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Original Article/Research

Jordanian experience: The internet pharmacy drug delivery platform during the COVID-19

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ABSTRACT

The present study aimed to see how well the newly designed internet hospital drug delivery platform model worked in the pharmacy department during the COVID-19 pandemic to make it easier for patients to get their prescribed drugs during the home quarantine.

Methods: The internet hospital drug delivery platform was designed and activated by the pharmacy department in collaboration with the information technology department.

The pharmacy department, in partnership with the information technology department, built and launched the internet hospital drug delivery platform (IHDD) immediately after the Jordanian government declared a full lockdown.

Results: During the quarantine, a total of 5994 prescriptions, including 28494 medications, were delivered to 4853 patients. The majority of the patients ($n = 1835$; 37.8%) were aged 60 to 74. Nearly three quarters (4722; 78.8%) of the patients were from Amman, the capital of Jordan, and the top five online prescription departments were cardiology ($n = 1737$, 31.6%), endocrinology ($n = 624$, 11.4%), nephrology ($n = 557$, 10.1%), respiratory ($n = 462$, 8.4%), and neurology ($n = 412$, 7.5%).

Conclusion: The IHDD platform was found to be efficient and convenient because it handled the challenge of precisely delivering medications to patients on time. To meet the pandemic's challenge, the pharmacy department has extended its inventive powers. In addition to safeguarding the environment, health technology was used to provide a coordinated, systematic program for the administration of medications.

The pharmacy department, in partnership with the information technology department, built and deployed the internet hospital drug distribution infrastructure shortly after Jordan's government proclaimed a full lockdown.

During the quarantine, a total of 5994 prescriptions, including 28494 medications, were delivered to 4853 patients. The majority of the patients ($n = 1835$; 37.8%) were between the ages of 60 and 74. Nearly three quarters (4722; 78.8%) of the patients were from Amman, the capital of Jordan, and the top five online prescription departments were cardiology ($n = 1737$, 31.6%), endocrinology ($n = 624$, 11.4%), nephrology ($n = 557$, 10.1%), respiratory ($n = 462$, 8.4%), and urology ($n = 412$, 7.5%).

The pharmacy department has expanded its capabilities creatively to face the challenge posed by the pandemic. Health technology was utilized to ensure a coordinated, systematic program for the delivery of medications, in addition to preserving the safety of the dedicated staff.

Introduction

An epidemic is described by the Centers for Disease Control and Prevention (CDC, USA) as a rapid increase in the number of cases of a disease in a certain community beyond what is ordinarily expected, with a considerable proportion of the population proportionately impacted in

such a geographical area [1]. COVID-19, a novel virus, had spread swiftly from China to neighboring nations by the end of 2019 [1]. The outbreak of COVID-19 was declared by the World Health Organisation (WHO) on January 30, 2020, and the spread of COVID-19 was recognized as a pandemic on March 11, 2020. A pandemic is described by the WHO as "an epidemic that occurs worldwide, or in a very wide area,

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crosses international borders, and usually affects a huge number of people" [2]. A few months after its discovery, the WHO revealed that the COVID-19 disease had spread to 206 countries, with 823,626 confirmed cases and 50,000 deaths [2].

The number of internet users globally expanded considerably between 2008 and 2018, going from about a quarter (22.7%) to nearly two-thirds (59.6%) of the population [3]. Jordan's government now has a new, more efficient method of evaluating healthcare issues. Due to the growing prevalence of computers and cellphones, as well as the availability of mobile internet connections, telehealthcare models are now accessible to the general public regardless of location.

