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Demographic profile of COVID-19 patients reporting to the triage area of a dedicated COVID-19 hospital (DCH) in Datia, Madhya Pradesh, India

P. Adhikari [1], Manohar Bhatia [1], Ghanshyam Ahirwar [1], Shubhanshu Gupta [1], P. Sukla [1], Sarvesh Kumar [1]

ABSTRACT

Introduction

Triage is, "the sorting out and classification of patients or casualties to determine priority of need and proper place of treatment." During infectious disease outbreaks, triage is particularly important to separate patients likely to be infected with the pathogen of concern from those who are not, to prevent nosocomial spread, and to ensure those who are infected receive the appropriate level of care. The aim of this study was to examine the characteristics of possible and confirmed COVID-19 patients transported to hospital by ambulance or self-presenting during April and May 2021, to see which symptoms indicated the likelihood of a severe, moderate or mild case that would enable the patient to be appropriately triaged to a COVID Care Centre (CCC); Dedicated COVID-19 Hospital (DCH) or Dedicated COVID Healthcare Centre (DCHC) respectively.

Methods

This study was conducted retrospectively using data from patients diagnosed with or suspected of having COVID-19 between April 1, 2021 and May 31, 2021, who reported to initial screening at the triage facility of DCH (Dedicated COVID-19 Hospital), Datia, a town in Madhya Pradesh, India. Patients were further classified and referred on accordingly based on risk stratification, to either CCC, DCHC or home care. All reported patients were included in the study and all patients were examined for signs of COVID-19.

Results

During the study period, 1,365 patients who matched symptoms sufficient to be classed as suspected cases under WHO criteria were referred to the DHC. Fever was present in 88% of the patients at the time of presentation but often developed in others. Patients were more likely to be male, and older age groups were more likely to be represented.

Conclusion

Descriptive data, such as age and gender distribution, sociocultural characteristics and symptoms of patients attended to by triage units will help to determine prevalence and risk and thus provides important information for public health management.

Keywords: Triage, Demographics, COVID-19, Risk, SARS-Cov2, Morbidity

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1 Department of Community Medicine, GMC, Datia, Madhya Pradesh, India

***Corresponding author** Shubhanshu Gupta, Assistant Professor, Department of Community Medicine, GMC, Datia, Madhya Pradesh, India, guptashubhanshu1@gmail.com

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INTRODUCTION

The COVID-19 pandemic seems unreal. Based on history, it should not: pandemics of influenza in the 1950s, 1960s and 2009, and of HIV/AIDS (Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome) in the 1980s, along with outbreaks of SARS (Severe Acute Respiratory Syndrome) in 2002 and of MERS (Middle East Respiratory Syndrome) in 2015, should have kept the threat of pandemics high in public consciousness.[1] Coronavirus disease 2019 (COVID-19) was unknown before it emerged in Wuhan, China in 2019 and we are still learning about it day-by-day. Pandemic-associated ethical dilemmas have been studied and discussed for years, however.[2] The basic ethical principles of medicine also apply to pandemics: justice, equality, respect for autonomy and obligatory provision of care to all patients, irrespective of age, race, disability, gender, sexual orientation, social status or other characteristics.[2]

By April 2021, the COVID-19 pandemic was affecting medical professionals, societies, countries, continents and the entire world. The disease had become part of daily life in India, including in Madhya Pradesh, a mostly rural region. In India, COVID-19 Response Teams and duty doctors tried to remain functional in the face of scarce medical resources. At that time, according to simulations based on the 1918 influenza pandemic, 400% of existing intensive care stations and 200% of ventilators would be required in the United States to meet the that country's demands of the crisis.[2] This caused concern amongst India's medical personnel as to how this would affect their ability to perform triage – a word that comes from French and means to classify or to sort (originally, it was used for grouping goods by quality and price during fairs)[3]. Triage also means to grant priority and in medical terms is the "sorting out and classification of patient or casualties to determine priority of need and proper place of treatment."[3]

