

Challenges Faced by Hospital Pharmacists in Low-income Countries Before COVID-19 Vaccine Roll Out: Handling Approaches and Implications for Future Pandemic Roles

Düşük Gelirli Ülkelerde COVID 19 Sırasında Hastane Eczacılarının Roller ve Zorlukları

Rajeev Shrestha¹, Sunil Shrestha^{2, #}, Binaya Sapkota³, Saval Khanal^{4, #}, Bhuvan KC²

¹Department of Pharmacy, Lamjung District Community Hospital, Lamjung, Nepal

² School of Pharmacy, Monash University Malaysia, Jalan Lagoon, Selatan, 47500 Subang Jaya, Selangor, Malaysia

³Department of Pharmaceutical Sciences, Nobel College, Affiliated to Pokhara University, Kathmandu, Nepal

⁴Warick Business School, Coventry, United Kingdom

both authors have an equal contribution

Corresponding Author Information

Rajeev Shrestha

rajiv2stha@gmail.com

+977-9845445205

<https://orcid.org/0000-0003-1822-3969>

27.10.2020

19.03.2021

Abstract

Coronavirus disease (COVID-19) is one of the greatest pandemics of modern times. More than one hundred eleven million global deaths have already been associated with COVID-19. The incidence of COVID-19 and morbidity and mortality due to COVID-19 has increased in low-income countries (LICs). COVID-19 has further weakened health systems in LICs, that is already distressed by inadequate funding, lack of human resource and poor infrastructure and service delivery. Despite the resources crunch, hospitals in LICs have been instrumental in treating COVID-19 patients. Pharmacists working in hospitals have an indispensable role in providing pharmaceutical services for infection prevention and control. The present study aims to discuss the contribution of hospital pharmacists and the challenges faced by them in the treatment of COVID-19 patients in LICs prior to the COVID-19 vaccine rollout.

Keywords: COVID-19; hospital pharmacy; hospital pharmacists; low-income countries; pharmacy service; pharmacist.

Main Text

Background

Coronavirus disease (COVID-19) is a current ongoing global threat. It is one of the fatal pandemics in the history of humankind. As per the World Health Organization (WHO), as of March 3, 2021, there were 114,140,104 confirmed cases and 2,535,520 deaths globally. Similarly, 828,461 confirmed cases and 14,749 deaths in Low-income countries (LICs)¹. Among 31 LICs, corona victims are found in 30 countries, and 83.87 % of countries were reported to have community transmission too¹. LICs are those countries that have a very low, i.e. \$ 1,035 or less Gross National Income (GNI) in 2019².

Vaccines against COVID-19 have been developed and rolled over in many countries. Before that, the non-pharmacological interventions to contain the virus, such as social distancing and personal hygiene, were only mechanisms to prevent the transmission. The LICs, often have a huge population concentrated in few cities, living in overcrowded conditions³. It is difficult to maintain social distancing for people. Furthermore, people did not have access to adequate hand sanitizer and other protective measures required for preventing transmission³. Health care systems of LICs were traditionally developed to deliver basic health services and treatment of some life-threatening infective diseases. These systems are already overstretched and struggling to cope up with the increasing burden of non-communicable diseases⁴. During this transition phase, the emergence of COVID-19 had presented significant challenges to LICs where the accessibility of quality and affordable health services is poor^{5,6}.

All healthcare professionals and health institutions are required to strengthen themselves against the COVID-19 or any pandemic situations. Like other healthcare professionals, hospital pharmacists also have a significant role in preventing and controlling pandemic. International Pharmaceutical Federation (FIP) has developed guidelines for hospital pharmacists considering their imperative value during the disaster and pandemic control^{7,8}. Various studies identified the importance of pharmacists' roles in providing pharmaceutical care and services during infection control and managing disaster complications^{9,10}. Pharmacists are the third largest health care professionals in the world after physicians and nurses¹⁰, but they are still struggling to prove their value in the health care systems of LICs¹¹. The current review aims to discuss the hospital pharmacists' potential contributions in the management of disaster and the challenges they faced in LICs. The discussion is based on the situation before the development of COVID-19 vaccines. The reflection will help different stakeholders to understand how essential pharmacists are to health care delivery during pandemics and how they can effectively utilize hospital pharmacists during any future pandemics.

Methods

We performed a narrative review of the existing literature known to the authors. The literature were searched in PubMed, Medline, Science Direct and Google Scholar from inception up to and including May 2020. Key search terms included were "Pharmacist", "COVID-19", "Low-income countries", "Pharmacy", "Hospital" and "Developing countries". Along with this, various synonyms or combination of these terms were used. The authors viz. RS, SS are working as the hospital and clinical pharmacists in the hospital. SK, BS and BKC are in academia but have experience working as a pharmacist in the past. We have themed potential activities and challenges into different headings to improve readability. The potential role of hospital pharmacists is mainly based on the FIP and Nepal (one of the LICs) guidelines to manage COVID-19. The main features of both guidelines are presented in Table 1.