During the pandemic, telemedicine, which is defined as "the delivery of remote health care services using information technology tools such as smartphones, telephones, and mobile wireless devices," has been given a number of attention because it reduced the risk of COVID-19 transmission by reducing in-person contact between individuals. Telepharmacy, for example, is defined as "offering remote pharmacist services, with a spatial distance between the pharmacist and the patients as health-care consumers." [4,5] permits patients to get immediate access to information, assessments, and therapies. It also allows physicians, pharmacists, and other healthcare providers to communicate with their patients while also providing and delivering services such as pharmaceutical treatment [6, 7]. As a result, solutions such as "Telehealthcare" using internet access have been set up to adapt to patients' needs during home quarantine. In Jordan, internet penetration stood at 66.8% in January 2021 [8]. As a result, the additional expenditures and time required to receive healthcare or prescriptions can be significantly decreased.

During the coronavirus disease (COVID-19) outbreak [9], the Jordanian government, like other countries throughout the world, implemented a number of administrative measures to try to limit the pandemic's spread [10]. On March 17, 2020, the Jordanian government, like the rest of the world, declared a state of emergency to stop the spread of COVID-19. As a result, it became imperative that the Jordan University Hospital's pharmacy department arrange a proper plan as quickly as possible. JUH is Jordan's first university teaching hospital, having a capacity of 600 beds. Patients at outpatient clinics received a total of 25,800 prescriptions and 100,000 drugs per month for both chronic and acute disorders.

Patient and worker safety are a primary focus at JUH, which is accredited by both the Joint Commission International (JCI) and the Health Care Accreditation Council (HCAC). As a result, the patient-centered approach, which focuses largely on well-being and patient care, was kept in mind when presenting a new plan or revising an existing one. As a result, it's vital to develop strategies to help the joint forces participate in providing care to patients during the virus's transmission and quarantine time.

Medication dispensing protocols and measures were immediately designed and established to benefit patients who could not attend the hospital or clinics as a result of mobility problems, those who suffered from multiple chronic medical conditions, or those confined to home quarantine as a result of the coronavirus. This approach could provide a solution that could help people obtain their medicines during the pandemic. The government regulatory authorities granted a special allowance to implement home delivery and internet pharmacy because it is not permitted in normal practice. The main objective of the present study was to evaluate the new model that was designed to facilitate patients' access to their medication during the period of quarantine due to COVID-19 disease through delivering the medications to their homes.

Patients who were unable to attend the hospital or clinics due to mobility issues, patients with various chronic medical illnesses, or patients restricted to home confinement as a result of the coronavirus, were quickly devised and implemented medication distribution policies and measures. This strategy could provide a way for people to get their medications during the pandemic. Because it is not permissible in normal practice, the government regulatory authorities issued a specific

exemption to allow home delivery and internet pharmacy. The primary goal of this research was to assess a new model that was created to make it easier for patients to get their prescriptions during their quarantine due to COVID-19 sickness by delivering them to their houses.

Method

The Internet Hospital Drug Delivery (IHDD) platform was built and activated during the quarantine period, which spanned from March 29 to April 30, 2020, just days after Jordan's government proclaimed a state of emergency. Patients who were unable to visit the hospital pharmacy were able to have their drugs sent to their homes via a delivery service.

To build this service, a pharmacy department devised a precise approach (Figure 1). To begin, the patient fills out an online application form with the pharmacy and picks a drug delivery service, with the option of having it delivered between Sunday and Thursday. Jordan University Hospital's pharmacy department would collect the requests from the hospital's electronic system (JUH). The pharmacist in charge then reviewed the patients' digital medical data, ensuring that the requested prescription was appropriate and making any necessary revisions if they were considered necessary (change of the drug, dose...). If a change in the patient's therapy was required, it was discussed with the patient over the phone in collaboration with the patient's physicians.

For each patient, the medications were given in a white sealed bag with specific labels stating the patient's address. Through a partnership with the Jordanian Medical Association, logistics services to carry medications from the hospital pharmacy to patients' homes were well-established and with no additional cost to the pharmacy department or the patients during the quarantine time. Before accepting the drugs, the patient signed a receipt. During the lockdown, the JUH's online outpatient prescriptions were analyzed, including their main characteristics, the total number of prescriptions delivered through this platform, and detailed information on these prescriptions, which was automatically retrieved from the hospital information system. In this study, the patients' gender, age, residence, associated prescription departments, drug delivery region, and insurance were all considered. SPSS was used to summarize and analyze the data (version 22).

