



TRENDS OF PHARMACY RELATED RESEARCHES DURING THE COVID-19 PANDEMIC IN SOUTHEAST ASIA: A SYSTEMATIC REVIEW

Erwin M. Faller, RPh, MSPharm, PhD, MMPS, FRIPharm, Jenefer A. Jose, Idine A. Orais, Ricca Mae S. Pontillas, Angela Nicole T. Trasona, Jefferson Chanco, RPh
Department of Pharmacy, St. Alexius College, Koronadal, South Cotabato

KeyWords

Pharmaceutical products and services, pharmaceutical innovation, pharmaceutical regulatory system, pharmacy workforce, COVID-19 pandemic

ABSTRACT

Several investigations were undertaken during the COVID-19 pandemic, and a large number of articles about the pandemic and its impact on the pharmaceutical industry are now available. However, many questions remain unresolved, and new ones are arising. Thus, a systematic review was conducted with the goal of identifying trends in pharmaceutical-related research during the COVID-19 pandemic in Southeast Asia in terms of pharmaceutical products and services, pharmaceutical innovation, pharmaceutical regulatory system, and the pharmacy workforce. The study was also conducted in order to determine the impact of the identified trends in pharmaceutical research on the pharmacists' roles. In order to select publications that correspond to the study's question, inclusion and exclusion criteria were established. Any papers that did not meet the researchers' data sources and inclusion criteria were excluded during the initial and final screening procedure. In reporting systematic reviews, the researchers followed and utilized PRISMA guidelines, which consist of a four-phase flow diagram, and the PRISMA 2020 statement, which consists of a 27-item checklist to improve the transparency of the review. Of several articles identified, only seven were able to provide the information needed to address the systematic review's objectives after the database search. The identified researches focused on pharmaceutical products and services in their analysis of each article, such as the development of a home drug delivery service that was utilized to lower the prevalence of medication-related problems during the pandemic. Furthermore, pharmacy-value-added services that have improved pharmacy services, particularly in the preparation of patient medication, were discussed. In terms of pharmaceutical innovations, online telepharmacy was discussed to be beneficial in providing continuous, high-quality care, and

consultation to patients throughout the COVID-19 pandemic by means of an online platform provided by the pharmacist. The knowledge, attitudes, and practices of community pharmacists during the pandemic are included in the regulatory system which aids in the development of protocols and safety measures to contain the virus. Community pharmacist services, continuous operation of drug retail outlets, and patient care support are all part of the pharmaceutical workforce. Despite the hazards of the COVID-19 pandemic, these obligations and functions have been regularly carried out, considerably aiding in the improvement of patient care and the preservation of high-quality public services. Evidently, trends in pharmacy-related researches during the COVID-19 pandemic are critical in improving patient health and the overall quality of healthcare systems, and this was made possible by the efforts of a medical team that included the pharmacist as a key player.

1. INTRODUCTION

Prior to COVID-19, the impact on on-going research from the different fields of knowledge and industry was rapid, dramatic, and long term. However, in recent years, the global pandemic has reduced most of the academic, industrial, and government research related to fundamental science and clinical studies, and redirected most of the research studies to the COVID-19 [1]. In fact, in just less than 6 months since the new strain of coronavirus was first discovered, there have already been an excessive variety and large number of research studies published about COVID-19 [2].

In the present pandemic, when the healthcare system is failing due to an unprecedented number of cases of COVID-19, pharmacists can play an important role and may help with illness prevention, control, and containment in a variety of ways [3]. The Philippine Pharmacists Association (PPhA) stated that pharmacists can help patients cope with their fears, reduce panic, and direct them to better healthcare facilities during this pandemic [4].

In the era of evidence-based practice and health services, it is no longer acceptable to suggest additional pharmacy services or positions without proof of their usefulness [5]. New pharmacy services and responsibilities must be demonstrated to be practical, acceptable, and cost-effective while also improving health outcomes [6]. Such evidence may be found in pharmacy practice research which can be used to confirm the usefulness of a new service, educate policy, and lead to practice improvement [7].

2. MATERIALS AND METHOD

2.1. Research Design

This study is a systematic review following the approach of narrative synthesis where it involves a process of synthesis of data from various research that mostly depends on the use of language and writing to summarize and explain the findings of the synthesis. This approach of systematic review allows in identifying answers to a clearly defined research question, selecting papers to be included in the review based on different inclusion and exclusion criteria, and then synthesizing the findings [8].

This study also followed and utilized the Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines which consist of a four-phase flow diagram intended for the identification, selection, and application of eligibility criteria to determine studies that were included in the synthesis of trends of pharmacy related researches during the COVID-19 pandemic in Southeast Asia. Furthermore, the PRISMA 2020 statement which consists of a 27-item checklist, was utilized as part of the PRISMA guidelines to improve the transparency of reporting systematic review.

2.2. Data Sources And Search Terms

The researchers have used a variety of online databases to obtain relative studies that were used to aid in the development of findings based on the researchers' objectives following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. The online databases that have been used are BioMed Central, Science Direct, PubMed, and Elsevier. In searching for the relevant studies the researchers included at least one of the following keywords: The keywords used for the search included the following: *“Trends of Pharmacy Related Research”* OR *“Pharmaceutical Products and Services”* OR *“Pharmaceutical Innovation”* OR *“Pharmaceutical Regulatory System”* OR *“Pharmacy Workforce”* AND *“COVID-19”* OR *“SARS-CoV-2”* OR *“Coronavirus”* OR *“Pandemic”* AND *“Southeast Asia”* OR *“Brunei”* OR *“Cambodia”* OR *“Timor-Leste”* OR *“Indonesia”* OR *“Laos”* OR *“Malaysia”* OR *“Myanmar”* OR *“Philippines”* OR *“Singapore”* OR *“Thailand”* OR *“Vietnam”* AND *“Pharmacist”*.

