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EPIDEMIOLOGICAL AND CLINICAL PROFILE OF NON COVID 19 PATIENTS ADMITTED TO PEDIATRIC INTENSIVE CARE UNIT OF A TERTIARY CARE REFERRAL CENTRE DURING COVID 19 PANDEMIC

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ABSTRACT **Objective:** To study the impact of lockdown during the corona virus disease 2019 pandemic, considering the limited healthcare and transport facilities while reaching the tertiary care hospital.

It was a hospital based; observational study done over a period of 12 month consisting of pre lockdown period (December 2019 to March 2020), Lockdown (April 2020 to June 2020) and post lock-down (July 2020 to November 2020) period data of COVID-19 negative reported children admitted to pediatric intensive care unit (PICU).

0ut of 1019 enrolled children, total number of admissions prior lockdown was 534, during lockdown 240 and post lock down 243. Admissions from rural was significantly less during lockdown i.e., urban =80% and rural=20% whereas prior lockdown 56% from urban and 44% from rural Pune. Percentage of male children admitted was significantly more during lockdown compared to prelockdown (62.3% male and 37.7% females). The mortality rate was 6.7% and discharge against medical advice rate was significantly high during lockdown compared to pre- and post-lockdown.

Our study has shown that covid-19 pandemic has strongly affected the number of PICU admissions, pattern of diseases, requirement of ventilatory support and mortality. Provision for good healthcare transport facility and availability of primary and routine health care facilities may have led to good outcome of PICU hospitalizations in terms of recovery and mortality.

KEYWORDS :

Introduction:

On March 11, 2020, the World Health Organization declared the disease caused by the novel virus (COVID-19) a pandemic health emergency for the first time since the swine flu (H1N1) in 2009.The emergence of corona virus disease 2019 (COVID-19) has led to high demand for intensive care services worldwide. [1] The spread of the novel corona virus disease 2019(covid-19) urged an never -seen coordinated global response to prepare the health system, including primary care, hospital facilities, and ICU. Most countries were not prepared for the medical need determined by major epidemics, as required by the covid-19 pandemic. In this pandemic, the adult intensive care settings became overcrowded, stressing the health system and the staff. However, data regarding PICU are still limited [2].

Intensive care has played a pivotal role during the COVID-19 pandemic as many patients developed severe pulmonary complications. The corona virus disease mainly starts with a respiratory illness and about 5-10% require intensive care management for acute respiratory syndrome and multiorgan dysfunction. The availability of intensive level of care has played a pivotal role, as many patients developed severe pulmonary complications. Gonzalez – Dambrauskas at al described a preliminary report of the CAKE (Critical Corona virus and Kids Epidemiologic) study that involves 60 centers in 20 countries from Europe and the Americas. Shekerdemian and colleagues described the burden of COVID-19 infection in North America's PICUs. This early study describes that severe illness is less frequent than in adults and that prehospital co morbidities are important factors of severity. [3] Children accounting for about 1-2% of total cases [4]. The purpose of this study is to characterize COVID-19 negative admissions and to determine factors that may impact those admissions.

Although the number of pediatric patients affected by COVID 19 and the severity of symptoms is limited compared to adults, undirected changes affecting the pediatric care system have been described since the beginning of the outbreak. Viral lower respiratory tract infections (LRTIs), particularly bronchiolitis and pneumonia due to respiratory syncytial virus (RSV) and influenza, are a frequent cause of hospitalization, morbidity and mortality in children under 5years of age [5]. Although children have been relatively spared from COVID-19 both in numbers of cases and disease severity, there is concern that an overlap between COVID-19 disease and the high burden of seasonal viral LRTIs could have disastrous consequences. It is unknown; however, whether strategies implemented to mitigate COVID-19 could influence the epidemiology of concurrent seasonal viral LRTIs in children [5] , and so true for other non-COVID-19 illnesses requiring intensive care admissions.

