Health Policy Analysis and Perspective

Response to COVID-19 Pandemic: Managing Inpatient Pharmacy Services at King Abdulaziz Medical City – Jeddah

Ali F. Alwadie, Hani S. Alhamdan, Anjum Naeem, Abdullah M. Alzahrani, Khalid Albogami

Pharmaceutical Care Services, King Abdulaziz Medical City – Jeddah; Ministry of National Guard – Health Affairs, Kingdom of Saudi Arabia

ABSTRACT

Since early December 2019, the coronavirus disease 2019 (COVID-19) has been relentlessly spread worldwide and has hit the healthcare systems with terrible force. Pharmacists play a vital role in the healthcare system in providing medicines, therapeutics, vaccines, clinical services, and other pharmaceutical care services to patients. Therefore, to ensure all these services continued at King Abdulaziz Medical City – Jeddah during the COVID-19 pandemic, the Department of Pharmaceutical Care initiated a departmental crisis preparedness plan, as a part of general hospital preparedness plan. It started with adjusting medication dosing time, instituting a daily medication refill process, working remotely, expanding the use of automation, and modifying employee schedules. Other actions included the following: handling drug shortages, placing restrictions on some medications, using personal protective equipment, changing routine practices of pharmacy aides, revising the medication delivery process, starting a contingency training program, and restricting pneumatic tube operation. We took guidance from the Ministry of Health, our own institute's experience, World Health Organization recommendations, updated scientific research, and the American Society of Health-System Pharmacists regulatory updates. This article aims to describe how health services, policies, and systems were applied and adapted to address a specific problem while maintaining all pharmacy employees' safety. This article reviews the inpatient pharmacy's particular needs and responses to these needs to meet the COVID-19 pandemic challenges.

Keywords: COVID-19 pandemic, inpatient pharmacy, pharmacists, King Abdulaziz Medical City, pharmaceutical care services

INTRODUCTION

King Abdulaziz Medical City (KAMC) – Jeddah provides state-of-the-art medical care services for the Saudi Arabian population in the Western Region under the umbrella of the Ministry of National Guard – Health Affairs. It also initiates, interacts with, and coordinates with the other medical-based practices in the institutional, local, regional, national, and international communities. KAMC is accredited by the Joint Commission International and The Saudi Central Board for Accreditation of Healthcare Institutes.¹

In response to the coronavirus disease 2019 (COVID-19) pandemic, KAMC devoted all its advanced facilities and talented employees to provide high-quality healthcare services for the community during a challenging time. The multidisciplinary disaster team worked out many solutions and actions to increase the hospital capacity based on the level of care required (Fig. 1).

The Department of Pharmaceutical Care Services provides proficient and compassionate care to patients. The inpatient pharmacy activated specific measures under the departmental crisis preparedness plan from March 2020 until August 2020 to guide workflow and optimize services during the COVID-19 pandemic. The plan ensured the maximization of patient care, optimization of patients’ medication outcomes, and increased the extent to which pharmacists helped individual patients. It also made employee safety a high priority during this most challenging time. Pharmacists from the inpatient facility worked as part of a multidisciplinary team with the unanimous support of other departments.

METHODS

Because this is project involved analysis of available data and no intervention with human beings, ethical clearance and informed consent were not required per our institutional policy. We took guidance from the...
Ministry of Health (MOH), our own institute’s experience, World Health Organization (WHO) recommendations, updated scientific research, and the American Society of Health-System Pharmacists (ASHP) regulatory updates.

Staffing During the COVID-19 Pandemic

The pressing challenge to all hospital departments, including the pharmacy, was maintaining the safety of employees, minimizing the risk of exposure, and ensuring a healthy mental and physical status during this crucial period. The pharmacy director released a powerful, motivational video message for all pharmacy employees at the hospital via our intranet to encourage and prepare the staff for the emergency preparedness plan. The emergency preparedness plan was introduced and new schedules were released while keeping in mind that medical workers fighting COVID-19 were also facing a mental health crisis.[2] Pharmaceutical care services at KAMC – Jeddah employ around 300 staff members from different ranks, including pharmacists, technicians, clinical pharmacists, administrators, and pharmacy aides.

To ensure continuity of care, a contingency staffing plan was implemented and aligned with a general organizational plan. We started by merging several duties in the central pharmacy so they could be performed by 50% of the regular workforce; we held the rest in reserve as backups in case of an outbreak or other regulatory and geographic restrictions enacted by authorities that affected some employees. In cooperation with the informatics team, a virtual private network access enabled a group of staff to work remotely on several tasks, mainly on order verifications and clinical follow-up. The lockdown affected the travel and vacations; many employees were placed on standby instead of official vacations and compensated when the situation returned to normal.

