



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## Pharmacy practice research priorities during the COVID-19 pandemic: Recommendations of a panel of experts convened by FIP Pharmacy Practice Research Special Interest Group

Dalia Dawoud<sup>a,\*</sup>, Aleda M.H. Chen<sup>b</sup>, Charlotte Verner Rossing<sup>c</sup>, Victoria Garcia-Cardenas<sup>d</sup>, Anandi V. Law<sup>e</sup>, Parisa Aslani<sup>f</sup>, Ian Bates<sup>g</sup>, Zaheer-Ud-Din Babar<sup>h</sup>, Shane Desselle<sup>i</sup>

<sup>a</sup> Cairo University, Faculty of Pharmacy, Clinical Pharmacy Department, Cairo, Egypt

<sup>b</sup> School of Pharmacy, Cedarville University, Cedarville, OH, USA

<sup>c</sup> Pharmakon, Danish College of Pharmacy Practice, Copenhagen, Denmark

<sup>d</sup> University of Technology Sydney, Sydney, Australia

<sup>e</sup> College of Pharmacy, Western University of Health Sciences, Pomona, CA, United States

<sup>f</sup> The University of Sydney Pharmacy School, Faculty of Medicine and Health, Sydney, NSW, Australia

<sup>g</sup> University College London, School of Pharmacy, London, United Kingdom

<sup>h</sup> Department of Pharmacy, School of Applied Sciences, University of Huddersfield, Huddersfield, United Kingdom

<sup>i</sup> Touro University California, Vallejo, CA, United States

### ARTICLE INFO

**Keywords**  
COVID-19  
Pharmacy practice  
Research  
Pharmacy education

### ABSTRACT

Across the globe, pharmacists on the frontline continue to fight COVID-19 and its continuously evolving physical, mental, and economic consequences armed by their knowledge, professionalism, and dedication. Their need for credible scientific evidence to inform their practice has never been more urgent. Despite the exponentially increasing number of publications since the start of the pandemic, questions remain unanswered, and more are created, than have been resolved by the increasing number of publications.

A panel of leading journal editors was convened by the International Pharmaceutical Federation (FIP) Pharmacy Practice Research Special Interest Group to discuss the current status of COVID-19 related research, provide their recommendations, and identify focal points for pharmacy practice, social pharmacy, and education research moving forward.

Key priorities identified spanned a wide range of topics, reflecting the need for good quality research to inform practice and education. The panel insisted that a foundation in theory and use of rigorous methods should continue forming the basis of inquiry and its resultant papers, regardless of topic area. From assessing the clinical and cost effectiveness of COVID-19 therapies and vaccines to assessing different models of pharmaceutical services and education delivery, these priorities will ensure that our practice is informed by the best quality scientific evidence at this very challenging time.

### Introduction

Information overload might be as problematic as ever during the current pandemic. Since the beginning of 2020, there has been an exponential growth in the volume of COVID-19 related publications, from clinical trials to research papers to commentaries and opinion pieces.<sup>1</sup> The rate at which articles are being published has made it an insurmountable task to keep abreast of the new information.<sup>2</sup> Yet, it is debatable as to whether or not this rapid increase in publications has

been borne from quality research.<sup>3</sup> In fact, a recent analysis by Girolamo and Reynders (2020) indicated that much of the research has not led to new knowledge.<sup>3</sup>

Pharmacists desire and need evidence to inform practice, and without credible and scientifically sound research studies, partly due to the rush to publish, there is not only a pandemic but an “infodemic”.<sup>3,4</sup> Hence, there is an urgent need to focus our research efforts to provide pharmacists and other healthcare providers with trusted information and evidence to inform patient care, pharmacy practice, and policy

\* Corresponding author. Faculty of Pharmacy, Cairo University, Kasr El-Aini Street, Cairo, Egypt.  
E-mail address: [ddawoud@gmail.com](mailto:ddawoud@gmail.com) (D. Dawoud).

<https://doi.org/10.1016/j.sapharm.2020.08.020>

Received 24 August 2020; Accepted 24 August 2020

Available online 26 August 2020

1551-7411/© 2020 Elsevier Inc. All rights reserved.

changes in the midst of COVID-19.