The COVID-19 pandemic has disrupted health and health systems worldwide, and most countries have still not recovered from the immediate effects of the increased mortality and morbidity due to severe acute respiratory syndrome Covid 19 infection [2] This, in addition to the devastating economic consequences of the prolonged lockdowns, will challenge both developed and developing countries irrespective of their health infrastructure for years to come. It is predicted that these adverse health consequences will disproportionately affect the most vulnerable members of society—our children [6].

There is also a growing concern among pediatrics providers that this lack of access to preventative and specialized care to millions of children will ultimately lead to a huge surge in preventable morbidity and mortality. In an attempt to address this problem [6] to date, limited data is available regarding the impact of lockdown on PICU admissions and epidemiology during the COVID-19 pandemic. To address this gap, we have studied the demographic data and epidemiology of pediatric intensive care admissions during the COVID-19 pandemic.

The similar study done in Brazil and Pakistan has shown that pediatric healthcare providers must ensure that a safe clinic and hospital environment is created for children with both COVID-19 and non-COVID-19 related illnesses so that essential preventive care and health maintenance can be provided to children during this time. It is essential to continue to spread public health awareness messages about how to prevent COVID-19 infection and about the importance of routine immunizations and seeking appropriate advice from healthcare providers when necessary. We may speculate that the implementation of lockdown measures, social distancing, mask-wearing, travel restriction, and the consolidation of the hygiene practices might have reduced the transmission of other respiratory pathogens. If parents are reassured that healthcare providers will follow standard operating

procedures and will wear and provide appropriate PPEs, they may be more likely to seek appropriate and timely care for their children.[6]

Materials and methods:

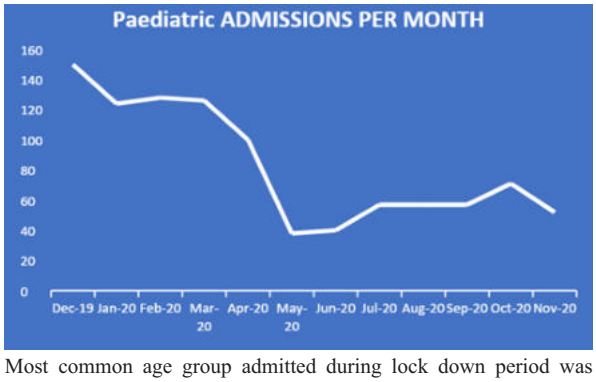
This is a data based observational study, which has collected the data from PICU admission records 4 months during, prior and post lockdown phases. Variables related to the number of hospital admissions and the epidemiological profile of hospitalized patients were analyzed considering April, may, June and July as lockdown period. Testing for SARS CoV 2 was performed with a dedicated PCR test.

We hypothesized that lockdown has impacted the admission, mortality and pattern of disease needed PICU admission. The aim of study was to observe the impact of admissions to PICU prior, during and post lockdown, where facility to reach tertiary care hospitals during lockdown period were limited and many of the primary and peripheral health care centers were closed because of the lockdown.

Results:

Admissions from rural was significantly less during lockdown i.e. urban =80% and rural=20% whereas prior lockdown 56% from urban and 44% from rural Pune .0ut of 1019 enrolled children, total number of admissions prior lockdown was 534 ,during lockdown 240 and post lock down 243 . (Graph 1).

Graph 1: Month wise distribution of study population



Most common age group admitted during lock down period was between 1-4 years (table 1). Mortality rate 6.7% and discharge against medical advice rate were significantly high during lockdown compared to pre and post lockdown

Table 1: Age wise distribution of children during pre-lockdown, lockdown and post-lockdown period.

