

The impact of COVID-19 pandemic on the health services provided by the Cardiothoracic Minia University Hospital in Egypt: A single-center retrospective observational study

Ali Omar Abdelaziz , Rasha mohammed Emam , Samah Rabea Shehata , Elham Abdelhady Abdelghany 

AO Abdelaziz, RM Emam, SR Shehata, EA Abdelghany. The impact of COVID-19 pandemic on the health services provided by the Cardiothoracic Minia University Hospital in Egypt: A single-center retrospective observational study. *Can J Respir Ther* 2023;59:70–74. doi: 10.29390/cjrt-2022-057.

Background: The emergence of the new coronavirus (severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2) in late 2019 resulted in a world-wide pandemic, which had severe consequences on the global health systems. There were drastic strains on the public health services. This, in turn, markedly affected patients with non-coronavirus disease (COVID-19) problems.

Aim: This study aimed to evaluate the impact of COVID-19 infection on the health services provided to patients at the cardiothoracic university hospital, Minia University.

Methods: A retrospective analysis of data about services provided to patients at Minia Cardiothoracic University hospital was obtained from pre-pandemic era (2018–2019) and during the pandemic time (2020–2021). The two sets of data were compared together. Data were collected about the number of patients who underwent different procedures such as Pulmonary Function Tests (PFTs), sleep studies or interventional chest procedures (bronchoscopy and thoracoscopy). Also, data were collected about the number of patients admitted in the chest ward, respiratory intensive care unit (ICU) or Coronary care unit and the number of patients who visited cardiothoracic, cardiology or chest outpatient clinics.

Results: There is 81.4% reduction in the number of Pulmonary Function Tests performed during the period 2020–2021 compared with the period 2018–2019, where the number of patients admitted to chest in ward decreased by 66.4%. The number of sleep studies performed reduced by 61.5%, while the number of different outpatient clinical visits reduced to similar values (45.8% for cardiothoracic clinic, 45.4% for cardiology clinic and 40.5% for chest clinic). Regarding respiratory ICU admissions, the study reported a reduction of 35.7% and also Coronary care unit admissions decreased by 30.6%. Interventional pulmonary procedures had the lowest reduction rate (0.7%).

Conclusion: Different health services were negatively affected by the emergence of COVID-19 era in both pulmonary and non-pulmonary fields.

Key Words: covid-19; impact; health; services; pandemic; emergency plan

INTRODUCTION

On March 11, 2020, a global pandemic caused by a new coronavirus (SARS-CoV-2) was announced. The virus led to COVID-19 disease, which has a predominant respiratory tropism (1).

Because of the nature of the COVID-19 pandemic, the enormous number of severe cases, and the excess fatality caused by the disease, it was logical that the COVID-19 infection news dominated all the press media. However, it is also important to pay attention to the other non-communicable diseases and non-COVID-19 infections since they continue to exist throughout the pandemic. So, in the fight against the pandemic, the resources against other diseases should be maintained (2).

Most of the health systems globally were unready to face an outbreak of COVID-19 magnitude. The result was a significant limitation on public health services. The limitations were not just for patients with COVID-19 infection, but extended to significantly involve the non-COVID-19 problems, especially patients with other respiratory diseases who can mimic COVID-19 infection (2).

The management of patients during COVID-19 pandemic was a great challenge for physicians of different specialties. It was difficult to manage the patients in the normal way for fear of spreading infection. For patients with symptoms similar to that of COVID-19 infection, it was more difficult to seek medical advice, and if they did, they were usually referred from one clinic to another. The phobia from being isolated was a significant cause of not seeking treatment, especially in elderly population (2).

The first wave of COVID-19 pandemic hit Egypt about 3 months after the initial announcement of the pandemic. It lasted through May, June and July 2020. The response of the Egyptian government was in line with the international response to the pandemic. Partial and complete lockdown measures were implemented during the period from mid-March to the end of June 2020 (3).