Contingency Training Program

Regular training for pharmacists and technicians was suspended. The summer camp training program, internship program, other educational programs, and all other teaching activities were disrupted. However, other opportunities emerged, such as training all clinical pharmacists as a part of the emergency preparedness plan. We trained all clinical pharmacists how to handle the inpatient area in case of an outbreak. The training and development committee initiated cross-training for pharmacists to work in different pharmacy areas in the inpatient services as well as in the sterile preparation area, discharge preparation area, and chemotherapy preparation room.[3]

Changeover to an Electronic Health Record System

KAMC – Jeddah uses the health information system, BESTCare, which is an electronic health record. BESTCare is interactive and contains all patients’ self-services, medical histories, diagnoses, medications, treatment plans, immunization dates, allergies, radiology images, and laboratory, and other test results. Using a health information system like BESTCare also allows access to evidence-based tools that providers can use to make decisions about a patient’s care.[4]

In inpatient settings, generally during working hours, physicians order through a computerized physician order entry. The orders are received at the central pharmacy and sent to inpatient teams in eight different satellites through the eight doctor’s orders review queues (DORQs) in BESTCare. Under the crisis-based operation, those eight inpatient satellites were merged into four satellites. Two new DORQs were created for newly established field hospitals to cover patients with COVID-19. Those two new DORQs were then merged in a satellite that served the intensive care units (ICUs) and emergency department to guarantee an immediate ordering process for COVID-19. The inpatient teams
worked with a total number of four DORQs after the new ones were created and merged. Moreover, the Information Services Department had launched new locations and electronic flags for all patients with COVID-19 to facilitate navigation and accessibility by pharmacists to ensure prompt and high-quality patient services (Fig 2).

**Cart-Filling and Refill Process**

In KAMC – Jeddah, approximately 70% of medications are delivered through the automated dispensing cabinets (ADCs) deployed in all nursing units. However, as a backup for ADCs, the pharmacy still supplies a group of medicines through a unit-dose system available 24 hours per day as a unit-dose system of medication distribution. The unit-dose system is a pharmacy-coordinated method of dispensing and controlling medications in organized healthcare settings. Moreover, unit-dose medications are contained in single-unit packages; those are dispensed in an as ready-to-administer form as possible for most of the prescriptions. However, not more than a 24-hour supply of doses are delivered or available at the patient care area at any time.

Under the emergency preparedness plan, several modifications were implemented to guarantee a safe medication delivery and adequate supply process. First, the 24-hour supply process was extended to cover 7 days in the COVID-19 units and 3 days for the rest of the hospital wards. The next step was maximizing the ADCs by adding more items and increasing the quantities of some frequently required medications. In addition, a batch system was used for many stable intravenous medications, which were stocked in the units designed for specific periodic automatic replenishment.

**Use of Pharmacy Automation**

All nursing units in KAMC have ADCs. Having most of the medications required for a particular ward, ADCs can improve medication safety, ensure pharmacist review of orders before administration, and reduce or eliminate delays due to medication unavailability, missing doses, and time-consuming controlled substance counts.

A comprehensive review was performed for ADC lists in all hospital units. ADCs in isolation wards (wards for patients with COVID-19) were filled with the required medications for patients after pharmacists coordinated with the nursing and clinical team. The override lists for all wards were updated to minimize visits to areas in which isolation precautions were strictly enforced. Pharmacy staff visiting areas to refilling ADCs were required to wear appropriate personal protective equipment (PPE). Additionally, the periodic automated replenishment level was increased to minimize multiple ADC-loading visits.

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*Figure 2.* Hospital facilities during COVID-19 pandemic for patients at Ministry of National Guard – Health Affairs – Western Region.
Medication Delivery Process

In response to COVID-19, two quarantine facilities (field hospitals) were created outside the hospital’s vicinity to manage nonsevere cases of COVID-19. We created a commonly used medication list for floor stock for those field hospitals. We assigned pharmacy aides and managed their rounds to field hospitals to make on-time delivery of medications possible. After the COVID-19 admission surge, we received a safety-related request from the pharmacy aides as to whether they could use just one area to deliver medications for ICUs. A safe delivery zone was located with assistance from the primary care team and the nurse practitioners because all ICUs were occupied by patients with COVID-19. The pharmacy aides were also instructed to wear masks, practice hand hygiene, and follow infection guidelines during their rounds to deliver medications.