			Period			Total	P
			Lockdown	Post Lockdown	Pre lockdown		
Age in years	< 1 Year	Count	$94_{a,b}$	85_{b}	232_{a}	411	0.008
		% within period	39.2%	34.8%	43.5%	40.4 %	
	1-4 Years	Count	68_{a}	55_{a}	156_{a}	279	
		% within period	28.3%	22.5%	29.3%	27.4 %	
	5 Years	Count	40_{a}	74_{b}	74_{a}	188	
		% within period	16.7%	30.3%	13.9%	18.5 %	
	> 5-10 years	Count	31_{a}	25_{a}	53_{a}	109	
		% within period	12.9%	10.2%	9.9%	10.7 %	
	> 10 years	Count	$1_{a,b}$	0_{b}	11_{a}	12	
		% within period	.4%	0.0%	2.1%	1.2%	

The percentage of male children admitted was significantly more during lockdown compared to prelockdown (62.3% male and 37.7% females). (Table 2)

Table 2: Gender-wise distribution of study population

			Period			Total	P
			Lockdown (N=240)	Post Lockdown (N=244)	Pre lockdown (N=533)		
Gender	Female	Count	124_{a}	92_{b}	$239_{a,b}$	455	0.008
		% within period	51.7%	37.7%	44.8%	44.7%	
	Male	Count	116_{a}	152_{b}	$294_{a,b}$	562	
		% within period	48.3%	62.3%	55.2%	55.3%	

We found that most common system involved was respiratory system, 27.1%, 36.65%, 13.9% during lock down, pre-lockdown and post-lockdown respectively. The other systems serially affected are depicted in the table as below (Table 3)

Table 3: Clinical profile of patients admitted during study period

			Period			Total
			Lockdown	Post Lockdown	Pre lockdown	
Diagnosis	AFI	Count	4_{a}	13_{b}	$21_{a,b}$	38
		% within Period	1.7%	5.3%	3.9%	3.7%
	AGE	Count	16_{a}	12_{a}	25_{a}	52
		% within Period	6.7%	4.9%	4.7%	5.1%
	Anemia with failure	Count	17_{a}	14_{a}	28_{a}	58
		% within Period	7.1%	5.3%	5.3%	5.7%
	CARDIAC ILLNESS	Count	1_{a}	$6_{a,b}$	20_{b}	27
		% within Period	.4%	2.5%	3.8%	2.7%
	EPILEPSY	Count	57_{a}	40b	83_{b}	178
		% within Period	23.8%	16.4%	15.6%	17.5%
	KIDNEY DISORDER	Count	11_{a}	23_{b}	13_{a}	47
		% within Period	4.6%	9.4%	2.4%	4.6%
	OTHERS	Count	64_{a}	90_{b}	139_{a}	293
		% within Period	26.7%	36.9%	26.1%	28.8%
	RESPIRATORY ILLNESS	Count	65_{a}	34_{b}	195_{c}	294
		% within Period	27.1%	13.9%	36.6%	28.9%
	SEPSIS WITH MULTIORGAN DYSFUNCTION	Count	$5_{a,b}$	12_{b}	9_{a}	26
		% within Period	2.1%	4.9%	1.7%	2.6%
	Total	Count	240	244	533	1017
		% within Period	100.0 %	100.0 %	100.0 %	100.0 %

According to our study observations, the requirement of invasive mechanical ventilation was more (30.1%) during lockdown period and percentage of children requiring mechanical ventilation during pre and post-lockdown is as follows (Table 4)

Table 4: Requirement of mechanical ventilation among the patients admitted during study period.

			Period			Total	P
			Lockdown (N=240)	Post Lockdown (N=244)	Pre lockdown (N=533)		
Need of Ventilator Support	No	Count	167_{a}	191_{b}	422_{b}	780	0.011
		% within period	69.6%	78.3%	79.2%	76.7 %	
	Yes	Count	73_{a}	53_{b}	111_{b}	237	
		% within period	30.4%	21.7%	20.8%	23.3 %	
Each subscript letter denotes a subset of period categories whose column proportions do not differ significantly from each other at the .05 level.							