Some hospitals were chosen to be isolation hospitals for managing patients with COVID-19 infection. Other hospitals were COVID-19 free hospitals, providing care to patients with diseases other than COVID-19, while the rest were mixed hospitals, serving both types of patients (3). The Minia Cardiothoracic University Hospital was transformed into an

Chest Department, Minia University Hospital, Minia, Egypt

Correspondence: Ali Omar Abdelaziz, 16 Ismail Aref St., Kapher Elmansura, Minia City, Mina, Egypt. Tel. 00201020508943. E-mail: omran282@yahoo.com

Published online at <https://www.cjrt.ca> on 08 March 2023



This open-access article is distributed under the terms of the Creative Commons Attribution Non-Commercial License (CC BY-NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits reuse, distribution and reproduction of the article, provided that the original work is properly cited and the reuse is restricted to noncommercial purposes. For commercial reuse, contact editor@csrt.com

isolation hospital for COVID-19 patients from June 2020 till the end of August 2020. During the rest of 2020 and 2021, the hospital was a mixed hospital, serving both COVID-19 and non-COVID-19 patients.

The pandemic had a significant impact on the profile of patients with pulmonary diseases. There was a significant decline in the outpatient and emergency admissions of pulmonary diseases other than COVID-19 infection (4).

This study aimed to evaluate the impact of COVID-19 infection on the health services provided to patients at the cardiothoracic university hospital, Minia University.

PATIENTS AND METHODS

A retrospective analysis of data about services provided to patients at Minia Cardiothoracic University Hospital was obtained from pre-pandemic era (2018–2019) and during the pandemic time (2020–2021). The two sets of data were compared together. Data were collected about the number of patients who underwent different procedures such as Pulmonary Function Tests, sleep studies or interventional chest procedures (bronchoscopy and thoracoscopy). Also, data were collected about the number of patients admitted in the chest ward, respiratory ICU and Coronary care unit (CCU) and number of patients who visited cardiothoracic, cardiology or chest outpatient clinics. Minia Cardiothoracic University Hospital has three departments: 1) chest department, with a capacity of 24 inward beds and 8 beds in respiratory intensive care unit, as well as pulmonary function unit, sleep study unit and interventional unit, which includes bronchoscopy and thoracoscopy, 2) cardiology department, with a capacity of 10 beds inward and 20 beds in CCU and 3) cardiothoracic surgery department, with a capacity 20 inward beds and 8 beds in post-operative care unit.

Inclusion and exclusion criteria

All patients whether admitted to the hospital (inwards and ICUs) or served at the outpatient clinics of different departments are included in the study. The study included a total of 24,569 patients. A total of 15,955 patients were served during the pre-pandemic period (2018–2019) and 8614 patients were served during the pandemic period (2020–2021).

The approval of local ethics committee of El-Minia University Hospital was obtained.

RESULTS

Table 1 and Figure 1 show that there are variable reduction rates in different services provided by the hospital during COVID-19 era; the highest reduction rates were reported on the number of Pulmonary Function Tests performed (81.4%), where the average number of patients who underwent the test during the 2018–2019 period was 1131 and decreased during 2020–2021 to be only 210 patients. This is followed by the number of patients admitted to chest inward (66.4%) where the number declined from 830 to 279 patients. The number of sleep studies performed reduced by 61.5% (from 32.5 to 12.5). The number of different

outpatient clinic visits reduced to similar values (45.8% for cardiothoracic clinic, 45.4% for cardiology clinic and 40.5% for chest clinic). Regarding respiratory ICU admissions, the study reported a reduction of 35.7% (from 457 to 294) and also CCU admissions decreased by 30.6% (from 1382 to 959). Interventional pulmonary procedures had the lowest reduction rate (0.5%) as it decreased from 137 patients during 2020–2021 to 136 patients during 2018–2019.

DISCUSSION

Because of the great stress imposed on the essential health services by the COVID-19 pandemic, the management of non-COVID-19 diseases was challenging. Due to similarity in symptoms, some patients tried to avoid seeking medical advice for fear of being diagnosed with COVID-19 infection (2). During the pandemic, the performance of diagnostic intervention such as bronchoscopy, thoracoscopy and spirometry almost ceased, except in very urgent conditions (5, 6).

Previous studies have demonstrated variable reduction rates in different health care service fields. In a study from the United States of America, the author reported a decline in non-COVID-19 admission by just over 20% (7). On the other hand, another U.S. study reported a higher percentage of decrease in the emergency department visits in five sample states, where the range of decrease was from 41.5% to 63.5% (8).

In a study from Germany, inpatient hospital admissions after the lockdown announcement were compared with the same period in 2018. The study included 18 university hospitals. The authors found that there was a decrease in the overall inpatients admission to the hospital by 35% from weeks 1 to 4 following the lockdown. From weeks 5 to 8 following the lockdown the reduction was by 30.3% (9).