Table 1. Guidelines for COVID-19 management by the hospital pharmacy and the pharmacists(FIP and Nepal)^{7,12}

Organization	Features of guidelines
International Pharmaceutical Federation (FIP)	<ul style="list-style-type: none"> • Ensuring healthy inventory management of pharmaceutical products (both medicines and medical devices) and a good supply system • Liaising with other healthcare professionals in providing patient care and support • Promoting infection control mechanisms in hospitals • Promoting health education and counseling • Ensuring responsible and proper use of the pharmaceutical products and personal protective equipment (PPE) supplied. Providing pharmacovigilance services and monitoring treatment outcomes.
Nepal Pharmaceutical Association	<ul style="list-style-type: none"> • Ensuring storage and supply of essential medicinal and surgical products including mask, thermometer, goggles • Co-ordinating with other health care professionals in patient care • Raising public awareness regarding COVID-19 prevention and control • Monitoring treatment outcomes and pharmacovigilance • Ensuring inventory of medicines in both inpatient and outpatients in COVID-19 pandemic cases

Results

Potential role of hospital pharmacists in the management of COVID-19 and Pandemics

The healthcare systems in LICs differs from one country to another. Therefore, it would be difficult to generalize what exactly a hospital pharmacist can provide in general. However, we aim to propose the following activities (Figure 1), which may be possible in many LICs jurisdiction under the existing legal and professional framework. These are the recommended role; some of these might not be legal in some countries. The role presented in Figure 1 is described below individually in subsequent sections.

<Figure 1 to be inserted here>

Pharmaceutical Management

Access to adequate, qualitative, and affordable essential medicines is challenging in LICs¹³. Medicine accessibility have been a problem during COVID-19 because of the disruption in manufacture, distribution and logistics. Hospital pharmacists played an important role in this situation via handling of medicine logistics via appropriate forecasting, stocking, quality maintenance and optimum utilization of resources.

In close consultation with clinicians, pharmacists can develop a strategy for using available therapeutic alternatives such as converting the oral dosage form to intravenous, selecting equivalent alternative medicine to tackle drug shortage^{14,15}. Hospital pharmacies used to have detailed information about their regular patients through electronic billing systems or other record-keeping forms. Therefore, they can estimate and transfer the required medications of their patients appropriately. Pandemic has broadly taught about keeping patient's medication record

practice. It must be started if many hospital pharmacies do not have a system of keeping patient's medication record. Medication records are essential not only for better logistics and distribution but also for measuring patient's adherence to medications therapy and effective management of therapy^{16,17}.

Drug information service

Access to reliable information is crucial to the general public and health care professionals during a pandemic. Fake or incomplete information is very serious. It can even cause severe accidents when the public figure personnel becomes a medium of rumour.

Similarly, more than 700 people in Iran died in about two months after injecting methanol following the manipulation of information raised by another misinformation by an influential global leader regarding the possibility of injecting disinfectant to cure COVID-19¹⁸. Therefore, the correct information should be transmitted to both the general public and health care professionals. Pharmacists had a fundamental professional responsibility to continuously evaluate the existing literature and make health professionals and public awareness of the pandemic and its medicinal management by providing accurate, unbiased information^{19,20,21}.

Currently, several medicines and vaccines are under trial for COVID-19 treatment. Pharmacists can be a part of the clinical trial team to manage and provide information on medicine or vaccine under trial. The pharmacist can also use various informative pictures, pamphlets, and information sheets to make patient aware when they visit hospitals.

Patient screening and triaging

Social distancing is one of the most crucial approach to pandemic control. Therefore, the initial screening of patients visiting the hospital could save unwanted contact with the hospital staff and patients. The pharmacy department and hospital pharmacists can play a significant role in initial screening and triage. The pharmacist can do an initial evaluation of patients. They can either recommend patients for clinician consultation or send them back home with OTC medications or non-pharmacological counseling in case of minor conditions. The pharmacist can also perform rapid diagnosis tests (RDT) of suspected patients segregate immediately. These approaches could save unwanted clinician workload and prevent infection transmission possibility in the pandemic. The FIP has also made specific guidelines for pharmacists in disaster and pandemic situations^{7,8}. The guidelines instruct pharmacists to carry out initial screening of patients to provide first aid, triage, and screening and treating minor ailments^{7,8}. In some developed countries, pharmacists have taken that role earlier too²². Therefore, LICs should also attempt to prepare, equip and utilize the pharmacy workforce optimally in disaster situations.

