

Implementation of pharmaceutical preparation management during the covid-19 pandemic: literature review

Maharani Dwi Pratiwi¹, Abdul Rahem², Liza Pristianty³

^{1,2,3}Faculty of Pharmacy, Gedung Nanizar Zaman, Universitas Airlangga, Surabaya, Indonesia

ARTICLE INFO

Article history:

Received Mar 09, 2023

Revised Mar 20, 2023

Accepted April 15, 2023

Keywords:

Pharmaceutical Preparation
Management
Pharmacist
Covid-19

ABSTRACT

Pharmacists should face challenging situations such as in the pandemic. The main problem is the preparation management of the drugs. Thus, this study aims to find out the effects of the pandemic on the management of pharmaceutical preparations. Articles were searched for using the PubMed and ScienceDirect search engines. PRISMA, or Preferred Reporting Items for Systematic Reviews and Meta-Analyzes, was utilized in this study. The data selection flow used the PICO (Population, Intervention, Compare, Outcome) method. Based on the discussion conducted, the management of pharmaceutical preparations in pharmacies during the COVID-19 pandemic can still be implemented with imperfect outcomes.

This is an open access article under the [CC BY-NC](#) license.



Corresponding Author:

Maharani Dwi Pratiwi,
Faculty of Pharmacy,
Universitas Airlangga,
Jl. Airlangga No.4 - 6, Airlangga, Kec. Gubeng, Kota SBY, Jawa Timur 60115, Indonesia
Email: maharani.dwi.pratiwi-2020@ff.unair.ac.id

INTRODUCTION

Practically, pharmacists have a standard in providing services. This standard is contained in PMK 35 of 2016. The Minister of Health Regulation stated that there were two parts to pharmaceutical service standards, namely the management of pharmaceutical preparations, medical devices, and BMHP and clinical pharmacy services (Permenkes, 2014). In order to provide and ensure appropriate, effective, and logical drug usage, pharmacists play a crucial role in pharmaceutical services (Komalawati, 2020). Planning, acquiring, storing, and delivering pharmaceutical preparations are only a few of the management's many facets (Erwinayanti, 2021).

During the Covid-19 pandemic, pharmacists played an important role. During a pandemic (Aburas & Alshammari, 2020). Pharmacists are required to continue providing pharmaceutical services to patients. In addition, pharmacists are a source of obtaining drugs and drug information (Zheng et al., 2021). As more patients self-medicate, pharmacists' role in preventing prescription shortages, spreading false information about drug usage, and failing to provide patients with appropriate care because of unmet drug demand has become increasingly important (Liu et al., 2020).

The Covid-19 pandemic has caused social restrictions and activities in the community. This is a health protocol measure to suppress the spread of the virus. As a pharmacist, this situation is a challenge. Since they are healthcare professionals, pharmacists must offer patients high-quality care while adhering to established medical standards (Patterson et al., 2022). Drug distributors are unable

to meet the enormous demand for their products. The management of pharmaceutical preparations is altered as a result, changing pharmaceutical service standards. This change is related to aspects of pharmaceutical preparation management, namely aspects of planning, procurement and delivery (Ying et al., 2021).

There have been several studies conducted to examine the management of drug availability during a pandemic. Empty stocks increased during the pandemic. This depends on drug management at the distribution stage whether the amount sent is appropriate, matches the list, and also the expiration date. This situation is due to several factors such as lack of planning, low compliance with SOPs, and a lack of human resources resulting in excessive workload.

This literature analysis was carried out to find out the effects of the pandemic on the management of pharmaceutical preparations from various nations during a pandemic situation based on several research that have been completed. This study will describe the management of pharmaceutical preparations based on aspects of planning, procurement, storage and delivery. Thus, the management of pharmaceutical preparations in a pandemic situation will become clearer to pharmacists in the future.

RESEARCH METHOD

Using the keywords drugs supply and pharmaceutical care management on pandemic, pharmacy practice on pandemic, community pharmacy services on pandemic, and pharmaceutical care services on pandemic, articles were searched for using the PubMed and ScienceDirect search engines to conduct a literature review for this study. Endnote X9 was used as a tool for organizing article search results and checking for duplicates.

The samples were 6 national and international research articles that entered the inclusion and exclusion criteria. The inclusion criteria were published from 2017-2022, could be accessed in full text, were accredited Sinta 1-4, and were in Indonesian or English. However, the exclusion criteria were articles that were not accredited, articles in the form of theses or dissertations and articles in the form of literature reviews. PRISMA, or Preferred Reporting Items for Systematic Reviews and Meta-Analyses, was utilized in this study to ensure the validity of the findings. The data selection flow used one of the critical appraisal journal methods, namely the PICO (Population, Intervention, Compare, Outcome) method.

RESULTS AND DISCUSSIONS

According to the keywords used, a database search turned up 2893 journals, including 1764 from *Science Direct* and 1129 from *Pubmed*. Based on these results, the researcher re-selected in accordance with the chosen criteria and obtained the results of 39 journals. From these 39 journals, the researcher read the abstracts and determined the suitability of the journals with the inclusion and exclusion criteria of 5 journals and continued further analysis.

Planning Aspect

The study of the five literatures found was research in different countries, namely China, Egypt, and Ireland. Based on the article, it was known that pharmacists in pharmacies must make adjustments to the management of pharmaceutical preparations during this pandemic. At the planning stage, HR arrangements are important because it can solve problems related to shortages of medical staff and ensure the health of employees is guaranteed. Thus, it can maximize the prevention and control plan of covid-19 (Ying et al., 2021). This also applies in Egypt which the pharmacists also felt it was important to conduct training and debriefing for employees and staff who work in pharmacies, and to create a separate room for patients suspected of having Covid-19. The process of adaptation and adjustment illustrates how society reacts swiftly to the requirement to sustain individualized and modified services before making future plans by organizing primary care services and getting ready

for the next public health emergency. ABC approaches, consumption methods, and epidemiology methods are highly effective in overcoming the lack of Covid-19 pharmaceuticals and drugs for accompanying symptoms when it comes to arranging and obtaining medications at pharmacies (Puspikaryani et al., 2022).

