RESEARCH ARTICLE

Impact of COVID-19 pandemic on hospital performance, trauma trends and surgical practice-early experience and challenges

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ABSTRACT

Introduction: Coronavirus disease came as a bolt from blue collapsing advanced healthcare all over the world. The main emphasis was given to the prevention of the spread of infection within the hospital and in the community. The health institutional infrastructure and resources were streamlined and exploited in such a way that the usual functioning of the facility does not slacken, with proper and adequate relocation of resources for the management of COVID-19 patients.

Study design: A one-year comparative study, comparing various hospital functioning parameters, between pre-COVID periods with COVID-19 period. The Institutional Medical Records Department and Institutional Annual Report Desk facilities were utilized for data collection.

Results: The OPD and A/E attendance reduced by 25.4% and 10.8% respectively. Total hospital admissions were reduced by 16.2%. However, the average length of hospital stay remained the same. The gross death rate, as well as net death rate, showed an increase of 15% and 24.2% respectively. There was a more than a one-third decrease in surgical procedures performed.

Conclusion: The pandemic had a definitive impact on our institutional performance parameters as well as other functional aspects like trauma patterns and operation room occupancy.

Key Words: *COVID-19; Surgery; Trauma*

INTRODUTION

The month of December in the year 2019 will be remembered in history as it is during this month the dynamics of world affairs changed; at least in the short term. A new severe acute respiratory syndrome, named COVID-19 (Coronavirus disease 2019), was reported from China. Soon it spread throughout the world hitting every aspect of life. It also forced major political decisions in almost all the countries of the world [1,2]. Eventually it was declared as a pandemic by the World Health Organisation (WHO) on March 11, 2020. As the number of cases rose throughout the world, various directives were implemented by various national and international health bodies to contain or minimize this pandemic [3,4].

Like other parts of the world, COVID-19 had a significant impact on the lifestyle in India. India recorded the first case of the disease on January 30, 2020. 6 Soon it multiplied by leaps and bounds. Akin to measures employed around the globe, the government of India announced a nationwide lockdown on March 25,2020, affecting all non-essential services, business establishments, Multi-National Companies (MNCs), educational institutions, travel, religious and social gatherings/ceremonies, agriculture, and almost all domains of livelihood, and almost every sphere of life was brought to a standstill [5,6].

Like other aspects of lifestyle, COVID-19 changed our health care system as well as the injury pattern. As reported by several researchers, the restriction measures had a bearing on the hospital footfall and the type and number of admissions in the hospitals around the world [7]. As expected, the type and causes of trauma or the population which suffered such trauma was set to change on account of lockdown measures, social restrictions, etc. [8-10]. At several centers, a significant reduction in trauma-related admissions was noted [7]. The general public hold the notion that hospitals can be a potential source of COVID-19 [8,9]. As such, for a "relatively minor" trauma, patients would avoid visiting a hospital and get treated at a local clinic, for fear of the virus. This, in part, has led to a reduction of trauma patients reaching the hospitals [8].

In this study, to analyze the effect of the pandemic on the working of our surgical teams, we studied the changes in the frequency and pattern of trauma admissions to our surgical emergency, and operating room occupancy, i.e., surgeries performed in our institution across various specialties. We also analyzed various parameters of institutional performance.

MATERIALS AND METHODS

This is a 1-year comparative study, comparing various hospital functioning parameters, between March 2019-February 2020 (Pre-COVID period) with March 2020-February 2021 (COVID-19 period). The data was collected from the Institutional Medical Records Department and Institutional Annual Report Desk. The effect of the Pandemic on the various aspects of hospital functioning was evaluated. The following data were evaluated:

- Outpatient attendance
- Inpatient attendance
- Hospital performance indicators (Bed occupancy rate, average length of hospital stay, Gross death rate, Net death rate)
- Department-Wise Analysis of Major Surgical Procedures Performed

In addition, the number and type of operations performed were collected from the Theatre Record Registry for these respective periods.

