

Effect of COVID-19 Pandemic on Emergency Department Admissions and Outcome

Jagannath Tiwari,¹ Pramod Paudel,¹ Sujan Adhikari,¹ Sharmila Lamichhane,¹ Anjali Basnet,² Kirtipal Subedi,³ Pratiksha Bhattarai,⁴ Prajwal Paudel³

¹Bharatpur Hospital, Bharatpur, Chitwan, Nepal, ²Global Star Education Foundation, Maitidevi, Kathmandu, Nepal, ³Paropakar Maternity and Women Hospital, Thapathali, Kathmandu, Nepal, ⁴Golden Community, Chakupat, Lalitpur Nepal.

ABSTRACT

Background: Emergency Department admissions have changed significantly during the COVID-19 pandemic. Understanding this variation may play a crucial role in rearranging hospital resources for better outcome. In this study, we aimed to assess the impact of COVID-19 pandemic on emergency department admission and outcome.

Methods: This is a cross-sectional retrospective study conducted at Bharatpur Hospital, Nepal comparing pre-pandemic data of the 4 months (March 24 to July 21, 2019) with the initial 4 months of the pandemic (March 24 to July 21, 2020).

Results: Admission in emergency ward decreased during covid period among female admission (47%vs43%), age-group(0-14)(18%vs12%), Dalit(17%vs11%) $p < 0.0001$. Diagnosis increased during covid for acute abdomen(11%vs13%), animal and insect bite(10%vs13%), psychiatric illness(2%vs6%), poisoning and drug over dose(0.9%vs2.6%)($p < 0.0001$). The odds for referral(cOR 3.62,95% CI:2.70-4.84), Left against medical advice(cOR 6.03,95% CI:.06-8.94) and death(cOR 3.28,95% CI:1.64-6.68) increased during the covid respectively.

Conclusions: There was decrease in rates of emergency department utilization during the Covid-19 pandemic. Admissions due to trauma, gastrointestinal, respiratory, neurological, musculoskeletal and coronary artery disease showed a decline whereas psychiatric disorders, diabetes and hypertension, animal and insect bites cases increased. Overall, mortality rate was increased.

Keywords: Admission; Covid-19; emergency department

INTRODUCTION

The COVID-19 pandemic has brought in an unprecedented change in the global, national and on daily wellbeing.¹ Different pandemic control policies such as lockdowns have been implemented to limit the spread of disease which impacted on the care of patient at emergency department and other settings.²

Reduction in admissions rate in terms of cardiovascular conditions, including acute myocardial infarction (AMI), stroke, and other conditions were observed.³⁻⁶ Such declines could be due avoidance of visit to hospitals due to fear of transmission of COVID-19 infections rather than reduction in the incidence of the disease condition.^{5,7}

After the detection of first case of COVID-19 on Jan 23, 2020 in Nepal along with the additional cases, pandemic control policies such as national lockdown and travel restrictions was introduced.⁸ This might have possibly brought significant changes in ED admissions rate and also in the patterns of disease and changes in mortality. We aimed to evaluate the impact of COVID-19 pandemic in Emergency department admissions and mortality.

METHODS

A cross-sectional retrospective study was conducted to assess the impact of COVID-19 pandemic on emergency department admission and outcome.

Place and duration of study: This study was conducted

Correspondence: Dr Prajwal Paudel, Paropakar Maternity and Women Hospital, Thapathali Kathmandu, Nepal. Email: prajwal.paudel999@gmail.com, Phone: +9779864222749.

at Bharatpur Hospital, Chitwan, Nepal which serves fairly high number of emergency department admissions annually. The hospital serves as a referral hospital for many neighboring districts like Nawalpur, Nawalparasi, Makwanpur, Parsa, Rupandehi, Dhading, Gorkha. Most of these places are connected to the study hospital by road which were almost unavailable during the national lock down except for ambulances and emergencies. Total data of 8 months was collected and analyzed. Pre pandemic data of the 4 months (March 24 to July 21, 2019) was compared with the data during the initial 4 months of the pandemic (March 24 to July 21, 2020). All the patients including the pediatric cases, adult, and geriatric emergency cases admitted during the study period were included in the study. Since obstetric emergencies are managed in the Obstetric department directly, they were not included in the study.