To address this challenge, methodologically robust, practitioner-led research is needed. It has been argued that “research” is not just for academics but is about authentic issues affecting the public, patients and pharmacists.<sup>5</sup> In many cases, professional organizations are collating information and providing resources for pharmacists in a variety of settings, with some that are more country- or member-specific, such as the American Society for Health Systems Pharmacists (ASHP)’s COVID-19 Resource Center,<sup>6</sup> or global, such as the International Pharmaceutical Federation (FIP) COVID-19 Information Hub.<sup>7</sup> Some organizations, such as the American Pharmacists’ Association (APhA), offer an online forum for pharmacists to share resources and ideas.

Historically, there have been few relevant studies in the pharmacy and related fields that can directly inform practice. For example, there are at least 39 systematic reviews relevant to “pharmacy” in the Cochrane library.<sup>8</sup> In many of these reviews, pharmacists and their roles are not the main focus.<sup>9</sup> Cochrane Reviews and other forms of evidence-based resources have long provided guidance towards practice and policy change; however, the need for accessible evidence-based information has dramatically increased during the current COVID-19 crisis.

### Time for a pause?

Given this fast-evolving research ecosystem, it is important to stop, reflect, and analyse what is published, what topics need further investigation and prioritisation, and what is required to deliver this high quality, well-conducted pharmacy practice and education research.

As the international organization representing pharmacists and pharmaceutical scientists, FIP has taken the lead during this unprecedented time and has produced a number of guidelines to standardise and inform pharmacy practice and education across the globe and provide support to practising pharmacists.<sup>10–13</sup> Within FIP’s six Special Interest Groups (SIGs) is the Pharmacy Practice Research SIG (PPR SIG), which organized a webinar, as part of the FIP series “Responding to the Pandemic Together”, to provide pharmacists with up-to-date information.<sup>14</sup> This commentary presents the recommendations of an expert panel consisting of journal editors in pharmacy as presented here and in this webinar.

### Pharmacy practice and education research priorities in the COVID-19 pandemic: Change or adapt?

Research priorities in pharmacy practice and education are in some sense altered by the COVID-19 pandemic, but in another sense, not so much. They are changed in the sense that in light of the pandemic or any other health crisis, research should be focused on preparedness of clinicians to promote patient safety, disseminate reliable information, point patients to other credible sources of information, maximize therapeutic outcomes, ensure the efficient use of resources, and advance the roles of pharmacists in interdisciplinary care. Yet, when reading and contemplating these foci (not intended to be exhaustive by any stretch), they resemble the same foci upon which we can and should be focused, regardless of a pandemic. The difference is the ability to adapt research and test new models in light of the rapidly changing conditions in which we might be working.

Thus, the “best” research continues to be that which is grounded in solid theory, rigorous methods and execution, with a well-constructed plan for streams of research that are cogent and complementary to one another. A well-planned research agenda based in theory and rooted in the literature is not “interrupted” by a sudden pandemic. Rather, the well-planned research agenda can be adapted toward and help meet the needs of an unexpected health crisis.

### What have we done so far?

Most researchers in pharmacy practice were not conducting research on COVID-19, itself, until after it took a hold on an unsuspecting world populace. However, a glance at some of the initial, well-regarded, and highly cited papers published in *Research in Social and Administrative Pharmacy* (RSAP) and elsewhere reveals carefully executed research strategies and highly instructive commentary by researchers employing strong backbone and adaptation of their existing line of inquiry.

For example, Carico et al. provide insight into how pharmacists can apply the health belief model toward risk mitigation communication with patients.<sup>15</sup> They describe how communication grounded in a well-tested model can assist patients come to their own realization of the benefits of certain behaviors in addition to improving their knowledge of their susceptibility to, and danger posed by, COVID-19 not through paternalistic communication but through guiding the patient in self-discovery.

Research by Park et al. evinced that persons believing they were at less risk of contracting the disease were less likely to take part in risk mitigation strategies.<sup>16</sup> Lam discussed the quick mobilization of pharmacists in Macau in assisting other health professionals and serving on the proverbial front lines of care not only to treat patients but also to bolster mitigation strategies among a public with close geographic and familial ties with those at the original epicenter of the outbreak in Wuhan, China.<sup>17</sup> This was made possible due to protocols and interdisciplinary mitigation strategies for various type of emergencies that had already been in place and had been constructed through scientific evidence and best practice.

