

Impact of lockdown on medical emergency visits during the COVID-19 pandemic in India

After emerging from Wuhan, China, in December 2019 and spreading within a short period of a few weeks, COVID-19 had resulted in one of the worst pandemics in history, with global deaths of over three and a half million. Social distancing and masking in public, lockdown, advancement in diagnosis and management and improved infection control measures were used to flatten the epidemic curve. While there is an undeniable role of lockdown (ie, ban on public assembly and restriction of most travel) in curbing the spread of COVID-19, the impact on other services, including chronic illnesses and emergency services, remains unknown. India declared a lockdown which was starting from 25 March 2020 to 30 May 2020 and gradually relaxed after that.¹ There was a significant reduction in the growth rate of cases. It also helped increase the duration in the doubling of patients. Few studies have reported the impact of lockdown on various essential services.² Knowing the effect of lockdowns on hospital services is essential to plan for future pandemics and disasters. Further, with each country experiencing more than one wave, lockdowns (either nationwide or region wise) would be required in the ensuing years. While some data are available from developed nations, data from low/middle-income countries (LMICs) are lacking. We planned to study the impact of lockdown on the trends and mortality among emergency medical admissions and document the difference between the number of emergency visits of the last 4 years and the current year.

We conducted a retrospective study in a large tertiary care centre of Northern India (Post Graduate Institute of Medical Education and Research, Chandigarh, India). The data were collected for the first 6 months of the year 2020, which included the 'pre-lockdown period' (from 1 January 2020 to 31 March 2020), lockdown period (1 April 2020 to 31 May 2020) and the post-lockdown period (1 June 2020 till 30 June 2021). Data were also collected regarding monthly visits and corresponding mortality for the past 4 years from the central records department. All consecutive patients visiting the medical emergency during the study period were enrolled. We obtained monthly visits and

corresponding mortality data from our central records department from January 2016 to June 2020. We also retrieved the information on subjects requiring hospitalisation for ≥ 24 hours for 2020 from the data registers maintained at the emergency observational units.

The sociodemographic profile and the diagnosis (classified as per the International Classification of Diseases-10 system) were documented. Descriptive statistics were used for summarising the characteristics of study groups. Categorical variables were presented as numbers (%) and continuous variables as mean \pm SD. Differences in the pattern of diagnosis between the three groups were tested by χ^2 test and analysis of variance for categorical and continuous variables, respectively. The p value for significance was set at <0.05 .

We calculated the percentage difference in admissions during January and February 2020 (when no COVID-19 cases were reported in our region) compared with the previous 4-year average (January and February of 2016–2019). For example, the percentage difference in January 2020 was derived as: $((\text{the number of visits in January 2020} - \text{average visits in January 2016} - 2019) / \text{average visits in January 2016} - 2019) * 100$. Then we used the percentage difference to estimate the expected number of visits from March to June 2020. Finally, the percentage decline

in emergency visits was then calculated as follows: $\text{percentage decline} = (((\text{estimated number of visits} - \text{the actual number of visits}) / \text{the estimated number of visits}) * 100)$.

A total of 22 267 emergency visits was observed during the study period (January to June 2020). Figure 1 shows the difference between the monthly visits between the previous 4 years and the study period (online supplemental table 1). Hospital visits have been increasing over the years. There was a 27% increase in admissions during January and February 2020 compared with the average of the previous 4 years. There was a decline in emergency visits by 54% (expected—10 151, actual—4681) during the lockdown period, which recovered to 31.6% (expected—4991, actual—3415) during the post-lockdown period.

Twelve thousand six hundred and ninety-one (57.0%) patients were admitted to the medical emergency from January to June 2020. Of these, 8965 (70.6%), 2310 (18.2%) and 1416 (11.2%) patients were admitted during the pre-lockdown, lockdown and post-lockdown period, respectively. All patients visiting the emergency were tested for COVID-19 by the reverse transcriptase-PCR technique. No COVID-19 patient was encountered during the pre-lockdown period, with the lockdown and post-lockdown periods showing a total of 417 (11.2%) and 40