Pharmaceutical care

China implemented pharmaceutical care programs as a substantial service in COVID-19 as it was reported to have a significant impact on patient outcomes²³⁻²⁵. Pharmaceutical care is a much need care for the treatment and management of COVID-19 patient, especially for elderly patient and patient with chronic diseases as they are at a higher risk of developing drug interactions and adverse effects as they use complex medication regimens^{26,27}. For instance, chloroquine, azithromycin, and hydroxychloroquine can cause QT prolongation, and the administration of these medicines to patients already suffering from cardiovascular conditions makes them worse²⁸. Therefore, there was a need for close monitoring of patient medication

status along with therapeutic outcomes. Hospital pharmacists should monitor and evaluate the medication dose, administration, drug interaction, and adverse effects to plan an appropriate medication formulary and medicine regimen in collaboration with other health care professionals^{26,29,30}. However, these clinical roles were not much emphasized in the guideline made by LICs such as Nepal¹².

Along with that, pharmacists had a responsibility to provide information on medication outcomes, assess polypharmacy issues, and monitor the medication compliance of patients. Patients might not come for regular follow up of their medical condition and do self-medication because of pandemic fears and movement control order and such restrictive provisions.

Therefore, pharmacists need to proactively identify these patients and get regular update about their clinical condition and provide proper counselling and refer them to hospitals if needed.

Promotion of preventive measures

In many countries, community pharmacies were closed because of covid-19; and the hospital pharmacies were serving as a primary source to get medicine and precautionary material like "masks" and "hand sanitizers" to the public. Therefore, hospital pharmacists are the most accessible and responsible health professionals in providing pharmacy and preventive and promotive health care services such as an aseptic way of using the mask, hand washing, social distance values, isolated coughing, sneezing, required in COVID-19 prevention^{7,31} (12.35). The study has previously shown a significant change in public health in controlling unhealthy behaviour and promoting disease control, prevention, and drug abuse management through pharmacist involvement^{24,32}.

Extemporaneous preparation

Healthcare-associated infection results in complications and even death³³. At the same time, simple hand hygiene can prevent diseases³⁴. As pharmacists are trained to carry out extemporaneous dispensing, pharmacist can prepare hand sanitizers, disinfectant liquids, etc., for hospitals' internal use and the community at the time of medical goods scarcity due to disaster. There were multiple reports about pharmacists preparing such products and contributing to society to fight against COVID-19 in this exceptional circumstance³⁵.

Telehealth Pharmacy Services (TPS)

Access to pharmacy services was challenging during the pandemic when people were not allowed to leave home. Approaching pharmacy services through the use of telecommunication technology can resolve that challenge. Continuous pharmaceutical care is prominent, especially for chronic disease patients who are at higher risk of infection and have already undertaken multiple medicines. Therefore, Telehealth Pharmacy Service (TPS) was a suitable way to reach the patient. TPS can serve people living in far off places, self-quarantined and people unable to visit a hospital pharmacy using email, phone call, text message, or social media^{36,37}. Hospital pharmacists can collect patient's medicine and disease information and supply medicines to a respective patient with appropriate labeling and counsel on medicine administration through phone calls or any other online media.³⁶ Furthermore, pharmacists can advise patients on self-monitoring of medicine effectiveness and self-management of minor ailments and whether to continue their medicine or visit a health centre on a phone call or at the doorstep while delivering

medications.^{24,38} Good access to the internet and telecommunication is highly essential to providing TPS, which may be problematic in many villages of LICs.

Many developed countries have been using telepharmacy services³⁷. In response to the pandemic, Australia enhanced its existing telepharmacy practices³⁹, and China also emphasized the online pharmacy consultation for COVID-19⁴⁰. Although online consultation and medicine delivery are difficult in LICs, the hospital pharmacist must attempt to start this approach in coordination with their hospital administration, at least in a disaster situation.

Psychological Counseling

Because of the pandemic and lockdown, people could not move and were forced to confine themselves inside the home. The changing daily routine and the thought of death, pandemic, and growing disease progressions affected the people's thinking patterns, leading to anxiety, panic, and depression, like psychological problems^{41,42}. Psychological problems can be more pressing in mentally ill patients, low-socioeconomic groups, and cardiovascular diseases like chronic illness patients.^{43,44}. Therefore, pharmacists should monitor the patient's emotional states and encourage them to do stress-relieving activities.

Professional challenges of pharmacists and possible solutions in disaster management

Although we proposed some roles, they do not come without challenges. We have identified six challenges related to the roles and presented them in Figure 2. These problems and potential solutions are described in the different subheadings in this section of this manuscript.