2.3. Eligibility Criteria

The researchers have gathered the articles that meet the following criteria and correspond to the objectives of the research studies in identifying the different trends of pharmacy related research during the COVID-19 pandemic in Southeast Asia in terms of pharmaceutical products and services, pharmaceutical innovation, pharmaceutical regulatory systems and pharmacy workforce. The articles that have been included in the study are: (1) primary research articles; (2) articles published from March 2020 up to June 2022; (3) authored by a doctor, pharmacist, or other healthcare professional; (4) related to the trends of pharmacy related research during the COVID-19 pandemic; (5) published in Southeast Asia; and (6) written in English.

2.4. Data Extraction

The studies that were utilized for systematic review are pharmacy related researches during the COVID-19 pandemic in Southeast Asia narrowed down to pharmaceutical products and services, pharmaceutical innovation, pharmaceutical regulatory system, and pharmacy workforce. The data extracted from the included studies are the title, author, author's profession, publication, online database, location, language, and the summary of results of the study. To avoid researchers' bias, a template has been used in this study. The template presented all the articles in an organized manner to provide transparency of the data collected from the included studies.

2.5. Data Synthesis and Analysis

The researchers used the PRISMA guidelines in presenting the process of selecting and excluding the studies, and in checking all other criteria of the study. This study also utilized the twenty-seven-item checklist

of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) for the transparency of the report of systematic review.

Identification and selection of the relevant studies have been conducted through database searching. After that, to avoid duplication of the research articles, they have undergone a screening process wherein two researchers have been assigned to filter and remove those duplicates. Then, the eligibility of the screened articles was checked based on the inclusion and exclusion criteria set by the researchers. Any articles that did not meet the inclusion criteria have been removed, and the research articles that have been included and were eligible to contribute to the research study has been presented in a tabular form based on the template that the researchers have provided. The data extracted from the included studies were presented using the template, wherein they have also been analyzed to which domains they belong. The final process was the reporting of study results which conclusions and recommendations were provided based on the review of the study outcomes. The reported systematic review has then undergone the process of counterchecking to ensure the proper assessment and quality of the paper. In line with this, the study had an official validator who checked the overall procedures and processes applied in this research.

3. RESULTS

Following a search conducted on Biomed Central, PubMed, Science Direct, and Elsevier, the researchers discovered that there are a combined 942 studies that have the potential to be relevant to the investigation, and 43 studies found from other online databases. Out of 985 articles identified, 674 articles were qualified to undergo screening processes after 311 duplicate articles were removed. Extracted baseline data of the screening process includes language, year of publication, publication, location, and author's profession, of which 600 articles were immediately disqualified following this further consideration.

The process took place by following and considering the chosen online databases from which different articles were extracted, then examining the language, year of publication, publication, and location of the qualified articles in the initial screening process. Out of 674 articles that underwent the process of initial screening, a total of 81 articles have met the criteria and undergone the final screening process by examining the author's profession, for which a total of 74 articles were taken into consideration and evaluated for eligibility. However, out of 74 articles, a total of 67 articles were disqualified and were not taken into consideration because they did not meet the eligibility criteria, and the findings of those research articles had no bearing on the efforts being made to bolster the function of the pharmacy profession in the Southeast Asian region. Hence, of the several studies that the researchers have collected, there are only 7 articles that meet the inclusion and eligibility criteria set by the researchers that have the potential to supply the information needed for the study.