Aspects of Procurement of Drugs in Pharmacies

According to Chinese study, the process of managing the drug supply for pharmacists includes online medication procurement, managing donated drugs, managing the environment, and developing drug supply plans based on treatment standards. Hence, there will be a sufficient supply of goods and medications at COVID-19. Drugs are divided into three groups using the ABC method: group A is for percentages between 0 and 70%, group B is for percentages between 70 and 90%, and group C is for percentages between 90 and 100%. There were 38 items (17.43%) for group A medications, 43 items (19.72%) for group B, and 137 items (62.84%) for group C found in the ABC analysis performed for the Bali Mandara Hospital between January and July 2021 (Puspikaryani et al., 2022).

Aspects of Drug Delivery at the Pharmacy

Pharmacists dispense drugs by tailoring pharmacy care procedures to suit the needs of different groups, providing updated treatment plans, monitoring potential drug interactions, focusing on specific medications and implementing remote pharmacy services. Treatment that is performed independently has serious potential due to the risk of using inappropriate drugs (Zheng et al., 2021). Patient education consists of knowledge about Covid-19, educating patients about inappropriate drug use and providing education about the dangers of duplication of therapy and safe drug use (Zheng et al., 2021). Pharmacists prefer to educate patients verbally (90.4%) as opposed to in writing (81.3%), according to a survey.

According to (Ying et al., 2021) showed that Pharmaceutical Department HR Management resolves the problem of shortage of medical staff by implementing man-management and ensuring the physical health of pharmacists and deepening understanding of the Covid-19 prevention and control plan, Pharmacist drug supply management determines a drug supply scheme based on treatment guidelines, carries out drug procurement online, manages donated drugs, and manages the environment. Pharmacists dispense drugs by tailoring pharmacy care procedures to suit the needs of different groups, providing updated treatment plans, monitoring potential drug interactions, focusing on specific medications and implementing tele pharmacy services. Meanwhile according to (Zheng et al., 2021) showed that Ensuring adequate supply of drugs and products for covid-19, Patient education consists of knowledge about Covid-19, educating patients about inappropriate drug use and providing education about the dangers of duplication of therapy and safe drug use. According to (Bahlol & Dewey, 2021) Training or debriefing of staff is required who work in a pharmacy, Providing a separate room for patients those with suspected Covid-19 and with those who didn't (64% of pharmacies), Pharmacists prefer providing information orally (90.4%) compared to administration written information (81.3%).

Pharmacists in China develop professional service manuals for pharmacists and pharmacies, create emergency drug formularies, monitor and resolve drug shortages, establish remote pharmacy services to prevent human-to-human infection, provide event-driven pharmaceutical care, educate the public on infection prevention and management disease, and participate in clinical trials and drug evaluation (Liu et al., 2020). Adaptation (reflects how society responds quickly to the need to maintain customized and adapted services and services); Main point of contact (continued accessibility of the community pharmacy when other services are not available and acting as a hub of communication, especially in relation to information for patients and maintaining contact with other health professionals); Learning (flexibility of community pharmacies, lack of infrastructure,

especially related to information technology, and the need to build on pandemic experience to develop practice); Planning for the future (better infrastructure amplifying concerns about poor technology, coordination of primary care services and preparing for the next public health crisis) (Patterson et al., 2022).

Grouping drugs using the ABC method into 3 groups, namely group A for percentages of 0 - 70%, group B for percentages > 70 - 90%, and group C for percentages > 90 - 100%. The results of the ABC analysis conducted for the Bali Mandara Hospital in January - July 2021 obtained 38 items (17.43%) for group A drugs, 43 items for group B (19.72%), and 137 items for group C (62.84%); The results of this study indicate that planning and procurement using the ABC method, the consumption method and the epidemiological method are quite effective in overcoming the shortage of Covid19 drugs and drugs for accompanying symptoms (Puspikaryani et al., 2022). The current role of the pharmacist needs to be expanded to include the concept of pharmaceutical care, making the pharmacist a health care professional rather than drug dealer in commercial establishments; A pharmacist is uniquely positioned to provide disease management through appropriate medication therapy management which has been shown to improve patient outcomes and reduce overall healthcare costs. This role is more important than ever as the environment demands new practices and payment models needed to further optimize care and outcomes while addressing unsustainable increases in healthcare costs (Toklu & Hussain, 2013).

In terms of drug dispensing practice, 314 (73.4%) and 210 (49.1%) pharmacists respectively reported an increase in the dispensing of over-the-counter drugs and antibiotics after COVID-19. Of the pharmacists included in the study, 380 (88.8%) and 328 (76.6%) respectively reported increased involvement in patient education and treatment review after COVID-19. On the other hand, 247 (57.7%) and 179 (41.8%) pharmacists reported that the frequency of their pharmaceutical interventions and physician acceptance of these interventions increased after COVID-19, which was significantly associated ($p=0.01$) with pharmacists' ability to intervene in the dosing regimen of COVID-19 patients (Kharaba et al., 2022). 180 participants responded (estimated response rate of 16.1%): 134 pharmacists (74.4%) and 46 technicians (25.6%). Responses indicated greater engagement with administrative tasks and reduction in clinical service provision, which pharmacists perceived as negative. There has been an increase in remote work, although most participants remain physically present in general practice. Face-to-face interactions with patients were reduced, which participants viewed negatively, and telephone consultations were perceived as efficient but less effective. Professional development activities are being challenged by increased workload and reduced available support. Although stress at work was apparent, there was no indication of widespread job dissatisfaction (Weir et al., 2022).