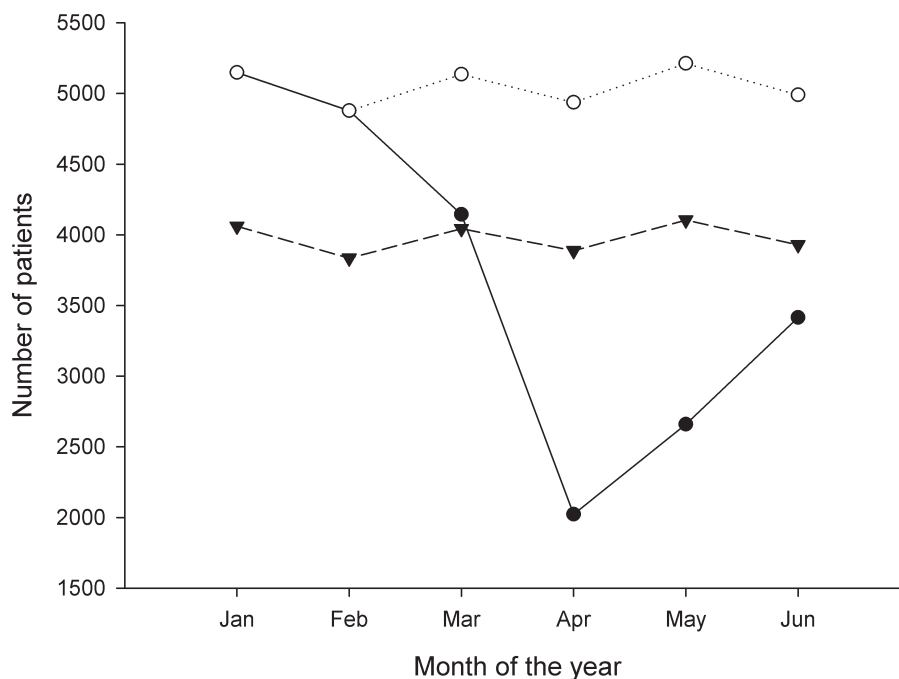


Figure 1 Trends of emergency visits before, during and after a lockdown compared with the previous 4-year monthly average. The solid line represents the current year (2020), the dashed line represents the average of the last 4 years (2016–2019) and the dotted line represents the expected patient visits.

Table 1 Demography, organ involvement and mortality in a medical emergency during COVID-19 pandemic

Variables	Pre-lockdown (n=8965)	Lockdown (n=2310)	Post-lockdown (n=1416)	P value
Age in years*	50.5 (17.4)	49.9 (17.2)	49.2 (16.6)	0.014
Sex (male)	5745 (64.1)	1466 (63.5)	927 (65.5)	0.46
Organ system involved				0.0001
Nervous system	1777 (19.8)	393 (17)	206 (14.5)	
Cardiovascular system	1443 (16.1)	555 (24)	381 (26.9)	
Gastrointestinal system	1504 (16.8)	293 (12.7)	196 (13.8)	
Renal system	715 (8)	173 (7.5)	103 (7.3)	
Respiratory system	768 (8.6)	113 (4.9)	92 (6.5)	
Haematological system	269 (3)	57 (2.5)	44 (3.1)	
Toxicological emergencies	147 (1.6)	63 (2.7)	48 (3.4)	
Endocrine system	189 (2.1)	33 (1.4)	14 (1)	
Multisystem involvement	1807 (20.2)	539 (23.3)	266 (18.8)	
Miscellaneous diseases	346 (3.9)	91 (3.9)	66 (4.6)	
Mortality	1206 (13.5)	260 (11.3)	212 (15.0)	0.0025

Pre-lockdown: January–March 2020; lockdown: April–May 2020; post-lockdown: June 2020. The parameters are presented as *mean (SD) and as numbers (%).

(9.6%) positive patients, respectively. Once these patients were tested positive, they were shifted to a dedicated COVID-19 unit in a different part of the hospital. Cardiovascular, neurological or gastrointestinal disorders constituted more than half of the admitted patients in all three periods (table 1). There was a significant change in the pattern of admissions during these periods (p value=0.0001). The proportion of patients getting admitted for cardiovascular ailments had increased. Admissions due to poisoning had also doubled in the post-lockdown period compared with the pre-lockdown period. The rest of the systems involved was similar across the three time periods. Mortality among admitted patients was 11.3%, 15% and 13.5% during the pre-lockdown, the lockdown and the post-lockdown periods, respectively (p=0.0025).

To the best of our knowledge, we describe the largest series of lockdown impacts on medical emergencies in an LMIC; we observed a decline in medical emergency visits by more than half during the lockdown period compared with the previous 4 years database. While the emergency visits increased in the post-lockdown period, they did not completely normalise. As the lockdown measures were relaxed phase-wise, health-seeking behaviour among the population gradually increased. However, it did not wholly normalise, which may be because of the fear of acquiring COVID-19 and restrictions in traffic movement across the interstate borders. Similar studies conducted worldwide during the initial phase of the COVID-19 pandemic have shown a decline in admission across all medical

emergencies.³ The pattern of diseases requiring emergency visits during the lockdown period differed significantly from those before and after. The proportion of cardiovascular diseases and poisonings had increased during the lockdown period. This appears to be a paradox as compared with other parts of the world; this may be as this study is from an LMIC, during the pandemic, many patients could not have access to quality care and medications which would have made the underlying illness deteriorate and present during the lockdown and after lockdown. COVID-19 related stress may also be a contributing factor to the increase in cardiac disease. We also found a proportional increase in poisoning cases; this can be attributable to the anxiety of home isolation, disruptions to social supports and activities, fear of contracting COVID-19, aggravated mental health disorders, limited access to primary care socioeconomic destabilisation of individual families.⁴

Despite India being the second largest country affected by the COVID-19 pandemic, the effect and consequences of lockdown on emergency services have not been clearly defined. Several factors such as the fear of acquiring COVID-19, miscommunication about the health setup reorganisation, strict border closures and related transport issues could have influenced the emergency visits by patients. There was a significant decrease in mortality during the lockdown period compared with the pre-lockdown period in our study. The reduction in mortality could indicate better services due to an improved doctor–patient ratio or the inability to move sick patients to the

hospital.⁵ The latter could be the reason for the observed increased mortality post-lockdown period wherein patients who deteriorated or developed complications during lockdown could reach the medical facility.