In another study (10), Chen et al, evaluated monthly data from 156 public hospitals in Shanghai, they found that there was a significant decrease in the medical services provided by the hospitals in China during and after the COVID-19 pandemic in 2020. Other studies from China demonstrated variable reduction levels for different health services, with decrease in the surgical cases in Wuhan by 94% and by 64% in other cities (11).

In a study (12), Li et al, found that the pediatric visits in a tertiary hospital had decreased by about 75% but recovered quickly.

In the present study, the average number of patients admitted to the respiratory ICU decreased by 35.7% during 2020–2021 when compared with the average during 2018–2019. More reduction was observed in the number of patients admitted to the ward, where there was 66.4% reduction during the same time period. Marked decline occurred in the pulmonary function unit, where there was 81.4% decrease in the number of people who had the test performed during 2020–2021 compared with 2018–2019. In addition, sleep studies dropped by 61.5%.

The least affected service was the interventional procedures, including thoracoscopy and bronchoscopy, where the percentage of reduction was less than 1%. However, it is important to mention that at some period of time, the hospital was transformed into an isolation hospital

TABLE 1

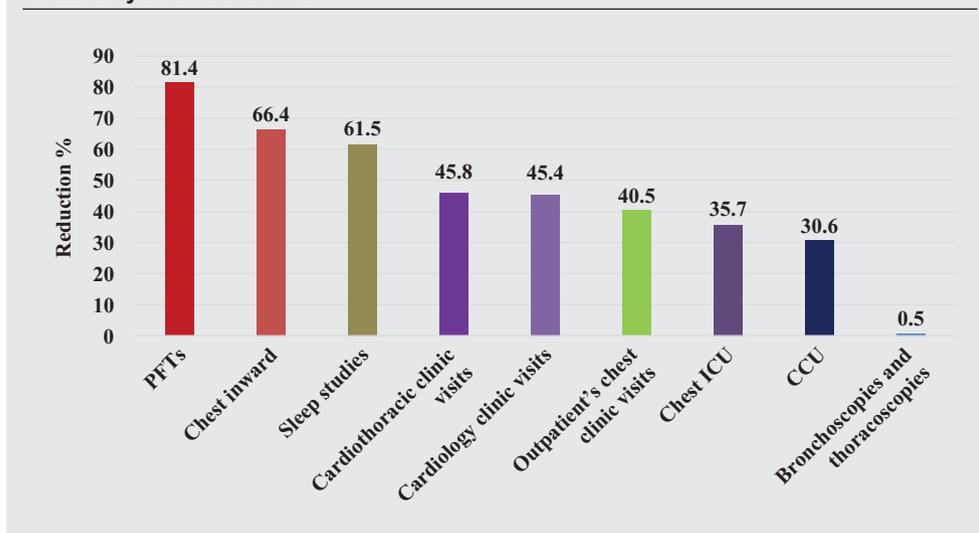
Comparison of the services provided by the hospital from 2018–2019 to 2020–2021

Year	PFTs	Chest ward	Sleep studies	Cardiothoracic clinical visits	Cardiology clinical visits	Chest outpatient clinical visits	Respiratory ICU	CCU	Interventional chest procedures
2018	1039	824	45	2012	6655	4141	461	1334	52
2019	1224	836	20	1506	5025	4769	454	1430	85
Average 2018–2019	1131	830	32.5	1759	5840	4455	457	1382	68.5
2020	280	365	25	709	2350	2417	345	995	55
2021	141	193	0	1199	4030	2880	243	924	81
Average 2020–2021	210	279	12.5	954	3190	2648	294	959	68
Reduction %	81.4	66.4	61.5	45.8	45.4	40.5	35.7	30.6	0.5

CCU Coronary Care Unit; ICU Intensive Care Unit; PFTs Pulmonary Function Tests.

FIGURE 1

The percentage of reduction in different services provided by the hospital during 2020–2021 compared with 2018–2019. CCU Coronary Care Unit; ICU Intensive Care Unit; PFTs Pulmonary Function Tests.



for COVID-19 patients. During that time, the interventional procedures were stopped completely, and since our hospital is the only center in Minia governorate to have such interventional maneuvers, this raises the question where did patients in need of such procedures go during that time? Did they find another place to serve them? Or had such interventions been delayed and to what extent did the delay affect them?!