During infectious disease outbreaks, triage is particularly important to separate patients likely to be infected with the pathogen of concern from those who are attending hospital for other conditions[1] and to direct affected patients to the most appropriate available care. To deal with the COVID-19 pandemic, the Indian healthcare system dedicated a three-tier system for patient care: COVID Care Centres (CCCs), makeshift arrangements in hotels and hospitals for milder cases that required oxygen; Dedicated COVID Hospitals (DCH) for moderate cases, set up in entire hospitals or hospital blocks for patients requiring oxygen beds; and Dedicated COVID Health Centres (DCHC) for the most severe cases, set up in intensive care units (ICU) for patients requiring ventilation and hospital beds. At most hospitals where COVID-19 patients were received, a self-contained building was assigned as a DCH; often with up to 50 ICU beds, 100 high dependency unit beds, and 500 beds overall. All patients in a region with fever and/or suspected COVID-19 were referred to the DCH for triage.

The worldwide spread of SARS-CoV-2, the causative agent of COVID-19, and increasing numbers of infections became a considerable strain for the emergency rooms (ER) of non-DCHs, especially when several suspected cases with unspecific general or respiratory symptoms arrived at the same time. Identification of more critical patients in the DCH ER for hospitalization was challenging. The detection of SARS-CoV-2 in nasopharyngeal swabs by quantitative polymerase chain reaction (qPCR) took several hours (>6h in some settings) due to the transport time between the sample collection site and laboratories with the capacity to process the tests.[4]

In Datia, Madhya Pradesh, India, the guidelines set by local government for hospitalization in the DCH was to select patients most at risk for developing more severe symptoms that could lead to respiratory failure. During clinical routine work in the frontline unit of the Dedicated COVID Hospital (DHC), Datia, to which patients with suspected or confirmed COVID-19 were referred, it was suggested that the development of a score to support the triage process and to assist other physicians in similar situations would be of value.[5] This would also help in the appropriate allocation of patients to COVID Care Centres (CCC), Dedicated COVID Hospitals (DCH) or Dedicated COVID Health Centres (DCHC) depending on their likely need for oxygen support, a ventilator or other complex medical care.[6]

This study followed up hospitalized patients in all three facility types (CCC, DCH and DCHC) with confirmed COVID-19 to determine what initial features they had displayed to see if this could help in distinguishing COVID-19 cases from patients displaying symptoms of other respiratory diseases. For example, several patients spontaneously mentioned having noticed an attenuation of smell or taste; this symptom, although not widely recognized at the time, was a typical feature at the beginning of the pandemic and was later considered to be a COVID-19 identifier.[7] When the relevant paraclinical components were analyzed, cut-off values were determined and a simple score was created based on clinical information routinely available in the emergency room, using an algorithm developed by the World Health Organization.[8] Based on the WHO criteria, 80% of confirmed cases of COVID-19 can be treated as outpatients and sent home for home isolation, up to 20% require hospitalization and 5% need intensive care. Efficient triage of patients with COVID-19 at all health facility levels (primary, secondary and tertiary) can help the national response planning and case management system cope with patient influx, direct necessary medical resources to efficiently support the critically ill and protect the safety of healthcare workers.

METHODS AND MATERIALS

We conducted a hospital-based, observational cross-sectional study lasting for two months from 1 April to 31 May 2021, during India's second wave of COVID-19. The study was conducted retrospectively, using data from patients with a positive diagnosis or suspected COVID-19, who reported to the DCH by ambulance or by self-presentation and were hospitalized in either the DCH or referred on to CCC or DCHC. Diagnosis of the disease was based on a positive RT-PCR test. Details of patient age, gender, residence, comorbidities, complaints/symptoms, time of the call to the emergency services call centre and the triage code assigned to the patient were recorded in the study for analysis. The triage code was taken from the guidelines and algorithm of the Ministry of Health and Family Welfare, Government of India, following recommendations by WHO.[8] (See Tables 1, 2 and 3). Patients reporting to triage at the DCH from the fever clinic and DHC emergency room were categorized by triage area staff, based on risk stratification and a decision matrix according to the WHO algorithm.[8] Based on the outcome, the patient was referred to the appropriate facility or discharged home. Patients were voluntarily enrolled in the study if they gave informed consent. The study was approved by permission of the local Nodal Officer COVID-19.