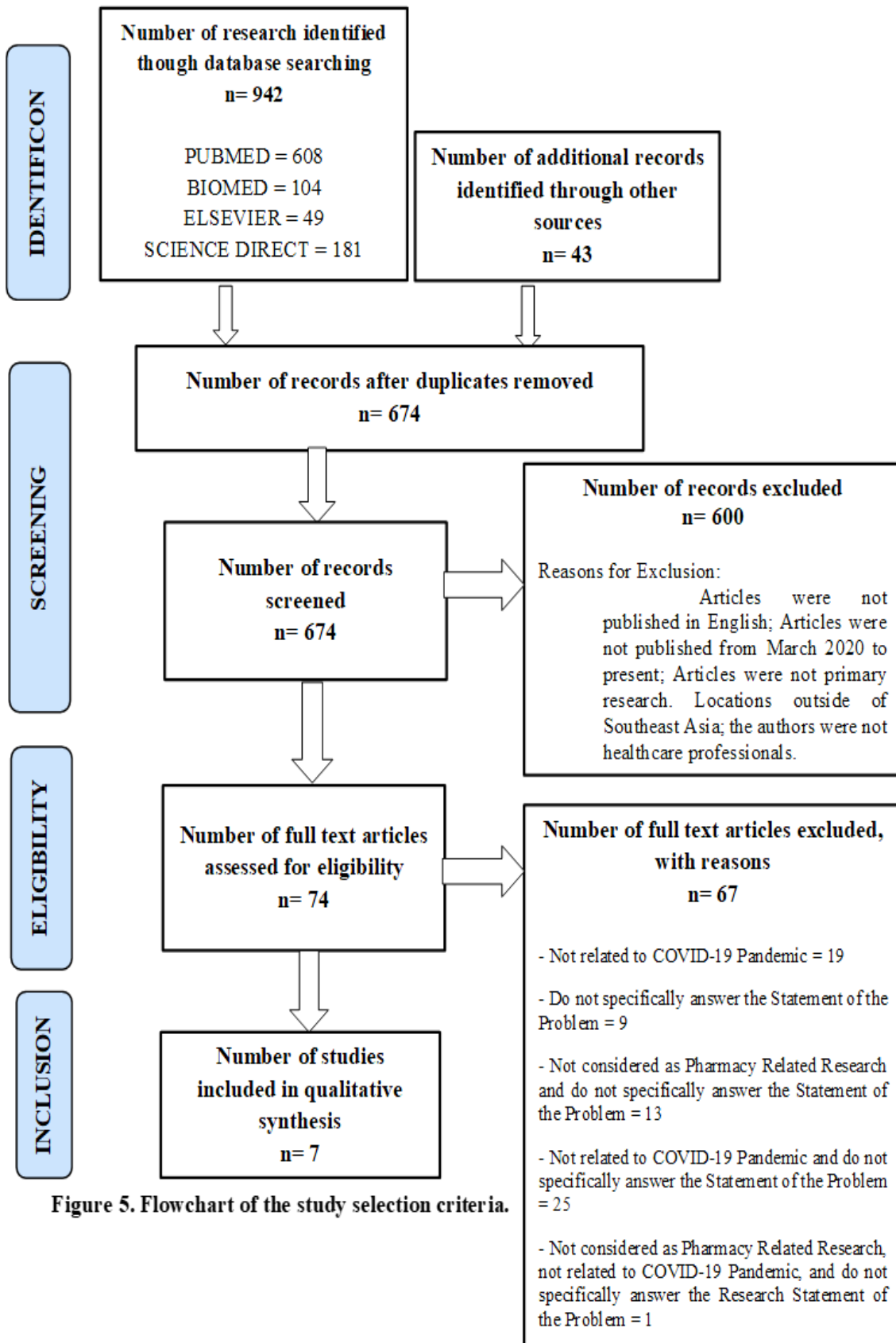


Figure 5. Flowchart of the study selection criteria.

3.1. Pharmaceutical Products and Services

TITLE	Study Design	Participants	Intervention	Control	Outcomes
Effects of home drug delivery on drug-related problems: preliminary evidence for improved patient outcomes during the COVID-19 pandemic in Thailand	Cross-sectional study	246	Collecting information related to DRPs	Prevalence and factors associated with DRPs of patients with chronic disease who received home drug-delivery services.	The present results indicate that home delivery caused no increase and may have caused a decrease in DRPs, and patients were highly satisfied. These promising results suggest that home delivery should be continued and further investigated even as the COVID-19-induced emergency subsides.
Evaluation of pharmacy value-added services in public health facilities: Staff perception and cost analysis	Cross-sectional study	290	To assess the perception of VAS among pharmacy staff, and to compare the time and cost needed to prepare medications for VAS and conventional counter service.	Public health facilities across Kuala Lumpur and Putrajaya from May until September 2020	The majority of the respondents involved in this study acknowledged the benefits of VAS to patients, but there were aspects of the services that could be improved. Preparation of patient medication for VAS requires significantly more time and cost than conventional counter service, indicating the need to review and streamline implementation of the services.

The utilization of drug-delivery programs during the exigency of the COVID-19 crisis has led to the development of Telepharmacy which is currently gaining popularity and effectiveness during this kind of pandemic. Among the several advantages of telepharmacy, its function on the role of pharmacists is to monitor drug-related problems that arise in rural areas, such as those regions mentioned in this study, helping to improve medication compliance, helping to reduce medication errors, as well as adverse drug reactions, costs, and even treatment failure. Furthermore, the flexibility and innovative function of telepharmacy will enable not just pharmacists but also other healthcare professionals to reach out to patients located in remote areas.

Home drug-delivery service through telepharmacy strengthened the roles of pharmacists during the pandemic because it effectively delivered pharmaceutical care and services in isolated and remote areas. People from the remote areas of Thailand have been able to access pharmacists during the pandemic and acquire consultations from them regarding drug information and their medication therapy and treatment. Through home drug delivery services, pharmacists have also been able to monitor patients' adherence to their medications and prevent adverse drug reactions. Accessibility to pharmacists and prescription medications is important in providing patient-centered healthcare, and home drug-delivery services have been able to provide these needs.

More so, pharmacy value-added services (VAS) in public health facilities have also been acknowledged to be helpful in facilitating the process of medicine collection in Malaysia. Value-added services were developed and utilized during the pandemic to meet the goal of improving patient access to medicine while also increasing

the efficiency of public health facilities. The types of value-added services include Medicines by Post (Ubat Melalui Pos), medicine lockers, drive-through pharmacy, appointment cards, and other forms of systems like using short message service, email, telephone, and others wherein patients can directly contact and schedule their chosen time for medicine collection. This service strengthened the roles of pharmacists in terms of expanding their capacity to still efficiently deliver quality health care in the middle of the COVID-19 pandemic. This has also enabled pharmacists to monitor and ensure that changes in a patient’s medication therapy were validated and that the patient has undergone counseling. It was also proven that this pharmacy value-added service has contributed to reducing patient waiting time in pharmacies and has been able to improve the medication adherence of patients.