Results

The main participants in this project were the pharmacy department at the JUH in Amman, Jordan, physicians, and medical students from the Jordanian Medical Association ($n = 240$). During the quarantine, a total of 5994 prescriptions, including 28494 medications, were delivered to 4853 patients between March 29 and April 30, 2020. Figure 2 shows the number of prescriptions that were delivered during the state of alarm. Among included patients, it was noticed that there were no great sex-based differences in receiving prescriptions (Table 1). The patients were categorized into five main groups according to their age: 1-17 years old, 18-35 years old, 36-59 years old, 60-74, and 70 years old. The majority of the patients ($n = 1835$; 37.8%) were aged 60 to 74. The second major group was those who were between 36 and 59 years old ($n = 1633$ (33.6%)).

A total of 5994 prescriptions were delivered to 4853 patients all over the country. Most of these prescriptions were delivered mainly to patients who live in Amman, the capital of Jordan (4722, 78.8%). Whereas nearly one-quarter of the delivered prescriptions were delivered to other cities, Table 2.

As shown in Figure 2, the top twelve online prescription departments represented 97.2% of the total prescriptions. The top five online prescription departments were cardiology ($n = 1737$, 31.6%), endocrinology ($n = 624$, 11.4%), nephrology ($n = 557$, 10.1%), respiratory ($n = 462$, 8.4%), and urology ($n = 412$, 7.5%). Additionally, as shown in table 3, the top 10 delivered medications represented nearly half of the delivered medications (47.9%) were used to treat chronic medical

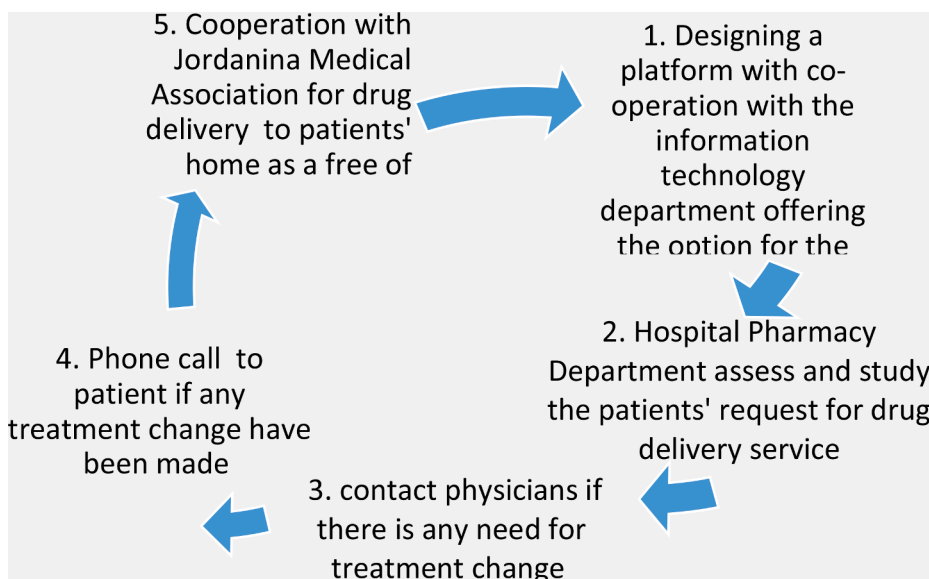


Fig. 1. Circuit delivery service.