The data analysis was conducted using IBM Statistics Package for Social Sciences (SPSS) for Windows, Version 25.0 software (IBM Corp., Armonk, NY, USA). Descriptive statistics (periodicity, percentage, mean, SD) were calculated and a Chi-squared test was used to compare the data. The distribution was evaluated with the Kolmogorov-Smirnov and Shapiro-Wilk tests. An independent samples t-test was used to compare normally distributed data of the independent variables. A p-value <0.05 was considered significant and indicated a difference between groups.

RESULTS

In total, 1,365 patients were referred to triage. Cases were highest in April 2021, with 68% of the cases referred during this month, with 32% of cases in May. Over the two months, more men than women were referred (64% male, 36% female), suggesting that men were more exposed to females, which may be because they are more likely to work outside the home. The difference between the numbers of men and women was statistically significant ($p<0.05$).

Table 4 the table shows the association of age with referral to facility in April. The most common age group referred in the month of April was the 21-40 years age group (n=384, 41.2%) followed by the 41-60 year age group (n=347, 37%), which showed the age groups most affected during the during second wave were reasonably young. Around 20% were referred to a Dedicated COVID Health Centre (DCHC) for the most severe cases, 40% of patients were referred to the Dedicated COVID Hospital (DCH), a facility for clinically assigned moderate cases; 2.7% were referred to a CCC (COVID Care Centre for mild cases) and 37% were isolated at home. The age distribution was found to be statistically significant ($p<0.05$).

Table 1 Risk stratification and decision matrix for facility selection (CC, DCH, DCHC or home isolation) of COVID-19 positive patients during triage at DCH (Source: WHO)[8]

Facility	Alertness	Age	Co-morbidities	Temp	SPO2	Pulse rate	Resp. rate	BP
Home Isolation	Alert and conscious	<60 yrs.	Absent	$<100.4^0$ F or 38^0 C	≥95% at room air	<100/min	<24/min	≥100/70
CCC* **	Alert and conscious	<60 yrs.	Absent	$<100.4^0$ F but $<101^0$ F	≥95% at room air	<100/min	<24/min	≥100/70
DCHC	Alert and conscious	</> 60 yrs.	Present	$<101^0$ F or 38.3^0 C	90 - 94% at room air	100-120/min or <60/min	24-30/min	<90/60 or ≥160/100
DCH	Drowsy/ unconscious	>60 yrs.	Present	$<101^0$ F or 38.3^0 C	≥90% at room air	>120/min or <60/min	>30/min	<90/60 or ≥160/100

Table 2 Scoring system for triage (Source: WHO)[8]

		Score = 0	Score = 1	Score = 2
Scoring System	**Alertness impaired**	N	n/a	Y
	Age in yrs	<60	>60	n/a
	Co-morbidities	-nt	n/a	+nt
	Temp ^{0} F	<100.4	>100.4 but <101	>101
	SPO2	≥95%	<94%	<90%
	Pulse rate	<100	<60/>100	n/a
	Resp. rate	<24	>24	n/a
	BP	≥100/70		<90/60 or ≥160/100
Score Sum Total 0 – Home Isolation, Score Sum Total 1 or 2 – DCHC, Score Sum Total 3 or more – DCH				

Table 3 Triage area criteria (Source: WHO)[8]

	Mild	Moderate	Severe
	Clinical Criteria		
SPO2	>95% in Room air	90-94 % in Room air	<90 % in Room air
Respiratory Rate (RR)	< 24 / min	24-30 / min	> 30 / min
	No Pneumonia	Pneumonia +	Pneumonia ++

Table 4 Association of age with referral facility in April 2021

Age	DCH	DCHC	Home isolation	CCC	Total	p-value
0-20	14	10	32	1	57	0.01*
21-40	108	68	190	18	384	
41-60	146	88	107	6	347	
61-80	95	19	16	1	131	
81-100	7	4	2	0	10	
Total	370	189	347	26	932	

