Impact of the COVID-19 Pandemic and Lockdown on Non-COVID Neurosurgical Patients: Lessons Learned

Rajnish Kumar Arora¹  Jitendra Shakya¹  Rajkumar Pannem¹  Suresh Sharma²  Saravanan Sadhasivam¹  Vikram Singh Rawat³  Rajashekhar Rekhapalli¹  Rakesh Kumar Sihag¹  Radhey Shyam Mittal¹

¹Department of Neurosurgery, All India Institute of Medical Science, Rishikesh, Uttarakhand, India  
²College of Nursing, All India Institute of Medical Science, Rishikesh, Uttarakhand, India  
³Department of Psychiatry, All India Institute of Medical Science, Rishikesh, Uttarakhand, India

Indian J Neurosurg

Abstract

Objective  The COVID-19 pandemic has challenged the basic functioning of the health care system. There has been an adverse impact on non-COVID-19 patients due to a shift in healthcare delivery, which is underreported. This study aims to explore the impact of the pandemic on various aspects of non-COVID neurosurgical patients.

Methods  This descriptive cross-sectional study was conducted with a structured questionnaire to assess the physical, economic, and psychological impacts of the COVID-19 pandemic and lockdown measures on neurosurgical patients presenting to our hospital after a nationwide lockdown.

Results  Among 203 patients, non-neurotrauma and neurotrauma cases were 175 (86%) and 28 (16%), respectively. Among non-neurotrauma patients, 130 (64%) patients had cranial pathology. All 56 (27.6%) preoperative patients experienced rescheduling of surgery. Among 52 postsurgical patients, 47 (90%) had their adjuvant therapy delayed. Forty patients experienced deterioration in their neurological symptoms. Seventy-six (37%) patients sought medical attention from private hospitals. A severe contraction of income (≥25% of the income before lockdown) was experienced by families of 29 (14.3%) patients. Severe and very severe stress have been experienced by 24 (11.8%) and 14 (6.9%) patients, respectively. Severe and very severe anxiety was experienced by 32 (15.8%) and 9 (4.4%) patients.

Conclusion  The COVID-19 pandemic and nationwide lockdown had a tremendous impact on the physical, social, and psychological well-being of patients with non-COVID illnesses. We are yet to face the long-term implications of the delay due to this pandemic in scheduled surgical and adjuvant treatments of non-COVID neurosurgical patients.

Keywords

► COVID-19  
► impact  
► neurosurgical patients  
► pandemic

© 2022. Neurological Surgeons' Society of India. All rights reserved. This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/)

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India
Introduction

The current pandemic due to coronavirus disease 2019 (COVID-19), which emerged in the Wuhan province of China and spread to other countries across the globe between December 2019 and early 2020, has disrupted every aspect of life.\textsuperscript{1,2} The impact was particularly tremendous on the current healthcare system, which has never seen a pandemic in many decades and is highly underprepared to deal with one. Numerous reports have emerged across the globe, documenting how the hospitals were overwhelmed by the tsunami of COVID-19 patients and how the pandemic disrupted the patients’ routine clinical care.\textsuperscript{3–9} As the hospitals were forced to limit regular admissions and close outpatient clinics to accommodate the ever-increasing number of COVID-19 patients, patients with non-COVID illnesses had to pay a heavy toll. The adverse impact has been on non-COVID-19 patients due to this unexpected and sudden shift in the focus of healthcare delivery. Concurrent lockdown and lack of public transport services also increased the burden on these patients in various aspects such as lack of access to the hospitals, decreased delivery of drugs, and job loss. Not many reports addressed the plight of those patients with non-COVID illnesses during this pandemic. This article reports our experience of ascertaining the perception and implication of this pandemic and lockdown measures on non-COVID neurosurgical patients in our hospital.