Our study had a few limitations, like using only the working diagnosis, which is just a snapshot of the patient on admission and not the definitive diagnosis. Similarly, we did not assess the clinical, laboratory and treatment-related characteristics. It was a single-centre study from an academic hospital and hence may not be generalised. We observed a change in the pattern of diseases, a decrease in emergency visits, admissions and mortality during the lockdown period compared with the pre-lockdown period. Nevertheless, we provide the profile of emergency patients and the pattern of disease from an LMIC, which would help us prepare for any future epidemic, pandemic or disaster.

Mandeep Kaur Saini,¹ Hemendra Kumar,¹ Komal Saini,¹ Ashish Behera¹ ,¹ Ashok Kumar Pannu¹ ,¹ Kathirvel Soundappan,² Mohan Kumar H¹

¹Internal Medicine, Post Graduate Institute of Medical Education and Research, Chandigarh, India

²Community Medicine and School of Public Health, Post Graduate Institute of Medical Education and Research, Chandigarh, India

Correspondence to Dr Mohan Kumar H, internal medicine, Post Graduate Institute of Medical Education and Research, Chandigarh 160012, India; monu8501@gmail.com

Acknowledgements We would like to thank Dr Valliappan Muthu and Professor Navneet Sharma for their support in analysing data and editing the manuscript.

Contributors MKH, AB contributed to conceptualisation. MKS, HK, KSo contributed to data curation. MKH, KSo contributed to formal analysis. MKH, KSo, AB contributed to methodology. MKS, HK, KSo contributed to writing-original draft. MKH, KSo, AKP contributed to writing-review and editing.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The study protocol was approved by the institutional ethics committee.

Provenance and peer review Not commissioned; internally peer reviewed.

This article is made freely available for use in accordance with BMJ's website terms and conditions for the duration of the covid-19 pandemic or until otherwise determined by BMJ. You may use, download and print the article for any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trade marks are retained.

© Author(s) (or their employer(s)) 2021. No commercial re-use. See rights and permissions. Published by BMJ.

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/postgradmedj-2021-140850>).



To cite Saini MK, Kumar H, Saini K, *et al.*
Postgrad Med J Epub ahead of print: [please include
 Day Month Year]. doi:10.1136/
 postgradmedj-2021-140850
 Accepted 29 August 2021

Postgrad Med J 2021;0:1–3.
 doi:10.1136/postgradmedj-2021-140850

ORCID iDs

Ashish Behera <http://orcid.org/0000-0002-1750-2352>
 Ashok Kumar Pannu <http://orcid.org/0000-0002-4476-3478>
 Mohan Kumar H <http://orcid.org/0000-0003-4426-9610>

REFERENCES

- 1 Iyengar KP, Jain VK. COVID-19 and the plight of migrants in India. *Postgrad Med J* 2021;97:471.
- 2 Kumar SU, Kumar DT, Christopher BP, *et al.* The rise and impact of COVID-19 in India. *Front Med* 2020;7:250.
- 3 Oomman S, Todd E. Impact of COVID-19 lockdown on A&E performances in an NHS Foundation Trust. *Postgrad Med J* 2021;97:48.
- 4 Le Roux G, Sinno-Tellier S, Puskarczyk E, *et al.* Poisoning during the COVID-19 outbreak and lockdown: retrospective analysis of exposures reported to French poison control centres. *Clin Toxicol* 2021;59:832–9.
- 5 Butt JH, Fosbøl EL, Gerds TA, *et al.* All-Cause mortality and location of death in patients with established cardiovascular disease before, during, and after the COVID-19 lockdown: a Danish nationwide cohort study. *Eur Heart J* 2021;42:1516–23.

Supplement Table 1 Trends of emergency visits before, during, and after a lockdown in comparison with the previous four-year monthly average

	Actual number of patient visits 4-year average	Actual number of patient visits 2020	Actual difference in number of patient visits	Calculated Percentage change	Expected value in 2020 by applying 27% multiplication factor	Percentage drop from expected value
January	4061.5	5148	1086.5	26.8	5158.2	-
Feb	3835	4878	1043	27.2	4870.5	-
Mar	4044	4145	101	-	5135.9	19.3
Apr	3888	2022	-1866	-	4937.8	59.1
May	4104.8	2659	-1445.8	-	5213.0	49.0
Jun	3929.8	3415	-514.8	-	4990.8	31.6