3.2. Pharmaceutical Innovation

Title	Study Design	Participants	Intervention	Control	Outcomes
Development of an Online Telepharmacy Service in the Philippines and Analysis of Its Usage During the COVID-19 Pandemic	Quantitative study	271	Development of an online telepharmacy service and evaluation of its use during the COVID-19 pandemic in the Philippines	This study describes the process of creating and managing an online telepharmacy service, examines how it is used, and evaluates how users seek out health information.	Adopting alternative platforms to supplement conventional sources of health information is necessary for the transition to the "new normal." An online telepharmacy service may be used to offer and convey pharmaceutical information as part of primary care.

The transition to the new normal in the country makes it more difficult for the Filipino people to have access to the traditional health information sources, especially since most of the general population has been found to be sensitive in terms of financial and time costs in seeking health services. Thus, the utilization of online telepharmacy services provided in pharmacies greatly satisfies patients during the COVID-19 pandemic, especially at the time when community lockdown and quarantine are relevant in the country.

The role of the pharmacist was greatly expanded and strengthened with this kind of service innovation that their responsibility was not only focused on the walk-in patients but also the general population who were able to reach with their online platform. Through this timely innovation, pharmacists could still provide patients with information about drug indications, give a series of recommendations for a set of symptoms, and also help the general public with certain vitamins, supplements, and herbal products that would help them to improve immunity in the presence of the COVID-19 virus. This service innovation was operated wherein responses were expressed in language adapted by the patient. Thus, the information given is assured to be understandable to a specific recipient, and this leads to effective communication between the pharmacist and the patient.

This innovation also strengthened the role of pharmacists amidst the pandemic in such a way that it was able to provide a convenient means of accessing health information to the Filipino people. Mainly, the queries relevant during the utilization of this online telepharmacy are based on patient-related queries. Therefore, the role of pharmacists in this service innovation is also strengthened by means of providing timely and accurate information about the COVID-19 pandemic, disease prevention and treatment, as well as drug procurement concerns.

3.3. Pharmaceutical Regulatory System

Title	Study Design	Participants	Intervention	Control	Outcomes
Knowledge, attitude and practices of community pharmacists regarding COVID-19: A paper-based survey in Vietnam	Cross-sectional study	1023	To find factors influencing pharmacists' knowledge, covariance analysis was used.	The Bayesian Model Averaging approach in R 4.0.4 was used to select the best model.	The pharmacists had good knowledge of COVID-19 transmission, symptoms, and prevention. In drug stores, several helpful precautions were taken to prevent the spread of this dangerous virus. However, pharmacists should avoid forgetting to wear face masks when speaking with patients who have purchased medications. The government and health organizations should have practical solutions to reduce the significant variations in pharmacists' knowledge of the COVID-19 among provinces and educational levels.

The pharmacists had a thorough knowledge of COVID-19 transmission, symptoms, and prevention. Many effective countermeasures against the spread of this deadly virus have been implemented in pharmacies. Face masks and hand sanitizers were provided to pharmacists. When pharmacists personally talked with customers, glass shields were built in many pharmacies to prevent the transmission of saliva or nose droplets. Hand sanitizers were also placed at the entrances of pharmacies, and customers were advised to use them before entering. Both pharmacists and clients were protected as a result of these safety measures. The only issue that has been identified is that pharmacists frequently forget to wear face masks when communicating with medicine purchasers, and these are the constraints they must keep in mind. And health authorities should have solutions to improve pharmacist knowledge, ensuring that there is no major disparity

in pharmacist COVID-19 knowledge among provinces and education levels. Additionally, pharmacists felt that it was important to compile data on patients buying cough, fever, and flu medications. This activity can assist health organizations in communicating with people who may have COVID-19. All pharmacists in Hanoi are mandated by the city’s health department to gather data on patients who buy the aforementioned medications so that they can be located and contacted if necessary. These positive initiatives significantly contributed to the remarkable achievements in Vietnam’s fight against the COVID-19 pandemic.

3.4. Pharmacy Workforce

TITLE	Study Design	Participants	Intervention	Control	Outcomes
The coping strategies of community pharmacists and pharmaceutical services provided during COVID-19 in Malaysia	A questionnaire-based, cross-sectional study	217	Examine community pharmacists' views on their work environment, policies and preparedness for safe retail patronage to prevent the transmission of COVID-19 and assess the variables influencing coping strategies during the pandemic.	An online survey of pharmacists practicing in community pharmacy settings in Malaysia.	The findings suggest the frontline and essential roles of community pharmacists in delivering pandemic responses, creating the opportunity to determine areas where community pharmacy services can be incorporated to strengthen the public health system and improve patient health outcomes.

The role of community pharmacists has strengthened both the public health system and patient health outcomes amidst the COVID-19 pandemic through their involvement in national plans to respond to any disease epidemic in partnership with multidisciplinary teams of healthcare providers and specialists.

Community pharmacists have enough expertise and information on COVID-19 to counsel their patients, reply to inquiries, and be successful in addressing COVID-19 prevention initiatives in their areas. The researchers have discovered that the majority of community pharmacists were well-prepared to deal with the pandemic and had a good attitude toward keeping themselves and their customer’s safe, validating community pharmacists’ crucial role in implementing public health measures to combat COVID-19 spread.