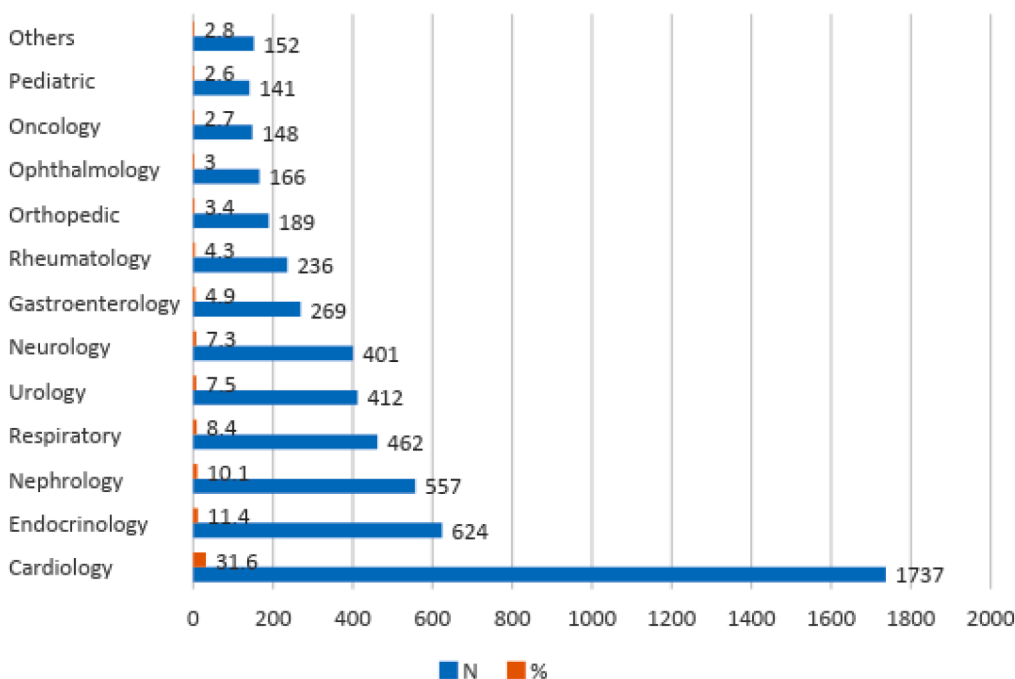


Fig. 2. Delivery of online prescription (N = 5994).

conditions. This was consistent with the distribution of online prescriptions.

Assessment of the medication errors revealed that 14 prescriptions were not delivered to patients as a result of wrong address (0.25%), wrong drug (15/28494, 0.05%), and wrong quantity (10/28494, 0.3%).

Discussion

According to the researchers, this was the first study in Jordan to demonstrate the results of pharmacists' role in providing pharmaceutical services via an online application form for patients requesting prescription delivery. Between March 29 and April 30, 2020, 4853 people received a total of 5994 prescriptions, comprising 28494 medications. The top five online prescription departments were cardiology (n

= 1737, 31.6 %), endocrinology (n = 624, 11.4 %), nephrology (n = 557, 10.1 %), respiratory (n = 462, 8.4 %), and urology (n = 412, 7.5%). Furthermore, the vast majority of these prescriptions were issued in Amman, Jordan's capital (4722, 78.8 %). Previous study [11] backed up this conclusion. This could be due to two factors: residents of the capital may have easier access to new medical platforms, and chronic illness patients may find it easier to renew their prescriptions.

Pharmacists and clinical pharmacists are important members of the healthcare system, and they are crucial in the management of the coronavirus outbreak [12]. During the COVID-19 pandemic, pharmacists at the JUH worked together with other health-care providers to coordinate efforts, and they were quick to adapt to the changes in pharmacy practice that were required. For this reason, it's vital to look into how our pharmacy department's pharmacists are handling both old

Table 1
Baseline characteristics of patients (N = 4853).

Characteristics	Value
Sex	No (%)
Male	2323(47.9)
Female	2530 (52.1)
Age (Group)	No (%)
1-17	143 (0.27%)
18-35	324 (6.7%)
36-59	1633 (33.6%)
60-74	1835 (37.8%)
≥75	918 (18.9%)
Insurance for each prescription	No (%) out of 5994)
Ministry of health	4079 (68.0%)
University and other institutions	1215 (20.3%)
100% coverage insurance	700 (11.7%)

Table 2
Out-of-Capital delivery details based on the geographical regions of Jordan n = 5994.

