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Research Paper

Provision of Clinical Pharmacy Service May Improve Pharmaceutical Care During COVID-19 pandemic: Clinical Practice Guideline Implementation

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ABSTRACT

Background: In public health emergencies, such as the COVID-19 pandemic, the work strategies of clinical pharmacists need to be modified according to the rapid spread of the disease, where information and resources are constantly changing. The aim of this study was to describe the role of clinical pharmacists in the COVID-19 pandemic by the implementation of clinical practice guidelines.

Methods: This was a prospective study from September 2020 to March 2021 in a COVID-19 center hospital. A clinical pharmacist visited patients in the ICU and internal ward three times per week and delivered Comprehensive Medication Management (CMM) on a consultation paper in patient's files. In October 2021, a consensus regarding the improvement of the rational use of COVID-19 medications and their costs was developed. The high-cost medications were selected based on the hospital information system to evaluate direct medical costs from the provider's perspective.

Results: During six months, in addition to pharmacotherapy consultation for 193 patients, pharmacotherapy evaluation was done 903 times for COVID-19 patients and their medication was also assessed. After implementation of the updated COVID-19 protocol in the hospital, the use of main drugs reduced by 8.950.328.786 IRR equivalent to 21,317 USD based on reference currency within two months.

Conclusion: The participation of a clinical pharmacist in a COVID-19 center by the implementation of pharmacotherapy guidelines and comprehensive medication management may lead to cost reduction and improved drug safety.

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Introduction

In December 2019, a novel coronavirus (SARS-CoV-2) was first detected in cases of acute respiratory illness in Wuhan, Hubei Province, China, which then caused a rapid outbreak and pandemic of infection worldwide. On February 11, 2020, the first case of COVID-19 case was reported in Iran. In March 2020, the World Health Organization (WHO) declared that the COVID-19 outbreak is a pandemic [1, 2].

Clinical pharmacists perform pharmaceutical care to ensure patients' safe and effective medication use. Nevertheless, in case of public health emergencies, such as the COVID-19 pandemic, the work strategies of clinical pharmacists need to be modified to adapt to the rapid spread of the disease, where limited information and resources are usually available to guide pharmacotherapy [3]. Clinical practice guidelines have attracted worldwide attention to improve healthcare services and rationalize the best use of available health resources [4]. Carefully constructed practice guidelines can reduce the use of unnecessary and expensive medications [5].

Implementation of guidelines can prevent medication errors and improve the appropriateness of the prescription, and may lead to reduced cost [6]. The aim of this study was to investigate the role of clinical pharmacists in the COVID-19 pandemic through clinical guideline implementation and routine patient visits.

Materials and Methods

This was a prospective study in a 6-months period from September 2020 to March 2021 in a general hospital, including ICU and general wards, which is one of the main COVID-19 centers in Tehran city. This setting has 48 beds for general COVID-19 patients and 19 beds for critically ill COVID-19 patients.

A clinical pharmacist routinely provided patient visits for a medication review, Adverse Drug Reaction (ADR) monitoring, participating in decision-making meetings for medication control in the hospital to design Clinical Practice Guidelines (CPGs) for all aspects of medication therapy for COVID-19 patients, along with concomitant education for the medical team to implement CPGs and improve pharmaceutical care in the hospital.

A dedicated clinical pharmacist visited patients in the ICU and general COVID-19 patients' ward three times per week. Clinical pharmacists collaborate with other healthcare providers to deliver Comprehensive Medication Management (CMM), and all interventions and recommendations were recorded on a consultation paper in the patient's file. In collaboration with healthcare providers, several educational programs were done for nurses and physicians.

In October 2021, a consensus was developed in the hospital regarding the need to improve the rational use of COVID-19 medications at the third peak of coronavirus in Iran. It was accomplished through several meetings in the hospital with the medical team and there were a lot of discussions around COVID19 pharmacotherapy, and finally, the protocol was released in October 2021. The top costly medications were obtained from an automated Hospital Information System (HIS). The only issue, which was considered in the pharmacoeconomic evaluation was the hospital's direct cost, while the nursing or other types of costs associated with these drugs were not included.

During this period, drugs, which were highlighted in the protocol were dexamethasone, remdesivir, interferon beta, tocilizumab, daclatasvir/sofosbuvir, and pantoprazole to rationalize drug therapy. All medication costs were calculated based on the reference currency, which was announced by the central bank of Iran (1US Dollar equals 42,105 Iranian Rial). Finally, the economic consequences of this protocol implementation were evaluated.

Result

Provision of pharmaceutical care for COVID-19 patients

During six months, in addition to pharmacotherapy consultation for 193 patients, pharmacotherapy evaluation was done 903 times for COVID-19 patients and their medication was assessed.

A clinical pharmacist paid more attention to the special patient populations, such as the elderly, concomitant comorbidities, pregnant women, and children, and close monitoring of drugs, including dexamethasone, remdesivir, interferon beta, tocilizumab, daclatasvir/sofosbuvir, and pantoprazole.

Preparation of the hospital treatment protocols

COVID-19 is caused by a newly discovered virus and currently, there are few approved drug therapies with uncertain effects on mortality.