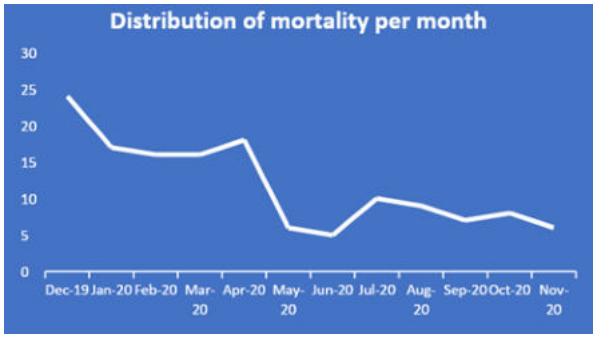
Table 5: Clinical outcome of study population

			Period			Total	P
			Lockdown	Post Lockdown	Pre lockdown		
outcome	Death	Count	39_{a}	30_{a}	73_{a}	142	0.158
		% within period	16.3%	12.3%	13.7%	14.0 %	

	discharge	Count	179_a	$192_{a,b}$	431_b	802	
		% within period	74.6%	79.0%	80.9%	78.9 %	
	DAMA	Count	16_a	14_a	25_a	55	
		% within period	6.7%	5.8%	4.7%	5.4%	

The mortality rate was 6.7% .and discharge against medical advice rate were significantly high during lockdown compared to pre and post lockdown (table 5 and Graph 2)

Graph 2: Distribution of mortality per month



Discussion:

In this study, we showed a great reduction in the number of children hospitalized in tertiary care PICU where many primary and nearby corporate health care facilities were closed and transport system was not easily accessible. Number of admissions reduced by 28.8 %, and the average age of admission was between children aged 1-4years.

Most common admissions was related to respiratory illnesses (Bronchopneumonia, bronchiolitis ,asthma)in all the 3 phases i.e. prior ,during and post lockdown period. The number of children requiring ventilatory support, and the mortality among the children with respiratory illnesses was more during the lockdown. The next common admissions was epilepsy (23.8% during lockdown, 16.4% and 15.6% during post and pre lockdown respectively) where many were known case of epilepsy and admitted with breakthrough seizures, though data regarding individual case is limited we may hypothesize that increase in admissions may be secondary to lack of availability of medications as many patients travel from the peripheries to epilepsy care health centers to a tertiary care centres for follow-up visits. As many tertiary care centers were closed for routine outpatient services during the lockdown period.

The respiratory support modalities for the treatment of pediatric patients were room air ventilation, non invasive positive pressure ventilation (NIPPV), mechanical conventional ventilation (MCV), high-frequency oscillatory ventilation (HFOV). As observed in our study percentage of patients requiring mechanical ventilation was significantly higher during lock-down period which was statistically significant. (P value=0.011)

The percentage of patients who took discharge against medical advice was more during lockdown period, though statistically values were not significant.

Conclusions:

The association with state population density makes intuitive sense as urban centers potentiate a rapid spread of an infectious disease, as well as a greater number of global travel routes. The Covid -19 pandemic strongly affected the tertiary care PICU in terms of reducing the number of admissions, and the epidemiological and clinical profile. The efforts to create more awareness regarding the disease and arrangement of nearby health care services and accessibility to health care transport system may have reduced the mortality and might have lead to more favorable outcomes. The study also throws light on preventing critical non COVID-19 admissions to intensive care and thereby would have prevented wastage of resources. Our clinical setting was important, as it helps us to understand what can be expected when such measures are adopted. This could also help us to plan for future outbreak.

Limitations of the study:

Hospitals in areas where the pandemic has caused devastation continue to struggle as many challenges remain unmet due to the speed of transmission, the lack of accurate knowledge regarding the benefits or pitfalls of the current available therapies, and the uncertainty of being able to provide adequate care if the rate of transmission continues.

This study has several limitations. This study was included limited data regarding pre lock down phase and lack individual case based information as data was collected from PICU data records. The data also lacking regarding out of hospital arrangements in community facilities or private clinics or even social media to mitigate Covid -19 pandemic and to create the awareness among the general population. Despite the limitations outlined, these analyses offer helpful information that may be used to assist during the consideration as to what factors need more clarification from future studies with patient-level data.

Nevertheless, analyzing the impact of lockdown, the mechanisms to approach critical care among children during crises need to be re‐evaluated, because treatment interruptions and delays are expected to affect patient outcomes in these otherwise largely curable diseases.

Conflict of interest: None

Funding strategies: None as this was data-based observational study

Ethical committee response: clearance taken from institutional ethics committee.

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