<Figure 2 to be inserted here>

Shortage of safety measures

As per the WHO, the appropriate protective materials like surgical masks, eye protection and face shield, long-sleeved gowns, and gloves are the basic needs to work in a health institution during COVID pandemics³¹. Hospital pharmacists were at high risk of getting infected, and they could be a medium of transmission as they were in close contact with patients visiting the hospitals⁷. However, the availability of precautionary safety materials to health care professionals, including pharmacists, has become challenging in LICs where there are not manufacturing companies for these protective supplies.^{31,45,46}. Therefore, LICs should promote local entrepreneurs in producing PPE and mask-like protective measures without relying on their import from outside. Hospital pharmacists can contribute in this regard by extemporaneous compounding hand sanitizer gels, sprays etc.

Difficulty in adequate medication management

Many LICs are not self-reliant and vastly depend on the import of medication from foreign countries. Thus, due to the possibility of a drug shortage or delayed supply chain system due to travel restrictions during a pandemic, adequate and timely access to essential medicine in health care settings can be challenging in many countries⁴⁵. The situation may become more difficult for people with a chronic condition for whom missing a few doses of medications can be life-threatening. The hospital pharmacist had a responsibility to update the prescribers on available medicines and their inventory. This helped prescribers make appropriate prescribing decisions

like prescribing only to the needed patients in minimum quantities to reduce the unnecessary wastage of medicine and prevent the medicine shortage. It also helped them decide whether to prescribe multiple refills to one patient or make a single refill to multiple patients. The appropriate quantification and stocking of medication-related to COVID such as remdesivir and chloroquine were essential based on the clinical practice. However, it came down to pharmacists' expertise to forecast the usage because overstocking may cause a shortage of these medications for those who require them regularly⁴⁷.

Furthermore, there might have been a problematic situation related to brand prescriptions when patients rely on a particular hospital for their continued medication. Brand prescribing is very common in LICs, and a refill of a particular brand or searching a particular brand for the patient is very tough when there is a shortage due to the lock-down⁴⁸. Also, there may come some circumstances in disasters or pandemics where the patient may not find generic substitution and clinician consultation. Furthermore, pharmacists could only be an option to manage the patients. Therefore, the pharmacist should be allowed to substitute medicine by therapeutically equivalent alternative in consultation with the prescribers if they are accessible or without consultation if the prescribers are inaccessible to consult in a disaster situation. The FIP in 2016 made a guideline focusing on pharmacy personnel's role in the disaster where pharmacists can also do some emergency prescribing if needed. That should be strongly taken into consideration by responsible bodies in LICs. At least pharmacists should be prepared to prescribe the essential medications during pandemic and other similar disaster⁸. However, it was not seen in the guideline made by LICs¹², which is quite hard to implement for LICs. Convincing the local hospital administration and legal body would help to solve this problem to some extent.

Shortage of pharmacy human resources

Pharmacists have been imparting a significant role in providing pharmacy services in pandemic prevention and control⁴⁹. COVID-19 has already caused the deaths of many health professionals in developed countries⁵⁰. The situation could be even more devastating for LICs, where there is already a shortage of pharmacy human resources^{51,52}. The death, hospitalization, or isolation of limited human resources would increase workload. Eventually, it hampered the pharmaceutical services of patients. Therefore, the LICs should work proactively in developing and equipping sufficient human resources to defeat disaster challenges. Pharmacy students and non-pharmacy medical personnel can be utilized through immediate short-term training to cope with the current pharmacy workforce shortage in providing pharmaceutical services. Also, the pharmacy services can be provided to a large group by small human resources through the telehealth pharmacy service approach.³⁶

Non-existent or less priority to pharmaceutical care

The pharmacy personnel in LICs are primarily focused on product approach (procurement, inventory, and dispensing). Although pharmaceutical care has been determined as a vital aspect of treatment, the environment of providing pharmaceutical service and access to a quality workforce still lacks in LICs^{31,40,51,53}. LICs should learn the importance of pharmaceutical care or clinical service of pharmacy personnel. They must utilize the available pharmacy personnel in providing pharmaceutical care, at least by this disaster. In the long run, LICs should make

appropriate policies and guidelines to promote the pharmacist in a clinical role in the health care system.

Poor security to health care professionals

Health care professionals also need motivation and security during a disaster. Taking personal care of oneself, along with continuous working for others' health, was relatively complicated. Healthcare personnel, including pharmacists, need appropriate motivation and support from the government and respective health centers. Pharmacists have been greatly appreciated even financially in developed countries like New Zealand for their remarkable contribution during pandemics.⁵⁴ The respective health institutions and governments of LICs should also learn from them and provide essential facilities such as food, lodging for them and their families during this disaster if they could not reward them as HICs did.