Geographical region N (%)	No (%)
Capital	4722 (78.8%)
North	41 (0.68%)
Central	1185 (19.8%)
South	46 (0.76%)

Table 3
Top 10 delivered medicines from the total prescriptions n = 28494.

Drug trade name	Drug scientific name	Pharmaceutical dosage form	No (%)
Atorvast 20 mg	Atorvastatin	Tablet	2117 (7.4%)
Salisal 100 mg	Acetyl salicylic acid	Tablet	2085 (7.3%)
D3 max 50, 000 IU	Vitamin D	Capsule	2062 (7.2%)
Lansazol 30 mg	Lansoprazole	Capsule	1574 (5.5%)
B-cor 5 mg	Bisoprolol	Tablet	1238 (4.3%)
Diamet 850 mg	Metformin	Tablet	1097 (3.9%)
Amlocard 5 mg	Amlodipine	Tablet	889 (3.1%)
Omedar 20 mg	Omeprazole	Tablet	719 (2.5%)
Diusemid 40 mg	Furosemide	Tablet	561 (2.0%)
Andesart 16 mg	Candesartan	Tablet	494 (1.7%)
Calcicar 500 mg	Calcium supplement	Tablet	431 (1.5%)
Lapril 10	Enalapril	Tablet	418 (1.5%)

and new tasks during the COVID-19 outbreak. To battle the spread of the disease, all healthcare practitioners, including pharmacists, are urged to collaborate with other healthcare providers around the world to combat the spread of this disease.

Telepharmacy services and expertise are accessible in a number of nations, including the United States and Europe. Telepharmacy services are distinguished by the fact that pharmacists are not physically present at the time of patient care. Several advantages of these new services have been reported: they provide broad coverage of pharmaceutical care services, particularly in economically challenged areas, and they allow for a decrease in healthcare inequities. It also saves time and money, especially for elderly people who need to get to health-care institutions [13]. However, there are certain drawbacks to using telepharmacy, such as a lack of human interaction between health care practitioners and patients and a higher risk of data confidentiality and integrity [14–15].

The expansion of telepharmacy is hampered by differences in regulatory issues between countries [16]. The North Dakota Board of

Pharmacy, for example, published telepharmacy standards and codes of rules 20 years ago [17]. Telepharmacy services are now covered by statute in 23 states [18]. European countries' institutions, on the other hand, make great efforts to govern parts of telemedicine [19].

According to the conclusions of this study, this pilot program would be a huge success with this approach. The pandemic has accelerated the development of new methodologies and models that would normally take months to develop [20].

Medication delivery services have undoubtedly provided various advantages during home quarantine. However, we must take into account the reality that not all patients have the same needs. More research is needed to determine which patient groups require intense pharmaceutical care and, as a result, who will gain the most from the new telepharmacy, rather than just the delivery service. According to recent studies, combining telepharmacy and home medicine delivery has become the most popular method [21–24].

Peterson and colleagues [21] propose a concept in which pharmacists provide pharmaceutical care to their patients via video consultations to verify that they understand the indication for the prescribed drug and how to take it properly. Other researchers [22] used video-conferencing to set up sessions and virtual consultations to cover both compliance and drug interactions. Despite the fact that there have been no previous studies in our country focusing on the impact of using this strategy, our experience with offering this new service has been quite beneficial in that it has allowed us to provide hospital medicines to patients at no additional cost to them.

Table 1 shows that the bulk of the patients in our study are between the ages of 60 and 74. This is in line with the latest WHO data from 2018, which showed that the average life expectancy in Jordan is 72.7 years for men and 76 years for women [25]. Aside from the fact that the government has advised this group of patients that COVID-19 infections put them at a higher risk of serious and possibly fatal illness.