During the COVID-19 pandemic, pharmacists were instrumental in improving both patient health and the overall quality of healthcare systems. Around the world, drug stores are still on the front lines of outbreaks and pandemics. By assisting in the reduction of facility burdens and offering advice and treatment, these providers play a vital role. Community pharmacies have now become the main entrance portals to primary healthcare services in many countries, in association with physicians’ practices, canceling booked appointments for non-essential care. With the help of community pharmacists, they are able to incorporate innovations in pharmaceutical services to lower the risk of transmission while continuing to provide routine pharmacy services to patients, despite the shortage of resources. All drug retail shops follow pandemic standards, which necessitates consistent access to precise guidelines and a stable supply of personal protective equipment. Given that pharmacists and pharmacy technicians are typically rural and isolated communities’ only point of contact with the health system, they have the potential to expand their position as credible information sources for COVID-19 and future pandemics. Calls for pharmacists to participate in response

initiatives enable customer education and surveillance that helped the health system cope with the outbreaks. This was accomplished through the coordinated efforts of a multidisciplinary health care team, which included the pharmacist as an essential member of the team.

In comparison to their roles in providing drug information, generating formularies, and maintaining the medication supply chain, clinical pharmacists' involvement in delivering patient care has received little attention, but this is not to suggest that clinical pharmacists are not working hard to deliver the finest possible pharmaceutical treatment. Studies like "The Impact of COVID-19 on the Role of Hospital-Based Clinical Pharmacists" have revealed that despite the disruption created by the COVID-19 pandemic, pharmacists in hospitals continue to assist patient care. It is necessary to provide them with a higher level of support and acknowledgement of the role they play in order to empower them and improve their capacity to provide pharmaceutical treatment.

4. DISCUSSION

Trends in pharmaceutical products and services during the COVID-19 pandemic have brought a new approach to the roles of pharmacists. Services that were used include home drug-delivery service and the pharmacists value added services (VAS).

Home drug delivery service during the pandemic through telepharmacy service was utilized. Patient monitoring and consulting services are among the services included in the implementation of home drug delivery services. This was used because of the prevalence of drug-related concerns such as problems with changes in drug packaging, leftover medications, nonadherence, conditions that require additional treatments, and adverse drug reactions; it has been employed in rural parts of Thailand. During home quarantine, telepharmacy and drug delivery services have brought numerous advantages. The delivery service was able to supply pharmaceuticals to patients in their local surroundings through a service that was free for both the patient and the hospital pharmacy and reached 20% of the outpatient population [9]. Home drug delivery service strengthened pharmacists' involvement throughout the pandemic by efficiently delivering pharmaceutical care and services in isolated and inaccessible places. During the pandemic, people in rural areas of Thailand were able to consult pharmacists about prescription information, medicine management, and treatment. Through home drug delivery services, pharmacists have been able to monitor patient adherence to drugs and prevent adverse drug reactions. The main advantage of home delivery was that it reduced the spread of COVID-19 among a vulnerable group. In the long run, the program will benefit patients because home delivery will save time away from work and lose wages due to drug collection [10].

Pharmacy value-added services (VAS) in public health facilities have also been utilized during the pandemic specifically, in facilitating the process of medicine collection in Malaysia. Finding a means to shorten the waiting time for health treatments is one strategy for improving healthcare quality. Pharmacy value-added services (PVAS) have long been given as an alternative to traditional counter services for prescription refills in Malaysian public health facilities, with the goal of reducing wait times [11]. In the midst of the COVID-19 pandemic, this service increased pharmacists' roles by increasing their capacity to give high-quality health care. This has also allowed pharmacists to keep track of changes in a patient's pharmaceutical therapy and guarantee that the patient has received counseling. It has also been proven that this pharmacy value-added

service has helped to reduce patient wait times in pharmacies and has improved patient medication adherence. However, according to Loh et al. (2017), even if the influence of VAS uptake on patient waiting time resulted in a decrease in the time of refilling prescriptions, the percentage of VAS registration still needs to be increased to detect a practically meaningful improvement in patient waiting time [12].

For the pharmaceutical advancement during the COVID-19 pandemic in Southeast Asia, it is very evident that pharmacists have been able to develop innovative strategies in order to deliver information based on patients' needs and provide innovative services for the patient to have an easier and more complete access to healthcare amidst the COVID-19 pandemic, especially when it comes to queries about certain medications that pharmacists have been able to provide. The use of information and communication technologies (ICTs) in the health sector can open up new perspectives in the delivery of health services and help to mitigate the problem of health professional shortages [13]. Through the development of an online telepharmacy, the transition of pharmacists' roles has also expanded to include their responsibility to answer several queries and provide patient counseling to the general public through the use of an online platform. This additional responsibility of the pharmacists during the COVID-19 pandemic in an online platform is proven feasible especially that according to the study of Ibrahim et al. (2020), the expanding use of telepharmacy can enhance patient-focused consultation and patient access to pharmacy services [14]. Also, according to the study by Le et al. (2018), telepharmacy may greatly help patients to enhance their adherence to drugs and help pharmacists to educate patients about their various concerns [15]. During the COVID-19 pandemic, telepharmacy services increased patient counseling at a period when traditional health services were becoming less accessible to patients and the general public.

Through this service innovation provided by the pharmacists, the general population may still be able to receive timely and accurate information about drug indications, a series of recommendations about specific health-related concerns, as well as information about the COVID-19 pandemic, disease prevention and treatment, and drug procurement concerns. The expanding use of telehealth can improve patient access to timely care, but it also raises concerns about patient safety. In terms of medication safety and adherence, the findings imply that telepharmacies perform similarly to or somewhat better than traditional pharmacies [16].