Respondents ($n = 1018$; response rate 98.4%) revealed practical and psychological barriers, including inadequate levels of preparedness for a pandemic (average 61.43%; \pm SD 0.47), inadequate work environment (average -average 56.23%; \pm SD 0.49) and uncooperative stakeholder behavior (average 65.3%; \pm SD 0.47). The majority of respondents emphasized the need for universal and independent facilitators in the region, including the availability of timely guidelines (94.9%) (97.4%) issued by the Egyptian health authorities (94.6%), in electronic format (82.1%), through smartphone applications (80.0%) and provision of special telephone hotlines (89.5%). Furthermore, authorities must use the media to manage public perception (97.2%) and increase public trust (94.8%) in pharmacists (Bahlol et al., 2022). During the pandemic, Australian pharmacists have worked closely with multidisciplinary teams on the front lines to manage a fair and safe supply of medicines despite this unprecedented situation (Parajuli et al., 2022). Specific challenges identified include difficulties patients face when accessing care, impact on patient care experience, and extensive changes to pharmaceutical practice during the pandemic (Gleeson et al., 2022).

The disproportionate burden of COVID-19 has exposed significant gaps in our healthcare system and the global public health response, leveraging community-based pharmacy services can promote health equity, close growing health disparities, increase access to health care, and rapidly

detect and respond to public health threats (Roman, 2022). More than half of CP (56%) did not retrieve relevant information to assess the patient's condition. Whereas pharmacist response was limited to one to two recommendations, with the majority recommending patients to take a PCR test (90%). Imprecise recommendations made by CP mainly include confirming that the patient has COVID-19 without prior testing (9%), and prescribing antimicrobial drugs (5%) or dietary supplements (20%), claiming that the latter is essential for boosting the patient's body. As for pharmacist-patient communication skills, the mean total score was 2.25 ± 0.79 (out of 4), indicating sub-optimal and ineffective communication (Karout et al., 2022).

The response rate is 18.7%. Seventy-three percent of hospitals implemented hospital unit changes, including 46% that increased intensive care unit bed capacity; 94% made changes to pharmaceutical supply chain acquisitions, product changes, and/or inventory increases. Staff changes were implemented by 69% of hospitals, with staff reductions being the most common (55%) and salary reductions (16%). Medication use change was implemented by 86% of hospitals, with medication guidelines for the treatment of COVID-19 (79%) and compassionate use or investigational drug research (55%) being the most common. Changes to the sterile compounding process were implemented by 84% of hospitals. The shortage of personal protective equipment (PPE) caused 71% of hospitals to modify the standard use of PPE in sterile dispensing. Eighty-seven percent of hospitals changed operational activities, such as changing drug return practices (56%), drug reconciliation processes (46%), intravenous drug recycling (38%), and discharge counseling (37%). Hospitals are experiencing shortages of many drugs, including albuterol inhalers (60%), sedatives and anesthetic agents (58%), neuromuscular blockers (43%), corticosteroids (34%), cardiovascular agents (24%), investigative agents (24%), and dialysis solution (6%) (Pedersen et al., 2021). With the COVID-19 pandemic continuing to grip the nation and causing an unprecedented number in Malaysia to become critically ill, pharmacists must be resilient in leading, adapting and integrating overarching strategies in their respective fields to ensure good pharmaceutical practice (Gill, 2021). Compared to the experience prior to the COVID-19 pandemic, fewer trainees did direct patient care (38.5% vs 91.4%, $P < 0.001$), more worked from home (31.7% vs 1.6%, $P < 0.001$), and less time spent with mentors per day (2 [IQR, 2-6] hours vs 4 [IQR, 1-4] hours, $P < 0.001$). Sixty-five percent of respondents reported experiencing a change in their training program, 39% reported being asked to work in an area outside their regular training experience, and 89% said their training had shifted to focus on COVID-19 to some degree. Most respondents considered either a major (9.6%) or minor (52.0%) deterioration in the quality of experience, with major and minor increases in the quality of experience reported by 5.5% and 8.4% of respondents, respectively (Moore et al., 2021).

Clinical pharmacists provide direct patient care through monitoring adverse drug reactions, ensuring individualized treatment, conducting evidence-based practice, and evaluating drugs in clinical trials. On the other hand, community pharmacists who are the most accessible health care providers to the community raise their awareness of preventive measures, balance drug supply and demand, provide drive-thru and home delivery services, offer telehealth counseling, psychological support, refer to suspected COVID-19 patients, and administer vaccinations when available (Mohamed Ibrahim et al., 2022). Community pharmacists have supported government initiatives to control the pandemic and ensure patients continue to receive their medications. Hospital pharmacists have moved beyond their specialty to help provide critical care to patients while addressing ICU drug shortages. Pharmaceutical scientists have been involved in finding effective vaccines and identifying effective treatments. In short, the pharmacist profession has demonstrated expertise, strength, courage and dedication to care at the highest level (Jordan et al., 2021). From the clinical effectiveness and cost of COVID-19 therapies and vaccines to assessing different models of pharmaceutical care and education delivery, these priorities will ensure that our practice is informed by the best quality scientific evidence in these very challenging times (Dawoud et al., 2021).

