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Challenges of the Management and Resource Allocation during Coronavirus Disease 2019 Outbreak: Experience from an Internal Medicine Centre, Iran

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ABSTRACT

The potency of health systems to effectively respond to crises varies between high- and low-income countries. The COVID-19 pandemic has presented numerous challenges for hospitals worldwide. In this context, the resilience of health systems and the capacity of health institutions and populations play a key role in mounting an effective response to crises.

We gathered data on the condition and resilience of health systems in the two main hospitals in Mashhad, Iran, during three peaks of the COVID-19 pandemic. The results highlighted the fact that health systems officials and managers need to consider the consequences of COVID-19, such as the need for more beds and trained healthcare workers. Hospitals should take into account the impact of the COVID-19 pandemic across all wards and departments and prioritize the well-being of healthcare workers since they are at the forefront of the fight against this pandemic.

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Introduction

Due to the lack of pre-existing scientific data, the coronavirus disease 2019 (COVID-19) epidemic has spread worldwide. As of March 2021, more than 1.7 million cases of COVID-19 have been reported in Iran, with over 60,000 deaths (1). The potency of health systems to effectively respond to crises varies depending on the income levels of countries (2). The COVID-19 outbreak has presented many new challenges for hospitals (3). In this regard, the resiliency of health systems, as well as the capacity of health institutions and populations, are crucial for giving effective responses to crises (4).

The first positive case of COVID-19 in Mashhad, Iran, was reported on February 25, 2020. During the following week, the number of reported positive cases increased to 40 individuals. It should be noted that due to the lack of RT-PCR diagnostic kits, diagnoses were made based on clinical signs and CT scan findings in the first week of the pandemic in Mashhad, Iran.

Due to the rapid spread of the disease, emergency task forces were established to respond to the outbreak, and managers offered plans to manage this pandemic in Mashhad,

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Iran. Here, we gathered data on the condition and resilience of health systems in two main hospitals in Mashhad, Iran, during three peaks of the COVID-19 pandemic.

Adaptation to real-time and clinical management of COVID-19 patients

The management of the first patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was based on scientific data and experiences obtained from previous outbreaks. Real-time data on SARS-CoV-2 was crucial to provide new guidelines promptly. Quick notifications and dissemination of the guidelines to healthcare workers was a significant challenge. To address this challenge, data communication sessions were held regularly either face-to-face or via the intranet.

Multidisciplinary management has played a vital role during epidemics. Initially, the responsibility of managing COVID-19 patients fell on infectious diseases and emergency departments. However, with the increase in the number of infected cases with SARS-CoV-2, internal medicine departments took action to support these two departments (i.e., Emergency and Infectious Diseases departments). Additionally, non-COVID-19-related activities, including non-urgent surgical interventions, had to be stopped or limited in line with similar observations in other centers worldwide (5-7). Microbiology services were also expanded for SARS-CoV-2 detection and monitoring.

Source of the information

During the three peaks of COVID-19 in Mashhad, Iran, Imam Reza and Ghaem hospitals managed the first cases of patients diagnosed with COVID-19 on February 25, 2020. To date, these two hospitals have given medical services to more than 70,000 COVID-19 patients admitted by the Internal Department. Imam Reza Hospital, affiliated with Mashhad University of Medical Sciences, is a 610-bed university hospital with nine floors with an area of 52,000 square meters. It is worth mentioning that this hospital has the largest hospital system in the northeast of Iran, with more than 3,400 staff. Furthermore, it is one of the reference centers in Iran for patients with suspected or confirmed emerging infectious diseases. On March 15, 2020, more than 100 COVID-19 patients were admitted to Imam Reza Hospital. In general, there were three peaks of COVID-19 in March, May, and September 2021. Professors and assistants planned to visit Imam Reza and Ghaem hospitals. The 610-bed Imam Reza University Hospital had to evacuate patients from other wards. The second basement in Ghaem Hospital was assigned to taking care of COVID-19 patients. During the first peak of the pandemic, all faculty members of the Internal Department visited COVID-19 patients. In the next peak, the majority of visits were conducted by Pulmonology and General Internal Medicine specialists. About 60 faculty members (professors in other fields and internal medicine specialists) and 26 internal assistants from Emergency (n=6) and other wards (n=20) were present in our center; however, there were only six internal assistants in the center after the first peak of the pandemic.

Moreover, 500 general staff (nurses and assistant nurses) have been involved in this process. In total, approximately 500 nurses provided services to COVID-19 patients in the inpatient ward. In the wards, one nurse was responsible for every five to six beds, and in the ICU, one nurse was responsible for providing nursing care to each patient. The workload was heavy during the midnight, and 200 patients were visited daily by the health workers of the internal ward.

In Imam Reza Hospital, COVID-19 patients on the 1st and 6th floors were visited by infectious disease specialists, while those hospitalized on the 4th and 5th floors were visited by internal specialists. The 2nd and 3rd floors (ICUs) were dedicated to patients with severe symptoms. However, the ICU staff visited patients hospitalized on these floors as well. Emergency medicine workers were also present at the screening sites and front line. All subspecialty wards were closed, and emergency patients were referred to the general wards of Ghaem Hospital. The only active subspecialty ward was the hematology ward in Imam Reza and Ghaem hospitals.

