.4)	51(6.6)	<0.001
Body Ache†	12(44.4)	39(5.1)	<0.001
Breathlessness†	11(40.7)	121(15.7)	0.002
Co-morbidities†	22(81.5)	572(74.2)	0.393
Dry Cough†	10(37)	83(10.8)	<0.001
ESI			
Emergent†	14(51.9)	119(15.4)	<0.00001
Urgent†	6(22.2)	144(18.7)	
Less Urgent†	7(25.9)	508(65.9)	
GI Symptoms†	8(29.6)	179(23.2)	0.439
Haemoptysis†	8(29.6)	21(2.7)	<0.001
History of Fever†	6(22.2)	116(15)	0.283
Other complain†	20(74.1)	285(37.2)	<0.001
Oxygen or VentilatorRequired†	15(55.6)	38(4.9)	<0.001
Sore throat†	3(6.8)	42(5.4)	0.893
Covid Test Done†	11(40.7)	118(15.3)	0.002
Vasopressors required†	14(51.9)	5(0.9)	<0.001

*Mean ± SD, compared by Independent samples t test, ‡ Median (Range) compared by Mann Whitney U t test. † Frequency (%), compared by Chi square test. p<0.05 significant

Predictors of non-survival

To assess the predictors of non-survival, binary logistic regression was used. Out of 17 variables, 11 were significantly associated with patients outcomes. Further estimation of odds ratio in univariate analysis and adjusted odds ratio for multivariate analysis was done for these predictors

Table 3: Predictors of the Non-Survivor in Study Patients (N=798).

Variables	*OR (95 CI)	P value	† AOR (95 CI)	P value
Age (Years)	1.06 (1.03-1.08)	<0.001	1.04 (1.01-1.07)	0.016
Alerted Mentum	11.29 (5.02-25.40)	<0.001	-----	
Body ache	15.02 (6.58-34.25)	<0.001	-----	
Breathlessness	3.69 (1.67-8.15)	0.002	-----	
Dry Cough	4.87 (2.16-11.00)	<0.001	-----	
ESI		<0.001		
Emergent	Ref	<0.001	-----	
Less Urgent	0.12 (0.05-0.30)	0.001	-----	
Urgent	0.35 (0.13-0.95)	0.039	-----	
Haemoptysis	15.04(5.92-38.23)	<0.001	5.33 (1.05-27.09)	0.044
Other complains	4.83(2.02-11.57)	<0.001	-----	
Oxygen or Ventilator Required	24.11 (10.55-55.09)	<0.001	5.02 (1.49-16.98)	0.009
Test Done	3.80(1.72-8.40)	0.002	-----	
Vasopressors required	165(51.8-155.7)	<0.001	30.12 (6.83-132.93)	<0.001

*Univariate / † Multivariate Binary Logistic Regression Analysis used, p<0.05 significant. OR Odds Ratio, AOR adjusted odds ratio

In multivariate analysis, only four variables i.e. age (adjusted Odds ratio : 1.04, 95% CI: 1.01-1.07),

hemoptysis (adjusted Odds ratio:5.33, 95% CI: 1.05-27.09), oxygen or ventilatory requirement(adjusted Odds ratio: 5.02, 95% CI : 1.49-16.98) and vasopressor requirement (adjusted Odds ratio:30.12, 95% CI:6.83-132.92) were significant independent predictors of non-survival (Table 3).

Discussion

In first half of the year 2020, as corona virus infection evolved from an outbreak to a pandemic, attempts were made to identify the predictors of mortality in victims of SARS Cov2 induced pneumonia.[5] However, the plight of patients suffering from non-COVID disease has largelybeen ignored. Though studies have evaluated the outcomes of patients with chronic kidney disease[6] and coronary artery disease[7], there is a dearth of literature on non-COVID patients presenting to emergency department during these times. With the onset of COVID-19 outbreak in India, the non-COVID emergencies took a massive brunt as significant fraction of healthcare infrastructure and resourceswere diverted to COVID care. Movement and transportation restrictions in the beginning of the pandemic were additional factors affecting the case load and profile of patients presenting to a tertiary care centre for non-COVID non-trauma emergencies.

