

Short Communication

# Pharmaceutical care services provided by pharmacists during COVID-19 pandemic: perspectives from around the World

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## Abstract

**Objectives** Pharmacists have proven to be an indispensable member of the frontline healthcare team during this COVID-19 pandemic and have performed key roles and responsibilities to mitigate its adverse impact. They are facing several unusual challenges in these changing and evolving circumstances and are adopting novel strategies to overcome them. This review aims to identify and describe the different pharmaceutical care services delivered by pharmacists during this ongoing COVID-19 pandemic.

**Methods** A review of different studies was conducted to appraise the existing literature regarding various pharmaceutical care services carried out by the pharmacist during the COVID-19 pandemic. The review was done using the preferred reporting items for systematic reviews and meta-analyses (PRISMA). A comprehensive literature search was done using different databases such as MEDLINE, PubMed, Embase and ProQuest to identify the relevant studies.

**Key findings** The review highlights the various pharmaceutical care services provided and implemented by pharmacists during the COVID-19 pandemic. Pharmaceutical care services like patient education and counselling, providing information, addressing medication shortages, teleconsultation, medication review, optimizing medication regimen, adverse drug reaction monitoring and addressing the medication-related problems are being delivered by the pharmacists in this ongoing pandemic.

**Conclusions** All the studies described the roles and responsibilities of the pharmacists during COVID-19. This pandemic adversity has opened up new avenues for the pharmacists which have broadened their scope as the member of multidisciplinary healthcare team. Pharmacists have to overcome the unforeseen barriers and challenges and continue providing need-based pharmaceutical care services.

**Keywords:** pharmaceutical care services; pharmacists; COVID-19 pandemic; roles; responsibilities

## Introduction

COVID-19 is an ongoing global pandemic that is adversely affecting human lives in more than 200 countries.<sup>[1]</sup> As of 24 February 2021, over 112 million people have been affected by COVID-19, and more

than 2 million deaths have occurred worldwide.<sup>[2]</sup> Frontline healthcare workers worldwide have put in their best efforts in mitigating the most significant challenge to humankind to date, the COVID-19 pandemic.<sup>[3]</sup> Pharmacists have proven to be an indispensable member

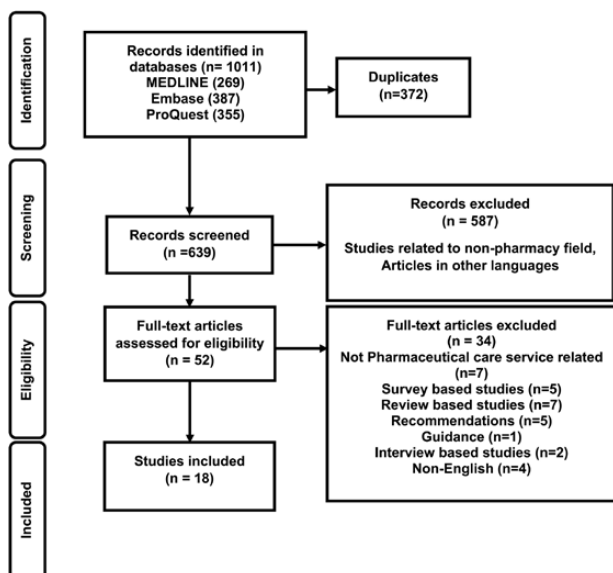
of this frontline team. Pharmacists have performed all their key roles and responsibilities during this pandemic, providing direct patient care as a community pharmacist, ensuring pharmaceutical care to COVID-19 patients as a hospital pharmacist, disseminating drug information for the management of COVID-19, managing drugs and other supplies, providing patient education related to COVID-19 and spreading awareness regarding the necessary preventing measures for COVID-19.<sup>[4]</sup>

Pharmacists faced several unusual challenges in these changing and evolving circumstances and adopted novel strategies to overcome them.<sup>[5]</sup> Different organizations like International Pharmaceutical Federation (FIP)<sup>[6]</sup> and American Pharmacists Association (APhA)<sup>[7]</sup> have issued guidelines and recommendations for pharmacists and pharmacy employees, outlining pharmacists' roles during the COVID-19 pandemic. Nevertheless, the on-field COVID-19 experiences are beyond the scope of any guidelines or recommendations. With this in mind, this review aims to identify and describe the different pharmaceutical care services delivered by pharmacists during the COVID-19 pandemic.

## Methods

A review of different studies was conducted to appraise the existing literature regarding various pharmaceutical care services delivered by the pharmacist during the COVID-19 pandemic. The available literature was summarized and presented in this review. The review was carried out using the preferred reporting items for systematic reviews and meta-analyses (PRISMA).

