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COVID-19 pandemic: Response plan by the Johns Hopkins Aramco Healthcare inpatient pharmacy department

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A B S T R A C T

The coronavirus disease 2019 (COVID-19) is an ongoing pandemic having caused a major health care crises across the globe. Pharmacy professionals are considered vital in preparation for optimal response to the COVID-19 pandemic. Therefore, in response to the estimated potential impact of COVID-19 on Johns Hopkins Aramco Healthcare (joint venture between Saudi Aramco and Johns Hopkins Medicine International), several initiatives were taken by the hospital's inpatient pharmacy department with focus on infection control, staffing, meeting clinical operational challenges, ethics, increased utilization of automation, and maintenance of employee wellness to prepare for this challenge. The plan implemented by the inpatient pharmacy department was prepared while incorporating information and recommendations from leading pharmacy organizations, ministry of health, institute's experience in battling another similar coronavirus (the Middle East respiratory syndrome–coronavirus) previously, and updated scientific research. The key focus areas include development of an institutionalized COVID-19 protocol, measures to improve infection control when handling and dispensing medications, modified staffing plan, system changes in peri-operative areas, keeping pharmacy professionals updated about new and scientific research, increased utilization of automation, clinical interventions by pharmacist ensuring appropriate utilization of medications while monitoring for drug-drug interactions, adverse drug event prevention, and preparing for handling drug shortages. By implementing a robust plan, pharmacy professionals continue to show that they are an integral member of inter-professional health care teams.

Introduction

With the first case of COVID-19 being recorded in Kingdom of Saudi Arabia, it became critical that Johns Hopkins Aramco Healthcare pharmacy department gets a plan in place to prepare immediately. Accredited by both Joint Commission international (JCI) and The Saudi Central Board for Accreditation of Healthcare Institutes (CBAHI), Johns Hopkins Aramco Healthcare keeps safety of visitors, patients, employees, and physicians as its highest priority. Having a realistic staffing and business continuity plan in place would have ensured that the department would function at a high level even in the most challenging times. Also, knowing that “now is the time to act”, step-by-step strategies were implemented by the department to ensure that we are able to put our patients first. Being a proud recipient of gold certification for excellence in Person-Centered Care by Planetree International, all of the above measures have been made with an emphasis on our commitment to the culture of person-centered care. Patient-centered approach with the focus on patient care and safety was always kept in mind when introducing new plans or changing our existing care plan. Pharmacists from inpatient pharmacy department provided this care in close coordination as part of multidisciplinary team either through a collaborative practice agreement or as a part of the patient's healthcare team.

Development of COVID-19 Protocol

A multidisciplinary expert committee was constituted by the hospital administration to review the available information and protocols on COVID-19. The committee consists of an infectious disease specialist, hospitalist, clinical pharmacists, respiratory therapist, nursing, health informatics, and other functional areas. Number of available articles and protocols were reviewed, and organization specific COVID-19 protocol for adult and pediatric patients has been developed. The core function of computerized physician order entry is the capture and transmission of clinical orders; however most computerized physician order entry systems incorporate support for a variety of time-saving devices such as care protocols and order sets. Order sets are collections of orders grouped by a clinical purpose. With this in mind, the COVID-19 protocol was used to design computerized physician order set to standardize patient care by integrating best practices through multiple disciplines, levels of care and services. The order set was created by the team from healthcare informatics, reviewed and incorporated into organization's electronic health records. The pharmacists made important contributions to the medication component of the order set with the following key points in mind:

• The order set shall reduce variation, and unintentional oversight

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Clinical Interventions

A variety of valuable clinical interventions were conducted by in-patient pharmacists. These include:

- Therapeutic drug monitoring for hydroxychloroquine and lopinavir/ritonavir has been enacted to avoid inappropriate prescribing, and prevent adverse drug events. QT-interval was monitored for patients prescribed hydroxychloroquine by the clinical pharmacist.3
- The pharmacy issued guidance on the dispensing of hydroxychloroquine upon discharge for the treatment of COVID-19.5
- Transition from nebulizers to hand-held inhalers for patients requiring inhaled therapy when feasible and safe.4
- Review of electronic best practice advisory for hydroxychloroquine such as monitoring parameters for baseline and follow up ECG incorporated into the computerized physician order entry system.5
- Where appropriate, change acetaminophen from regular to as-needed dosing to aid in COVID-19 fever surveillance.6
- Special monitoring of drug interactions being implemented for COVID-19 patients with renal impairment on dialysis and several concomitant anesthetics.7 Review has been made for current antivirals on hospital formulary to avoid drug interactions with anesthetic medications.
- Medication adjustment for patients with renal insufficiency being made per institutional policy.
- Computerized physician order entry system generated report utilized to review liquid medication preparations, and their rationale for use to avoid wastage.

Safety measures for infection control

Several safety measures have been taken to protect both our pharmacy staff and our patients using the interim guidance from government and professional pharmacy organizations. Some of the key best practices adopted included:

- Expanding home delivery services for the patients enrolled in Johns Hopkins Aramco Healthcare home health care.
- Mandatory online training for “infection control” and “hand hygiene” completed by all pharmacy staff.8
- Minimizing visits to the pharmacy area by colleagues from other units encouraging them to use phones or in-basket messages from the computerized physician order entry system to communicate.
- Enforcing social distancing by placing social distancing signs, and enforcing pharmacy staff to maintain a minimum distance of 1.5 meters.9
- Adding floor markings on the ground to section areas of the pharmacy that patients can stand in while waiting or being helped.
- Nursing unit inspections being done on regular basis with special emphasis on neuromuscular blockers and emergency medication kits such as ‘rapid sequence intubation’ kits.
- Guidance provided for pharmacists in emergency services pharmacy on socially-distanced methods of patient counseling and prescription handling.9
- Enable independent double check for high alert medications to be conducted at the automated drug dispensing system in isolation wards instead of patient bedside.
- Based on organizational medication administration guideline consolidate dispensing times - e.g., every 12 hours to twice daily, eliminate outlier medication administration times.
- For empty narcotic vials in operating rooms and isolated floor automated drug dispensing system, users to ensure wearing gloves and mask before handling and sealing into cartons.10

Staffing plan

A temporary department-wide staffing plan has been implemented to adjust to the current situation. The staffing was modified based on both the restrictions imposed by the government and the advice from ministry of health. Given however that our employees are the “backbone” of the department, our remaining colleagues took upon the challenge of performing unprecedented tasks and embracing new schedules. Shift patterns and assignments are altered to reduce employee burn out and minimize risk due to exposure. Pharmacists quarantined due to geographical restrictions have been permitted to work in non-Johns Hopkins Aramco Healthcare facilities that extended their healthcare services to Johns Hopkins Aramco Healthcare patients. All vacations, absences, or other leaves have been deferred to ensure our pharmacy staff is available and prepared to handle a possible surge in patients in the coming weeks. The department also explored work from home options, and the pharmacists in quarantined areas have been enabled to provide their services from home. Also, as part of allied health care professional upsingaling program, some of the pharmacy staff has been cross-trained to serve other patient care areas.11 The administration also tried to look for schedule solutions, keeping mental health of their staff in mind.12,13 Pharmacists and pharmacy technicians are reminded of the importance of taking care of their own wellbeing and that of those they manage.14,15 All pharmacy staff was informed of launch of Johns Hopkins Aramco healthcare staff emotional and domestic abuse support help line.15

Supporting Quarantine areas

In response to COVID-19, a number of quarantine facilities were established. To support these facilities a standardized list of commonly used medications including antipyretics and analgesics was made following a discussion with primary care team and the nurse practitioners. The list has been uploaded to hospital’s material management system. This enables front line nursing staff to request the medications online for the guests in quarantine facilities.