Zheng et al. prepared recommendations for pharmacists’ practice in light of the pandemic, again, coming from near its origins in China.<sup>18</sup> While emphasizing the need for flexibility and adaptability in the face of the pandemic, the recommendations were rooted in evidence-based practice from solid research accounting for evolutions in pharmacy practice prior to the pandemic. This group of researchers have long been involved in research proffering roles for pharmacists to ensure patient safety and to advance the roles of clinical pharmacists even prior to the pandemic.<sup>19</sup>

Cadogan and Hughes wrote of pharmacists’ priorities and shifts in practice during the COVID-19 pandemic, but likewise, basing these on prior research on pharmacists’ roles during unexpected emergencies, in a broader sense.<sup>20</sup> While these and other initial papers on COVID-19 were in the form of commentary, the recommendations and guidance proffered in all of them were based upon evidence by other researchers coupled with an existing stream of research in pharmacists’ roles long carried out by the authors, themselves.

Aruru et al. employed official statement white papers from various organizations such as the American Society of Health-System Pharmacists, the Centers for Disease Control and Prevention (CDC), and FIP to proffer a roadmap for pharmacists in emergency preparedness and response, not unlike that which has been observed for pharmacist involvement in the supply and furnishing of emergency contraception and other therapies deemed allowable by law.<sup>21</sup> Their recommendations addressed several areas, including: operations management, patient care and population health interventions, public health pharmacy education and continuing professional education, and evaluation, research, and dissemination for impact.

To that end, research in pharmacy practice, while grounded in solid frameworks, must be multifaceted. It takes myriad system factors and people to optimize pharmacists’ roles and patient outcomes. Thus, research must examine communication, operations, the interaction of health systems and economic factors, social support, patient and pharmacist/student education, and pharmacological and non-pharmacological aspects of therapy.

Basheti et al. evaluated pharmacists’ readiness to engage in these various aspects of practice, including management of actual and potential medicines shortages and weaknesses in the supply chain.<sup>22</sup>

Karasneh evaluated the effect of media coverage of the pandemic on pharmacists' awareness and practice activities finding perhaps an undue influence by lay media, as opposed to relying solely on medical and professional resources.<sup>23</sup> Bahlol and Dewey found pharmacists' preparedness to practice amidst the pandemic to be adequate, but lacking in reporting frequency, mechanisms, and structure.<sup>24</sup> Indeed, if pharmacists are to be more integrated into public health systems, they must participate avidly in reporting of adverse events, triaging of patients, and informing health authorities of suspected health trends.

Dawoud described these and other activities that must be carried out by pharmacists, including adapting to technology, serving as vaccination hubs, and continuously gaining the public trust as critical means in which pharmacists can help society move forward post-lockdown and past the eventual ebb of the pandemic.<sup>25</sup> In a study employing the transtheoretical model of change, Hoti et al. found pharmacists to outweigh pros versus cons and be in high levels of readiness to engage in risk mitigation strategies related to COVID-19.<sup>26</sup>

Austin and Gregory studied resilience of pharmacists during the pandemic and found significant themes in ability to adapt to new technology, provision of personal protective equipment by the organization, and dedicated support staff.<sup>27</sup> As such, future research can leverage these findings to assume that pharmacists want to and are prepared to evolve practice, but might need to adapt to and advocate for change in systems that make this more a reality. Doing so must be placed within the context of improving patient outcomes, rather than improving pharmacists' "lot in life" for the sake of doing so.

Koster et al. demonstrated that emerging patient-centric pharmacist services have been deleteriously impacted by the pandemic and urged leaders to embrace tele-pharmacy even post-pandemic in a changed world, with all that new models of delivery entail.<sup>28</sup> Amariles et al. worked with researchers outside of pharmacy to project future numbers of cases, morbidity, and hospitalizations not merely to project numbers but for anticipation of their country's needs for pharmacists to continue delivering the necessary care to patients with and without COVID-19 and help ensure adequate supply chain of pharmacological therapies for weeks and even months into the future.<sup>29</sup>

Forecasting can and should become an even greater priority for pharmacy practice researchers, and Aruru et al. have begun to do so for pharmacy-provided vaccinations as pharmacists become more highly integrated into public health systems and as their potential involvement in furnishing and/or administration of vaccinations for COVID-19 if and when that time arrives.<sup>21</sup> This is an important example of the research needed for pharmacists to gain public trust and become part of an important solution to health problems. This includes, but is not limited to, logistical consideration, acquiring the necessary expertise and skills, possible monitoring, ensuring adequate supply of vaccines, ensuring adequate labor capital, and having in place mechanisms for reimbursement for services rendered, all the while ensuring minimum disruption in, even a confluence with, the delivery of traditional and other recently emerging pharmacist services. As countries expand the roles of pharmacists in administering vaccines in light of COVID-19, such as the recent decision by the United States Department to allow all pharmacists to immunize children ages 3 and older and all adults, these recommendations become even more important.<sup>30</sup>