Two hundred and forty pharmacists participated in this study; response rate was 80.5%. Patient counseling (99.6%), assessment and treatment of common acute illnesses (99.6%), and patient

education on hygiene (99.6%) were the most reported services provided by community pharmacists. The most frequent COVID-19 infection prevention and control measures performed by pharmacists include cleaning floors with soap and water (98.4%), providing hand sanitizer for staff use (97.1%), and taking care when handling prescriptions and dispensing drugs (96.7%). Significant barriers to service delivery are reduced labor in pharmacies, time constraints, and extended working hours. Zinc (98.3%), Vitamin C (97.5%), and ivermectin (95. Telehealth utilization jumped 50-75 times during the peak of the pandemic, with the majority of outpatient visits being made by telehealth in spring 2020. 1, 2 Approximately 80% of providers were involved with telehealth during the pandemic, as were 22% of consumers (Nau, 2022). Provision of prevention services to reduce and mitigate the spread of SARS-CoV-2, such as education on hygiene and social distancing, delivery of face masks and hand sanitizers, and adjustments to pharmacy locations. Most of the respondents also explained that they were involved in detecting SARS-CoV-2 through screening and carrying out antigen testing at pharmacies. Participants reported being actively involved in the COVID-19 vaccination by educating the general public about vaccines, facilitating their distribution to general practitioners, and administering vaccines (Durand et al., 2022).

Research activities on COVID-19 in pharmaceutical practice journals are a form of commitment by researchers and professionals to transform and advance the pharmaceutical profession. Research on the practice of pharmacy and pharmacists in low- and middle-income countries during a pandemic needs to be prioritized by scholars and journal editors (Sweileh, 2022). This study highlights the critical role that our pharmacists and pharmaceutical institutions play in ensuring continuity of care during the COVID-19 pandemic. We implemented several key initiatives, innovations and collaborations with other clinical disciplines to successfully address the challenges at hand (Hammad et al., 2023). Out of 491 responses, only 9.6% scored above the 75th percentile (19.3% for general services, 2.4% for the spending indicator and 12.6% for the storage indicator). The main concerns focus on a lack of medicine and reduced opening hours; however, 67.1% of respondents prefer to consult with community pharmacists rather than visiting puskesmas, private doctor's clinics, and hospitals. Significantly higher mean scores of indicators B, C and overall indicators were found in the presence of pharmacists compared to pharmacy support personnel (Bou-Saba et al., 2022). Disasters like COVID-19 disproportionately affect poor and vulnerable populations, and patients with mental health conditions may be among the hardest hit. Pharmacist-level, system-level, and regulatory responses have attempted to minimize this impact, despite the possibility of lasting impressions on the profession, for better and for worse (Hayden & Parkin, 2020). Recent publications regarding the pharmacist profession's response to the COVID-19 crisis are often generalized for pharmacists at different stages of their career, 3 and there are limited resources emphasizing the new practitioner's role in emergency preparedness (Messing et al., 2020).

Pharmacists and their colleagues are contributing to America's health and recovery during the COVID-19 pandemic by providing >350 million clinical interventions to >150 million people in the form of testing, parenteral antibodies, vaccinations, antiviral therapy, and inpatient care. The number of lives touched and people treated by pharmacists is steadily increasing (Grabenstein, 2022). A total of 758 participants (75% completion rate) including pharmacists, owners, managers, technicians, dispensers, medical assistants and pre-registration pharmacists took part. Increased workload and working hours coupled with staff shortages disrupted professional practice (n = 257, 35%). Some of the main challenges of working in CP during the pandemic included: fear of contracting and transmitting the virus to others (n = 578, 78%), patients hoarding medicines (n = 530, 71%) and doctors' operations being closed (n = 517, 70%) Impact on emotional well-being (n = 433, 76%) including stress, anxiety, depression and loneliness; physically (n = 322, 56%) affected sleep, pain and weight. The effects of the pandemic made 45% (n = 258/569) of participants reconsider their future at CP because they felt demotivated, unsupported, and belittled (Bhamra et al., 2021). Profesi apoteker perlu memanfaatkan pelajaran dan pengalaman dari pandemi global ini dan tidak membiarkan momentum perubahan yang terlihat dan tidak terlihat menjadi sia-sia (Watson et al.,

2021). Participants in this multinational qualitative study describe various service adaptations and adoption of new roles to prevent and mitigate the public health impact of the pandemic. Study findings can help inform governments, public health agencies and health care systems in leveraging ongoing service provision and adapting to future disruptions (Paudyal et al., 2021).

Telepharmacy supports the work of community pharmacies during the COVID-19 pandemic by facilitating the provision of pharmaceutical services. Despite some financial and technical problems, they are less common in pharmacy chains with a large number of pharmacists (Jirjees et al., 2022). We identified 30 eligible studies. The meta-analysis of this study found that the most frequently reported adaptation in pharmacist practice was modifying hygiene behavior, including regular cleaning and disinfection (81.89%), followed by maintaining social distance from staff and clients (76.37%). Educating clients about COVID-19 was reported by 22 studies (72.54%). Telemedicine and home delivery services were provided to clients by 49.03 and 41.98% of pharmacists, respectively (Kambayashi et al., 2023). Pharmacies have shifted from product-based and patient-facing to service-based and patient-centric. Pharmacies have moved from compounding centers devoted to the manipulation of medical materials to fully integrated pharmacy centers, clinical pharmacies and "medical pharmacy networks", providing a significant range of non-prescription services. In addition, the role, duties and responsibilities of the pharmacist have kept pace with these historical changes and have undergone a gradual expansion, incorporating new skills and reflecting new societal demands and challenges. The COVID-19 outbreak has opened up new opportunities for pharmacists: community and hospital pharmacists have indeed played a key role during the COVID-19 pandemic, demonstrating that fully integrated, inter-sectoral and inter-professional collaboration is needed to deal with crises and public health emergencies. Early emerging evidence seems to suggest that, perhaps, a new era in pharmacy history ("post-COVID-19 post-pharmaceutical care era") has begun (Bragazzi et al., 2020).