Moreover, many effective countermeasures against the spread of this deadly virus have been implemented in pharmacies. In the absence of vaccinations, non-pharmaceutical interventions have mainly consisted of a mix of quick testing, contact tracing, awareness campaigns, staged community quarantines, and mandatory face mask use [17]. Face masks and hand sanitizers were provided to pharmacists. When pharmacists personally talked with customers, glass shields were built in many pharmacies to prevent the transmission of saliva or nose droplets. Hand sanitizers were also placed at the entrances of pharmacies, and customers were advised to use them before entering. Both pharmacists and clients were protected as a result of these safety measures. The Hanoi city health department has also given pharmacists the responsibility of gathering information on patients who purchase cough, fever, and flu medications so that these people can be found and contacted if necessary. With people who may have COVID-19, this activity can help health organizations communicate with them. This study enhanced pharmacists' roles by proving their competency in Southeast Asia by presenting their knowledge and use of that information in providing safety measures to safeguard themselves and the wider public from the COVID virus. Their ability to hold knowledge about COVID-19 and apply it to prevent and contain the virus demonstrates that they are culturally competent healthcare practitioners. Knowledge, attitude, and practices of community pharmacists are also vital because

the urgent need to investigate the virus and produce better vaccinations, drugs, and therapies for patients has revealed new learning opportunities and highlighted ways in which the pharmaceutical industry might improve traditional methods [18].

Providers of health care are under increasing pressure to provide high-quality, integrated, and usually complex patient care, which needs sophisticated and specialized knowledge and abilities. This is according to the International Pharmaceutical Federation (FIP), a global leadership group that is also dedicated to transforming the global pharmaceutical workforce. Pharmacists are in charge of ensuring that patients receive safe pharmaceuticals and assisting the medical team in achieving the best therapeutic outcomes. Community pharmacists' involvement in national plans to respond to any disease epidemic in partnership with multidisciplinary teams of healthcare providers and specialists strengthened both the public health system and patient health outcomes during the COVID-19 pandemic.

According to the Philippine Pharmacists Association, Inc. (2020), community pharmacy is the most strategic health facility where people can receive care and guidance on how to manage our healthcare system. In support of this, according to Elbeddini et al. (2020), during COVID-19, community pharmacists assisted the healthcare system [19]. They have been involved in COVID-19 efforts alongside ICU nurses, physicians, and respiratory therapists, in a variety of ways, including delivering medications to patients, educating patients on telehealth services, assessing patients for chronic medication renewal, providing minor illness consultations, clarifying misconceptions about COVID-19 treatments, and contributing to COVID-19 screening. This was achieved through the collaborative efforts of a multidisciplinary health care team, which included the pharmacist as a key member.

In contrast, clinical pharmacists' role in patient care has garnered little recognition. However, that does not mean they are not working hard to provide the best possible pharmaceutical treatment. Despite the distress caused by the COVID-19 outbreak, pharmacists in hospitals are still assisting with patient care. In the study of Li et al. (2021), to better understand and prescribe drugs, clinical pharmacists created a rational drug use manual for frontline medical personnel to apply to the treatment of COVID-19, including dosage and usage, precautions, adverse drug reactions, and dose adjustments for special populations, such as pregnant women, children, elderly patients, dialysis patients, ECMO patients, and so on, that can reinforce better service to patients [20].

Our defense is the healthcare system, and our warriors are healthcare professionals, including pharmacists. To empower and strengthen their capacity to administer pharmaceutical care, it is vital to give them a better level of support and appreciation of their function. Indeed, according to the study by Elbeddini et al. (2020), pharmacists have stepped up to take on new tasks. Their efforts should not be forgotten when frontline workers are honored once the worldwide epidemic is gone, but they should also not be disregarded now, while their frontline efforts help in strengthening the services of medical teams to combat COVID-19. Pharmacists are frontline employees who deserve to be treated as such and given the respect they deserve [21].

5. CONCLUSION

The COVID-19 pandemic has brought a lot of changes and improvements in the pharmaceutical field. Pharmacists have utilized new methods in delivering services to the public in order to be able to keep up with the new normal while also continuously providing efficient and quality health care. The trends in pharmaceutical related research in Southeast Asia, specifically in pharmaceutical products and services, pharmaceutical innovation, pharmaceutical regulatory system, and pharmacy workforce, have shown that pharmacists have expanded their duties and become an important part of the healthcare team in improving therapeutic outcomes as well as in containing and controlling the pandemic. Studies related to utilization of online telepharmacy, use of home drug-delivery services, development of pharmacists' value-added services, evaluation of the knowledge, attitude, and practices of community pharmacists about COVID-19, the coping strategies of community pharmacists and pharmaceutical services, and the continuous operation of drug retail outlets in the midst of a pandemic are the trends that have been recorded and synthesized.

The pharmaceutical products and services in Southeast Asia during COVID-19 have been able to improve despite the restrictions and chaos brought by the pandemic. The home-drug delivery services in Thailand have been used to provide accessibility to pharmacists and prescription medications in the midst of a pandemic, and pharmacy value-added services (VAS) have been a great help in facilitating the process of medicine collection in Malaysia. In terms of pharmaceutical innovation, online telepharmacy is the trend that made the delivery of drug information, medications, and other health information needed by patients effective and efficient, even though there are a lot of limitations in terms of patient accessibility to health resources due to COVID-19.