Some studies have shown that hospital admissions for respiratory diseases other than COVID-19 such as chronic obstructive pulmonary disease (COPD), asthma, influenza and pneumonia have significantly decreased (13, 14). Studies from the United States of America and Europe also reported similar observations (7, 15, 16). In a South Korean study (13), it was demonstrated that there was a decrease in hospital admission for respiratory diseases; however, admission due to other causes such as diabetic ketoacidosis, myocardial infarction and other chronic conditions was not affected. These findings lead to the assumption that the alteration in hospital admission was not related to the change in health care seeking behavior of the patients during the pandemic, but due to decrease in respiratory infections, which is the most common trigger of acute exacerbation of both asthma and COPD (17, 18). However, it is worth noting that South Korea did not undergo lockdown as many other countries.

Acute coronary events are related to stressful lifestyle. Several studies had reported an increased rate of hospital admission due to acute coronary syndrome during stressful times, for example wars, natural catastrophic events and even during major sport competitions (19). Although the COVID-19 time was one of the most stressful time periods during the current century, for both the governments and population, several studies reported a decline in the number of cases admitted to hospitals due to acute coronary syndrome worldwide during the pandemic. The reported decline was as much as 40% to 50% (19–21).

In this study, the average number of admissions to the CCU during 2020–2021 had dropped by 30.6% when compared with the average number during 2018–2019. Also, there was a 45.4% reduction in the number of patients serviced at the outpatient cardiac clinics during the same time period.

In agreement with our results, by comparing the hospitalization rates due to acute coronary syndrome between March 2019 and 2020, Solomon et al, elucidated that the weekly admission rate had dropped by about 48% during the COVID-19 pandemic (20). Similarly, in a study

(19), Spaccarotella et al. found that there was a 49.4% reduction in hospitalization due to myocardial infarction from March 12 to 19 in 2020 when compared with those during the corresponding week in 2019.

In a large database study from England (21), by comparing the weekly average of admission due to acute coronary syndrome during the same time period between 2019 and 2020, it was revealed that there was a 40% reduction in admission during COVID-19 pandemic.

The COVID-19 pandemic had severe negative consequences on the cardiac and thoracic surgeries performance globally. In some centers elective surgeries were cancelled. However, it is worth noting that what is considered as elective surgery can be changed into an emergency case suddenly (22–24). The situation is more challenging in low-income countries, as Egypt, where the constrained resources for the health system, especially critical care system, is a big issue (22). Mortality has been frequently reported during the waiting time for cardiac surgery and also recorded in the center during the lockdown (25).

In the present study, there is reduction in the number of patients serviced at the outpatient cardiothoracic surgery clinics by 45.8%. Moreover, the hospital had been transformed into a complete isolation hospital for COVID-19 patients, from June till August 2020 and all the cardiothoracic surgeries stopped during this time. Bearing in mind that the hospital is the only governmental cardiothoracic surgery center in Minia governorate, this opened the dilemma: where did the patients who needed cardiothoracic surgery intervention go during this period?

Similarly, in the only governmental cardiothoracic surgery center in Alexandria, Hemead and colleagues (26) evaluated the number of cardiac surgeries performed during 2020 and compared it with the same period in 2019. During the pandemic, only 14 cases had surgery, whereas the average number of annual cardiac surgeries performed in the center is 300–350 cases. Furthermore, a significant reduction in the number of emergent admission due to cardiothoracic causes was reported globally (27).

Several possible explanations have been suggested for this decline in inpatient flow: 1) patients might be afraid of acquiring infection during hospital admission or transportation, thereby choosing to stay at home and self-manage symptoms. 2) Some authors suggested that the resulting lockdown and the pandemic restricted hospital access due to physical limitations and overcrowding of infected patients in emergency departments. 3) The lockdown may have led to strict social distancing and minimal exercise indoors, which could have resulted in lower exertional

activity and therefore, lower the incidence of cardiovascular conditions (28).

Other studies set forth many probabilities that could explain our findings, including but not limited to, 1) patients' fear of acquiring COVID-19 infection, which lead them to avoid seeking medical attention, 2) restriction of hospital access and limitations on medical services imposed by the pandemic and lockdown, 3) decrease in the number of reported cardiovascular conditions, which may be attributed to the strict social distancing and quarantine that led to lowering the exertional activity of many individuals (28)

STUDY LIMITATIONS

This study is limited by being a single-center study and hence our population sample may not be a representative of the whole country. However, our hospital is the main governmental tertiary cardiothoracic hospital in Minia governorate, which serves more than 5 million people with relatively stable population size. This may remove the bias from population size change. Also being the main tertiary cardiothoracic hospital in the governorate may eliminate the bias from loss of patients due to admission to another governmental center in the governorate.

