The Effect of Corona Epidemic on Hospital Services and Revenues: A Case Study of Fars Province / Iran

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Abstract

Background: The economic impact of corona virus (COVID-19) disease on hospital performance in Iran is unknown. The aim of this study was to examine the effect of corona epidemic on hospital services and revenues: a case study of Fars province / Iran.

Methods: The study was cross-sectional and descriptive. The information recorded in the hospital information system (HIS) of hospitals affiliated with Shiraz University of Medical Sciences, Iran from March to August 2019 and 2020 was used to identify the number of services provided. Revenues from services were derived from HIS and accrual accounting systems.

Results: The results showed that the total number of services provided from March to August 2019 and 2020 were 75,415,652 and 59,436,379, respectively, indicating that the total number of services in 2020 has decreased by 21% compared to 2019. The finding also indicated that the total revenue of services provided from March to August 2019 and 2020 is \$ 166,929,626, and \$ 146,530,916, respectively, indicating that the total revenue of services provided in 2020 decreased by 12% compared to 2019.

Conclusions: Corona epidemic could accelerate the redesign of the health care system to make it more efficient, active, sustainable and patient-centered. Some strategies to measure and control costs and revenues and improve clinical outcomes as well as changes in reimbursement systems that maintain the structure of the health system are vital to reaching this redesign and the desired results.

Background:

The coronavirus (Covid-19) epidemic started to spread in Wuhan, China in December 2019 and has spread to most countries ever since [1, 2]. Reports show that more than 212 countries and territories have been affected by the coronavirus, killing more than 280,000 people [3-5].

Corona is an acute respiratory disease manifested with severe respiratory symptoms [6, 7]. Its main transmission method is via respiration. These patients who have symptoms of fever, dry cough, and respiratory distress should be hospitalized to continue their treatment [8]. All the countries that are severely affected by the disease have reported large numbers of Covid-19 patients in need of intensive care [9-12].

Covid-19 may threaten the financial infrastructure of academic medical centers. As the costs of treating this contagious disease are high, these centers have incurred significant debts because of performing medical procedures and providing the necessary facilities [13-16]. The American Hospital Association has estimated that the corona has reduced US hospital revenues by \$ 202.6 billion. Corona has put hospitals under pressure to purchase personal protective equipment, overpaid staff, and train staff to fight the virus. Additionally, this virus has posed many elective and non-emergency surgeries and procedures to be canceled in the hospital, which in turn reduces the hospital's income [17-20].

Hospital revenues are gained by activities like patient care, activities needed for patient care (tests, radiology services, and so on), and other revenues (gifts, grants, and so on).

Revenues from patient care make up the bulk of the hospital income and have two parts: the cost of daycare (nursing care, room, food, and so on) and specialized services (surgery, diagnostic tests, tests, and so on). The World Health Organization (WHO) has recently asked all the countries to focus their efforts on financing health systems to respond to this epidemic [21, 22]. Thus, it is essential to examine the economic consequences of this critical situation and its effects on health care organizations such as hospitals. The purpose of the study was to examine the effect of the corona epidemic on hospital revenue and services in Fars's province, Iran.

Method:

The study was cross-sectional and descriptive. The information recorded in the HIS systems of hospitals affiliated with Shiraz University of Medical Sciences from March to August 2019 and 2020 was used to identify the number of services provided. Revenues from services were derived from HIS and accrual accounting systems.

Services and revenues were extracted at three levels of service, all hospitals and Shiraz, other cities, and Fars's province.

Moreover, the hospitals revenues were converted into dollars. According to the website of the Central Bank of Iran, each dollar was considered 42,000 Rials [23]. The dataset was compared with the aggregate information of Shiraz University of Medical Sciences collected in the center of the province and the opinions of managers and senior financial experts of the University of Medical Sciences were taken in this regard after collecting the obtained data and to determine the accuracy of the information (validity and reliability). Excel software was used for data analysis.

Results:

Table 1 is the number of services provided by hospitals affiliated with Shiraz University of Medical Sciences, Iran from March to August 2019 and 2020.

Based on the results of this table, the total number of services provided from March to August 2019 and 2020 are 75,415,652 and 59,436,379, respectively, indicating that the total number of services in 2020 has decreased by 21% compared to 2019. The table findings indicate that except for the three services - CT scan, radiotherapy, and dialysis that increased by 10%, 3%, and 0.7%, respectively - from March to August 2020 compared to March to August 2019, other services have decreased, with the largest decrease relating to rehabilitation services (49.5%). The highest frequency of services provided from March to August 2019 and 2020 was related to medicine (31,922,072) and medical supplies (24,335,900), and the lowest to the operating room of the Cath lab (1,378 and 890, respectively). Table 2 is the revenue of

services provided from March to August 2019 and 2020 by hospitals affiliated with Shiraz University of Medical Sciences.

Based on the table results, the total revenue of services provided from March to August 2019 and 2020 is \$ 166,929,626, and \$ 146,530,916, respectively, indicating that the total revenue of services provided in 2020 decreased by 12% compared to 2019. Revenues for CT scan, anesthesia, dialysis, colic, radiotherapy, operating room and special beds also grew positively in 2020. The highest revenue of services from March to August 2019 and 2020 was related to regular bed (\$ 27,847,144) and medicine (\$ 22,359,052), respectively, and the lowest to the Cath lab operating room (\$ 97,532 and \$ 63,435, respectively).