For the pharmaceutical regulatory system, in Vietnam, community pharmacists' knowledge, attitude, and practices addressing the COVID-19 pandemic have enabled them to give quality treatments to patients while still adhering to virus regulations and safety measures. COVID-19 transmission, symptoms, and prevention were all well-understood by the pharmacists. In pharmacies, numerous efficient measures against the spread of this dangerous disease have been established. In order to help health organizations reach people who might have COVID-19, the Hanoi municipal health administration has also given pharmacists the duty of compiling data on patients who purchase cough, fever, and flu medications. This study strengthened pharmacists' roles in Southeast Asia by demonstrating their competency by presenting their knowledge and use of that knowledge in offering safety measures to protect themselves and the general public from the COVID-19 virus. Their capacity to retain COVID-19 knowledge and use it to prevent and contain the virus proves that they are culturally competent healthcare providers. And lastly for the pharmaceutical workforce, the roles of community pharmacists during the pandemic have been evaluated. It was found that with the innovations that were utilized by the community pharmacists, they were able to contain and lower the transmission of the virus while still giving quality service to the patients, even with the shortage of resources.

These trends have strengthened the roles of the pharmacy profession in a way that it has been able to make developments and improvements in the field of pharmacy and they have made the roles of pharmacists expand and go beyond the traditional methods or services. It has also made an impact and been able to acknowledge pharmacists as an important part of the healthcare team during the pandemic. Like any other

medical professional, a pharmacist can also do more and become flexible when it comes to delivering care to the public.

Overall, the trends in pharmacy-related research during the COVID-19 pandemic can be useful in the academe in terms of providing information related to the pandemic and identifying what gaps are still there in the pharmaceutical field that need to be addressed. This study can help them understand the effects of the pandemic in society and how important it is for them to prioritize and strengthen the healthcare system by collaborating with healthcare professionals, most especially with pharmacists, in improving their health and conditions. This study is significant in the pharmaceutical industry as it will serve as a guide on what is still needed to improve in terms of the services, in the development of pharmaceuticals, products, and others. For pharmacists and other healthcare professionals, this review can be a great help for them to know the best approaches they could use in delivering quality healthcare to the public. Lastly, for future researchers, this can provide them with reference data related to the researchers conducted during the pandemic. This can also be a means for them to determine the improvements that can be made or gaps that still need to be studied to address more pharmaceutical problems in the future.

Acknowledgment

The authors would like to express their gratitude to Mr. Jefferson Chanco, RPh, our research mentor; and to Dr. Erwin M. Faller, RPh, MSPharm, PhD, MMPS, FRIPharm, our adviser, who gave us guidance and advice through all the stages of writing this paper; the opportunity to conduct this research on the trends of pharmacy related research during the COVID-19 pandemic in Southeast Asia: A Systematic Review. The researchers would also like to extend their gratitude to Mr. Venchie Badong, RCH, MAT, CSSO, for the help in evaluating and synthesizing the results and information needed for this study from the different articles identified.

The researchers would like to extend a deepest thanks to the validators of this study, Dr. Ernieda Hatah, RPh, MClin Pharm, PhD, Mr. Joshua Daniel Pendon, RPh., MSPharm, and Mr. Joseph Mari Querechincia, RPh, MSPharm. Their help and expertise has been able to make this research credible and of good quality.

The researchers are also extremely grateful and honored to be working with the panelists who imparted their time, for their support, kind understanding, and brilliant comments and suggestions, efforts, and guidance in helping the researchers throughout the whole process of the study to be able to produce good and quality research.

To all relatives, friends, and others who in one way or another shared their support, either morally, financially, or physically, thank you.

Above all, to the Great Almighty, the author of knowledge and wisdom, for his countless love.

References:

- [1] Weiner, D. L., Balasubramaniam, V., Shah, S. I., & Javier, J. R. (2020, June 16). *COVID-19 impact on research, lessons learned from COVID-19 research, implications for pediatric research*. Retrieved from Pediatric Research: <https://www.nature.com/articles/s41390-020-1006-3>
- [2] Älgå, A., Eriksson, O., & Nordberg, M. (2020, November 10). *Analysis of scientific publications during the early phase of the COVID-19 pandemic: topic modeling study*. Retrieved from PubMed: <https://pubmed.ncbi.nlm.nih.gov/33031049/>
- [3] Mallhi, T. H., Liaqat, A., Abid, A., Khan, Y., Alotaibi, N., Alzarea, A., . . . Khan, T. (2020, December 08). *Multilevel engagements of pharmacists during the COVID-19 pandemic: The way forward*. Retrieved from Frontiers: <https://www.frontiersin.org/articles/10.3389/fpubh.2020.561924/full#B3>
- [4] Plantado, A. N., Guzman, H. J., Mariano, J. E., Salvan, M. R., Benosa, C. A., & Robles, Y. R. (2021, July 17). *Development of an online telepharmacy service in the Philippines and Analysis of its usage during the COVID-19 pandemic*. Retrieved from SAGE Journals: <https://journals.sagepub.com/doi/full/10.1177/08971900211033120>
- [5] Awaisu, A., Mukhalalati, B., & Mohamed Ibrahim, M. (2019, July 23). *Research designs and methodologies related to pharmacy practice*. Retrieved from PubMed Central (PMC): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7149347/>
- [6] Dalton, K., & Byrne, S. (2017, January 25). *Role of the pharmacist in reducing healthcare costs: current insights*. Retrieved from PubMed Central (PMC): https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5774321/#_ffn_sectitle
- [7] Awaisu, A., Mukhalalati, B., & Mohamed Ibrahim, M. (2019, July 23). *Research designs and methodologies related to pharmacy practice*. Retrieved from PubMed Central (PMC): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7149347/>
- [8] Selçuk, A. A. (2019, March 14). *A guide for systematic reviews: PRISMA*. Retrieved from PubMed Central (PMC): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6461330/#b6-tao-57-1-57>
- [9] Bejarano, A. P., Santos, P. V., Robustillo-Cortés, M. d., Gómez, E. S., & Rubio, M. D. (2021). *Implementation of a novel home delivery service during pandemic*. Retrieved from European Journal of Hospital Pharmacy: https://www.google.com/url?sa=t&source=web&rct=j&url=https://ejhp.bmj.com/content/28/e1/e120&ved=2ahUKewi2s_2A64v4AhVqhMYKHycRDJwQFnoECAoQAQ&usg=AOvVaw2hsE4lYBuOdtOglYCrqgmX