Similarly, protecting and preventing infection transmission to health care personnel is supremely essential because healthcare providers themselves can transmit others while serving. Previously, up to 10% of covid cases in china and up to 9% in Italy were healthcare personnel⁵⁰. Infection of health care personnel not only increases patient numbers but also reduces persons to care for patients. Therefore, stringent health approaches are to be adopted to prevent infection transmission. China made a strict guideline of cleansing, disinfecting, and controlling human movements to prevent infection transmission⁴⁰. Learning from them, LICs can create separate allocated places for COVID management, prepare disinfection guidelines, and make designated sites for health personnel involved in COVID management.

Along with that, health care professionals, including hospital pharmacists, needs to be aware and trained in following the safety procedures of work to prevent being infected and being a source of infection transmission⁵⁰. The concerned government and hospital administrative body should provide appropriate training to assure healthcare providers' safety, including hospital pharmacist.

Non-favorable legislation

LICs suffer from a lack of appropriate pharmacy education, skilled and qualified personnel, and professional guidelines for effective professional functioning^{53,55}. Though similar professionals have significantly impacted the health sector in developed countries, the pharmacist suffers due to the deficient role from the concerned authority in LICs^{53,55}. Unprepared pharmacy professionals cannot play a significant role in emergencies and disaster situations. The recent earthquake disaster in Nepal taught much about preparing pharmacy services for disaster management in LICs⁵⁶. Many studies have already talked about the significant contributions pharmacists have made in pandemic and emergency disasters; therefore, along with the appropriate policy, pre-qualifying them through quality education and skill is the only necessity in LICs to defeat the disaster^{49,57,58}. Therefore, the LICs, where the pharmacists have not been adequately utilized to provide pharmaceutical service, should learn from the current COVID-19 disaster and equip the pharmacy workforce to manage possible future disasters through the appropriate formulation of guidelines and emergency training preparedness. Additionally, LICs or hospitals themselves can make separate guidelines for disaster situations by using FIP guidelines on responding to disasters for pharmacy personnel as a reference⁸.

CONCLUSION

The growing cases of COVID-19 have created significant challenges to the health care system and health professionals of LICs. Amid disaster, hospital pharmacists were responsible for ensuring appropriate therapy outcomes, medication management, health promotion, pharmaceutical care of patients, and infection transmission prevention. The study recommends enhancing the hospital pharmacists' professional role in disaster and management for COVID-19 and other such disaster in the future.

Acknowledgement

The authors would like to thank Mr. Mandip Pokharel (Vennue Foundation) and Mr. Pankaj Baidya (Nepal Cancer Hospital and Research Center) for their valuable suggestion and comment in developing the concept and overall writing.

Ethical approval

Not applicable

Conflict of Interest:

The authors have declared that there is no conflicting interest.

Funding

The authors have received no funding to carried out this study

References

1. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. Published 2020. <https://covid19.who.int/table>
2. World Bank. World Bank Country and Lending Groups. Accessed February 25, 2021. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
3. WHO/UNICEF. Water, sanitation and hygiene in health care facilities: status in low- and middle-income countries and way forward. Published online 2019:1-52. https://apps.who.int/iris/bitstream/handle/10665/154588/9789241508476_eng.pdf;jsessionid=8BB20D0F383BB2585E35A2CEA1EF1457?sequence=1
4. Hajat C, Stein E. The global burden of multiple chronic conditions: A narrative review. *Prev Med Reports*. 2018;12(September):284-293. doi:10.1016/j.pmedr.2018.10.008
5. McGregor S, Henderson KJ, Kaldor JM. How are health research priorities set in low and middle income countries? A systematic review of published reports. *PLoS One*. 2014;9(10). doi:10.1371/journal.pone.0108787
6. Agampodi TC, Agampodi SB, Glozier N, Siribaddana S. Measurement of social capital in relation to health in low and middle income countries (LMIC): A systematic review. *Soc Sci Med*. 2015;128:95-104. doi:10.1016/j.socscimed.2015.01.005
7. International Pharmaceutical Federation (FIP). *COVID-19: Guidelines for Pharmacists and the Primary Workforce*.; 2020. Accessed May 7, 2020. <https://www.fip.org/files/content/priority-areas/coronavirus/COVID-19-Guidelines-for-pharmacists-and-the-pharmacy-workforce.pdf>