Ethical approval was taken from the institutional review committee, Bharatpur Hospital (078/78-008/HG). The data collection process was commenced after receiving the ethical approval.

All the details of the patients, treatment received, outcome and related clinical conditions was extracted from the emergency registers and patients chart. Descriptive statistics using frequency and percentage was used to describe the demographic and clinical status and outcome of the admitted patients. Comparison of the ED admission during and before pandemic was done using a trend analysis using a line graph. Pearson's Chi squared test was used to determine the level of significance. Bivariate logistic regression analysis was conducted for calculation of odds ratio.

RESULTS

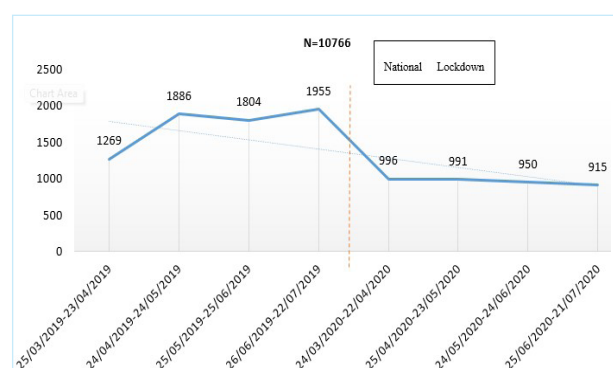


Figure 1. Emergency ward admission during pre and post covid period.

Figure 1 shows the monthly hospital admission at the emergency ward during pre and post Covid period. The emergency ward admission decreased over the initial months of Covid lock down as compared to admissions over same months' previous year (1269 vs 996, 1886 vs 991, 1804 vs 950, 1995 vs 915) respectively.

Table 1. Background characteristics of patients admitted at the Emergency Unit.

Indicator	Pre-Covid (N=7014)	Covid (N=3752)	p-value
Sex			0.000
Male	3708(53%)	2112(56%)	
Female	3306(47%)	1640(43%)	
Age			<0.0001
0-14	1287(18%)	452(12%)	
15-24	1259(18%)	806(21%)	
25-64	3462(49%)	2044(54%)	
≥65	1006(14%)	450(12%)	
Ethnicity			<0.0001
Dalit	1178(17%)	427(11%)	
Janjati	2834(40%)	1701(45%)	
madhesi	365(5%)	112(3%)	
Muslim	185(3%)	39(1%)	
Brahmin/chettri	2320 (33%)	1450(39%)	
Others	132(2%)	23(1%)	
Distance from hospital			<0.0001
<10 km	1167(17%)	926(25%)	
10-24 km	2460(35%)	1458(39%)	
25-50 km	2261(32%)	1042(28%)	
>50 km	1126(16%)	326(9%)	

Table 1 Shows the background characteristics of patients who were admitted at the emergency department during pre and post covid period. The female proportion at emergency admission decreased during Covid period compared to pre covid period (47% vs 43%) ($p=0.000$). The proportion of patient from Janajati (40% vs 45%) and brahmin/chhetri (33% vs 39%) ethnic group increased during covid period compared to pre covid period ($p<0.0001$). The proportion among age group >65 years decreased during the covid period (14% vs 12%) ($p<0.0001$). The proportion of admission among patient from 25-50 km distance (32% vs 28%) and >50km (16% vs 9%) decreased during covid period compared to pre covid period ($p<0.0001$).

Table 2. ER Diagnosis among admitted patients during pre and post covid period.