- [10] Brey, Z., Mash, R., Goliath, C., & Roman, D. (2020, June 4). *Home delivery of medication during Coronavirus disease 2019, Cape Town, South Africa: Short report*. Retrieved from National Library of Medicine National Center for Biotechnology Information: https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7284162/&ved=2ahUKEwi2s_2A64v4AhVqhMYKHcRDJwQFnoECDEQAQ&usg=AOvVaw0rKuKMI33KYJ8Lu25aQNW1
- [11] Taridi, M. M., Hassan, M. R., Mohamad, R., Keat, C. H., Nordin, N., Lim, C. P., . . . Ramli, A. (2022, March 03). *Utilization of pharmacy value-added services and its association with waiting time for medication collection in public health institutions across Malaysia*. Retrieved from MedRxIV: <https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.medrxiv.org/content/10.1101/2022.02.28.22271668v1.full&ved=2ahUKEwjB8ly38ov4AhXTC94KHVoSC6UQFnoECB8QAQ&usg=AOvVaw0b8E0laWYMqPNkN8xkJz-4>
- [12] Loh, B. C., Wah, K. F., Teo, C. A., Khairuddin, N. M., Fairuz, F. B., & Liew, J. E. (2017, March 15). *Impact of value added services on patient waiting time at the ambulatory pharmacy Queen Elizabeth Hospital*. Retrieved from National Library of Medicine National Center for Biotechnology Information: <https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5386619/&ved=2ahUKEwjB8ly38ov4AhXTC94KHVoSC6UQFnoECEEAQAQ&usg=AOvVaw1LHdsrmTW-lrhlm5eF22gS>
- [13] Baldoni, S., Amenta, F., & Ricci, a. G. (2019, July 01). *Telepharmacy services: present status and future perspectives: A review*. Retrieved from PubMed Central (PMC): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6681067/>
- [14] Ibrahim, O., Ibrahim, R., Meslamani, A. Z., & Mazrouei, N. A. (2020, October 15). *Role of telepharmacy in pharmacist counselling to coronavirus disease 2019 patients and medication dispensing errors*. Retrieved from Sage Journal: <https://journals.sagepub.com/doi/full/10.1177/1357633X20964347>
- [15] Le, T., Toscani, M., & Colaizzi, J. (2018). *Telepharmacy: A new paradigm for our profession*. Retrieved from SAGE Journals: <https://journals.sagepub.com/doi/abs/10.1177/0897190018791060>
- [16] Pathak, S., Blanchard, C., Moreton, E., & al., e. (2021, June 30). *A systematic review of the effect of telepharmacy services in the community pharmacy setting on care quality and patient safety*. Retrieved from Patient Safety Network: <https://www.google.com/url?sa=t&source=web&rct=j&url=https://psnet.ahrq.gov/issue/systematic-review-effect-telepharmacy-services-community-pharmacy-setting-care-quality-and&ved=2ahUKEwjgNPG6lv4AhXRAogKHRKLC-wQFnoECAcQAQ&usg=AOvVaw1Kr-jExa2ookgRlopXbs4i>
- [17] Estadilla, C. D., Uyheng, J., Lara-Tuprio, E. P., Teng, T. R., Macalalag, J. M., & Estuar, M. R. (2021, August 09). *Impact of vaccine supplies and delays on optimal control of the COVID-19 pandemic: Mapping*

interventions for the Philippines. Retrieved from Infectious Diseases of Poverty:
<https://idjournal.biomedcentral.com/articles/10.1186/s40249-021-00886-5>

[18] Brown, D. R. (2021, March 15). *Dissecting the impact of COVID-19 on pharmaceutical regulatory practices.* Retrieved from European Pharmacaetical Review:
<https://www.europeanpharmaceuticalreview.com/article/147528/dissecting-the-impact-of-covid-19-on-pharmaceutical-regulatory-practices/>

[19] Elbeddini, A., & Yeats, A. V. (2020, May). *Pharmacist intervention amid the coronavirus disease 2019 (COVID-19) pandemic: From direct patient care to telemedicine.* Retrieved from ResearchGate:
https://www.researchgate.net/publication/341706840_Pharmacist_intervention_amid_the_coronavirus_disease_2019_COVID-19_pandemic_From_direct_patient_care_to_telemedicine

[20] Li, H., Zheng, S., Liu, F., Liu, W., & Zhao, R. (2021, January). *Fighting against COVID-19: innovative strategies for clinical pharmacists.* Retrieved from ScienceDirect.com | Science, health and medical journals, full text articles and books.:
<https://www.sciencedirect.com/science/article/pii/S1551741120303284?via%3Dihub>

[21] Elbeddini, A., & Yeats, A. V. (2020, May). *Pharmacist intervention amid the coronavirus disease 2019 (COVID-19) pandemic: From direct patient care to telemedicine.* Retrieved from ResearchGate:
https://www.researchgate.net/publication/341706840_Pharmacist_intervention_amid_the_coronavirus_disease_2019_COVID-19_pandemic_From_direct_patient_care_to_telemedicine