8. International Pharmaceutical Federation (FIP). Responding to disasters: Guidelines for Pharmacy 2016. Published online 2016:46. <http://fip.org/files/fip/publications/2016-07-Responding-to-disasters-Guideline.pdf>
9. Watson KE, Singleton JA, Tippet V, Nissen LM. Defining pharmacists' roles in disasters: A Delphi study. *PLoS One*. 2019;14(12):1-13. doi:10.1371/journal.pone.0227132
10. Menighan TE. Pharmacists have major role in emergency response. *Pharm Today*. 2016;22(8):8. doi:10.1016/j.ptdy.2016.07.009
11. Ranjit E. Pharmacy practice in Nepal. *Can J Hosp Pharm*. 2016;69(6):493-500. doi:10.4212/cjhp.v69i6.1614
12. Association NP. *Covid-19: Guideline for Pharmacists and Pharmacy Assistant*. Accessed April 28, 2020. https://www.fip.org/files/content/priority-areas/coronavirus/mo-resources/NEPAL_Final_Guideline_COVID.pdf
13. Ozawa S, Shankar R, Leopold C, Orubu S. Access to medicines through health systems in low-and middle-income countries. *Health Policy Plan*. 2019;34:III1-III3. doi:10.1093/heapol/czz119
14. Dalton K, Byrne S. Role of the pharmacist in reducing healthcare costs: current insights. *Integr Pharm Res Pract*. 2017;Volume 6(January):37-46. doi:10.2147/iprp.s108047
15. Al Ruthia YS, Al Kofide H, Al Ajmi R, et al. Drug shortages in large hospitals in Riyadh: A cross-sectional study. *Ann Saudi Med*. 2017;37(5):375-385. doi:10.5144/0256-4947.2017.375
16. Lam WY, Fresco P. Medication Adherence Measures: An Overview. *Biomed Res Int*. 2015;2015. doi:10.1155/2015/217047
17. Barnsteiner JH. Chapter 38. Medication Reconciliation. In: Hughes RG, ed. *Patient Safety and Quality An Evidence Based Handbook for Nurses*. ; 2010:1-14.
18. Aljazeera. *Iran: Over 700 Dead after Drinking Alcohol to Cure Coronavirus*. www.aljazeera.com/news/2020/04/iran-700-dead-drinking-alcohol-cure-coronavirus-200427163529629.html
19. Ghaibi S, Ipema H, Gabay M. ASHP Guidelines on the Pharmacist's Role in Providing Drug Information. *Am J Heal Pharm*. 2015;72(7):573-577. doi:10.2146/sp150002
20. Shrestha S, Khatriwada AP, Gyawali S, Shankar PR, Palaian S. Overview, challenges and future prospects of drug information services in Nepal: A reflective commentary. *J Multidiscip Healthc*. 2020;13:287-295. doi:10.2147/JMDH.S238262
21. World Health Organization. Coronavirus disease (COVID-19) advice for the public: Mythbusters. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters>
22. Epp DA, Tanno Y, Brown A, Brown B. Pharmacists' reactions to natural disasters: From Japan to Canada. *Can Pharm J*. 2016;149(4):204-215. doi:10.1177/1715163516652423
23. Song Z, Hu Y, Zheng S, Yang L, Zhao R. Hospital pharmacists' pharmaceutical care for hospitalized patients with COVID-19: Recommendations and guidance from clinical experience. *Res Soc Adm Pharm*. Published online April 2020. doi:10.1016/j.sapharm.2020.03.027
24. Zheng S, Yang L, Zhou P, Li H, Liu F, Zhao R. Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: A China perspective. *Res Soc Adm Pharm*. Published online March 26, 2020. doi:10.1016/j.sapharm.2020.03.012
25. Bukhari N, Rasheed H, Nayyer B, Babar Z. Pharmacists at the frontline beating the COVID-19 pandemic. *J Pharm Policy Pract*. 2020;13(1):8. doi:10.1186/s40545-020-00210-w