Materials and Methods

Study Design

This study is a descriptive cross-sectional survey. It was conducted among neurosurgical patients and their family members from AIIMS, Rishikesh. Our institute was a designated COVID center in Uttarakhand. We followed the CROSS (Checklist for Reporting of Survey Studies) guidelines for the questionnaire-based survey studies. CROSS includes both evidenced-informed and expert consensus-based items, which are intended to serve as a tool that helps improve the quality of survey studies.\textsuperscript{10}

Data Collection Methods

A self-structured questionnaire consisting of 35 questions for data collection, subdivided into five sections, was developed in the native (Hindi) language (Appendix A). The first section consisted of the information related to the socio-demographic and clinical characteristics of the respondents. The second section included the issues related to the overall impact of COVID-19 and lockdown on participants. In the third section, we included questions about the physical health status of participants. This section also discussed the symptoms that arose due to the unavailability of the treatment during the lockdown. The fourth and fifth sections covered questions related to economic losses incurred and the psychological impact of the pandemic and lockdown among participants. We used the Likert scale (5-point scale) to assess the economic and psychological effects on the non-COVID patients and their family members.

Survey Administration

The period of data collection was from May 13, 2020, to July 31, 2020. We circulated the questionnaire as a Google form (Google, Alphabet inc., CA, USA) via WhatsApp messenger (WhatsApp, Facebook Inc. CA, USA).

Sample Characteristics

To study the impact of the pandemic and lockdown on non-COVID neurosurgical patients, we identified patients who had visited our department before the pandemic from the hospital record using the convenience sampling technique. We included those who had earlier undergone a neurosurgical procedure in our departments. We also included those patients who completed preoperative evaluation from our outpatient departments and were waiting for surgical intervention. Patients/families who were unwilling to participate in the study or were unable to give their responses due to any reason were excluded. The respondents’ participation was voluntary, and we took informed consent from all participants.

Statistical Analysis

The statistical analysis was performed using descriptive statistics. We used Microsoft Excel, 2013 version (Microsoft Corp., Washington, USA) for the statistical analysis.

Ethical Considerations

The authors complied with the institutional and national committees’ ethical standards. The Institutional Ethics Committee of AIIMS, Rishikesh, approved the study (IEC/21/19).

Results

Out of 208 participants, we got responses from 203 participants, so the response rate was 97.6%. Table 1 summarizes the demographic characters and health status of the patients. We could recruit 203 patients for this study. The majority (66%) were between 18 and 50 years of age, and 11.3% were less than 18 years. Among 203, 125 (61.6%) patients were males. We divided the patients into neurotrauma and nonneurotrauma-related cases. Nonneurotrauma cases accounted for 86% (175 patients) of the total patients, and 14% (28 patients) were follow-up neurotrauma patients.

Among the nonneurotrauma patients, 130 (64%) patients had cranial pathology, and the remaining 45 (36%) patients were follow-up patients with spinal pathologies. Among 203 patients, 128 (63.1%) patients had undergone surgical intervention earlier in our institute. Fifty-six (27.6%) patients were preoperative and waiting for scheduled surgery. All experienced the rescheduling of their surgery and four (7%) required emergency intervention due to the worsening of their symptoms. On MRI, a 32-year-old patient with high-grade glioma experienced rapid tumor size progression over 2 weeks while waiting for OR. He presented with low neurological status.
and had a dismal outcome. Fifty-two (25.6%) patients were waiting for scheduled adjuvant treatment after prior surgical intervention. Of these 52 patients, 47 (90.4%) experienced a delay in their scheduled adjuvant therapy because of the lockdown measures and hospital policy, restricting the elective admissions as our center is a designated COVID-19 treatment center. The 9-year-old boy was operated on for a fourth ventricular tumor, and histopathology was medulloblastoma. He was categorized as a low-risk patient and scheduled for RT in April. However, it was delayed for nearly 6 months due to the pandemic and lockdown. He developed recurrence in the fourth ventricle during this period and received RT 8 months after the surgery. He is presently under follow-up with no residual tumor in the operative site.