A specific night duty service was established, which was initially managed by six assistants and overseen by three assistants and senior consultants. In general wards, patients were visited by professors (n=10) and internal assistants (n=10). Since the beginning of the outbreak, interns have been on-call and responsible for visits in non-COVID-19 and non-infectious wards. Non-resident interns specializing in Dermatology, Gynecology, Urology, Surgery, and Cardiology had to take night shifts in COVID-19 wards.

General visits were performed by the Rheumatology and Endocrinology fellowships. In addition, Gastroenterology, Hematology, and Nephrology fellowships visited patients related to their field of study. This program was run under the supervision of the internal group manager.

Table 1 presents the key elements of the response to COVID-19, including challenges and strategies, following the experience of our center.

Taking care of the Healthcare Workers and Staff

Healthcare workers were at the forefront of the fight against the COVID-19 epidemic which posed many challenges to the healthcare system, including the difficulty in recruiting healthcare workers and bed shortages. Vacations were put on hold, working hours increased, and we even had to call in temporary nurses to deal with the pandemic. In this regard, it was essential to support healthcare workers who played a key role during the epidemic. A total of 300 healthcare workers and 75 faculty members and internal assistants were infected with COVID-19, nine of whom were hospitalized. Training sessions were run remotely through virtual classes in the first

Table 1: Challenges encountered by the internal medicine ward and local solutions

Challenges	Preparations
Management of COVID-19 patients	Training frontline healthcare workers, including the provision of practical exercises within different departments (emergency, infectious, and internal wards; as well as ICU and microbiology laboratory). Performing technical supervision by trained and experienced workers. Identifying facilities of the hospital. Systematic supervision of the patients' transportation.
Prediction of the new items	Predicting the suspicious cases in each unit and developing plans to deal with it. Setting up a special unit in the emergency department for visiting outpatients. Determining the required medical equipment (by the logistics department).
Preparation of the healthcare workers	Identifying the required professions. Inviting nurses, laboratory technicians, and ICU staff to collaborate on relevant trends and plans. Increasing the number of trained healthcare workers
Adaptation to COVID-19 Outbreak condition	Performing regular crisis meetings for all healthcare staff and workers. Compatibility with national and international strategies and protocols in managing the pandemic. Adapting real-time data to investigate epidemiology and novel scientific knowledge.
Diagnosis and treatment	Having access to RT-PCR. Training laboratory technicians Training point-of-care testing at the bedside.
Emergency department considerations	Training the emergency department staff. Providing protocols for the management of the calls. Regular communication between the hospital and ambulance services.
Management of the healthcare workers	Focusing on effective management strategies. Regular communication between healthcare workers and hospital staff (using the communication software). Providing psychological support. Providing real-time information to the healthcare workers. Ensuring a rotation of healthcare workers' shifts
Equipment	Ensuring the availability of beds. Providing protective equipment for healthcare and staff. Providing therapeutic devices, such as medicines and oxygen masks.
Development of research projects and teaching activities	Identifying the research purposes. Creating coordination between clinical research and patient care. Maintaining proper teaching activities through online training classes. Presenting educational webinars. Equipping the students with outbreak management skills.

peak and the first months of the second peak of the epidemic. About 16 apprentices and interns were infected with COVID-19 during the third peak.

All healthcare workers in the hospital had to wear surgical masks following the instructions from the Internal Department. Some psychological support was provided for healthcare workers and staff, especially those who were anxious and felt threatened by the disease. To control rumors that might have affected healthcare workers, information was shared via the Internet on a daily basis. Moreover, internal communication was performed through conferences that were open to all healthcare workers (8, 9).

Resource Allocation

The internal medicine center had to adapt to the rapidly growing medical demands and provide personnel with the necessary treatment equipment. The task of providing personal protective equipment for interns was undertaken by Mashhad University of Medical Sciences, Mashhad, Iran. It should be noted that the cost of providing equipment to assistants and professors of the Internal Department was covered by supporting groups and donors. At the workload peaks, there was a dire shortage of beds and medicines. Disinfectants, disposable face masks, filtered masks, and gowns were the main personal protective equipment shortages, which were most noticeable in the first weeks of the pandemic onset.

Education and training

During the COVID-19 outbreak, all proposals on COVID-19 offered by internal groups were approved in collaboration with the Ethics Committee and Research Deputy of Mashhad University of Medical Sciences, Mashhad, Iran. Education, training, and practices have been regularly organized for frontline healthcare workers. From April 4, 2020, virtual training was started for interns and stagers in WhatsApp groups. Moreover, various webinars on COVID-19 were conducted through Camtasia or the university's virtual education system. In addition to visiting COVID-19 patients, internal professors performed their educational duties as well. So far, the Internal Department has organized 62 webinars out of 400 prepared webinars at Mashhad University of Medical Sciences, which was the second group following the Neurology Department. (10-12).

Conclusion

During the pandemic, health structures faced an increasing number of patients to deal with. Therefore, leaders and managers of the health systems should consider the consequences of this widespread pandemic, such as the need for more beds and trained healthcare workers. Hospitals have to consider the consequences of COVID-19 on all departments, and it is of utmost importance to take special care of the healthcare workers who are at the forefront of the fight against any pandemic.

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