Of course, pharmacy practice researchers should be involved in testing the safety, effectiveness and cost effectiveness of agents putatively useful for COVID-19, as well as for other diseases, related or not. Given its controversy, a ripe target for investigation has been hydroxychloroquine with or without azithromycin. Two recent studies evaluated the safety of hydroxychloroquine, one using 15 years-worth of data from the MarketScan Commercial Claims,<sup>31</sup> and the other nearly 40 years of data from the Food and Drug Administration's Adverse Event Reporting System database (FAERS) and found fears of its unsafe use, particularly that posed by correlations with atrial fibrillation, to be unfounded, even while neither tested for the effectiveness of the drug.<sup>32</sup> Likewise, Pergolizzi et al. found no reason for patients with or potentially vulnerable

to COVID-19 to quit taking their prescribed regimen of angiotensin enzyme inhibitor (ACE II) or angiotensin receptor blocker (ARB) therapy.<sup>33</sup> Another topic permeating lay media, and thus potentially impacting patient safety, has been the use of cannabidiol products, and Brown addressed this effectively in a pithy letter backed by evidence.<sup>34</sup>

Likewise the *Journal of Pharmaceutical Policy and Practice* (JoPPP) has received a large number of commentaries and papers on COVID-19 and has published a thematic series on the issue.<sup>35</sup> A paper by Bukhari et al. highlighted the role of the pharmacist in COVID-19, particularly in low- and middle-income countries (LMICs). The authors discussed 10 steps improve the practice of pharmacy.<sup>36</sup> These guidelines were endorsed by FIP as well as by the Drug Regulatory Authority of Pakistan (DRAP).

Costa et al. discussed the changing role of pharmacists from different parts of the world including Asia, Europe, the Americas, and Africa during the pandemic.<sup>37</sup> The services provided by pharmacists ranged from essential and extended services, services developed to ensure continuity of care, and supply of essential medicines as well as the responsibilities in emergency care. In another paper, Elbeddini et al. emphasized mental health issues impacting pharmacists during COVID-19, highlighting increasing workloads as well as workplace harassment.<sup>38</sup>

The pandemic also has pharmacy educators contemplating adaptations and transitions to be made in educating future pharmacists, both in the content of the education and in the logistics, or manner in which it is to be provided. A recent global call by FIP for university responses to the COVID-19 pandemic elicited responses from 373 universities located in 63 countries, together with 40 associated case studies (from 15 countries) on how universities have rapidly adapted their teaching and learning delivery in the context of the COVID-19 pandemic (personal communication). The principal themes that universities reported included adjustments to experiential learning, a greater focus on self-directed learning, rapid innovations in learning assessment, and, naturally, an accelerated focus on educational technology and online delivery. All WHO regions and income levels were represented with parity. Prior to the pandemic, in late 2019, the FIP *Pharmacy Education* journal had conducted a retrospective trends analysis of educational research papers submitted to the journal since 2008 (forthcoming). Interestingly, an increase in publication trends reflected these same themes – in particular online and information technology driven professional education and an increasing focus on experiential learning in pharmacy programs. COVID-19, whilst an abrupt global shock, seems to have accelerated existing trends in educational development in higher education.

### What is next?

COVID-19 has brought a plethora of challenges, as well as opportunities for pharmacists to contribute. The community pharmacy sector is seeing increasing numbers of patients and the public. The current crisis has also seen an impact on medicines' supply lines and health systems throughout the globe. This has been seen in high-, middle- and low-income countries. Access to and availability of essential medicines have been impacted, medicines' shortages were noted and there were reports on the use of substandard and falsified medicines.<sup>39,40</sup> The quality and safety of pharmaceuticals are increasingly important when a large number of people are relying on them. Health systems' ability to cope with this pressure is being tested to the limit and pharmacists are well-positioned to help, if well-supported and informed. There is real demand for services related to testing, screening, supply of medicines as well as information needs related to safety, effectiveness, and value of medicines and vaccines related to COVID-19 and the consequences of delayed healthcare due to COVID-19.