New roles for community pharmacists were discovered in relation to maintaining drug supply chains, telepharmacy and telehealth service delivery, provision of outpatient pharmacy services, use of digital software to coordinate drug delivery for patients with chronic conditions, eliminating misinformation, and roles in research and clinical trials. Roles in the post-COVID world regarding immunization of the population and engagement in the lifting of lockdown restrictions with other stakeholders are also explored (Pantasri, 2022). COVID-19 has had a significant impact on pharmaceutical practice in Indonesia. Most participants implemented precautionary measures and adapted their business models to changing circumstances. The shift to remote sales and home delivery has allowed many pharmacies to maintain, and even increase their profit margins due to greater demand for medicines and PPE (Wulandari et al., 2022). A number of studies have been found that describe the role of pharmacists during the COVID-19 pandemic. All studies reported actions taken by pharmacists, although without a satisfactory picture. Thus, future studies with more detailed descriptions and impact evaluations of pharmacist interventions are needed to guide future actions in this-and-or other pandemics (Visacri et al., 2021).

The role of pharmacists in fighting the corona virus is fundamental in guiding patients with comorbidities who are seeking information about drugs in the pathological process of COVID-19, supplying and controlling stocks of medical and hospital. The role of pharmacists in fighting the corona virus is fundamental in guiding patients with comorbidities who are seeking information about drugs in the pathological process of COVID-19, supplying and controlling stocks of medical and hospital materials, in clinical care activities, and dealing with their problems. Using drugs safely and rationally, preventing drug-related errors and maintaining drug stability, whether after dilution or reconstitution, are fundamental to economics and the use of scarce resources. When we are going through difficult times, the pharmacist acts in the face of this pandemic, being an important professional, because he has full support to integrate the frontline health team, developing all his expertise regarding drugs, dosages, side effects and drug interactions (Silva et al., 2021). Pharmacists demonstrate A, SN, PBC, and goodwill in participating in the management of COVID-19 in the

community. Specialized training, improved stakeholder communication and improved pharmacy management are critical to increasing pharmacists' willingness to take part in the COVID-19 pandemic and other public health emergencies in the future (Li et al., 2021). Pharmacists are medical professionals who provide patient care in a variety of settings including hospitals, clinics, community pharmacies, long-term care, doctor's offices, and national and public health. In this paper, we describe how pharmacists from high- and low-income countries are contributing to essential patient care and societal well-being during the COVID-19 pandemic. While the news media, the public, and politicians often overlook pharmacists as important frontline healthcare providers (Goff et al., 2020).

(1) increasing pressure on pharmacists to meet the unique healthcare needs of engaged and unattached patients; (2) what pharmacists offer (eg, accessibility, trust); (3) positioning pharmacists in the system (eg, how can pharmacists address disparities in primary health care); (4) pharmacist welfare; and, (5) recommendations for post-pandemic practice (eg maintaining some of the policy changes made during the COVID-19 pandemic) (Isenor et al., 2023). Private pharmacies in Kenya are actively contributing to the COVID-19 response, but more intentional involvement, support and engagement is needed. In particular, there is an urgent need to develop guidelines for pharmacy-based COVID-19 testing, a service that is clearly needed and could significantly increase testing coverage. Pharmaceutical-based COVID-19 programs must be accompanied by implementation research to inform current and future pandemic responses (Mugo et al., 2022). Many of the changes introduced to regulation of pharmacy services in Ireland have been replicated in other countries. This includes the introduction of electronic means for sending prescriptions and other orders for medicines, relaxing legal restrictions in place to control the emergency supply of prescription-only medicines and more (Lynch & O'Leary, 2021).

Increased work pressure in pharmacies, and severe frustration and anxiety among pharmacy customers were also reported. Vigilance is required to monitor foreseeable shortages of therapeutic items, especially in regional pharmacies. There are opportunities for long-term changes to maintain certain rights and roles based on demonstrated competency of pharmacists in these challenging times, such as telephone drug reviews, telehealth for MedsCheck and MedsCheck Diabetes, digital prescription handling and therapy substitution (Parajuli et al., 2022). During the pandemic, pharmacists continued to work according to their previous roles and adjusted their roles and practices in pharmaceutical services following changes in people's behavior. This condition also encourages pharmacists to develop their roles and capacities. Health management teams, governments, and professional organizations influence their roles, both positively and negatively. The results of this study provide a deeper understanding of the role and practice of pharmacists during the pandemic (Widayanti et al., 2022).

The results of the study show that the COVID-19 pandemic has had an impact (60.4%) on pharmacy services in Indonesia due to an increase in demand for several pharmaceutical products (supplements, vitamins and medical devices) which can put pressure on the drug supply chain system. Pharmacy services during COVID-19 have been implemented by several pharmacies in Indonesia (31.25%, n = 30) according to the Indonesian Ministry of Health Guidelines regarding the COVID19 Preparedness Guidelines Rev 02 of 2020. In addition, several pharmacies in Indonesia (71.88%, n =69) has implemented E-pharmacy, non-cash payments, online prescription and self-medication services, as well as drug delivery to patient homes during the COVID-19 pandemic. The impact of the COVID-19 pandemic on pharmaceutical services in pharmacies, namely the implementation of e-pharmacy and most pharmacies have implemented appropriate operational procedures (Prasetio, 2022). Independent management of medicines and traditional medicines is influenced by gender, occupation, and distance from where to buy them (Melviani & Rohama, 2022). Implementation of drug supply management during the COVID-19 pandemic, drug supply problems and efforts to handle them, such as through optimizing pharmaceutical logistics information systems and managing pharmaceutical resources. Two other articles examine methods

for planning hospital drug supplies during a pandemic. During a pandemic, hospitals need to establish a strategy to overcome drug supply problems including optimizing the use of information systems, selecting appropriate drug demand planning methods and managing pharmaceutical resources (Dharmaningsih & Andriani, 2022).