Diagnosis	Pre-Covid	Covid	p-value
Gastrointestinal Problems			0.003
	1198(17%)	559(15%)	
Respiratory Problems			0.011
	901(13%)	419(11%)	
Acute Abdomen			0.024
	780(11%)	472(13%)	
Neurological			<0.0001
	150(2%)	31(1%)	
Diabetes, Hypertension, Stroke			0.506
	384(5%)	217(6%)	
Renal			0.497
	271(4%)	155(4%)	
Musculoskeletal			0.000
	123(2%)	34(1%)	
Psychiatric Illness			<0.0001
	117(2%)	240(6%)	
Coronaryartery disease(CAD)			0.041
	43(0.6%)	12(0.3%)	

The types of diagnosis among admitted patient at emergency department during pre and covid period is shown in Table 2. There was a significant decrease in the diagnosis among admitted cases during covid period compared to pre covid period gastro intestinal (17% vs 15%) respiratory problem (13% vs 11%), musculoskeletal (2% vs 1%) neurological (2% vs 1%), ($p<0.05$) and coronary artery disease(CAD) (0.6% vs 0.3%) ($p<0.05$). There was a significant increase in the diagnosis from pre covid period to covid period among acute abdomen problem (11% vs 13%) and psychiatric illness (2% to 6%) ($p<0.0001$).

Table 3. Additional ER Diagnosis among admitted patients during pre and Covid.

Diagnosis	Pre-Covid	Covid	p-value
Trauma & Injuries			0.000
No	5739(82%)	3281(88%)	
Yes	1275(18%)	471(12%)	
Infectious Diseases			<0.0001
No	6761(96%)	3696(99%)	
Yes	253(4%)	56(1%)	
Animal & Insect Bites			<0.0001
No	6322(90%)	3248(87%)	
Yes	692(10%)	504(13%)	
Poisoning and Drug overdose			<0.0001

No	6951(99.1%)	3655(99.7%)	
Yes	63(0.9%)	97(2.6%)	
Others			0.977
No	6207(88%)	3321(88%)	
Yes	807(12%)	431(12%)	

The additional types of diagnosis among admitted patient at emergency department during pre covid and covid period is shown in Table 3. There was a significant decrease in the diagnosis among admitted cases during covid period compared to pre covid period for trauma and injuries (18% vs 15%), infectious disease (4% vs 1%) ($p<0.0001$). Similarly, there was a significant increase in the diagnosis from pre covid period to covid period among animal and insect bite (10% vs 13%) and poisoning and drug over dose (0.9% vs 2.6%) ($p<0.0001$).

Table 4. Outcome of the cases admitted at the Emergency Ward during pre Covid & Covid.

Indicators	Pre-covid (n=7014)	Covid (n=3752)	cOR 95%(CI)	p-value
Improved			0.96 (0.89-1.04)	0.368
No	3150(45%)	1719(46%)		
Yes	3864(55%)	2033(54%)		
Admitted			0.83 (0.77-0.90)	<0.0001
No	3980(58%)	2292(61%)		
Yes	3034(42%)	1460(39%)		
Referred			3.62 (2.70-4.84)	<0.0001
No	6943(99%)	3618(96%)		
Yes	71(1%)	134(3%)		
LAMA			6.03 (4.06-8.94)	<0.0001
No	6981(99.6%)	3648(97%)		
Yes	33(0.4%)	104(3%)		
Death			3.28 (1.64-6.68)	0.000
No	7002(99.8%)	3731(99.5%)		
Yes	12(0.2%)	21(0.6%)		

Table 4 shows the outcome of the admitted cases in the emergency department during pre and post covid period. The odds for having patient admission was

27% lesser during covid period (cOR:0.83,95% CI:0.77-0.90); ($p<0.001$). The odds of having referral from the emergency department was 3.62 times higher during covid period (cOR: 3.62, 95% CI:2.70-4.84) ;($p<0.0001$). The odds of having patient leaving against medical advice(LAMA) was 6.03 times higher during the covid period (cOR:6.03 95% CI:4.06-8.94) ;($p<0.0001$). The odds of having death within the emergency department was 3.28 times higher during the covid period (cOR:3.28,95% CI:1.64-6.68) ;($p=0.000$).