System changes in Peri-Operative areas

Automated drug dispensing systems were removed from two operating rooms, and cardiac catheterization (cath) labs were reserved to manage COVID-19 patients to avoid contamination. Instead, they were supplied isolation kits with medications. In the event, the hospital reaches full capacity for COVID-19 patients, two new “clean areas” in post anesthesia care unit and outpatient procedure area have been created. Automated drug dispensing system has been already mapped to serve these new areas.

Communication

The pharmacy department is ensuring that relevant information about inpatient pharmacy updates are communicated to the employees, colleagues from other departments as well as our valued patients. Pharmacy employees receive electronic notifications about preparedness, schedule changes, workplace mitigation strategies, and Johns Hopkins Aramco healthcare and ministry of health COVID-19 updates. Also, webinars and online resources are available to seek more
Handling Drug shortages

In light of unprecedented disruptions to, and demands on, the global pharmaceutical supply chain as a result of the Covid-19 pandemic, response measures were taken to prepare and handle drug shortages. This included conversion of intravenous to oral medications for both antibiotics and non-antibiotics based on institutional policy. Also, switches were made for medications from intravenous infusion to intravenous push whenever permitted by the standardized drug and therapeutic committee intravenous administration guidelines. Other measures included managing drug stocks using therapeutic interchange if deemed necessary and communicating with supply team about adequate supplies of medications.

Utilization of Pharmacy Automation

The Johns Hopkins Aramco Healthcare Pharmacy department has embraced several technological advancements in recent years to improve clinical outcome of the patients, and boost its overall efficiency. At the center of this tech-driven approach, a system capable of interfacing with multiple technologies ensures delivery of care with person-centered culture of safety for Johns Hopkins Aramco Healthcare in mind. An average of 80–85% of the medication dispensing for the majority of patient areas are fulfilled by the automated drug dispensing system. Following the announcement from the organization about the pandemic, a decision was made to maximize the capacity of automated drug dispensing systems, especially for the isolation areas and intensive care units. A periodic review of cart-fill medications was scheduled with pharmacy automation team. This strategy helps us to minimize the visit to those areas where isolation precautions are strictly enforced.

Cart-fill medications are being perpetually reviewed, utilizing system-generated reports. Based on the findings of the report, more medications were added to the automated drug dispensing system and par levels (days of stock) were increased to reduce the frequency of restocking, and thereby reduce traffic to the central pharmacy. In the central pharmacy, a container of the appropriate cleaning disinfectant was placed nearby to allow those accessing the automated drug dispensing system to disinfect common touch points.

The system in place already does not allow medications removed from the automated drug dispensing system to be returned to the specific bin or pocket from which they were removed. This was reinforced to minimize the risk of errors and cross-contamination. A designated return bin for medication is used for returning un-administered medications to the pharmacy, as long as they have not entered an isolation patient’s room.

During the refilling process, pharmacy staff disinfected the automated drug dispensing system and barcode scanners while wearing appropriate personal protective equipment (PPE). A decision in consensus with nursing administration was made to discard all unused medications dispensed for presumptive and confirmed COVID-19 patients. This included any medications located in the emergency crash cart trays used for confirmed COVID-19 patients.

Conclusion

The Johns Hopkins Aramco Healthcare inpatient pharmacy department has creatively expanded its capabilities in multiple regards to prepare for the challenge posed by COVID-19 pandemic. Several measures including improved safety measures to improve infection control, changes in existing staffing plan, supporting regionally quarantined areas, system changes in peri-operative areas, development of COVID-19 protocol, clinical interventions, efficient communication, overcoming drug shortages, and finding ways to improve utilization of automation were employed to ensure the inpatient pharmacy department continues to play a vital role in delivering high quality, effective, compassionate care for our patients while also maintaining the safety and wellness of our dedicated employees.

Author statement

We the undersigned declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed.

We further confirm that the order of authors listed in the manuscript has been approved by all of us. We understand that the corresponding author is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

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