Among 203 patients, 45 (22.2%) patients remained asymptomatic during the lockdown period. They were both preoperative (18) and follow-up (27) patients, including cranial and spinal cases. Forty (19.7%) patients continued to have persistent, significant neurological symptoms. Many of them were those with degenerative spine diseases. Others included patients with low-grade glioma with recurrent seizures and two patients with high-grade glioma. Seven patients experienced recurrent seizures during this period. Of these seven patients, three reported that they could not get the antiepileptic drugs because of the lack of transport services and the closure of local pharmacies due to lockdown. Six patients with posttraumatic behavioral disturbances could not visit the psychiatrist, and they remained symptomatic during the lockdown period. Also, 118 (58.1%) patients were stable or noticed an improvement in their symptoms. These patients were both postoperative and follow-up patients of head injury.

Table 1 summarizes the hospital visits of patients during the lockdown period. Seventy-six (37%) patients sought medical attention from private hospitals in their neighborhood. These patients could not visit our institution because of the lack of public and private transport services (83%), financial constraints (8%), and personal reasons (9%). Among them, 47 (62%) patients required only a visit to the outpatient department and incurred an expenditure of 2000 to 5000 Indian Rupees (INR). Twenty-nine (38%) patients reported that job loss due to lockdown caused a decline in family income. Seventy-two (35.5%) patients reported that job loss due to lockdown caused a decline in family income. They also admitted that the patient was the primary or sole income generator in the family, which led to low income. The rest of the patients (6%) did not avail of the service. The remaining patients (6%) did not know about the telemedicine services.

Table 2 summarizes the financial impact on the family of non-COVID patients. Seventy-two (35.5%) patients reported a reduction in their monthly income to a variable extent. However, a significant contraction of income (≥ 25% of the income before lockdown) was experienced by families of 29 (14.3%) patients. Twenty patients (27.8%) reported delay in the scheduled treatment and persistent symptoms as the primary cause of income contraction. They also admitted that the patient was the primary or sole income generator in their families, which led to low income. The rest of the patients (72.2%) reported that job loss due to lockdown caused a decline in family income.

The current pandemic and unprecedented lockdown measures also took a toll on the psychological well-being of non-COVID patients. Table 3 shows the impact on the mental health of patients and their family members. Seven patients experienced recurrent seizures during this period. Of these seven patients, three reported that they could not get the antiepileptic drugs because of the lack of transport services and the closure of local pharmacies due to lockdown. Six patients with posttraumatic behavioral disturbances could not visit the psychiatrist, and they remained symptomatic during the lockdown period. Also, 118 (58.1%) patients were stable or noticed an improvement in their symptoms. These patients were both postoperative and follow-up patients of head injury.

Table 2 summarizes the hospital visits of patients during the lockdown period. Seventy-six (37%) patients sought medical attention from private hospitals in their neighborhood. These patients could not visit our institution because of the lack of public and private transport services (83%), financial constraints (8%), and personal reasons (9%). Among them, 47 (62%) patients required only a visit to the outpatient department and incurred an expenditure of 2000 to 5000 Indian Rupees (INR). Twenty-nine (38%) patients reported that job loss due to lockdown caused a decline in family income. Seventy-two (35.5%) patients reported that job loss due to lockdown caused a decline in family income. They also admitted that the patient was the primary or sole income generator in the family, which led to low income. The rest of the patients (6%) did not avail of the service. The remaining patients (6%) did not know about the telemedicine services.

Table 3 summarizes the financial impact on the family of non-COVID patients. Seventy-two (35.5%) patients reported a reduction in their monthly income to a variable extent. However, a significant contraction of income (≥ 25% of the income before lockdown) was experienced by families of 29 (14.3%) patients. Twenty patients (27.8%) reported delay in the scheduled treatment and persistent symptoms as the primary cause of income contraction. They also admitted that the patient was the primary or sole income generator in their families, which led to low income. The rest of the patients (72.2%) reported that job loss due to lockdown caused a decline in family income.

The current pandemic and unprecedented lockdown measures also took a toll on the psychological well-being of non-COVID patients. Table 4 shows the impact on the mental health of patients and their family members. Severe and very severe stress was seen in 24 (11.82%) and 14 (6.89%) patients, respectively. Similarly, severe and very severe anxiety was experienced by 32 (15.8%) and 9 (4.4%)
patients, respectively, during the lockdown period. They reported the increasing financial crisis (64%), delay in the treatment (58%), and lockdown measures (52%) as the predominant cause of their stress. Family members also experienced an impact on their mental health. Nineteen patients (9.4%) agreed that their family members had been under very severe stress during the lockdown period.