CONCLUSION

Based on a literature search, the management of pharmaceutical preparations in pharmacies during the COVID-19 pandemic can still be implemented with imperfect outcomes. Pharmacy staff members must be able to adjust to the COVID-19 pandemic condition in order to continue offering patients the best possible care. Human resource arrangements are crucial during the planning stage because they can address issues with medical staff shortages and guarantee employee health. In order to maximize the COVID-19 prevention and control approach. The pharmacist's drug supply management process determines a drug supply scheme based on treatment guidelines, and carries out drug procurement online. The ABC approach, the consumption method, and the epidemiological method can all be used in pharmacy medicine planning and procurement to great effect in order to combat the shortage of Covid-19 medications and medications for symptomatic treatment. Information about Covid-19, warnings about improper drug use, information on the risks of repeating therapy, and instructions on how to use drugs safely are all included in patient education.

References

- Aburas, W., & Alshammari, T. M. (2020). Pharmacists' roles in emergency and disasters: COVID-19 as an example. *Saudi Pharmaceutical Journal*, 28(12), 1797–1816. <https://doi.org/10.1016/j.jsps.2020.11.006>
- Bahlol, M., & Dewey, R. S. (2021). Pandemic preparedness of community pharmacies for COVID-19. *Research in Social and Administrative Pharmacy*, 17(1), 1888–1896. <https://doi.org/10.1016/j.sapharm.2020.05.009>
- Bahlol, M., Tran, V. De, & Dewey, R. S. (2022). Community pharmacy practice related to the COVID-19 pandemic: barriers and facilitators. *International Journal of Pharmacy Practice*, 30(3), 226–234. <https://doi.org/10.1093/ijpp/riac002>
- Bhamra, S. K., Parmar, J., & Heinrich, M. (2021). Impact of the coronavirus pandemic (COVID-19) on the professional practice and personal well-being of community pharmacy teams in the UK. *International Journal of Pharmacy Practice*, 29(6), 556–565. <https://doi.org/10.1093/ijpp/riab062>
- Bou-Saba, A. W., Kassak, K. M., & Salameh, P. R. (2022). Public views of community pharmacy services during the COVID-19 pandemic: a national survey. *Journal of Pharmaceutical Policy and Practice*, 15(1), 76. <https://doi.org/10.1186/s40545-022-00474-4>
- Bragazzi, N., Mansour, M., Bonsignore, A., & Ciliberti, R. (2020). The Role of Hospital and Community Pharmacists in the Management of COVID-19: Towards an Expanded Definition of the Roles, Responsibilities, and Duties of the Pharmacist. *Pharmacy*, 8(3), 140. <https://doi.org/10.3390/pharmacy8030140>
- Dawoud, D., Chen, A. M. H., Rossing, C. V., Garcia-Cardenas, V., Law, A. V., Aslani, P., Bates, I., Babar, Z.-U.-D., & Desselle, S. (2021). Pharmacy practice research priorities during the COVID-19 pandemic: Recommendations of a panel of experts convened by FIP Pharmacy Practice Research Special Interest Group. *Research in Social and Administrative Pharmacy*, 17(1), 1903–1907. <https://doi.org/10.1016/j.sapharm.2020.08.020>
- Dharmaningsih, D., & Andriani, H. (2022). Pengendalian Persediaan Obat Di Rumah Sakit Pada Masa Pandemi Covid-19 Di Indonesia: Tinjauan Literatur. *Syntax Literate ; Jurnal Ilmiah Indonesia*, 7(11), 16033–16042. <https://doi.org/10.36418/syntax-literate.v7i11.10066>
- Durand, C., Douriez, E., Chappuis, A., Poulain, F., Yazdanpanah, Y., Lariven, S., Lescure, F.-X., & Peiffer-Smadja, N. (2022). Contributions and challenges of community pharmacists during the COVID-19 pandemic: a qualitative study. *Journal of Pharmaceutical Policy and Practice*, 15(1), 43.
- Erwinayanti, G. (2021). PERFORMANCE MEASUREMENT OF PHARMACY DEPARTMENT AT PANEMBAHAN SENOPATI BANTUL REGIONAL GENERAL HOSPITAL USING BALANCED SCORECARD. *Jurnal Manajemen Dan Pelayanan Farmasi (JMPF)*.
- Gill, M. S. (2021). Challenges and Changes of Pharmacy Practice During the COVID-19 Crisis in Malaysia:

- Instability as an Opportunity. *Malaysian Journal of Medical Sciences*, 28(2), 171-176. <https://doi.org/10.21315/mjms2021.28.2.16>
- Gleeson, L. L., Ludlow, A., Clyne, B., Ryan, B., Argent, R., Barlow, J., Mellon, L., De Brún, A., Pate, M., Kirke, C., Moriarty, F., & Flood, M. (2022). Pharmacist and patient experiences of primary care during the COVID-19 pandemic: An interview study. *Exploratory Research in Clinical and Social Pharmacy*, 8, 100193. <https://doi.org/10.1016/j.rcsop.2022.100193>
- Goff, D. A., Ashiru-Oredope, D., Cairns, K. A., Eljaaly, K., Gauthier, T. P., Langford, B. J., Mahmoud, S. F., Messina, A. P., Michael, U. C., Saad, T., & Schellack, N. (2020). Global contributions of pharmacists during the <scp>COVID</scp> -19 pandemic. *JACCP: JOURNAL OF THE AMERICAN COLLEGE OF CLINICAL PHARMACY*, 3(8), 1480-1492. <https://doi.org/10.1002/jac5.1329>
- Grabenstein, J. D. (2022). Essential services: Quantifying the contributions of America's pharmacists in COVID-19 clinical interventions. *Journal of the American Pharmacists Association*, 62(6), 1929-1945.e1. <https://doi.org/10.1016/j.japh.2022.08.010>
- Hammad, M., Tashtoush, M. M., Faki, E. M. A. El, Hajaj, M. Y., Ahmed, Saima Saeed, A., & Darwish, A. A. (2023). Hospital pharmacy response to the COVID-19 pandemic: experience from a regional referral center in the United Arab Emirates. *Journal of Pharmaceutical Policy and Practice*, 36.
- Hayden, J. C., & Parkin, R. (2020). The challenges of COVID-19 for community pharmacists and opportunities for the future. *Irish Journal of Psychological Medicine*, 37(3), 198-203. <https://doi.org/10.1017/ipm.2020.52>
- Isenor, J. E., Cossette, B., Murphy, A. L., Breton, M., Mathews, M., Moritz, L. R., Buote, R., McCarthy, L., Woodill, L., Morrison, B., Guénette, L., & Marshall, E. G. (2023). Community pharmacists' expanding roles in supporting patients before and during COVID-19: An exploratory qualitative study. *International Journal of Clinical Pharmacy*, 45(1), 64-78. <https://doi.org/10.1007/s11096-022-01430-7>
- Jirjees, F., Odeh, M., Aloum, L., Kharaba, Z., Alzoubi, K. H., & Al-OBAIDI, H. J. (2022). The rise of telepharmacy services during the COVID-19 pandemic: A comprehensive assessment of services in the United Arab Emirates. *Pharmacy Practice*, 20(2), 02-11. <https://doi.org/10.18549/PharmPract.2022.2.2634>
- Jordan, D., Guiu-Segura, J. M., Sousa-Pinto, G., & Wang, L.-N. (2021). How COVID-19 has impacted the role of pharmacists around the world. *Farm Hosp*, 45(2), 89-95.
- Kambayashi, D., Manabe, T., & Hirohara, M. (2023). Adaptations in the role of pharmacists under the conditions of the COVID-19 pandemic: a systematic review and meta-analysis. *BMC Health Services Research*, 23(1), 72. <https://doi.org/10.1186/s12913-023-09071-w>
- Karout, S., Khojah, H. M. J., Itani, R., Jaffal, F., & El-Lakany, A. (2022). Assessing the pharmaceutical care provision to suspected COVID-19 patients in community pharmacies: a simulated patient study. *BMC Health Services Research*, 22(1), 467. <https://doi.org/10.1186/s12913-022-07870-1>
- Kharaba, Z., Moutraji, S. A., Al Khawaldeh, R. A., Alfoteih, Y., & Al Meslamani, A. Z. (2022). What has changed in the pharmaceutical care after COVID-19: Pharmacists' perspective. *Pharmacy Practice*, 20(2), 01-08. <https://doi.org/10.18549/PharmPract.2022.2.2656>
- Komalawati, V. (2020). *Responsibilities of Pharmacists in Drug Service With Prescription*. 237-238.
- Li, J., Hu, H., Liu, W., Lei, C. I., & Ung, C. O. L. (2021). Predicting Pharmacist Intention to Contribute to COVID-19 Management at the Community Level: A Cross-Sectional Survey Study. *Frontiers in Public Health*, 9, 653335. <https://doi.org/10.3389/fpubh.2021.653335>
- Liu, S., Luo, P., Tang, M., Hu, Q., Polidoro, J. P., Sun, S., & Gong, Z. (2020). Providing pharmacy services during the coronavirus pandemic. *International Journal of Clinical Pharmacy*, 42(2), 299-304. <https://doi.org/10.1007/s11096-020-01017-0>
- Lynch, M., & O'Leary, A. C. (2021). COVID-19 related regulatory change for pharmacists - The case for its retention post the pandemic. *Research in Social and Administrative Pharmacy*, 17(1), 1913-1919. <https://doi.org/10.1016/j.sapharm.2020.07.037>
- Melviani, M., & Rohama, R. (2022). Faktor-Faktor yang Berhubungan dalam Pengelolaan Obat atau Obat Tradisional untuk Pengobatan Sendiri di Masa Pandemi. *Jurnal Surya Medika*, 7(2), 199-204. <https://doi.org/10.33084/jsm.v7i2.3215>
- Messing, E. G., Quinn, N. J., Shah, D. D., Veltri, K., & Chirico, J. (2020). Practicing during a pandemic: The role of a new pharmacy practitioner. *American Journal of Health-System Pharmacy*, 77(24), 2045-2048. <https://doi.org/10.1093/ajhp/zxaa274>
- Mohamed Ibrahim, O., Ibrahim, R. M., Ibrahim, Y. A., Madawi, E. A., & Al Deri, M. Y. (2022). Shedding the light on Pharmacists' roles during COVID-19 global pandemic. *Saudi Pharmaceutical Journal*, 30(1), 14-27. <https://doi.org/10.1016/j.jsps.2021.12.003>
- Moore, W. J., Webb, A., Morrisette, T., Sullivan, L. K., Alosaimy, S., Hossain, S., Howe, Z., Vlashyn, O. O.,