Table 1. Impact of protocol implementation on the use of COVID-19 medications during two months

			%		
Drugs	**Pre-protocol Period**	**Post-protocol Period**	**Patients' Growth Rate During Two Months**	**Drug's Growth Rate During Two Months**	**Total Cost Difference During Two Months**
Remdesivir	10.411.979.516 IRR	4.630.400.000 IRR	-16.1	- 47.4	-5.781.579.516 IRR
Interferon beta	2.830.168.500 IRR	1.348.177.500 IRR	-16.1	- 55.4	-1.481.991.000 IRR
Tocilizumab	1.965.389.029 IRR	919.512.000 IRR	-16.1	- 53.3	-1.045.877.029 IRR
Daclatasvir/Sofosbuvir	769.047.908 IRR	342.990.000 IRR	-16.1	- 61.4	- 426.057.908 IRR
Dexamethasone	184.272.000 IRR	117.238.000 IRR	-16.1	- 31.8	- 67.034.000 IRR
Pantoprazole	526.853.333 IRR	379.064.000 IRR	-16.1	- 26	- 147.789.333 IRR
Total	16.687.710.286 IRR	7.737.381.500 IRR			-8.950.328.786 IRR

Many of our recommended treatment drugs for these patients are established based on several guidelines by the National Institutes of Health (NIH), WHO, Infectious Diseases Society of America (IDSA), and also National clinical guidelines. Clinical pharmacists are responsible for providing updates to treatment protocols, drug information resources, and formularies. The use of proper antibiotics is also recommended for antimicrobial monitoring. After implementation of the COVID-19 protocol for two months, the use of main drugs reduced, and subsequently, it led to a decrease of 8.950.328.786 IRR equivalent to 21,317 USD based on reference currency in COVID-19 pharmacotherapy, which is demonstrated in Table 1.

Providing an educational program regarding COVID-19 for healthcare providers

Clinical pharmacists promote pandemic-related knowledge for healthcare providers through pharmacotherapy classes, face-to-face education, and social media, such as WhatsApp (the most common mobile social networking platform in Iran), and other online platforms for the education of hospital healthcare providers.

In addition to face-to-face training, six classes regarding COVID-19 medication were held for healthcare providers, including physicians and nurses. Other classes on pharmaconutrition, proper antibiotic use, medication errors, etc. were held. The main clinical pharmacist's activities are illustrated in Figure 1.

Discussion

This is the first study to evaluate the impact of pharmacist presence in the COVID-19 pandemic in Iran. Although clinical pharmacists have played an active role in combating COVID-19 during the pandemic, there is a need to

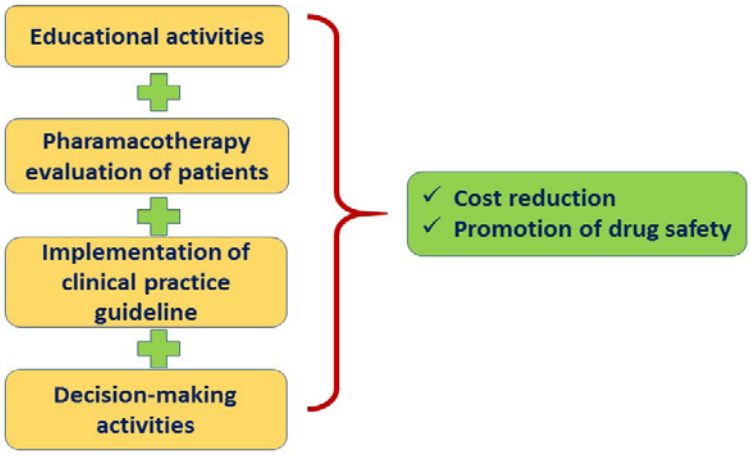

Figure 1. Clinical pharmacist activities in the hospital for COVID-19 patients

provide an appropriate platform for their activities. Clinical pharmacists can collaborate with other healthcare providers to utilize their pharmacology knowledge and pharmacological expertise to actively coordinate pharmacotherapy for COVID-19 patients and maximize pharmacists' value and responsibility thorough the pandemic [3].

In a study in Iran, using a clinical pharmacist in the ICU resulted in a minimum and maximum benefit-cost ratio of 8.4:1 to 12.7:1 and a net benefit of $169,205 to $266,633 [7]. Promotion of communication skills and the use of appropriate emotional intelligence (EQ) help for the development of clinical practice guidelines in order to promote medication therapy [8]. Training in the field of pharmacy improves the level of pharmaceutical knowledge of healthcare providers, and it also facilitates the acceptance and utilization of clinical practice guidelines [9]. In a study, participation of ICU pharmacists in patient care caused a reduction in medication administration errors [10]. The role of clinical pharmacists in COVID-19 centers needs to be further clarified and explored. Their contributions to improving clinical and economic outcomes are accomplished independently or through a multidisciplinary team [11].

Conclusion

The results of this study demonstrated that the presence of a clinical pharmacist during the COVID-19 pandemic and the implementation of practice guidelines in COVID-19 centers may lead to a decrease in the medical cost and enhance the proper use of drugs and may improve drug safety. Therefore, the employment of pharmacists in COVID-19 centers would enhance evidence-based medicine in clinical settings.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Authors contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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