The study aimed to evaluate the effect of the COVID-19 pandemic on the routine functioning of our institutional system and to evaluate the "bench strength" of our setup.

Various statistical parameters evaluated in this study are defined as:

Bed occupancy rate (inpatient occupancy rate)=total number of inpatient service days for a given period/total number of inpatient bed count days for the same period) × 100. Since our data compared the results over one year (1st March 2019 to 28th February 2020 or 1st March 2020 to 28th February 2021), the formula for bed occupancy rate would be:

$$\left[\frac{\text{Total number of hospital admissions in a given year (1st March 2019 to 28th February 2020 or 1st March 2020 to 28th February 2021)} \times 100}{\text{Total number of service beds of the hospital} \times 365}\right]$$

Gross death rate=gross death rate is the ratio of the total number of inpatient deaths including newborns to the total number of discharges for a given period. The formula is:

$$\left[\frac{\text{Total no. of inpatient deaths including new-borns for a given period} \times 100}{\text{Total number of discharges including deaths for the same period}}\right]$$

$$\text{Net death rate}=\left[\frac{\text{Total number of inpatient deaths} - \text{inpatients deaths} < 48 \text{ hours} \times 100}{\text{Total discharges (including deaths)} - \text{deaths} < 48 \text{ hours}}\right]$$

$$\text{The average length of hospital stay} = \left[\frac{\text{Total inpatient days of care (in a given period)}}{\text{Total number of patients discharged (in a given period)}}\right]$$

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RESULTS

As soon as COVID-19 cases began to increase, the same was reflected in hospital admissions in major hospitals of the valley. This prompted hospital administrations to create separate COVID wards as well as dedicate several government hospitals as COVID hospitals. The elective surgical procedures were either deferred or cancelled to effectively utilize hospital infrastructure and resources. Emergencies and semi-emergencies including oncologic surgeries and vital organ transplants were carried out unabated. This led to the redistribution of healthcare workers from non-COVID to COVID facilities. This had an impact on various surgical specialties in our hospital.

The overall outpatient attendance in our Institute shrunk to 74.6% of the previous year. We observed a blanket decrease in the out-patient attendance in all our clinics. Comparing to the previous year, new patients seen in OPD decreased by 30.5% while an almost similar reduction (28.4%) was noticed in revisit patients. The Gynecology and Obstetrics OPD attendance reduced by a somewhat less percentage (18.5%) as compared to general medical/surgical OPD. The Accident and Emergency Department footfall decreased by 10.8%. Total hospital admissions reduced by 16.2%; among these, more decrease was observed in routine admissions (20.5%), followed by emergency admissions (which reduced by 10.8%) and gynecology/Obstetrics decreased by only 5.8% (Table 1).

The hospital performance indicators like average daily admissions and bed occupancy rate demonstrated a decrease of 16% and 20% respectively. However, the average length of hospital stay remained the same. In contrast, gross death rate, as well as net death rate, showed a respective increase of 15% and 24.2% (Table 2). Department wise major surgeries showed a drop during 2020 except in surgical oncology cases. As compared to other specialties, there was only a slight decrease noted in inpatient admissions and surgeries of Obstetrics and Gynecology. There was an overall 33.8% (one-thirds) decrease in surgical procedures performed (Table 3).

DISCUSSION

Almost all the countries around the globe were affected equally by the pandemic to need organizational rearrangements to cope up with the crisis. During this onslaught, on the whole, the healthcare systems proceeded towards the strategy of disease limitation. The key plans of action involved steps to restrict disease advancement through numerous measures known to one and all. The governments implemented lockdown measures to ward off the spread of infection and flatten the rising curve. It was urged that people remain at home and restrict their outdoor activities to a minimum, that too when in dire need [5,11]. Since the first-ever recorded case of COVID-19 in India in January 2020, the number of cases rose exponentially. Due to its high infectivity and no available vaccine (at that time), the COVID-19 spread around the world rapidly. Given the population of India, it was bound to put a strain on the existing untenable health care system of our country [12]. As apparent throughout the world, the health officials had the

TABLE 1
Outpatient/inpatient attendance.