A comprehensive literature search was done using different databases such as MEDLINE, PubMed, Embase and ProQuest to identify the relevant studies. The search was done using terms such as COVID-19, pharmacist and pharmacy. All the studies describing the pharmaceutical care services provided by the pharmacists during COVID-19 were included. Studies published in languages other than English studies not related to the pharmacy field and pharmaceutical care, survey-based and interview-based studies, reviews, duplicated studies, studies dealing with guidance and recommendations were excluded.



**Figure 1** Study flowchart of the search for literature.

## Results

The comprehensive literature using different databases identified 1011 potentially relevant studies. Out of these 1011 studies, 639 studies were screened after removing 372 duplicated studies. After thorough scrutiny, 52 studies were chosen for full-text reading. Out of these 52 studies, only 18 studies were as per the selection criteria and were considered for the review. A study selection flowchart is represented in [Figure 1](#).

The studies included in the analysis were performed in various parts of the globe: China ( $n = 2$ ), Macao ( $n = 1$ ), USA ( $n = 3$ ), Saudi Arabia ( $n = 2$ ), India ( $n = 1$ ), Thailand ( $n = 1$ ), Pakistan ( $n = 1$ ), Australia ( $n = 1$ ), Jordan ( $n = 1$ ), Malaysia ( $n = 1$ ), Africa ( $n = 1$ ), Global ( $n = 1$ ), European Union ( $n = 1$ ) and UAE ( $n = 1$ ). All articles were studies based on research. The findings of all the studies included in the review are summarized in [Table 1](#).

## Discussion

Pharmacists working in the government and private sectors provided and implemented various pharmaceutical care services during the COVID-19 pandemic. It includes optimizing medication regimens, teleconsultation services, addressing drug shortage issues, clinical interventions and event-driven pharmaceutical care services, including point-of-care testing and vaccination services.

Community, hospital and clinical pharmacists worldwide have faced several work-related barriers and challenges during the COVID-19. To protect the employees and patients from the spread of infection in the pharmacy was the immediate challenge. Concern about contracting the coronavirus infection was another perceived barrier to provide emergency services.<sup>[8]</sup>

Clinical rotation, which is the basis for the provision of pharmaceutical care services, was conducted virtually, which limited the direct physical patient–healthcare worker interaction. Communications were done using remote technologies using tablet devices, computers, cameras and telephones, which limited the personal touch, and pharmacists had to adapt to these new technological approaches.<sup>[9, 10]</sup> Medication reconciliations and counselling were done using remote strategies avoiding direct contact with patients. Keeping up to date with rapidly emerging healthcare and treatment-related information was another persistent task.<sup>[11, 12]</sup> Addressing the institutional medication shortages was another task due to disruption in the global and central medication supply.<sup>[11]</sup> Changes in the working schedule, shortage of staff, deferred leaves, vacations, increased workload, communication with disabled, geriatric, low health literacy patients<sup>[13]</sup> and language barriers have been reported.<sup>[13–16]</sup>

## Conclusions

A review of the different studies from different parts of the world has identified various pharmaceutical care services provided and implemented by pharmacists during the COVID-19 pandemic. Pharmaceutical care services, including patient education and counselling, providing information, addressing medication shortages, teleconsultation, medication review, optimizing medication regimen, adverse drug reaction monitoring and addressing the medication-related problems are being delivered by the pharmacists in this ongoing pandemic. COVID-19 pandemic has forced pharmacists to adapt to new situations and challenges, which has further enhanced their roles and responsibilities beyond their usual scope. This adversity has opened up new avenues for