► Table 5 also shows that the patients who experienced stress were predominantly younger and in the productive age group (19–50 years).

**Discussion**

Recently, a vaccination drive against COVID-19 has been started in many countries worldwide. Reducing the severity of COVID illness on subsequent exposures is a significant benefit of vaccination. The effect of this vaccination drive in controlling the pandemic is yet to be seen. With no definitive treatment for COVID-19, the effective way to manage this pandemic is by self-isolation, face masks, and social distancing. The pandemic had forced several governments to impose nationwide lockdown in many countries. The first case in India was reported on
The COVID-19 pandemic also had an adverse impact on the psychosocial well-being of healthcare professionals, children, and older people and is likely to increase the disease burden across the globe. Stress, anxiety, depressive symptoms, insomnia, denial, anger, and fear are the major mental health manifestations of the COVID-19 pandemic and have been increasingly reported in non-COVID patients. A significant number of our patients reported symptoms of anxiety and stress. Hao et al27 also reported worsening psychiatric symptoms such as anxiety and depression during this lockdown in patients with a previous history of mental health illness. Lack of access to primary care or outpatient clinics, financial difficulty, long-staying at home, and financial stress led to high levels of psychological symptoms. These patients also reported increased financial difficulties due to the pandemic.

Table 5 Level of stress in neurosurgical patients in different age groups

<table>
<thead>
<tr>
<th>Age group (y)</th>
<th>Level of stress</th>
<th>Very severe</th>
<th>Severe</th>
<th>Moderate</th>
<th>Mild</th>
<th>No</th>
<th>Total frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤18 (n: 23)</td>
<td>Patient</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>02 (8.7%)</td>
</tr>
<tr>
<td>19–50 (n: 134)</td>
<td>Patient</td>
<td>13</td>
<td>17</td>
<td>27</td>
<td>4</td>
<td>73</td>
<td>57 (42.54%)</td>
</tr>
<tr>
<td>≥50 (n: 46)</td>
<td>Patient</td>
<td>1</td>
<td>5</td>
<td>12</td>
<td>2</td>
<td>26</td>
<td>18 (39.13%)</td>
</tr>
</tbody>
</table>

January 30, 2020. The government of India ordered a nationwide lockdown for 3 weeks on March 24, 2020, which was subsequently extended with some relaxation. The caseload had increased to 10.8 million in our country, with 11,673 new cases on February 07, 2021. With this substantial COVID-19 caseload, hospitals experienced an acute shortage of beds, ventilators, PPEs, and health care professionals. The limited resources had led hospitals to adopt a policy restricting elective admissions and surgeries. Nasta et al15 reported a 77% reduction in elective surgeries during the lockdown period in India. The need to protect the caregivers has also led the hospitals to close outpatient departments to curtail the infection spread to health care workers. In a global survey by Jean et al, a high prevalence of COVID-19-positive cases and government policy on lockdown of shops and public transport services caused a 77% reduction in elective surgeries due to the financial crisis, and prolonged indoor stay during this lockdown contribute to such complications. Fear of contracting COVID-19 can also lead to avoiding hospital visits by many patients, especially older people. The physical impact of the COVID-19 pandemic has been reported in other non-COVID patients such as those with Parkinson’s disease, kidney disease, coronary heart disease, and cancer. Prasad et al20 reported that 11% of their patients with Parkinson’s disease experienced worsening motor and nonmotor symptoms due to the stress following lockdown. Baranidharan et al24 conducted a telephonic survey of the patients waiting for neuromodulation procedures for chronic pain. They reported deterioration in pain and mental health of these patients and direct health costs due to the COVID-19 pandemic.