DISCUSSION

A newly emerged pandemic i.e. COVID-19 created chaos in human life and the global health system. The lack of appropriate treatment measures for COVID-19 led to an emphasis on public health preventive measures. The majority of the hospitals throughout the world adopted various measures such as shut down of non-commercial activities, non-essential travel restriction, physical distancing, lockdowns, quarantine, isolation, and other measures.⁹ Modalities of lockdown led to the modification of hospital practices which impacted the emergency ward leading lack of emphasis on emergency care of non-COVID-19 patients.¹⁰ This raised concerns about the quality of life of non-COVID-19 patients. However, studies have also suggested that despite the life-threatening conditions, patients have avoided emergency admissions due to fear of getting infected with COVID-19.^{7,11} Similar reasons might have decreased the emergency admission during our study as well. Similarly, other studies also reported decreased emergency admissions due to COVID-19.¹²⁻¹⁴

COVID-19 has adversely impacted the socio-economically vulnerable groups such as the poor, and minorities. Lockdown modalities have caused a huge problem to the daily wage earners due to which they are unable to fulfill their basic needs of food and shelter.¹⁵ Such populations are already deprived of quality health care services and the pandemic has widened the gap in health equity. Those with good socio-economic conditions can consult with their health care providers through phone or home visits which is not possible for poor people.¹⁶ Similarly, those willing to visit health care centers may have accessibility issues due to lack of transportation during lockdown while advantageous groups may visit the health care center in their private vehicles at ease.¹⁷

Various constraints acted as a barrier to the utilization of health services during a pandemic. Health services were interrupted due to the disruption of transportation services particularly during the lockdown. Similarly, the

availability of ambulances was also constrained during the lockdown period due to which patients could not reach the health facility. Both rural and urban settings of Nepal were impacted due to the long-term closure of transportation services. This caused extreme hardships for the patient to fulfill their routine health-related check-up and could not attend non-COVID illness-related health services.^{18,19} Similarly, the current study showed that the proportion of admission among patients was also decreased due to the distance from the hospital ($p<0.0001$).

Despite the increase in psychiatric illnesses, the positive impact of COVID-19 was the reduction in trauma and injury cases. Studies have reported a significant decrease in the incidence of trauma during the pandemic as there was a reduction in road traffic collisions due to lockdowns and work-from-home modalities.^{20,21} A study revealed a 26.7% reduction in the overall incidence of trauma admission during the pandemic.²² Similarly, this study observed a reduction of trauma and injuries admissions by 6%. Another study also depicted a decrease in cases of trauma and injuries with the decrease in road traffic accidents during the lockdown.²³ However, reduction in cases does not mean the overall reduction of trauma and injuries as depicted by another study in Nepal. Even though the reduction of road crashes and related injuries was observed, there was some incidence of ambulances and other vehicle crashes due to ease in traffic congestion and speed of vehicles.²⁴

Some studies reported decreased cases of respiratory diseases with the implementation of pre-lockdown measures as observed in this study as well.^{25,26} This could be due to the implementation of various preventive measures such as wearing masks, physical distancing, hand washing, and others which limits the contact with the infected person. Studies have reported a reduction in the emergency department for cardiac presentations.²³ Similarly decreased cases of chronic illness such as coronary artery diseases were observed in this study. Patients with cardiovascular diseases are vulnerable ones requiring careful diagnostics, monitoring, and treatment which increases the risk of COVID-19 exposure.²⁷ Thus, decreases might be mostly due to the avoidance of treatment by patients out of fear of exposure to COVID-19 in hospital settings. Similarly, shortages of personal protective equipment (PPE) for medical staff could have also limited the utilization of health services.²⁸ But cases of other lifestyle-related diseases such as diabetes mellitus, hypertension were found to be increased during COVID-19 which was detected in the present study as well. The possible reason could be

psychological stress that worsens hyperglycemia, limited physical activity, and change in diet due to lockdown which may cause weight gain and enhance the risk of metabolic disorders.^{29,30}