These newly designed or introduced services will benefit from research into their implementation and outcomes. So, as pharmacy practice research adapts to the new normal imposed by the pandemic, some topics will inevitably be pushed to the top of the priority list. These

are expected to include: pharmacists' changing roles and responsibilities in the future and during pandemics, the role of telehealth, remote counselling, and other new models of service delivery, such as drive thru pharmacies, and their impact on patient health outcomes as well as the efficiency of service provision.<sup>41</sup> The pharmacist's role in providing medicines information and patient education relating to COVID-19 treatments and vaccines is also an area that will require more focus, as these start to become available.

Against this backdrop, the following recommendations can be made:

- The priorities of scholars in pharmacy practice must remain steadfast in efforts to promote more effective and more efficient models of care to promote patient safety and optimize therapeutic outcomes. These priorities do not change in light of the COVID-19, but rather, must be adapted.
- Alternative models of service delivery have to consider the value of pharmacist services in health emergencies, the logistics of delivery through telehealth and other technologies, the viability and optimization of pharmacological therapies given the omnipresence of a deadly virus, the deployment of support personnel (i.e., technicians and other) to improve the quantity and efficiency of services delivery, and evolving reimbursement mechanisms that recognize value-based contributions by health professionals.
- Pharmacy practice researchers must be at the forefront of evaluating therapies and communication strategies that improve adherence to those therapies in a manner that produces meaningful outcomes.
- Several “enablers” are needed to strengthen evidence-informed research during COVID-19. This includes “human resources”, understanding of research methods, as well as health systems, and clinical knowledge including local and global understanding of the issues. This should be informed by an understanding of how this research would be used to inform practice and who will be the end-users.
- As has always been the case, research conducted will be grounded in proven theory and rigorous methods.
- The following areas can be considered as priorities, even if not an entirely exhaustive list:
  - o Medicines- and vaccines-related:
    - Clinical effectiveness of COVID-19 therapies and vaccines
    - Pharmacovigilance, including patients' use of OTCs, alternative and complementary medicines, “folklore”, and other beliefs regarding medicines and non-pharmacological aspects of wellness and safety
    - Pharmacoepidemiological studies and drug utilization patterns
    - Pharmacoeconomics, pricing and cost effectiveness
    - Supply chain issues
    - Legal/regulatory issues and frameworks
  - o Service-focused
    - Pharmacists' and pharmacy workforce support personnel expansion of roles to improve patient access and outcomes
    - Interdisciplinary teamwork and multi-professional delivery of care/alternative models
    - Systems re-engineering for optimization of safe and efficient care delivery
    - Telepharmacy and other ‘alternative’ models of service delivery
    - Piloting and evaluation of interventions in various pharmacy practice setting, using various mediums, delivered to a range of populations
    - Payment models
  - o Workforce issues
    - Forecasting educational and labor needs
    - Pharmacy workforce and quality of work-life issues,
    - Barriers to recognition of pharmacists as healthcare providers and educators
    - Resilience and other characteristics (eg, grit, moral reasoning, communication, negotiation, empathy, motivational

interviewing, entrepreneursim, innovativeness) that will help students and practitioner pharmacists thrive, particularly in any new normal, other crises, and pandemics

- Safety of pharmacy personnel
- o Pharmacy education and training
  - Experiential learning and earlier learnings on medicines optimization in clinical settings
  - Undergraduate transition and how we can better support students and early career practitioners

## Conclusion

Despite the local to global havoc caused by COVID-19, pharmacy practice and education researchers have made considerable effort to respond to this global emergency and their research output is starting to inform practice across the world. Reflecting on this output, we should plan carefully for the coming stage to ensure that the impact and value of this research are maximised. The recommendations made by this panel of experts goes some way towards informing pharmacy practice researchers' and research funders' priorities in the next phase of this battle against the most disruptive pandemic that we have witnessed for decades.

## Funding

None.

## Declaration of competing interest

The authors have no interests to declare.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.sapharm.2020.08.020>.

