Research Article

Exploring the role of community pharmacists in preventing the onsite infection during COVID-19 pandemic

Noor Raouf Al-Hasani[1*], Dheyaa Jabbar Kadhim[2], Ali Azeez Al-Jumaili[2,3]

[1] Department of Basic Sciences, College of Dentistry, University of Baghdad, Baghdad, Iraq
[2] University of Baghdad, College of Pharmacy, Baghdad, Iraq
[3] University of Iowa, College of Pharmacy, Iowa City, IA, USA

ABSTRACT

This study aimed to evaluate the preparedness and adherence of community pharmacists to the International Pharmaceutical Federation (FIP) Health Advisory COVID-19 guidelines for pharmacists (July 2020) during COVID-19 pandemic. This was a cross-sectional study based on electronic survey using google form, which was distributed from November 19, 2020 to January 1, 2021 using social media platforms. The survey measured 21 pharmacy preventive measures (PM). A multivariate regression analysis was used to identify factors influencing pharmacy implementing of PM. Hand disinfection after serving patients represented the main adopted measure (89.3%). Surprisingly, only 35.4% of participants implemented the proper ways of hand disinfection during face mask handling and 35.4% could not recognize the purpose behind medical mask uses. Significant (p-value<0.05) positive association with pharmacy adoption of PM during COVID-19 was recorded for high influx of patients into pharmacy and working for extended hours, while inadequate information of pharmacists about COVID-19 (which represented the main difficulty that down regulated the adoption of PM in pharmacies) had significant negative association. This study revealed suboptimal implementation of the PM in community pharmacies, and a gap in the pharmacists' knowledge about safety protocols to limit COVID-19 transmissions in the pharmacies. Official health organizations might need to develop a national guideline for community pharmacies to enhance the pharmacists' and patient safety during COVID-19 pandemic.

Keywords:
COVID-19, Community pharmacist, Iraq, Preventive measures, FIP Guidelines

1. INTRODUCTION

Corona Virus Disease 2019 (COVID-19) is a contagious rapidly spread disease detected for the first time in China (Wuhan) in December 2019[1]. The World health organization (WHO) emergently announced on 12th March 2020 that COVID-19 is a pandemic[2]. As of March 23, there were 124 million confirmed COVID-19 cases and 2.73 million related deaths[3].

In Iraq, the first confirmed case was reported in Najaf governorate on 24th February 2020 for a student came from Iran[4]. Then, infection with the virus was widely transmitted to affect people in all the Iraqi governorates. As of March 23, 2021, Iraq had about 800,000 confirmed COVID-19 cases and 14,000 related deaths[5] including about 4,450 cases recorded for medical staff (physicians, dentists and pharmacists)[6-7]. Globally, pharmacists have been recognized as a first point of contact for healthcare advice and making a significant participation during outbreaks. Pharmacists' role involves patient vaccination (like what they did during the H1N1 outbreak), medication supply, patient education, and providing valuable pharmaceutical care for public and patients[8-12].

Iraq healthcare system includes two main sectors: Public (governmental) and private. All pharmacists in public healthcare settings are governmental employees[13]. The public sector has been facing several challenges including deficiency in essential medications, unsatisfactory

use for the technology and unharmonious distribution of pharmacists across healthcare settings[13-14]. On the other hand, the private community pharmacies are owned/ invested by pharmacists, provide about 50% of the market need of medications in addition to other health-care services[14]. These services might involve medicine dispensing, monitoring the adverse effects and educating patients about medications and diseases. Moreover, community pharmacies provide pharmaceutical preparations like creams and ointment, treating minor sickness. Some community pharmacies providing measurements of blood pressure and blood glucose for their customers[14].

Upon the widespread of COVID-19, and due to the pharmacists' vital role during usual and pandemics days, and to save the community pharmacist's life with increasing their satisfaction towards their work[15], the FIP released an interim guidelines for pharmacists, which aimed to boost pharmacists' role and regulate their work rules in an attempt to relieve the stress on the health care system by controlling the disease transmission and providing a scientifically based advice to population[16]. Adherence of community pharmacists to the FIP guidelines is really important as the FIP represents the international entity for pharmacy, pharmaceutical sciences and pharmaceutical education; in addition, its main aim is to provide safe and effective medicines with high quality pharmaceutical services to the patients[17]. So, the FIP offered all the information that is related to the COVID-19 pandemic for pharmacists and the pharmacy workforce in community and hospital pharmacies[16] by issuing special guidelines for them that provide a trusted source of information, which can be followed during pandemic to save their lives and regulate their work rules as well. Accordingly, it was really important to evaluate the extent of the FIP guidelines application in the community pharmacies.