The COVID-19 pandemic had an adverse impact on the psychosocial well-being of healthcare professionals, children, and older people and is likely to increase the disease burden across the globe. Stress, anxiety, depressive symptoms, insomnia, denial, anger, and fear are the major mental health manifestations of the COVID-19 pandemic and have been increasingly reported in non-COVID patients. A significant number of our patients reported symptoms of anxiety and stress. Hao et al27 also reported worsening psychiatric symptoms such as anxiety and depression during this lockdown in patients with a previous history of mental health illness. Lack of access to primary care or outpatient clinics, financial difficulty, long-staying at home, and financial stress led to high levels of psychological symptoms. These patients also reported increased financial difficulties due to the pandemic.

Table 5 Level of stress in neurosurgical patients in different age groups

<table>
<thead>
<tr>
<th>Age group (y)</th>
<th>Level of stress</th>
<th>Very severe</th>
<th>Severe</th>
<th>Moderate</th>
<th>Mild</th>
<th>No</th>
<th>Total frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤18 (n: 23)</td>
<td>Patient</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>02 (8.7%)</td>
</tr>
<tr>
<td>19–50 (n: 134)</td>
<td>Patient</td>
<td>13</td>
<td>17</td>
<td>27</td>
<td>4</td>
<td>73</td>
<td>57 (42.54%)</td>
</tr>
<tr>
<td>≥50 (n: 46)</td>
<td>Patient</td>
<td>1</td>
<td>5</td>
<td>12</td>
<td>2</td>
<td>26</td>
<td>18 (39.13%)</td>
</tr>
</tbody>
</table>
home, a personal concern of contracting COVID-19, and impoverished living conditions due to a shortage of supplies during the lockdown have been reported to be the underlying cause of the impairment of mental health.\textsuperscript{25–27} Wang et al.\textsuperscript{28} reported moderate to severe psychological impact among 53.8% of respondents in an online survey. They also reported moderate to severe depression, anxiety, and stress among 16.5%, 28.8%, and 8.1% of respondents, respectively. There is a desperate need to promote community sensitization and awareness about mental health issues due to pandemics, family counseling, and support. We also need to develop policy and program interventions to manage the complex problems of mental health rehabilitation.

The economic and social disruption caused by the pandemic is devastating. The economic impact of the COVID-19 pandemic is profound across all countries. Household income in India has been drastically impacted due to the pandemic and subsequent lockdown measures. Across India, 84% of households reported a fall in revenue during the lockdown.\textsuperscript{29} Nearly half of the world’s 3.3 billion global workforce are at risk of losing their livelihoods because of the lack of social protection and access to quality health care.\textsuperscript{30} Apart from the direct impact on the household economy by this pandemic, delay in treatment and persistent symptoms could contribute to additional job loss and families’ financial constraints, as reported by our patients. The impact is even more if the patient is a significant source of family income. Some of our patients also experienced additional expenditure as they approached private health care for worsening symptoms due to the lack of access to the treating physician. The fall in household income can also lead to a decline in health expenditures apart from food and education.

The long-term impact of the delay in proposed surgical intervention and adjuvant therapy for other diseases is yet to be seen. An 8-year-old boy scheduled for adjuvant treatment after medulloblastoma resection experienced a delay in radiotherapy due to the pandemic and lockdown. During the waiting period, he developed a recurrence of the tumor. This incident is just the tip of an iceberg. Also, patients may experience the progression of their diseases. Such patients can present with an advanced tumor or low neurological status. Complications such as tumor recurrences and disease progression due to the delay in the planned treatments caused by the COVID-19 pandemic would have an adverse impact on these patients’ survival. The magnitude of the long-term effect of such complications is uncertain at this point. Also, the impact of the COVID-19 pandemic on other diseases’ mortality is mainly unknown due to underreporting, difficult data collection, and many overlapping causes.