Due to the nature of retrospective studies, some data may not be available.

CONCLUSION

Different health services were negatively affected by the emergence of COVID-19 era in both pulmonary and non-pulmonary fields'. The number of admissions to both respiratory and CCUs reduced by more than 30%. The number of patients admitted to the chest department was reduced by 68.5%. The number of outpatients' clinics visits decreased by more than 40% for the three hospital departments. Furthermore, performance of pulmonary functions and sleep studies were markedly reduced.

In cases of emergency situations, as what happened during COVID-19 pandemic, alternative plans should be implicated. Tertiary hospitals should maintain their usual services offered to patients and not be locked down or turned into isolation hospitals.

DISCLOSURES

Contributors

All authors contributed to the conception or design of the work, the acquisition, analysis, or interpretation of the data. All authors were involved in drafting and commenting on the article and have approved the final version.

Funding

The present study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interests

All authors declare no conflict of interest.

Ethical approval

The local ethics committee of El-Minia university hospital approval was obtained.

REFERENCES

- Petersen E, Koopmans M, Go U, et al. Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics. *Lancet Infect Dis* 2020;20:E238-40. [https://doi.org/10.1016/S1473-3099\(20\)30484-9](https://doi.org/10.1016/S1473-3099(20)30484-9)
- Jindal SK, Jindal A, Moitra S. Problems of management of non-corona respiratory diseases in the era of COVID-19. *Int J Noncommun Dis* 2020;5(2):63. https://doi.org/10.4103/jncd.jncd_30_20
- Abd Al Jawad M, Shokri H, Ali I. Effect of coronavirus disease 2019 pandemic on cardiothoracic hospitalization rates and emergency services: The collateral damage. *Egyptian J Cardiothorac Anesth* 2022;16(1):8-13. https://doi.org/10.4103/ejca.ejca_15_21
- Sevinç C, Tertemiz KC, Atik M, et al. How were Non-COVID pulmonary patients and diseases affected from COVID-19 pandemic period?