## References

1. Nature index. Published online <https://www.natureindex.com/news-blog/the-top-coronavirus-research-articles-by-metrics>; July 16, 2020. Accessed August 22, 2020.
2. Brainard J. Scientists are drowning in COVID-19 papers. Can new tools keep them afloat?. Published online <https://www.sciencemag.org/news/2020/05/scientists-a-re-drowning-covid-19-papers-can-new-tools-keep-them-afloat>; May 13, 2020. Accessed August 22, 2020.
3. Di Girolamo N, Meursinge Reynders R. Characteristics of scientific articles on COVID-19 published during the initial 3 months of the pandemic. *Scientometrics*. 2020. <https://doi.org/10.1007/s11192-020-03632-0>. Published online July 24.
4. Babar ZUD. The need for an evidence-based encyclopaedia in health services research in pharmacy. *Int J Environ Res Publ Health*. 2020;17(7):2549. <https://doi.org/10.3390/ijerph17072549>, 2020.
5. Roberts R, Kennington E. *The pharmaceutical journal*; March 11, 2010. Published online <https://www.pharmaceutical-journal.com/news-and-analysis/opinion/comment/pharmacy-practice-research-has-an-impact-on-each-and-every-pharmacist/11001265>. Accessed August 22, 2020. article.
6. American Society for Health Systems Pharmacists (ASHP)'s COVID-19 Resource Center. <https://www.ashp.org/COVID-19?loginreturnUrl=SSOCheckOnly>. Accessed August 22, 2020.
7. International pharmaceutical federation (FIP)COVID-19 information hub. <https://www.fip.org/coronavirus>. Accessed August 22, 2020.
8. Cochrane library. <https://www.cochranelibrary.com/about/about-cochrane-library>. Accessed August 22, 2020.
9. Bond C. *Pharmacy Practice, Evidence and Impact. Pharmacy Practice Research Methods, Ed, Babar ZUD*. Springer Publishing; 2020.
10. FIP Health Advisory. Covid-19: guidelines for pharmacists and the pharmacy workforce. Last updated <https://www.fip.org/file/4729>; July 14, 2020. Accessed August 22, 2020.
11. FIP Health Advisory. Covid-19: clinical information and treatment guidelines. Last updated <https://www.fip.org/file/4723>; July 14, 2020. Accessed August 22, 2020.
12. FIP Health Advisory. Covid-19: frequently asked questions and myth busting. Last updated <https://www.fip.org/file/4727>; July 14, 2020. Accessed August 22, 2020.
13. Sousa Pinto G, Hung M, Okoya F, Uzman N. FIP's response to the COVID-19 pandemic: global pharmacy rises to the challenge. *Res Soc Adm Pharm*. 2020. <https://doi.org/10.1016/j.sapharm.2020.07.004>.