- Paloucek, F. P., Rybak, M. J., & Wang, S. K. (2021). Impact of COVID-19 pandemic on training of pharmacy residents and fellows: Results from a national survey of postgraduate pharmacy trainees. *American Journal of Health-System Pharmacy*, 78(12), 1104–1111. <https://doi.org/10.1093/ajhp/zxab114>
- Mugo, P. M., Mumbi, A., Munene, D., Nzinga, J., Molyneux, S., & Barasa, E. (2022). Experiences of and response to the COVID-19 pandemic at private retail pharmacies in Kenya: a mixed-methods study. *BMJ Open*, 12(6), e058688. <https://doi.org/10.1136/bmjopen-2021-058688>
- Nau, D. (2022). The era of telehealth pharmacy practice. *Journal of the American Pharmacists Association*, 62(1), 13–14. <https://doi.org/10.1016/j.japh.2021.11.029>
- Pantasri, T. (2022). Expanded roles of community pharmacists in COVID-19: A scoping literature review. *Journal of the American Pharmacists Association*, 62(3), 649–657. <https://doi.org/10.1016/j.japh.2021.12.013>
- Parajuli, D. R., Khanal, S., Wechkunanukul, K. H., Ghimire, S., & Poudel, A. (2022). Pharmacy practice in emergency response during the COVID-19 pandemic: Lessons from Australia. *Research in Social and Administrative Pharmacy*, 18(8), 3453–3462. <https://doi.org/10.1016/j.sapharm.2021.08.013>
- Patterson, S. M., Cadogan, C. A., Barry, H. E., & Hughes, C. M. (2022). 'It stayed there, front and centre': perspectives on community pharmacy's contribution to front-line healthcare services during the COVID-19 pandemic in Northern Ireland. *BMJ Open*, 12(9), e064549. <https://doi.org/10.1136/bmjopen-2022-064549>
- Paudyal, V., Cadogan, C., Fialová, D., Henman, M. C., Hazen, A., Okuyan, B., Lutters, M., & Stewart, D. (2021). Provision of clinical pharmacy services during the COVID-19 pandemic: Experiences of pharmacists from 16 European countries. *Research in Social and Administrative Pharmacy*, 17(8), 1507–1517. <https://doi.org/10.1016/j.sapharm.2020.11.017>
- Pedersen, C. A., Schneider, P. J., Ganio, M. C., & Scheckelhoff, D. J. (2021). ASHP national survey of pharmacy practice in hospital settings: Impact of COVID-19 pandemic on pharmacy operations—2020. *American Journal of Health-System Pharmacy*, 78(18), 1701–1712. <https://doi.org/10.1093/ajhp/zxab212>
- Prasetyo, A. N. (2022). MASA PANDEMI COVID-19 MENJADIKAN PELAYANAN KEFARMASIAN LEBIH INOVATIF DI BEBERAPA APOTEK DI INDONESIA.
- Puspikaryani, G. A. P., Iin Kristanti, I. G. A. M., & Wibawa, I. M. A. Y. (2022). Strategi Perencanaan dan Pengadaan Obat Dalam Penanganan Pandemi Covid-19 di Instalasi Farmasi RSUD Bali Mandara. *Majalah Farmasetik*, 18(1), 85. <https://doi.org/10.22146/farmasetik.v18i1.71902>
- Roman, Y. M. (2022). COVID-19 pandemic: the role of community-based pharmacy practice in health equity. *International Journal of Clinical Pharmacy*, 44(5), 1211–1215. <https://doi.org/10.1007/s11096-022-01440-5>
- Silva, D. C. da, Marquez, C. de O., & Alves, N. C. (2021). Atuação do farmacêutico clínico frente a pandemia da COVID-19. *Research, Society and Development*, 10(12), e230101220287. <https://doi.org/10.33448/rsd-v10i12.20287>
- Sweileh, W. M. (2022). Bibliometric analysis of COVID-19 research publications in pharmacy practice journals. *Journal of Pharmaceutical Health Services Research*, 13(3), 198–207. <https://doi.org/10.1093/jphsr/rmac026>
- Toklu, H. Z., & Hussain, A. (2013). The changing face of pharmacy practice and the need for a new model of pharmacy education. *Journal of Young Pharmacists*, 5(2), 38–40. <https://doi.org/10.1016/j.jyp.2012.09.001>
- Visacri, M. B., Figueiredo, I. V., & Lima, T. de M. (2021). Role of pharmacist during the COVID-19 pandemic: A scoping review. *Research in Social and Administrative Pharmacy*, 17(1), 1799–1806. <https://doi.org/10.1016/j.sapharm.2020.07.003>
- Watson, K. E., Schindel, T. J., Barsoum, M. E., & Kung, J. Y. (2021). COVID the Catalyst for Evolving Professional Role Identity? A Scoping Review of Global Pharmacists' Roles and Services as a Response to the COVID-19 Pandemic. *Pharmacy*, 9(2), 99. <https://doi.org/10.3390/pharmacy9020099>
- Weir, N., Newham, R., Dunlop, E., Ferguson, A., & Bennie, M. (2022). The impact of the COVID-19 pandemic on pharmacy personnel in primary care. *Primary Health Care Research & Development*, 23, e56. <https://doi.org/10.1017/S1463423622000445>
- Widayanti, A. W., Haulaini, S., & Kristina, S. A. (2022). Pharmacists' Roles and Practices in Pharmaceutical Services During Covid-19 Pandemic: a Qualitative Study. *Indonesian Journal of Pharmacy*, 33(3), 402–411. <https://doi.org/10.22146/ijp.2435>
- Wulandari, L. P. L., Khan, M., Probandari, A., Batura, N., Ferdiana, A., Mashuri, Y. A., Wibawa, T., Daraninggar, D., Dewi, B. K., Day, R., Jan, S., Schierhout, G., Yeung, S., Wiseman, V., & Liverani, M. (2022). "We face the same risk as the other health workers": Perceptions and experiences of community pharmacists in Indonesia during the COVID-19 pandemic. *PLOS Global Public Health*, 2(7), e0000606. <https://doi.org/10.1371/journal.pgph.0000606>
- Ying, W., Qian, Y., & Kun, Z. (2021). Drugs supply and pharmaceutical care management practices at a

- designated hospital during the COVID-19 epidemic. *Research in Social and Administrative Pharmacy*, 17(1), 1978–1983. <https://doi.org/10.1016/j.sapharm.2020.04.001>
- Zheng, S., Yang, L., Zhou, P., Li, H., Liu, F., & Zhao, R. (2021). Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: A China perspective. *Research in Social and Administrative Pharmacy*, 17(1), 1819–1824. <https://doi.org/10.1016/j.sapharm.2020.03.012>