The importance of telemedicine service has been recognized widely like never before during this pandemic. The current pandemic has brought several critical changes in the pre-COVID-19 telemedicine regulatory guidelines. Some of them are insurance coverage for telehealth visits, allowing the use of non-HIPAA (Health Insurance Portability and Accountability Act)-compliant applications, and the ability to prescribe drugs via telemedicine communication.\textsuperscript{31} With these changes, we should make telemedicine an integral part of the healthcare service to fill the gap between the healthcare system and patients. The telemedicine service is still underutilized in India although it has improved recently.\textsuperscript{32,33} The critical reason for the underutilization is the lack of awareness among the patients, as demonstrated in our study. There is also a regional discrepancy in the availability of telemedicine services.\textsuperscript{32} It is the health care system’s responsibility to improve awareness among the patients and minimize the impact of this pandemic on non-COVID patients.

Satellite health centers can also improve patient outreach in remote areas. Our institute has established such centers in addition to telemedicine services. Judicious admission of COVID-19 patients based on the disease severity and comorbidities will reduce the bed occupancy and spare the beds for non-COVID patients. The COVID designated centers can also establish make-shift facilities along with local administration where stable COVID-19 patients can be observed. AIIMS, Rishikesh, and the Indian armed service made such a COVID care center facility, which significantly reduced the bed occupancy by COVID-19 patients during the second and third waves. Each clinical department should make its protocol for triaging the patients at the department level based on the disease’s nature, its natural history, and symptoms. Patients with malignancy and those with progressive symptoms should be given priority for admission and intervention.\textsuperscript{34} The designated COVID centers should create policies for the judicious use of hospital resources such as beds, intensive care unit (ICU), operation theaters, and healthcare workers at the institute level based on their previous experience. Such policies would help continue routine clinical work and minimize the adverse impact on non-COVID patients.

The major drawback of our study is that we did not use a validated method for the quantitative assessment of the stress and anxiety levels of the patients and their family members. We used only the Likert scale to assess the psychological impact of the pandemic and lockdown to keep the questionnaire short and simple as we did not interview the patients in person.

Conclusion

The COVID-19 pandemic and nationwide lockdown greatly affected the health care system. The pandemic also affected the physical, social, and psychological well-being of patients with non-COVID illnesses, which is unfortunately under-recognized. We are yet to face the long-term impact of the delay caused by this pandemic in scheduled surgical and adjuvant treatments of non-COVID neurosurgical patients. Effective utilization of telemedicine service and triaging may help minimize the adverse impact of this pandemic and subsequent lockdown measures on non-COVID neurosurgical patients.

Ethical Approval

The study was approved by the institute ethics committee (IEC/21/19) of All India Institute of Medical Science, Rishikesh, and Uttarakhand, India.
Consent to Participate
Informed consent was taken from all study participants.

Consent for Publication
The authors affirm that human research participants provided informed consent for publication of their data.

Research Involving Animals
This study did not involve any animals.

Funding
None.

Conflict of Interest
None declared.

References

Indian Journal of Neurosurgery  © 2022. Neurological Surgeons’ Society of India. All rights reserved.
**Supplementary material**

Check list: (All the following are included in the manuscript)

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Background and aim of the study are presented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td></td>
</tr>
<tr>
<td>Study design</td>
<td></td>
</tr>
<tr>
<td>Data collection method</td>
<td>Descriptive cross-sectional survey</td>
</tr>
<tr>
<td>Sample characteristics</td>
<td>Self-structured questionnaire-based survey</td>
</tr>
<tr>
<td>Study administration</td>
<td>Patients from hospital record were selected using the convenience sampling technique</td>
</tr>
<tr>
<td>Ethical consideration</td>
<td>The questionnaire was circulated as a Google form via WhatsApp messenger</td>
</tr>
<tr>
<td>Statistical analysis</td>
<td>Institute ethics committee approved the study</td>
</tr>
<tr>
<td>Descriptive statistics using Microsoft Excel (2013 version)</td>
<td></td>
</tr>
<tr>
<td>Results</td>
<td>Response rate, characteristics of study participants, and main findings of the survey were presented in results.</td>
</tr>
<tr>
<td>Discussion</td>
<td>Study findings and limitations were discussed.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Interpretations of the study findings were presented</td>
</tr>
<tr>
<td>Conflict of interest</td>
<td>COI statement has been included</td>
</tr>
</tbody>
</table>