****p<0.05 is statistically significant***

Table 5 Distribution of gender in April and May 2021

S.No.	Sex	April	May	Total	p-value
1	Male	588	280	868	**0.03***
2	Female	344	153	497	
Total		**932**	**433**	1365	

p<0.05 is statistically significant

Table 6 Association of age with gender in May 2021

S.No.	Age	Sex	No.	Total	p-value
1	0-20	Male	12	20	0.11
		Female	8		
2	21-40	Male	112	162	**0.01***
		Female	50		
3	41-60	Male	103	164	**0.01***
		Female	61		
4	61-80	Male	49	79	0.21
		Female	30		
5	81-100	Male	4	8	0.34
		Female	4		
Total			**433**	**433**	

p<0.05 is statistically significant

Table 7 Overall referral facility for April-May 2021, showing significantly higher admissions during April

S.No.	Referral Facility	April	May	Total	p-value
1	DCH	370 (39.6%)	215 (49.6%)	369	**0.02***
2	DCHC	189 (20.2%)	100 (24%)	254	
3	CCC	26 (2.7%)	38 (9.1%)	64	
4	Home Isolation	347 (37.2%)	80 (19.3%)	427	
Total		**932**	**433**	**1365**	

p<0.05 is statistically significant

DISCUSSION

The epidemiology of COVID-19 varies between countries. Possible reasons for this include differences in demographic and sociocultural structure, the extent of national and international travel, and the capacity, accessibility and versatility of healthcare systems. If the epidemic continues, demographic data will be needed to raise and maintain public awareness and to guide disease intervention strategies. Some reports in the literature have noted gender-related differences in the prevalence and severity of COVID-19 infection.[9,10] Studies conducted in China reported that the disease was more common in men and it has been observed that this may be due to lifestyle factors, such as a greater prevalence of smoking among men, or hormonal and genetic factors that might influence the expression of angiotensin converting enzyme,[2] the functional receptor for SARS-CoV-2.[11] A high prevalence in men has also been reported in studies conducted in Turkey,[12,13] however, other research has indicated a higher female sex ratio of 52.6%.[5]

COVID-19 patients often present with upper and lower respiratory tract symptoms, but patients may also have fewer or different common symptoms, such as headache or diarrhoea. Common clinical symptoms in an epidemiological study of 1,099 confirmed cases included fever (88.7%), cough (67.8%), fatigue (38.1%), sputum (33.4%), shortness of breath (18.6%), sore throat (13.9%) and headache (13.6%).[8] In another study, which examined the demographic data of 137 patients, the primary symptoms were fever (81.8%), cough (48.2%) and muscle pain or fatigue (32.1%), with less common reports of diarrhoea.[14] In our study, the most common complaints in patients with a positive PCR test were fever (82%), cough (49%), fatigue (31%), shortness of breath (19%) and a sore throat (14%). Diarrhoea was not a significant variable in terms of the COVID-19 diagnosis. Our findings were consistent with other studies in the literature.[13-15] For emergency health services to perform effectively, it is necessary to determine the density of hospitals and to transfer patients to hospitals accordingly. Accurate pre-hospital triage is critical to ensure the proper allocation of resources and care.[15,16] Over the entire study period, the triage codes of our patients were 57% yellow (admit to DCH), 37.1% green (refer to CCC) and 5.7% red (refer to DCHC). Epidemiological studies of COVID-19 have found that the disease is more common in urban areas,[17] where individuals are more at risk for COVID-19 than residents of rural areas due to the ease of airborne transmission in densely populated environments. In our study, 68% of the positive cases were from urban locations, 32% rural.

CONCLUSION

SARS-CoV-2 infection spread rapidly in India during the COVID-19 pandemic. The growth in case numbers and the high morbidity rate caused widespread anxiety and a significant strain on resources and health systems in India, as indeed it did around the world. The duration, magnitude and impact of the pandemic remains uncertain. Descriptive data, such as age and gender distributions, and sociocultural details such as place of residence (urban or rural), help to determine which populations are most at risk. Awareness of common symptoms (especially fever) can encourage appropriate early diagnosis and treatment in the most appropriate facility.

This information can provide guidance on measures that can be taken to control the disease. Triage is used to classify the patient and timely classification is paramount. As a retrospective and single-center study, this research is limited. Confirmation of our study data with prospective cohorts is needed.

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