**Table 1** Pharmaceutical care services delivered by pharmacists during COVID-19

Author	Country	Pharmaceutical care services delivered by pharmacists during COVID-19
Meng <i>et al.</i> <sup>[17]</sup>	China	<ul style="list-style-type: none"> <li>Psychological counselling, patient counselling, assistance in development of treatment plans, monitoring efficacy, adverse drug reaction/event monitoring, medication reconciliation, clinical ward rounds, medication review, multidisciplinary team care</li> </ul>
Arain <i>et al.</i> <sup>[14]</sup>	Saudi Arabia	<p>Clinical interventions</p> <ul style="list-style-type: none"> <li>TDM: Hydroxychloroquine, Lopinavir/ritonavir</li> <li>QT-interval monitoring - Hydroxychloroquine</li> <li>Change to hand-held inhalers from nebulizers</li> <li>Assessment of electronic best practice advisory for Hydroxychloroquine</li> <li>Switch paracetamol from regular to as needed</li> <li>Drug interaction, dosage adjustment in dialysis, and renal insufficiency</li> </ul> <p>Safety measures for infection control</p> <ul style="list-style-type: none"> <li>Enhancing patients' home delivery services</li> <li>Web-based training for infection control and hand-hygiene</li> </ul> <p>Handling drug shortages</p> <ul style="list-style-type: none"> <li>There have been changes to medications from IV infusion to IV push</li> <li>Management of drug stocks through therapeutic interchange</li> </ul> <p>Staying up to date</p> <ul style="list-style-type: none"> <li>The transition of COVID-19 to treatment regimens until there is any evidence of a lack of clinical benefit and potential risks associated with the use of the regime</li> </ul> <p>Responding to inpatient emergencies</p> <ul style="list-style-type: none"> <li>Critical care pharmacy services: direct patient care ward rounds, cardiovascular life support, medication management services</li> <li>Customization of intubation kits for critical COVID-19 patients</li> </ul> <p>Optimization of medication orders</p> <ul style="list-style-type: none"> <li>Decreasing the number of bag changes required for larger volume parenteral</li> </ul> <p>Ensuring adequate supply</p> <ul style="list-style-type: none"> <li>Management of COVID-19 medications supply</li> <li>Mitigating the risk of drug shortages by following a collaborative approach with other institutions</li> </ul>
Li <i>et al.</i> <sup>[11]</sup>	United States	<ul style="list-style-type: none"> <li>The study documented 1,572 pharmacist interventions like regimen simplification, timing, dosage adjustment, antimicrobials, COVID-19 treatment, sedation, neuromuscular blockers, ADR avoidance, and monitoring drug-drug interaction assessment.</li> </ul> <p>Optimization of medication regimens</p> <ul style="list-style-type: none"> <li>Dispensing interacting medications in separate cups resulted in reducing nursing contact time with the COVID-19 patients</li> </ul> <p>Storage of patient's medications</p> <ul style="list-style-type: none"> <li>Providing advice to COVID-19 patients to leave their medications at home, in contrast advising other inpatients to bring their medications.</li> <li>Non-contact medication history Interview and appropriate medication adjustments using electronic patient records</li> </ul> <p>Clinical Trials</p> <ul style="list-style-type: none"> <li>Participation in COVID-19-related clinical trial</li> </ul> <p>Availability of time-critical medications</p> <ul style="list-style-type: none"> <li>To ensure timely availability of time-critical medications in the COVID-19 wards.</li> <li>Preparing educational videos related to COVID-19</li> <li>Preparing alcohol-based disinfecting preparations in the pharmacy</li> </ul>
Colins <i>et al.</i> <sup>[18]</sup>	United States	<p>Member of an expert team</p> <ul style="list-style-type: none"> <li>Providing pharmaceutical, pharmacokinetic, and pharmacotherapy inputs, and alternative treatments</li> </ul> <p>Telemedicine services</p> <ul style="list-style-type: none"> <li>Online tracking, processing, and dispensing of e-prescriptions</li> </ul> <p>Community pharmacy services</p> <ul style="list-style-type: none"> <li>Home delivery for masks, non-prescription drugs, thermometers, sanitizers, etc.</li> <li>Pack bulk mask packages into smaller packages</li> <li>Patient education related to COVID-19 preventive measures</li> </ul>
Nguy <i>et al.</i> <sup>[13]</sup>	Australia	<p>Member of an expert team</p> <ul style="list-style-type: none"> <li>Providing pharmaceutical, pharmacokinetic, and pharmacotherapy inputs, and alternative treatments</li> </ul> <p>Telemedicine services</p> <ul style="list-style-type: none"> <li>Online tracking, processing, and dispensing of e-prescriptions</li> </ul> <p>Community pharmacy services</p> <ul style="list-style-type: none"> <li>Home delivery for masks, non-prescription drugs, thermometers, sanitizers, etc.</li> <li>Pack bulk mask packages into smaller packages</li> <li>Patient education related to COVID-19 preventive measures</li> </ul>
Jalil <i>et al.</i> <sup>[19]</sup>	Jordan	<p>Member of an expert team</p> <ul style="list-style-type: none"> <li>Providing pharmaceutical, pharmacokinetic, and pharmacotherapy inputs, and alternative treatments</li> </ul> <p>Telemedicine services</p> <ul style="list-style-type: none"> <li>Online tracking, processing, and dispensing of e-prescriptions</li> </ul> <p>Community pharmacy services</p> <ul style="list-style-type: none"> <li>Home delivery for masks, non-prescription drugs, thermometers, sanitizers, etc.</li> <li>Pack bulk mask packages into smaller packages</li> <li>Patient education related to COVID-19 preventive measures</li> </ul>
Liao <i>et al.</i> <sup>[20]</sup>	China	<p>Member of an expert team</p> <ul style="list-style-type: none"> <li>Providing pharmaceutical, pharmacokinetic, and pharmacotherapy inputs, and alternative treatments</li> </ul> <p>Telemedicine services</p> <ul style="list-style-type: none"> <li>Online tracking, processing, and dispensing of e-prescriptions</li> </ul> <p>Community pharmacy services</p> <ul style="list-style-type: none"> <li>Home delivery for masks, non-prescription drugs, thermometers, sanitizers, etc.</li> <li>Pack bulk mask packages into smaller packages</li> <li>Patient education related to COVID-19 preventive measures</li> </ul>