According to the study (Figure 2), more than half of patients with cardiac, endocrine, and nephrological disorders elected to receive their prescriptions by delivery. The Institute for Health Metrics and Evaluation reported something similar. Ischemic heart disease, cerebrovascular illness, diabetes, congenital disorders, and chronic kidney disease are the top ailments in Jordan, according to the report [26]. The number of prescriptions sent to Amman (Jordan's capital) accounted for the majority of all deliveries (Table 2). This could be owing to the fact that Amman is a sophisticated city with a relatively educated population, ensuring that locals have a clear knowledge of the benefits of this new platform.

It's worth emphasizing that this new platform was created in partnership between the pharmacy department and the JUH's information technology management department at no expense, using existing instruments and technology. In addition, medications were delivered to patients at no cost by volunteer physicians who kept them in proper storage conditions. At JUH, for example, patients have an electronic medical file in which clinical pharmacists and pharmacists record and review all pertinent medical and nutritional information. Looking back on the pharmaceutical errors associated with the implementation of this procedure, it was discovered that undeliverable prescriptions accounted for only 0.25 percent (14/5994), improper drugs (15/28494, 0.05%), and the wrong quantity (10/28494, 0.03%). It could be attributed to the availability of electronic patient records and coordination between health care providers, such as clinical pharmacists, who review medication appropriateness before dispensing, evaluate the patient's medication-related needs, and initiate, modify, or discontinue patient-specific treatment. Furthermore, pharmacists and clinical pharmacists played a vital role in public health during the COVID-19 pandemic.

Drive-through pharmacy services have recently been launched in Jordan, demonstrating a modern trend in community pharmacy services with favorable awareness and impressions from clients [27–28]. As a result, clients praise the delivery approach, which meets all of the patients' needs. Within the pharmaceutical model, this model also detects

which patients might benefit from this new service. Finally, during the pandemic, the implementation of the previously discussed novel home delivery service allowed us to provide coverage across the entire country, and as a result, top hospital management collaborated with medical departments to begin developing a model for a telehealth system and online clinics at our institution.

Strengths and limitations

Although this study is the first in Jordan to evaluate a newly designed revolutionary platform for drug delivery during a crisis, it is the first in Jordan to do so. It had a lot of flaws. To begin with, due to practical challenges with COVID-19, a full review of the sorts of mistakes connected with adopting this strategy was not completed. In addition, this new platform was only used in one hospital. As a result, the findings cannot be generalized, and more research is needed before this platform can be used in a variety of situations, including community pharmacies.

Conclusions

This new medicine service has brought numerous benefits to patients, particularly during this period of home confinement. In the future, healthcare practitioners should think about the specific patients who would benefit the most from this new service and tailor it to their specific requirements. As pharmacists, we must concentrate on providing pharmaceutical care to patients through the use of an online platform and a drug delivery system. The pharmacy department at Jordan University Hospital has creatively expanded its capabilities to meet the new challenge posed by the COVID-19 pandemic by identifying ways to improve the use of health technology to ensure the continuity of medication delivery for patients while maintaining the safety and wellness of the dedicated staff.

Statement of Practical Impact

The hospital pharmacy department may play a critical role in delivering medications to patients while also assuring the safety and well-being of dedicated personnel, especially during challenging times, by utilizing drug delivery system platforms. In the future, health care providers and policymakers should consider the types of people who would most benefit from this new service and personalize it to their unique requirements.

Authors declared that

1. The manuscript submitted represents original work and has not been previously published or simultaneously submitted elsewhere for publication.
2. The manuscript has been read and approved by all authors.
3. All authors have participated sufficiently in the work to take public responsibility for the entire content of the manuscript
3. Conflict of interest: none
4. Funds: None

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Conflict of interest

None to be declared.

Patient consent

Not required.

Ethical approval

The study's protocol was approved by Jordan University Hospital institutional review board and ethical approval was granted (reference number is 10/2020/24819).

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