Particulars		2019	2020	Difference	%
Outpatient attendance	New patients seen in OPD	347953	241873	106080	30.5
	Revisit patients seen in OPD	488302	349790	138512	28.4
	Gynecology and Obstetrics/Community Medicine OPD attendance	85069	69318	15751	18.5
	A&E Registration/Attendance	179173	159858	19315	10.8
	Total OPD and A&E Attendance	1100497	820839	279658	25.4
Inpatient attendance	Routine admissions	40485	32204	8281	20.5
	Emergency admissions	23388	20856	2532	10.8
	Gynae/Obs admissions	4504	4244	260	5.8
	Total admissions	68377	57304	11073	16.2

TABLE 2
The hospital performance indicators of our hospital.

Hospital performance indicators	Year		Difference	%
	2019	2020		
Average daily admissions	187	157	30	16
Bed occupancy rate	86.77	69.41	17.36	20
Average length of hospital stay (in days)	4	4	0	0
Gross death rate	4.32	4.97	0.65*	15.0*
Net death rate	2.31	2.87	0.56*	24.2*

Note: *: Increase.

TABLE 3
The department-wise analysis of major surgeries in various specialties.

	Department-wise analysis of major surgeries			
Department	2019	2020	Difference	%
Cardiovascular and Thoracic Surgery	1428	1046	382	26.8
General Surgery	2212	1540	672	30.4
Gynecology and Obstetrics	3031	2798	233	7.7
Neurosurgery	1764	1394	370	21
Orthopedic Surgerie*[$]	18	7	11	61.1
Pediatric Surgery	1241	902	339	27.3
Plastic Surgery	2867	2027	840	29.3
Surgical Gastroenterology	218	161	57	26.1
Surgical Oncology	304	334	3[£]	9.9[£]
Urology	1703	1196	507	29.8
EBU[$]¥	33	12	21	63.6
Total Major Surgeries	17256	11419	5837	33.8

Note: *: Done in collaboration with other specialties in polytrauma cases; £: Increase; ¥: Endobronchial ultrasound.

dual responsibility of alleviation of transmission of COVID-19 with no or minimal impact on the functioning of health care facilities [13,14].

COVID-19 Pandemic proved to be the largest medical challenge that health care professionals are facing today. Trespassing all barriers, it has altered our practice as healthcare professionals. As doctors we all own universal duties and commitments in dealing with COVID-19, and for these, we resort to various national/international and local guidelines**.** The pandemic has a long-lasting impact on healthcare with numerous hospitals been designated as COVID treatment centers [15,16]. Healthcare has evolved and is still adapting itself to the day-to-day newer demands posed by the changing trends of the disease, including the recently documented mutated strains [7,15].

On March 18, 2020, the Centres for Medicare and Medicaid Services (CMS) announced that all elective surgeries, non-essential medical, surgical, and dental procedures be delayed/deferred. This was directed for the effective resource, manpower, and emergency service management as well as to flatten the rapidly rising curve of the pandemic [17]. As seen in most countries of the world [18], this allowed redirecting resources and staff from non-COVID to COVID facilities for the better management of the patients. Keeping in tune with these developments throughout the world and across the country, similar measures were put in place at our institution. One big task is containing its spread while not letting it hinder patient care. Given the possible threat of disseminating infection whilst furnishing care, complex logistical arrangements have been generated as infection prevention maneuvers to safeguard patients as well as the workforce. In all the countries around the globe, intense systemic and mechanism changes have been enforced; special COVID management areas have been designated [13]. Exposure hazard to COVID-19 in the medical institutions is explicit to all patients, and when reasonable patients are motivated for the treatment on an outpatient basis with the advice of only inevitable follow-up visits. Similar to the advisories by the most national as well as international medical associations and societies, it is endorsed that the patients should avoid visiting the hospital except in an immensely pressing situation [19].