Table 1 Continued

Author	Country	Pharmaceutical care services delivered by pharmacists during COVID-19
		<ul style="list-style-type: none"> <li>Identifying potential COVID-19 infections by documenting dispensing of acetaminophen and symptoms of cough and fever</li> </ul>
		Fever clinic
		<ul style="list-style-type: none"> <li>Sterilizing paper prescriptions with ethylene oxide before moving to storage</li> <li>Using separate drug delivery devices and containers, quarantine and non-quarantine areas</li> </ul>
		Hospital discharge
		<ul style="list-style-type: none"> <li>Use of online platform for medication counselling and adverse drug reaction monitoring</li> </ul>
		Hospital pharmacy operation
		<ul style="list-style-type: none"> <li>Ensuring appropriateness of prescription extension because of COVID-19</li> </ul>
		Clinical trials
		<ul style="list-style-type: none"> <li>Dispensing and inventory control of investigational drug for COVID-19 treatment trials</li> <li>Updating the members of the healthcare team on new findings for potential COVID-19 treatments</li> </ul>
		Member of specialized health care teams to Wuhan
		<ul style="list-style-type: none"> <li>Guaranteed adequate medical supply to the members of healthcare teams</li> <li>Provide drug information to physicians, nurses, and patients and compile medication formularies for local facilities</li> <li>Ensure optimal dosing regimens by identifying potential drug–drug interactions and evaluating their effectiveness</li> </ul>
Ung <i>et al.</i> <sup>[21]</sup>	Macao	Personal and environmental hygiene services
		<ul style="list-style-type: none"> <li>Educating the public on hand hygiene and infection control measures</li> </ul>
		Ensuring adequate supply
		<ul style="list-style-type: none"> <li>Ensured adequate and timely mask supply</li> </ul>
		Active surveillance
		<ul style="list-style-type: none"> <li>Performed screening of patients</li> </ul>
		Ensuring compliance with government directives for COVID-19
Kua <i>et al.</i> <sup>[22]</sup>	Malaysia	<ul style="list-style-type: none"> <li>Ensured adherence to government policies for COVID-19</li> <li>Provided drive-through services and home delivery of services</li> <li>Offered remote or teleconsultation</li> <li>Used social media sites for providing health-related advice and updates on COVID-19</li> <li>Started collaborative programs with doctors and other pharmacies for referrals and procurement of medications and supplies</li> </ul>
Goff <i>et al.</i> <sup>[23]</sup>	United States, United Kingdom, Saudi Arabia Lebanon, Nigeria, Canada, Qatar, UK, South Africa, Australia	<ul style="list-style-type: none"> <li>Involved in drug therapy, personal protective equipment preservation, patient counselling, outpatient and community services, health interventions and research</li> </ul>
Ibrahim <i>et al.</i> <sup>[24]</sup>	United Arab Emirates	Telepharmacy Services
		<ul style="list-style-type: none"> <li>Promoted appropriate use of face mask and gloves</li> <li>Stressed importance of social distancing</li> <li>Gave directions for home quarantine and isolation</li> <li>Identified medication errors and provided appropriate resolution</li> </ul>
Hedima <i>et al.</i> <sup>[10]</sup>	Sub Saharan Africa	<ul style="list-style-type: none"> <li>Innovations in pharmaceutical services in respect of telepharmacy services</li> </ul>
		<ul style="list-style-type: none"> <li>Patient education, counselling, and pharmaceutical care services were provided through telephone</li> </ul>
Paudyal <i>et al.</i> <sup>[15]</sup>	Sixteen European Countries	<ul style="list-style-type: none"> <li>Reducing the health risks: Prevention and mitigation strategies</li> <li>Ensuring uninterrupted drug supply and continuity of operations</li> <li>Providing information to prescribers regarding experimental drug treatments</li> <li>Contributes directly to the care of COVID-19 patients</li> <li>Cardiovascular risk assessment, glycosylated haemoglobin, the lipid profile, the blood pressure measurement at community pharmacies</li> <li>Remote web-based pharmaceutical care services</li> </ul>