The pneumatic tube system is an easy-to-use system; it delivers medications to and from the inpatient pharmacy, operates via an automatic and intelligent control system, and ensures preservation and speedy transport of items. However, because of the potential for the pneumatic tube to be a carrier of infectious aerosols or droplets between the inpatient pharmacy and isolation units, we urged staff not to use the pneumatic tube for isolation units. We increased quantities of some medications and added succinylcholine, etomidate, propofol, and rocuronium to the crash cart and red bags with approval of the hospital’s cardiopulmonary resuscitation committee. Other medications, such as dopamine, dobutamine, norepinephrine, and epinephrine, were added to the ADCs in isolation wards to accommodate patients with COVID-19. This strategy helped to decrease the exposure of the pharmacists to isolation units.

Handling Drug Shortages

Mindful of the disruptions in the worldwide pharmaceutical supply chain because of the COVID-19 pandemic, we took several measures. Wherever possible, conversion of intravenous to oral medications was implemented based on institutional policy. A list of automatic substitutions for medications was issued; such medications could be dispensed if considered necessary without compromising patient care. Moreover, the pharmacy restricted the use of commonly used medications in the COVID-19 treatment protocol, including hydroxychloroquine and some other antiviral agents. Inpatient pharmacists were educated and kept informed of all restrictions and dispensing regulations enacted by the hospital’s Pharmacy and Therapeutic Committee.

Returned Medication Management

The inpatient pharmacy in KAMC – Jeddah, receives a remarkable number of returned medications daily. There can be many reasons for these returned medications. In one study, the most common reasons for returning intravenous medications were drug discontinuation (933 items, 45.3%), dispensing of an extra quantity (396 items, 19.2%), patient deaths (173 items, 8.4%), dose changes (171 items, 8.3%), and drugs being held (150 items, 7.3%). Although a degree of medication wastage is unavoidable, the most reported reason was drug discontinuation when initiating a new therapy.

In all patient areas, nursing units and wards used the medication outboxes to keep unused, oversupplied, discontinued, and expired medications that were to be returned to the pharmacy. During regular rounds to dispense medications, the pharmacy aides collected the medications from the outboxes so they could be recycled or processed as waste. Because of the modification in the cart filling and refilling process and the increase in the medication supply for 7 days in the COVID-19 units and 3 days in other wards, medication waste and medications returned to the pharmacy increased. This was not a cost-effective solution; however, pharmacy employees’ rounds to wards were decreased, ensuring employees’ safety, and the availability of medications to isolation units was ensured during a most challenging time.

To handle increased returns, we assigned one pharmacy aide exclusively under the supervision of a registered pharmacist to all medications from all wards. Before
Putting medications in outbox, nurses stored them in sealed zip top bags. To reduce waste, all items requiring refrigeration were kept under controlled temperatures during transport to pharmacy by the pharmacy aide.

In case a medication was moved to a patient’s room and not used, it was supposed to be discarded as medical waste and not returned to the pharmacy. All bags containing returned medications were sterilized and disinfected with 70% isopropyl alcohol before being opened and the medications relocated in an inpatient pharmacy.

**Communication Tools During COVID-19**

To minimize close contact between pharmacy staff members, weekly and monthly staff meetings were canceled. The daily inpatient huddle was canceled. The department ensured that all significant information about inpatient pharmacy updates was communicated to the employees through electronic notifications, emails, and memos on a notice board. A “WhatsApp” group of all inpatient pharmacists and technicians was created to ensure preparedness, handle any schedule changes, or communicate important COVID-19 updates. Webinars and online resources were made available to provide further information. Given the rapidly evolving data on COVID-19, a series of weekly inpatient communications was distributed as an internal circular by the inpatient supervisor and team leader to increase awareness among the staff of recent updates. A unified inpatient pharmacist’s email was created to communicate with nurses.

**Safety Measures for Employees**

As mentioned above, measures were taken to protect employees’ safety so that they might adequately provide patient care. We followed the universal use of face coverings and took measures to maintain social distancing.[8] Social distancing was practiced in combination with other everyday preventive actions to reduce the spread of COVID-19, and it was one of the best tools to avoid being exposed and to slow the spread in communities. The number of satellites were decreased by merging different DORQs in the electronic health record to make sure social distancing was maintained while dispensing medications. One satellite (oncology) was transferred to a separate workstation.