Table 3 and Figure 1 show the revenue of hospitals affiliated with Shiraz University of Medical Sciences from March to August 2019 and 2020. The table results indicate that from March to August 2019 and 2020, the total revenues of Shiraz University of Medical Sciences hospitals were \$ 166,436,271 and 146,348,192, respectively, indicating that the total revenue of hospitals in 2020 reduced by 12% compared to 2019. Moreover, according to the findings of this table, from March to August of 2019, 74.6% of the revenues of Shiraz University of Medical Sciences have been earned in Shiraz hospitals and 25.4% of the revenues of Shiraz University of Medical Sciences have been earned in city hospitals. The total income of Shiraz hospitals affiliated with Shiraz University of Medical Sciences has decreased by 13% in 2020 compared to 2019. The total revenues of the hospitals of the affiliated cities of Shiraz University of Medical Sciences in 2020 have decreased by 7% compared to 2019. Out of the total number of hospitals covered by Shiraz University of Medical Sciences, seven hospitals (K, L, M, O, AA, CC, ZZ) had positive revenue growth in 2020 compared to 2019.

Figure 2 is the hospital revenue forecast for the 4-month period. The findings of this chart show that during the 4-month period, hospital revenues increase slightly reaching \$ 30 million.

Discussion

One of the biggest worries over coronavirus (COVID-19) is the effect of the disease on the functioning of the health care system. For the first time, the study examined the effect of corona on the performance (income and services) of hospitals affiliated with Shiraz University of Medical Sciences from March to August of 2019 and 2020. The results indicated that the total number of services provided from March to August of 2020 compared to March to August of 2019 decreased by 21%, with the largest decrease associated with rehabilitation services (49.5%). The highest frequency of the services provided from March to August 2019 and 2020 was related to medicine and medical supplies, respectively.

It seems that because of the prevalence of corona disease, the number of hospital visits for elective services and nonurgent care and rehabilitation services has decreased, and considering that the common payment system in hospitals (fee for service), with the reduction of the number of services provided, the hospital revenue has decreased too. Corona has resulted in an increase in the purchase of personal

protective equipment and disinfectants, laboratory kits for corona, and consumables for a variety of graphs from patients with corona.

Sharifah et al.'s results in Malaysia indicated that only 19.5% of respondents in Klang Valley in Malaysia have benefited from health care services due to corona [24].

Glenn et al.'s results in the United States show that California's acute care hospitals earned an average of \$ 8.7 billion in net income per month in 2018. The sharp reduction in inpatient and outpatient visits because of the corona has reduced their net income to \$ 3.7 billion per month in the first four months of the corona pandemic launch in June 2020 [25] .

The present study results indicated that the total revenue of services provided in 2020 decreased by 12% compared to 2019 with the largest decrease in revenue related to nuclear medicine (78%). Moreover, the revenues for CT scan, anesthesia, dialysis, colic, radiotherapy, operating room, and special beds grew positively in 2020. The total revenues of Shiraz hospitals and hospitals of Shiraz University of Medical Sciences in 2020 decreased by 13% and 7%, respectively, compared to 2019.

The reasons for declining hospital revenues can be the increased overpayment of staff, purchase of personal protective equipment and disinfectants, and cancellation of outpatient visits and elective surgeries at the hospital.

The study findings are similar to those of Beck da Silva in Brazil. The results of Beck da Silva indicated that the monthly income of the hospital decreased by 10% from 2019 to 2020. Moreover, the hospitals in Brazil experienced declining hospitalization rates and incomes. The average bed employment rate in the intensive care unit decreased from 88–83% and from 85–73% in the hospital ward [26].

The results of the study by Colenda et al. indicated that Covid-19 disease might threaten the financial infrastructure of academic medical centers as the costs of treating this contagious disease is high. Thus, these centers have incurred significant debts because of conducting medical procedures and providing the necessary facilities [6].

Conclusion:

Corona epidemic could accelerate the redesign of the health care system to make it more efficient, active, sustainable and patient-centered. Some strategies to measure and control costs and revenues and improve clinical outcomes as well as changes in reimbursement systems that maintain the structure of the health system are vital to reaching this redesign and the desired results. Moreover, because of the reduction in hospital revenues as a result of the corona pandemic, it seems that the financial pressure on hospitals can be reduced by timely payment of hospital claims by insurance companies.

Abbreviations

Declarations

This study approved by Ethics Committee of Shiraz University of Medical Sciences; Shiraz, Iran and received Ethical code: IR.SUMS.REC.1399.1172

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Authors' contributions

Erfan Kharazmi, Shima Bordbar, and Abdosaleh Jafari contributed to conceiving and designing the study. The data was collected by Erfan Kharazmi and was analyzed and interpreted jointly by Erfan Kharazmi, Shima Bordbar, Abdosaleh Jafari. All authors contributed equally in writing the manuscript.

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Availability of data and materials

All related data were displayed in the manuscript. Further information regarding the data can be obtained by contacting the corresponding authors.

Consent for publication:

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Tables

Due to technical limitations, table 1-3 is only available as a download in the Supplemental Files section.

Figures

Figure 1

Total income (\$) of hospitals covered by Shiraz University of Medical Sciences from March to August 2019 and 2020

Figure 2

Supplementary Files

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- [Tables.pdf](#)