Undoubtedly, mental health-related problems have been rising since the pandemic. Studies have suggested that traumatic events as such of the pandemic are associated with a psychiatric illness like increased depression and anxiety.³¹ A study in Geneva showed that there was a statistically significant increase in psychiatric emergency admissions such as suicidal behavior and behavior-related problems during the COVID-19 period.³² Similarly, a study conducted in Nepal depicted that suicide and self-harm increased by 44% and 71.9% during the lockdown in the emergency department.³³ Increase of psychiatric illness in the emergency department was also observed in this study. Loss of loved ones due to pandemics, lack of financial stability, academic pressures, fear of being infected, poverty, loss of employment, and other factors might have resulted in it.¹⁸

This was one of the few studies to shed light on indirect effects of COVID -19 on emergency department care. However, this study has some limitations. Besides being a retrospective study, our study was a single center study. The admission rates and outcome among the COVID positive cases could not be highlighted.

CONCLUSIONS

We found reduced admission rates in ED during the initial months of the pandemic. The rate of admission for trauma, injuries, gastrointestinal, neurological, musculoskeletal, coronary artery disease were significantly reduced. Conversely, psychiatric disorders, diabetes and hypertension, animal and insect bites outnumbered during the pandemic as compared to their attendance during the same months of previous year. Mortality as well as referral and LAMA cases increased.

CONFLICT OF INTEREST

The authors declare no conflict of interest

REFERENCES

- Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun* [Internet]. 2020 May 1 [cited 2022 Apr 12];109. [PubMed | FullText]
- Menendez C, Gonzalez R, Donnay F, Leke RGF. Avoiding indirect effects of COVID-19 on maternal and child health. *Lancet Glob Heal* [Internet]. 2020 Jul 1 [cited 2022 Mar 16];8(7):e863. [PubMed | DOI | FullText]
- Metzler B, Siostrzonek P, Binder RK, Bauer A, Reinstadler SJ. Decline of acute coronary syndrome admissions in Austria since the outbreak of COVID-19: the pandemic response causes cardiac collateral damage. *Eur Heart J* [Internet]. 2020 May 14 [cited 2022 Apr 12];41(19):1852–3. [PubMed | FullText]
- Sokolski M, Gajewski P, Zymliński R, Biegus J, Berg JMT, Bor W, et al. Impact of Coronavirus Disease 2019 (COVID-19) Outbreak on Acute Admissions at the Emergency and Cardiology Departments Across Europe. *Am J Med* [Internet]. 2021 Apr 1 [cited 2022 Apr 12];134(4):482. [PubMed | FullText]
- Nourazari S, Davis SR, Granovsky R, Austin R, Straff DJ, Joseph JW, et al. Decreased hospital admissions through emergency departments during the COVID-19 pandemic. *Am J Emerg Med* [Internet]. 2021 Apr 1 [cited 2022 Mar 16];42:203. [PubMedFullText]
- Gómez-Ramiro M, Fico G, Anmella G, Vázquez M, Sagué-Vilavella M, Hidalgo-Mazzei D, et al. Changing trends in psychiatric emergency service admissions during the COVID-19 outbreak: Report from a worldwide epicentre. *J Affect Disord* [Internet]. 2021 Mar 1 [cited 2022 Apr 12];282:26–32. [PubMed | FullText]
- Kuitunen I, Ponkilainen VT, Launonen AP, Reito A, Hevonkorpi TP, Paloneva J, et al. The effect of national lockdown due to COVID-19 on emergency department visits. *Scand J Trauma Resusc Emerg Med* [Internet]. 2020 Dec 1 [cited 2022 Mar 16];28(1):1–8. [BMC | DOI]
- Ministry of Health and Population. Coronavirus disease (COVID-19) outbreak updates & resource materials. Situation report 42. Government of Nepal, Kathmandu 2020 <https://heoc.mohp.gov.np/update-on-novel-coronavirus-covid-19/> Date accessed: May 9, 2020 [View in Article](#) .[Google Scholar](#)
- Talic S, Shah S, Wild H, Gasevic D, Maharaj A, Ademi Z, et al. Effectiveness of public health measures in reducing the incidence of covid-19, SARS-CoV-2 transmission, and covid-19 mortality: systematic review and meta-analysis. *BMJ* [Internet]. 2021 Nov 18 [cited 2022 Mar 16];375. Available from: <https://www.bmj.com/content/375/bmj-2021-068302> [DOI | FullText]
- Ekwoaba JO, Ugochukwu .U. Ikejeje, Ufoma N. The impact of recruitment and selection criteria on organizational performance. *Global Journal of Human Resource Management* [Internet]. 2015;3(2):22–33. [FullText]
- Andrade C. COVID-19 and lockdown: Delayed effects on health. *Indian Journal of Psychiatry* [Internet]. 2020 May 1 [cited 2022 Mar 16];62(3):247. [PubMed | DOI]
- Vollmer MAC, Radhakrishnan S, Kont MD, Flaxman