A nationwide lockdown led to the decline in traffic (and hence road traffic accidents) across the country. Also, as people were mostly indoors, other work-related injuries, routine hospital visits, non-essential medical services, etc. saw a marked decrease [20]. Some countries noted around a 5-fold decrease in trauma activations since the lockdown measures were put in place [21].

On the other hand, other types of traumas like that due to speeding motor vehicles (on quieter roads), alcohol and substance abuse (on account of depression), domestic violence (due to couples spending more time together due to lockdown) were reported by some centers around the world [22].

In our study at SKIMS, we can see that there was a significant decrease in outpatient attendance [5,23,24]. This is due to two reasons: lockdown restrictions leading to unavailability of transport on the roads; awareness about COVID-19 by mass media leading to avoidance of unnecessary hospital visits (for minor ailments). Another reason for decreased hospital OPD attendance, apart from public reluctance to visit hospitals, was the start of telemedicine consultation at our Institute. Telemedicine consultations are common elsewhere in other institutions, and this idea was adopted to ease the outpatient population needing consultation.

Inpatient admissions too witnessed a decline. A 20% decrease in routine admissions was noted. There was a reduction in the total number of admissions across all the specialties [25]. This was because elective hospital admissions were deferred to redirect "resources" towards COVID patients. Also due to lockdown, the incidence of trauma-related incidents like road traffic accidents and work-related accidents decreased considerably. In the Department of Gynecology and Obstetrics, "minor" reduction was only noted as this department caters mostly to obstetrics and deliveries which cannot be significantly affected by the pandemic. Only elective Gynecology/Obstetric cases as benign disorders like fibroid surgeries, prolapse, etc. decreased which comprise "minor figures" of total cases in this department. Although the total number of trauma cases decreased, an increase in domestic violence, pediatric injuries (while playing) and other cases where the trauma occurred due to household work demonstrated a rise. Most probably this increase in the number of cases is due to people utilizing "lockdown time" doing household activities, children spending more time in playing and increased "friction" between husband-wife (due to more time being spent together). Similar findings were noted by other authors also [5,23].

Among hospital indicators, Gross and Net death rates showed an increase during the study period [26]. This is due to COVID-19 related mortality in 2020. COVID was a new disease in 2020; hence it would add up to the mortality figures seen in the previous year in 2019. As we know that most of the inpatient mortality is due to emergency conditions/malignancies in a hospital (remained the same), COVID added to these figures in 2020. Similar results were also found in other parts of the world. This explained increase in the Gross and Net death rate in 2020 [27]. The average length of hospital stay in our institution did not change due to COVID-19 because it was associated with the reduction in other elective hospital admissions. This is in concordance with the results seen in other hospitals in India. The Department of Surgical Oncology showed an increase of 9.9% in the number of major surgeries performed in 2020 as compared to 2019. Malignancies are always taken as a priority/semi-emergency and were never given a leave. In absence of other routine theaters, they were allotted additional theaters with the same staff strength as previously. In our hospital, the availability of elective theater is the limiting factor for most surgical specialties; hence this slight increase in the operation rate may be attributed to it. The rate of oncologic surgeries in the rest of the world also did not show significant changes. Oncologic services are always a priority like any other "life-threatening" emergency [28,29].

CONCLUSION

The pandemic of COVID-19 has unleashed a crisis of the unprecedented magnitude that has forced upon us some major decisions in a short span of time. Our routine policies and priorities were forced to change, and all of a sudden "health crisis" out of nowhere loomed around us. Our health care setup needs a serious revamp both at the level of policymakers to grass root level workers to heath education providers so that effective control of health crisis is done. Also, if trauma can be minimized at the time of COVID-19, it can be minimized at "normal times", if education, safety protocols are followed in letter and spirit.

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