14. FIP. Responding to the Pandemic Together™ Webinar Series. FIP Library <https://www.fip.org/publications?tab=2&eventCategory=24&eventWhen=upcoming>. Accessed August 22, 2020.
15. Carico R, Sheppard J, Thomas CB. Community pharmacists and communication in the time of COVID-19: applying the health belief model. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.03.017>.
16. Park T, Ju I, Ohs JE, Hinsley A. Optimistic bias and preventive behavioral engagement in the context of COVID-19. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.06.004>.
17. Ung COL. Community pharmacist in public health emergencies: quick to action against the coronavirus 2019-nCoV outbreak. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.02.003>.
18. Zheng S, Yang L, Zhou P, et al. Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: a China perspective. <https://doi.org/10.1016/j.sapharm.2020.03.012>; 2020.
19. Li H, Zheng S, Liu F, Liu W, Zhao R. Fighting against COVID-19: innovative strategies for clinical pharmacists. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.003>.
20. Cadogan CA, Hughes CM. On the frontline against COVID-19: community pharmacists' contribution during a public health crisis. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.03.015>.
21. Aruru M, Truong HA. Pharmacy Emergency Preparedness and Response (PEPR): a proposed framework for expanding pharmacy professionals' roles and contributions to emergency preparedness and response during the COVID-19 pandemic and beyond. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.002>.
22. Bashedi IA, Nassar R, Barakat M, et al. Pharmacists' readiness to deal with the coronavirus pandemic: assessing awareness and perception of roles. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.020>.
23. Karasneh R, Al-Azzam S, Muflih M, et al. Media's effect on shaping knowledge, awareness risk perceptions and communication practices of pandemic COVID-19 among pharmacists. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.027>.
24. Bahlol M, Dewey RS. Pandemic preparedness of community pharmacists for COVID-19. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.05.009>.
25. Dawoud D. Emerging from the other end. Key measures for a successful COVID-19 lockdown exit strategy and the potential contribution of pharmacists. *Res Soc Adm Pharm.* <https://doi.org/10.1016/j.sapharm.2020.05.011>.
26. Hoti K, Jakupi A, Hetemi D, Raka D, Hughes J, Desselle S. Provision of community pharmacy services during COVID-19 pandemic: a cross sectional study of community pharmacists' experiences with preventative measures and sources of information. *Int J Clin Pharm.* 2020. <https://doi.org/10.1007/s11096-020-01078-1>.
27. Austin Z, Gregory P. Resilience in the time of the pandemic: the experience of community pharmacists during COVID-19. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.05.027>.
28. Koster ES, Philibert D, Bouvy ML. Impact of the COVID-19 epidemic on the provision of pharmaceutical care in community pharmacies. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.07.001>.
29. Amariles P, Granados J, Ceballos M, Montoya CJ. COVID-19 in Columbia endpoints: are we different, like Europe? *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.03.013>.
30. U.S. Department of Health & Human Services. HHS expands access to childhood vaccines during COVID-19 pandemic. Published online <https://www.hhs.gov/about/news/2020/08/19/hhs-expands-access-childhood-vaccines-during-covid-19-pandemic.html>; August 19, 2020. Accessed August 22, 2020.
31. Vouri SM, Thuy TN, Winterstein AG. An evaluation of co-use of chloroquine or hydroxychloroquine plus azithromycin on cardiac outcomes: a pharmacoepidemiological study to inform use during the COVID19 pandemic. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.031>.
32. Sarayani A, Cicali B, Henriksen CH, Brown JD. Safety signals for QT prolongation or Torsades de Pointes associated with azithromycin with or without chloroquine or hydroxychloroquine. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.04.016>.
33. Pergolizzi JV, Varrassi G, Magnusson P, Wollmuth C, Breve F. The concern about ACE/ARB and Covid-19: time to hold your horses!. *J Am Pharmaceut Assoc.* 2020. <https://doi.org/10.1016/j.japh.2020.06.026>.
34. Brown JD. Cannabidiol as prophylaxis for SARS-CoV-2 and COVID-19: unfounded claims versus potential risks of medications during the pandemic. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.03.020>.
35. Pharmacists and the COVID-19 pandemic, Journal of Pharmaceutical Policy and Practice Thematic Series. <https://www.biomedcentral.com/collections/PharmCovid>. Accessed August 22, 2020.
36. Bukhari N, Rasheed H, Nayyer B, Babar ZUD. Pharmacists at the frontline beating the COVID-19 pandemic. *J of Pharm Policy and Pract.* 2020;13(1):8. <https://doi.org/10.1186/s40545-020-00210-w>.
37. Alves da Costa F, Lee V, Leite SN, Murillo MD, Menge T, Antoniou S. Pharmacists reinventing their roles to effectively respond to COVID-19: a global report from the international pharmacists for anticoagulation care taskforce (iPACT). *J of Pharm Policy and Pract.* 2020;13(1). <https://doi.org/10.1186/s40545-020-00216-4>, 12.
38. Elbeddini A, Wen CX, Tayefehchamani Y, To A. Mental health issues impacting pharmacists during COVID-19. *J of Pharm Policy and Pract.* 2020;13(1):46. <https://doi.org/10.1186/s40545-020-00252-0>.
39. Newton PN, Bond KC, Babar ZUD, Oxford Collaboration. COVID-19 and risks to the supply and quality of tests, drugs, and vaccines. *The Lancet Global Health.* 2020;8(6):e754–e755. [https://doi.org/10.1016/S2214-109X\(20\)30136-4](https://doi.org/10.1016/S2214-109X(20)30136-4).
40. The Medicine Quality Research Group, Centre of Tropical Medicine & Global Health, Nuffield Department of Medicine, University of Oxford. Medical product quality report – COVID-19 issues. Published online [https://www.iddo.org/sites/default/files/publication/2020-08/Medical%20Product%20Quality%20Report\\_Covid-19%20Issues\\_Issue%201%20Jan-June%202020\\_Main%20text%20plus%20annexes\\_12aug2020.pdf](https://www.iddo.org/sites/default/files/publication/2020-08/Medical%20Product%20Quality%20Report_Covid-19%20Issues_Issue%201%20Jan-June%202020_Main%20text%20plus%20annexes_12aug2020.pdf); August 13, 2020. Accessed August 22, 2020.
41. Hussain R, Dawoud D, Babar ZUD. Drive-thru pharmacy services: a way forward to combat COVID-19 pandemic. *Res Soc Adm Pharm.* 2020. <https://doi.org/10.1016/j.sapharm.2020.07.015>.