26. Shrestha S, Shrestha S, Khanal S. Polypharmacy in elderly cancer patients: Challenges and the way clinical pharmacists can contribute in resource-limited settings. *Aging Med.* 2019;2(1):42-49. doi:10.1002/agm2.12051
27. Kurt M, Akdeniz M, Kavukcu E. Assessment of Comorbidity and Use of Prescription and Nonprescription Drugs in Patients Above 65 Years Attending Family Medicine Outpatient Clinics. *Gerontol Geriatr Med.* 2019;5:233372141987427. doi:10.1177/2333721419874274
28. Saleh M, Gabriels J, Chang D, et al. Effect of Chloroquine, Hydroxychloroquine, and Azithromycin on the Corrected QT Interval in Patients with SARS-CoV-2 Infection. *Circ Arrhythmia Electrophysiol.* 2020;(June):496-504. doi:10.1161/CIRCEP.120.008662
29. Elden NMK, Ismail A. The Importance of Medication Errors Reporting in Improving the Quality of Clinical Care Services. *Glob J Health Sci.* 2015;8(8):243. doi:10.5539/gjhs.v8n8p243
30. Velo GP, Minuz P. Medication errors: Prescribing faults and prescription errors. *Br J Clin Pharmacol.* 2009;67(6):624-628. doi:10.1111/j.1365-2125.2009.03425.x
31. Al-Quteimat OM, Amer AM. SARS-CoV-2 outbreak: How can pharmacists help? *Res Soc Adm Pharm.* Published online March 26, 2020. doi:10.1016/j.sapharm.2020.03.018
32. Agomo CO. The role of community pharmacists in public health: A scoping review of the literature. *J Pharm Heal Serv Res.* 2012;3(1):25-33. doi:10.1111/j.1759-8893.2011.00074.x
33. Sartelli M, Mckimm J, Bakar MA. Health care-associated infections – an overview. Published online 2018:2321-2333.
34. Mathur P. Hand hygiene: Back to the basics of infection control. *Indian J Med Res.* 2011;134(11):611-620. doi:10.4103/0971-5916.90985
35. Di-Falco E, Bourbon J, Sbaffe I, Kaiser J-D. Preparation of alcohol-based handrub in COVID-19 Alsatian cluster. *Pharm Technol Hosp Pharm.* 2020;5(1). doi:10.1515/pthp-2020-0004
36. Poudel A, Nissen L. Telepharmacy: a pharmacist's perspective on the clinical benefits and challenges. *Integr Pharm Res Pract.* 2016;Volume 5:75-82. doi:10.2147/IPRP.S101685
37. Le T, Toscani M, Colaizzi J. Telepharmacy: A New Paradigm for Our Profession. *J Pharm Pract.* 2020;33(2):176-182. doi:10.1177/0897190018791060
38. Albanese NP, Rouse MJ, Schlaifer M. Scope of contemporary pharmacy practice: Roles, responsibilities, and functions of pharmacists and pharmacy technicians. *J Am Pharm Assoc.* 2010;50(2):e35-e69. doi:10.1331/JAPhA.2010.10510
39. Department of Health AG. *FACT SHEET NATIONAL HEALTH PLAN A GUIDE FOR PRESCRIBERS.*; 2020.
40. Association CP. *CORONAVIRUS 2019-NCov INFECTION: Expert Consensus on Guidance and Prevention Strategies for Hospital Pharmacists and the Pharmacy Workforce (1st Edition).* First.; 2020. Accessed April 24, 2020. <https://www.fip.org/files/content/priority-areas/coronavirus/CPA-CORONAVIRUS-2019-nCoV-Expert-Consensus-on-Guidance-and-Prevention.pdf>
41. Holmes EA, O'Connor RC, Perry VH, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry.* 2020;7(6):547-560. doi:10.1016/S2215-0366(20)30168-1
42. Xiang YT, Yang Y, Li W, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry.* 2020;7(3):228-229. doi:10.1016/S2215-0366(20)30046-8

43. Mokdad AH, Mensah GA, Posner SF, et al. When chronic conditions become acute: Prevention and control of chronic diseases and adverse health outcomes during natural disasters. *Prev Chronic Dis*. 2005;2(November):1-4.
44. Dimsdale JE. Psychological Stress and Cardiovascular Disease. *J Am Coll Cardiol*. 2008;51(13):1237-1246. doi:10.1016/j.jacc.2007.12.024
45. Kretchy IA, Asiedu-Danso M, Kretchy J-P. Medication management and adherence during the COVID-19 pandemic: Perspectives and experiences from low-and middle-income countries. *Res Soc Adm Pharm*. Published online April 2020. doi:10.1016/j.sapharm.2020.04.007
46. Bong C-L, Brasher C, Chikumba E, McDougall R, Mellin-Olsen J, Enright A. The COVID-19 Pandemic: Effects on Low- and Middle-Income Countries. *Anesth Analg*. 2020;131(1):86-92. doi:10.1213/ANE.0000000000004846
47. National Institute of Health NIH. *Coronavirus Disease 2019 (COVID-19) Treatment Guidelines*.; 2020.
<https://files.covid19treatmentguidelines.nih.gov/guidelines/covid19treatmentguidelines.pdf>
48. Shrestha R, Prajapati S. Assessment of prescription pattern and prescription error in outpatient Department at Tertiary Care District Hospital, Central Nepal. *J Pharm Policy Pract*. 2019;12(1):16. doi:10.1186/s40545-019-0177-y
49. Chin TWF, Chant C, Tanzini R, Wells J. Severe acute respiratory syndrome (SARS): The pharmacist's role. *Pharmacotherapy*. 2004;24(6):705-712. doi:10.1592/phco.24.8.705.36063
50. European Centre for Disease Prevention and Control. *Infection Prevention and Control and Preparedness for COVID-19 in Healthcare Settings*.; 2020. Accessed April 29, 2020.
<https://www.ecdc.europa.eu/sites/default/files/documents/nove-coronavirus-infection-prevention-control-patients-healthcare-settings.pdf>
51. Sakeena MHF, Bennett AA, McLachlan AJ. Enhancing pharmacists' role in developing countries to overcome the challenge of antimicrobial resistance: a narrative review. doi:10.1186/s13756-018-0351-z
52. Koehler T, Brown A. A global picture of pharmacy technician and other pharmacy support workforce cadres. *Res Soc Adm Pharm*. 2017;13(2):271-279. doi:10.1016/j.sapharm.2016.12.004
53. Alipour F, Peiravian F, Mehralian G. Perceptions, experiences and expectations of physicians regarding the role of pharmacists in low-income and middle-income countries: The case of Tehran hospital settings. *BMJ Open*. 2018;8(2):e019237. doi:10.1136/bmjopen-2017-019237
54. Pharmaceutical Society of New Zealand Incorporated. COVID-19: Guidance provided by the society for pharmacy.
55. Babar Z, Seahill S. Barriers to effective pharmacy practice in low- and middle-income countries. *Integr Pharm Res Pract*. 2014;52(6):25. doi:10.2147/iprp.s35379
56. Shrestha S, Kandel P, Danekhu K, Bhuvan KC. Reflecting on the role of a pharmacist during the two major earthquakes of 2015: Are we prepared for similar future disasters? *Res Soc Adm Pharm*. 2019;15(12):1500-1501. doi:10.1016/j.sapharm.2019.03.006
57. Hannings AN, von Waldner T, McEwen DW, White CA. Assessment of Emergency Preparedness Modules in Introductory Pharmacy Practice Experiences. *Am J Pharm Educ*. 2016;80(2):23. Accessed April 24, 2020.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4827574/pdf/ajpe80223.pdf>