Staff who were exposed to or had close contact with COVID-positive patients were referred to the staff health clinic for a comprehensive check-up and COVID-19 test.[14] We advised staff to stay home if they were sick and to remain there until they had recovered. We ensured sufficient and easy access to 70% isopropyl alcohol, soap, and water or hand sanitizer for all inpatient staff. Everyone entering the pharmacy had to wear a face covering as part of standard precautions (i.e., to protect others if the person were infected), regardless of symptoms. We discouraged visits to the pharmacy area by colleagues from other units and encouraged them to use phones, email, or a pager system to communicate.[15]

**RESULTS**

In response to COVID-19, based on methods and resources used, we succeeded in the following outcomes in key focused areas:

1. Staffing during the COVID-19 pandemic—the contingency staffing plan and virtual private network access to work remotely on several tasks ensured continuity of patient care.
2. Contingency training program—clinical pharmacists served as a reserve inpatient force; they were trained to handle the inpatient areas in case of an outbreak.
3. Changeover to an electronic health record system—the creation of DORQs, additional locations, and electronic flags for all patients with COVID-19 guaranteed an immediate ordering process and high-quality pharmaceutical care services.
4. Cart filling and refilling process—modifications in the cart filling and refilling process and the application of a batch system for specific periodic and automatic replenishment of medications ensured minimal exposure of the pharmacy staff to nursing units.
5. Use of pharmacy automation—comprehensive ADC lists were reviewed and the subsequent increased periodic and automated replenishment level minimized the number of loading visits for ADCs.
6. Medication delivery process—creation of quarantine facilities (field hospitals) managed nonsevere cases of COVID-19. The pharmacy aide’s safety concern was addressed by creating a safe medication delivery zone and adding floor stock in field hospitals. Amending the guidelines on the use of the pneumatic tube system eased on-time delivery of medications.
7. Code blue and inpatient pharmacy team—we increased quantities of some medications in red bags and crash carts to decrease the concern about pharmacists’ attendance in code blue situations in isolation wards.
8. Handling drug shortages—a list of automatic substitutions for medications was approved and issued by the hospital pharmacy and therapeutic committee. The conversion of intravenous to oral medications helped mitigate the lack of adequate supplies and drug shortages.
9. Returned medication management—to handle increased returns to pharmacy because of additional floor stocks and the change in unit-dose dispensing strategy, we assigned one pharmacy aide exclusively to collect all medications from all wards. Keeping items requiring refrigeration under controlled temperatures during transport minimized the waste of returned medications.
10. Communication tools during COVID-19—webinars and online resources, electronic notifications, and emails were used. These communication tools decreased close contact between pharmacy staff, eventually reducing the spread of infection.
DISCUSSION

COVID-19 was a global challenge indeed. For healthcare workers, it demanded addressing multiple situations. There was significant pressure on healthcare workers to change therapeutic policies, work extended shifts, and make changes to regular routines.

The pharmacy department is an essential mainstay in public health and has considerable potential to help meet that global challenge. Pharmacists in KAMC worked as part of a multidisciplinary team with the unanimous support of other healthcare departments. They were highly responsive to the crisis, performed as frontline healthcare professionals, and acted promptly to provide essential pharmaceutical care services. We instituted a series of system modifications and interventions to prevent the spread of COVID-19 and to maintain the continuity of our services. These arrangements maximized patient care, optimized patients’ medication outcomes, and increased the extent to which pharmacists helped individual patients make the best use of medications. The arrangements also simultaneously maintained employee safety as a high priority. The arrangements and system modifications described can be used to develop, implement, and establish new initiatives to respond to pandemic crises.

Conclusion

The inpatient pharmacy in KAMC applied and adapted several methods to address problems created by the COVID-19 pandemic. These methods and modifications included manpower preparedness by preparing a contingency staffing plan, suspending regular training, and creating an emergency training plan.

For the inpatient medication management system, it was essential to modify the cart filling and refilling process to minimize the need for pharmacists to be in patients’ units. Establishing a medication delivery process for quarantine facilities and changing the guidelines for using the pneumatic tube system were also effective. The use of pharmacy automation was increased by modifying the periodic and automatic replenishment systems to prevent the spread of COVID-19 and to maintain the continuity of our services. These arrangements maximized patient care, optimized patients’ medication outcomes, and increased the extent to which pharmacists helped individual patients make the best use of medications. The arrangements also simultaneously maintained employee safety as a high priority. The arrangements and system modifications described can be used to develop, implement, and establish new initiatives to respond to pandemic crises.

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