**Table 1** Continued

Author	Country	Pharmaceutical care services delivered by pharmacists during COVID-19
Hussain <i>et al.</i> <sup>[12]</sup>	Pakistan	<ul style="list-style-type: none"> <li>• Event-driven Pharmaceutical care services: Ensure the usage of off-label drugs appropriately and evaluation and monitoring of ADRs of these off-label drugs and dosage adjustment</li> <li>• Individualized tele-clinical pharmacist services: Including interventions</li> <li>• Assisting frontline physicians for optimal dosing schedules, appropriate routes of administration.</li> <li>• Development of rational drug use guidelines</li> <li>• Updating all the health care providers about the use of medications in COVID-19 patients</li> <li>• Mitigation of drug shortages issues</li> <li>• Implementation of unit dosage system to reduce medication wastage</li> </ul>
Ahmad <i>et al.</i> <sup>[9]</sup>	Saudi Arabia	<ul style="list-style-type: none"> <li>• Event-driven pharmaceutical treatment</li> <li>• Formulation of emergency medications, follow-up, and remediation of medication shortages, building a remote pharmacy system</li> <li>• Sending reminders to patients through mobile phones</li> <li>• Medication delivery by post and drive-through pharmacy</li> <li>• Community pharmacists promoted continued adherence to medications and prescribed over-the-counter medications, and prepared posters, leaflets, app alerts, and text messages</li> <li>• Door-to-door medication delivery, online consultation, especially for people at high risk by community pharmacists</li> <li>• Community pharmacist contributions: Point-of-care testing for chronic disease management, COVID-19 testing and administering vaccination</li> </ul>
Strand <i>et al.</i> <sup>[25]</sup>	United States	<ul style="list-style-type: none"> <li>• Screening patients for symptoms of COVID-19 and emotional and anxiety issues</li> <li>• Telephonic consultations, patient education</li> <li>• Disseminating information on handwashing and mask usage</li> <li>• Collaboration with other pharmacies to procure medications and supplies</li> <li>• Provision of therapeutic drug monitoring services</li> <li>• Dosing consultations for medications (drug dosing design, dosage adjustment)</li> <li>• Adverse drug reactions monitoring</li> <li>• Identification of drug-related problems</li> </ul>
Meghana <i>et al.</i> <sup>[26]</sup>	India	<ul style="list-style-type: none"> <li>• Screening patients for symptoms of COVID-19 and emotional and anxiety issues</li> <li>• Telephonic consultations, patient education</li> <li>• Disseminating information on handwashing and mask usage</li> <li>• Collaboration with other pharmacies to procure medications and supplies</li> <li>• Provision of therapeutic drug monitoring services</li> <li>• Dosing consultations for medications (drug dosing design, dosage adjustment)</li> <li>• Adverse drug reactions monitoring</li> <li>• Identification of drug-related problems</li> </ul>
Surapat <i>et al.</i> <sup>[27]</sup>	Thailand	<ul style="list-style-type: none"> <li>• Screening patients for symptoms of COVID-19 and emotional and anxiety issues</li> <li>• Telephonic consultations, patient education</li> <li>• Disseminating information on handwashing and mask usage</li> <li>• Collaboration with other pharmacies to procure medications and supplies</li> <li>• Provision of therapeutic drug monitoring services</li> <li>• Dosing consultations for medications (drug dosing design, dosage adjustment)</li> <li>• Adverse drug reactions monitoring</li> <li>• Identification of drug-related problems</li> </ul>

pharmacists, which they can capitalize on post-COVID-19. As a multi-disciplinary healthcare team member, pharmacists should always find ways to overcome the barriers or challenges and look for opportunities to provide need-based pharmaceutical care services in a coordinated effort involving public-private partnerships.

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### Author Contributions

Both S.B.S. and S.A.R. were involved in conceptualization of the idea, literature search and analysis, manuscript preparation, editing and review. Both the authors approved final version of the manuscript, and are accountable for the accuracy and integrity of the manuscript.

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The authors declared no conflict of interest

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