58. Porter KE, Singleton JA, Tippet V, Nissen LM. Ready, willing and able: the role of pharmacists in natural and manmade disasters - can we do more? *Int J Pharm Pract*. 2018;26(2):195-196. doi:10.1111/ijpp.12351

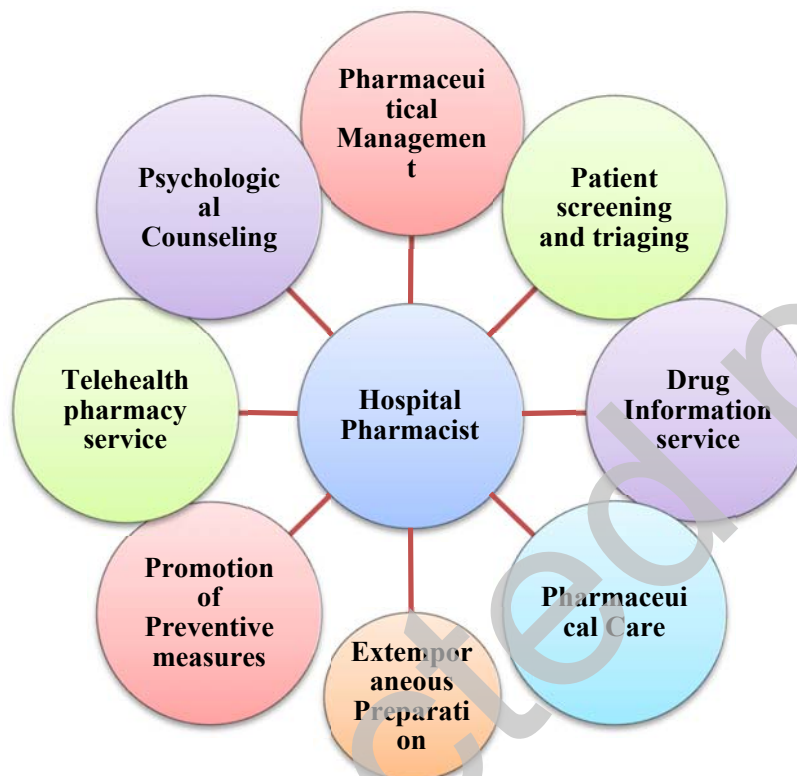


Figure 1. The role Hospital pharmacists can play in COVID-19 and Pandemic Control in LICs

Shortage of Safety Measures	<ul style="list-style-type: none"> • Promoting local entrepreneurship • Extemporaneous preparation of hand sanitizer • Telehealth pharmacy services
Difficulty in adequate medication management	<ul style="list-style-type: none"> • Need based minimal medicine prescribing • Medicine substitution
Shortness of pharmacy manpower	<ul style="list-style-type: none"> • Utilizing pharmacy students and medical personnel • Long term planning on qualified pharmacy personnel development
Non-existent or less priority to pharmaceutical care	<ul style="list-style-type: none"> • Promotion and utilization of pharmacy personnel in pharmaceutical care
Poor security to health care professionals	<ul style="list-style-type: none"> • Assure basic need and health • Site allocation and Ensure the safety of work place • Appropriating training
Non-favourable legislation	<ul style="list-style-type: none"> • Formulation of appropriate guideline for emergency prepared • Promotion of appropriate education to developed skillful pharmacy personnel

Figure 2: Challenges and solutions