- S, Bhatt S, Costelloe C, et al. The impact of the COVID-19 pandemic on patterns of attendance at emergency departments in two large London hospitals: an observational study. *BMC Health Services Research* [Internet]. 2021 Dec 1 [cited 2022 Mar 20];21(1):1–9. [BMC | DOI]
13. Butt AA, Kartha AB, Masoodi NA, Azad AM, Asaad NA, Alhomsy MU, et al. Hospital admission rates, length of stay, and in-hospital mortality for common acute care conditions in COVID-19 vs. pre-COVID-19 era. *Public Health* [Internet]. 2020 Dec 1 [cited 2022 Mar 20];189:6. [PubMed | DOI | FullText]
 14. Kalanj K, Marshall R, Karol K, Tiljak MK, Orešković S. The Impact of COVID-19 on Hospital Admissions in Croatia. *Frontiers in Public Health*. 2021 Sep 9;9:1307. [PubMed | DOI | FullText]
 15. Shadmi E, Chen Y, Dourado I, Faran-Perach I, Furler J, Hangoma P, et al. Health equity and COVID-19: Global perspectives. *International Journal for Equity in Health* [Internet]. 2020 Jun 26 [cited 2022 Mar 20];19(1):1–16. [BMC | DOI]
 16. Moscrop A, Ziebland S, Roberts N, Papanikitas A. A systematic review of reasons for and against asking patients about their socioeconomic contexts. *International Journal for Equity in Health* 2019 18:1 [Internet]. 2019 Jul 23 [cited 2022 Mar 20];18(1):1–15. [BMC | DOI]
 17. Singh DR, Sunuwar DR, Shah SK, Karki K, Sah LK, Adhikari B, et al. Impact of COVID-19 on health services utilization in Province-2 of Nepal: a qualitative study among community members and stakeholders. *BMC Health Services Research* [Internet]. 2021 Dec 1 [cited 2022 Mar 16];21(1):1–14. [BMC | DOI]
 18. Poudel K, Subedi P. Impact of COVID-19 pandemic on socioeconomic and mental health aspects in Nepal. *International Journal of Social Psychiatry* [Internet]. 2020 Dec 1 [cited 2022 Mar 20];66(8):748–55. [FullText]
 19. Karkee R, Morgan A. Providing maternal health services during the COVID-19 pandemic in Nepal. *The Lancet Global Health* [Internet]. 2020 Oct 1 [cited 2022 Mar 20];8(10):e1243–4. [Lancet | DOI]
 20. Kamine TH, Rembisz A, Barron RJ, Baldwin C, Kromer M. Decrease in Trauma Admissions with COVID-19 Pandemic. *Western Journal of Emergency Medicine* [Internet]. 2020 [cited 2022 Mar 20];21(4):819. [PubMed | DOI | FullText]
 21. DiFazio LT, Curran T, Bilaniuk JW, Adams JM, Durling-Grover R, Kong K, et al. The Impact of the COVID-19 Pandemic on Hospital Admissions for Trauma and Acute Care Surgery. *American Surgeon* [Internet]. 2020 Aug 1 [cited 2022 Mar 20];86(8):901–3. [FullText]
 22. Alao DO, Cevik AA, Yasin YJ, Jaiganesh T, Abu-Zidan F. The COVID-19 pandemic reduced the trauma incidence and modified its pattern in Al-Ain City, United Arab Emirates. *European Journal of Trauma and Emergency Surgery* [Internet]. 2022 [cited 2022 Mar 20];1. [PubMed | DOI | FullText]