Mortality rate among patients presenting to the ED in present study was 3.4% which is higher as compared to 0.7% deaths reported by another series from Southern Indian by Clark et al. in pre-COVID era.[8] Another study from Iran (Alimohammadi et al) documented a mortality of 3.5% among the patients presenting to ED including trauma deaths.[9] The commonest presenting symptom as reported by Clark et al. was fever and renal colic while in the present study, most common presenting symptomsincluded gastrointestinal complains (abdominal pain), fever and breathlessness. Sixty seven percent (n=516) of patients were males. Age was significantly higher among non-survivors (16 years younger than survivors, 57.6 Vs 41.6 years, p<0.05) (Table2). Similarly, Alimohammadi et al[9] documented the average age of patients who succumbed in emergency to be significantly higher than those who were discharged (67 Vs 46 years, p<0.0001). The most common presenting complains included cardiovascular symptoms and severe trauma. Several risk factors in a single patient were associated with higher mortality. In the present study, presence of grave signs like altered mentation, hemoptysis, oxygen or ventilator requirement and vasopressor support were significantly more common among non-survivors. Presence of breathlessness and dry cough wasalso associated with non-survival. However, comorbidities did not differ significantly between the two groups. The clinical symptoms that are commonly associated with COVID infection such as fever and sore throat did not affect the final outcome. When ESI (Emergency Severity Index)[10] was compared between the two groups, majority of non-survivors belonged to emergent group while majorityof survivors belonged to the less urgent group (p<0.05). Overall, 16.7% (n=133) patients and 18.7% (n=150) patients were classified as emergent and urgent group respectively. This was much higher than that reported by Chih-Hsien Chi et al in pre Covid era[10], where only 3.4% and 7.4% patients were classified under emergent and urgent group respectively and was associated with higher hospitalization rate. This may reflect the change in the treatment seeking behaviour of patients in the COVID era. The emergencies of less severe magnitude might have been managed at localcommunity centres (primary or secondary healthcare centres). Late referral of patients may also be responsible for these differences. This is suggested by overall high number of patients with high ESI score and those requiring vasopressor support (2.3%) or oxygen requirement/ventilator support (6.6%) at admission.

Change in profile of patients who visited the emergency department during the pandemic was expected.[11] However, literature on the outcomes of non Covid emergency is lacking. Pre Covid era studies have shown differing results.Jena et al documented age >65 years, male gender and location of patient as risk factors for mortality in patients presenting with chest pain in their ED.[12] Higher age and co-morbidities were reported to be associated with non-survival in patients visiting the ED more than five times a year in a study from Switzerland.[13] Amongst patients presenting in ED with sepsis, mortality in Emergency Department Sepsis (MEDS) score has been found to be most effective in predicting the mortality.[14] This score, as described by Shapiro et al and validated by Sank off et al; takesinto account terminal illness, respiratory rate greater than 20 or oxygen saturation <90%, a systolic blood pressure <90 mm Hg despite a 20–30 ml/kg fluid bolus, platelet count >150 000/mm3, age > 65 years, presence of lower respiratory tract infection, nursing home residence and altered mental state.[15,16] Greater age seems to be a common factor in majority of the studies. Our findings correlated with the world literature. Oxygen saturation less than 90% which would require

supplemental oxygen or ventilatory support and blood pressures <90 mmHg despite adequate fluid resuscitation, necessitating vasopressor support was seen to influence survival in septic patients.

The chief limitation of the present study is lack of a comparison group from the non-COVID period and it was a single centre study. The period in which the study was conducted was the initial phase of spread of COVID infection in India. Approach to emergency management is constantly changing. However, travel restrictions continue to affect the communication and economy in varying proportions. Frequent outbreaks and ongoing transmission in different regions of the country may continue to affect the transport system and decision of patients to seek medical help. This study may help in identifying patients with poor prognosis at the time of admission and be guide to effective management of non Covid emergencies. It may lay down the basis of a multicenter evaluation and thus help the policymakers to strengthen the healthcare system, improve upon the referral pattern and resource optimization.

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