- Turk Thorac J 2021;22(2):149-53. <https://doi.org/10.5152/TurkThoracJ.2021.20249>
- Wahidi MM, Shojae S, Lamb CR, et al. The use of bronchoscopy during the coronavirus disease 2019 pandemic: CHEST/AABIP guideline and expert panel report. *Chest* 2020;158(3):1268-81. <https://doi.org/10.1016/j.chest.2020.04.036>
- Steinfors DP, Herth FJ, Irving LB, Nguyen PT. Safe performance of diagnostic bronchoscopy/EBUS during the SARS-CoV-2 pandemic. *Respirology* 2020;25:703-8. <https://doi.org/10.1111/resp.13843>
- Birkmeyer JD, Barnato A, Birkmeyer N, Bessler R, Skinner J. The impact of the COVID-19 pandemic on hospital admissions in the United States: Study examines trends in US hospital admissions during the COVID-19 pandemic. *Health Aff* 2020;39(11):2010-7. <https://doi.org/10.1377/hlthaff.2020.00980>
- Madjid M, Safavi-Naeini P, Solomon SD, Vardeny O. Potential effects of coronaviruses on the cardiovascular system: A review. *JAMA Cardiol* 2020;5(7):831-40. <https://doi.org/10.1001/jamacardio.2020.1286>
- Kapsner LA, Kampf MO, Seuchter SA, et al. Reduced rate of inpatient hospital admissions in 18 German university hospitals during the COVID-19 lockdown. *Front Public Health* 2021;8:594117. <https://doi.org/10.3389/fpubh.2020.594117>
- Chen Y, Cai M, Li Z, Lin X, Wang L. Impacts of the COVID-19 pandemic on public hospitals of different levels: Six-month evidence from Shanghai, China. *Risk Manag Healthc Policy* 2021;14:3635-51. <https://doi.org/10.2147/RMHP.S314604>
- Wang H, Wu J, Wei Y, Zhu Y, Ye D. Surgical volume, safety, drug administration, and clinical trials during COVID-19: Single-center experience in Shanghai, China. *Eur Urol* 2020;78:118-26. <https://doi.org/10.1016/j.eururo.2020.04.026>
- Li H, Yu G, Duan H, Fu J, Shu Q. Changes in children's healthcare visits during coronavirus disease-2019 pandemic in Hangzhou, China. *J Pediatr* 2020;224:146-9. <https://doi.org/10.1016/j.jpeds.2020.05.013>
- Huh K, Kim Y-E, Ji W, et al. Decrease in hospital admissions for respiratory diseases during the COVID-19 pandemic: A nationwide claims study. *Thorax* 2021;76:939-41. <https://doi.org/10.1136/thoraxjnl-2020-216526>
- Tan J, Conceicao E, Sim X, et al. Public health measures during COVID-19 pandemic reduced hospital admissions for community respiratory viral infections. *J Hosp Infect* 2020;106:387-9. <https://doi.org/10.1016/j.jhin.2020.07.023>
- Krivec U, Seliger AK, Tursic J. COVID-19 lockdown dropped the rate of paediatric asthma admissions. *Arch Dis Childhood* 2020;105(8):809-10. <https://doi.org/10.1136/archdischild-2020-319522>
- Berghaus TM, Karschnia P, Haberb S, Schwaiblmair M. Disproportionate decline in admissions for exacerbated COPD during the COVID-19 pandemic. *Respir Med* 2022;191:106120. <https://doi.org/10.1016/j.rmed.2020.106120>
- Papi A, Bellettato CM, Braccioni F, et al. Infections and airway inflammation in chronic obstructive pulmonary disease severe exacerbations. *Am J Respir Crit Care Med* 2006;173:1114-21. <https://doi.org/10.1164/rccm.200506-859OC>
- Matthew M, Denise F, Shaun H, Richard B. The global burden of asthma: Executive summary of the GINA Dissemination Committee Report. *Allergy* 2004;59:469-78. <https://doi.org/10.1111/j.1398-9995.2004.00526.x>
- Spaccaretella C, Sorrentino S, Indolfi C. Reduction of hospitalisations and increased mortality for acute coronary syndromes during covid-19 era: Not all countries are equal. *Lancet Reg Health-Western Pacific* 2021;12:100155. <https://doi.org/10.1016/j.lanwpc.2021.100155>
- Solomon MD, McNulty EJ, Rana JS, et al. The Covid-19 pandemic and the incidence of acute myocardial infarction. *N Engl J Med* 2020;383(7):691-3. <https://doi.org/10.1056/NEJMc2015630>
- Mafham MM, Spata E, Goldacre R, et al. COVID-19 pandemic and admission rates for and management of acute coronary syndromes in England. *Lancet* 2020;396:381-9. [https://doi.org/10.1016/S0140-6736\(20\)31356-8](https://doi.org/10.1016/S0140-6736(20)31356-8)
- Mokhtar MS. Critical care medicine in Egypt: Problems & challenges. *LWW* 2015;3(2):83-5. <https://doi.org/10.1016/j.ejccm.2016.01.001>
- Bonalumi G, Di Mauro M, Garatti A, Barili F, Gerosa G, Parolari A. The COVID-19 outbreak and its impact on hospitals in Italy: The model of cardiac surgery. *Eur J Cardio-Thorac Surg* 2020;57(6):1025-8. <https://doi.org/10.1093/ejcts/ezaa151>
- Gaudino M, Chikwe J, Hameed I, et al. Response of cardiac surgery units to COVID-19: An internationally-based quantitative survey. *Circulation* 2020;142:300-2. <https://doi.org/10.1161/CIRCULATIONAHA.120.047865>

25. Dedeilia A, Sotiropoulos MG, Hanrahan JG, et al. Medical and surgical education challenges and innovations in the COVID-19 era: A systematic review. *In vivo* 2020;34:1603–11. <https://doi.org/10.21873/invivo.11950>
 26. Hemead HM, El Sayed MH, Hassanein W. Impact of COVID-19 on cardiothoracic surgery: Experience of Alexandria (Egypt) Main University Hospital. *Braz J Cardiovasc Surg* 2022;37(3):380–4. <https://doi.org/10.21470/1678-9741-2020-0551>
 27. Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 pandemic on emergency department visits—United States, January 1, 2019–May 30, 2020. *Morb Mort Wkly Rep* 2020;69(23):699–704. <https://doi.org/10.15585/mmwr.mm6923e1>
 28. Ashraf S, Ilyas S, Alraies MC. Acute coronary syndrome in the time of the COVID-19 pandemic. *Eur Heart J* 2020;41:2089–91. <https://doi.org/10.1093/eurheartj/ehaa454>
-