 23. Sharma BD, Sitaula J, Neupane G, Dawadi TP. Effect of the COVID-19 Lockdown on Orthopedic Services In A Tertiary Hospital In Nepal. *Journal of Chitwan Medical College*. 2019;6(34):2299–305.
 24. Sedain B, Pant PR. Road traffic injuries in Nepal during COVID-19 lockdown. *F1000Research* [Internet]. 2020 [cited 2022 Mar 20];9. [PubMed | DOI | FullText]
 25. Wan WY, Thoon KC, Loo LH, Chan KS, Oon LLE, Ramasamy A, et al. Trends in Respiratory Virus Infections During the COVID-19 Pandemic in Singapore, 2020. *JAMA Network Open* [Internet]. 2021 Jun 1 [cited 2022 Mar 20];4(6):e2115973–e2115973. [FullText]
 26. Alsallakh MA, Sivakumaran S, Kennedy S, Vasileiou E, Lyons RA, Robertson C, et al. Impact of COVID-19 lockdown on the incidence and mortality of acute exacerbations of chronic obstructive pulmonary disease: national interrupted time series analyses for Scotland and Wales. *BMC Medicine* [Internet]. 2021 Dec 1 [cited 2022 Mar 20];19(1):1–10. [BMC | DOI]
 27. Bax JJ, Prendergast B, Leclercq C. Cardiovascular disease in the COVID-19 pandemic: risk and risk reduction. *European Heart Journal Supplements* [Internet]. 2020 Dec 23 [cited 2022 Mar 20];22(Supplement_P):P1–3. [FullText]
 28. Pina A, Castelletti S. COVID-19 and Cardiovascular Disease: a Global Perspective. *Current Cardiology Reports* [Internet]. 2021 Oct 1 [cited 2022 Mar 20];23(10). [PubMed | DOI | FullText]
 29. Ghosal S, Arora B, Dutta K, Ghosh A, Sinha B, Misra A. Increase in the risk of type 2 diabetes during lockdown for the COVID19 pandemic in India: A cohort analysis. *Diabetes & Metabolic Syndrome* [Internet]. 2020 Sep 1 [cited 2022 Mar 20];14(5):949. [PubMed | DOI | FullText]
 30. Khare J, Jindal S. Observational study on Effect of Lock Down due to COVID 19 on glycemetic control in patients with Diabetes: Experience from Central India. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2020 Nov 1;14(6):1571–4. [PubMed | DOI | FullText]
 31. Janoczkin A, Kiers S, Edara N, He P, Li Y. Impact of COVID-19 pandemic on emergency psychiatry-Millcreek community hospital, Erie, PA. *Comprehensive Psychiatry*.

- 2021 Oct 1;110:152255. [[Pubmed](#) | [DOI](#)]
32. Ambrosetti J, Macheret L, Folliet A, Wullschlegler A, Amerio A, Aguglia A, et al. Psychiatric emergency admissions during and after COVID-19 lockdown: short-term impact and long-term implications on mental health. *BMC Psychiatry* [Internet]. 2021 Dec 1 [cited 2022 Mar 20];21(1):1–8. [[BMC](#) | [DOI](#)]
33. Shrestha R, Siwakoti S, Singh S, Shrestha AP. Impact of the COVID-19 pandemic on suicide and self-harm among patients presenting to the emergency department of a teaching hospital in Nepal. *PloS one* [Internet]. 2021 Apr 1 [cited 2022 Mar 20];16(4). [[Pubmed](#) | [DOI](#) | [Full Text](#)]