Community pharmacies are accessible to everyone and their staff and customers can be at high risk of infection[11,16]. Several studies have been conducted to evaluate the clinical role, knowledge and awareness of the community pharmacists during COVID-19 pandemic in different countries[1,18-22]. However, they have not used an international guideline to evaluate the community pharmacists' role, knowledge, barriers that may halt them from implementing preventive measures to reduce the probability of disease transmission in community pharmacies during COVID-19 pandemic. This was the first national survey that evaluated the preparedness level and adherence of community pharmacists to international preventive guidelines during COVID-19 pandemic. Therefore, this study was designed to bridge the gap in the literature about the community pharmacists' role, compliance to preventive measures and real-world barriers. The study objectives were to 1) investigate the preparedness level and the role of community pharmacists during COVID-19 pandemic, and 2) to evaluate the gaps in their infection-prevention knowledge and adherence of community pharmacies to the FIP Health Advisory COVID-19 guidelines for pharmacists.

2. MATERIALS AND METHODS

2.1. Study design, participants and period

This was a cross-sectional study based on electronic survey using google form. This survey was conducted in Iraq during COVID-19 pandemic (from 19th Nov 2020 to 1st Jan 2021). Eligible participants were pharmacists who were working at the community pharmacies in different governorates either in full or part time as was stated in the instruction of the questionnaire form that the participant should be a community pharmacist. The participation was anonymous and voluntary. The study was approved by the Ethical Committee at the University of Baghdad College of Dentistry, Department of Basic Sciences (Reference number: 200820)

2.2. Questionnaire development

Developing the survey items were mainly relied on the FIP Health Advisory COVID-19 guidelines for pharmacists and other previous studies[1,16,18-20,23-27]. Face validation process was conducted by five independent academic pharmacists who have a good experience in pharmacy practice and research. They had experience in community pharmacy research as well as community pharmacy practice for more than 10 years. All their comments were taken into consideration and the questionnaire was amended according to their recommendations.

The survey included four sections: Demographics, knowledge sources, pharmacist's role in promoting disease prevention according to the FIP guideline and main difficulties facing community pharmacists/ pharmacies during COVID-19 pandemic. The first section collected the demographic data of the participating pharmacist. Section two investigated the community pharmacists' knowledge sources. The questions of this section composed of six items, which involved the information sources that detailed into: type of information sources, international guidelines that the community pharmacists depend on and how frequently these sources were used.

The third section included 21 items that assessed community pharmacist's role in promoting disease prevention and infection control according to FIP guidelines[16]. Here, the survey investigated the implementation of preventive measures in community pharmacies to reduce the probability of COVID-19 infection. Accordingly, the questions of this section asked about the availability of safety distance, the types of educational tools used and the actual steps that were

implemented in order to educate pharmacy customers and staff on how to behave inside community pharmacies. Additionally, this section investigated the approaches that were used in order to reduce the individual numbers at a single time inside a pharmacy. Lastly, a brief evaluation for pharmacists' knowledge about the differences between masks and disinfectant types was conducted.

Section four included items about the main difficulties that were facing community pharmacists during COVID-19 pandemic. In this section the factors were classified into pharmacy factors, patient factors and pharmacist factors. These factors that may halt or affect the pharmacists' role during pandemics were evaluated using 3-points Likert scale (agree, neither agree or disagree and disagree).

2.3. Response collection

The questionnaire was electronically distributed to the Iraqi pharmacists' closed groups. The main social media platforms that were used for survey distribution were the Facebook, WhatsApp and Telegram. The survey link was redistributed twice weekly to recruit a higher response rate.

2.4. Statistical analyses

Descriptive statistics (frequencies and percentages) were conducted for all survey items. Median and interquartile range (IQR) were measured for skewed items. Data was analyzed using Statistical Package for the Social Sciences (SPSS) software (version 22). A multivariate regression analysis was used to identify factors influencing pharmacy implementing of preventive measures. The multiple regression analysis was conducted to measure the relationships between the independent variables (pharmacy, pharmacists and patient factors) and the outcome variable (summation of 21 preventive measures). The assumption of no multi-collinearity was tested measuring Variance Inflation Factor (VIF) values. Scatterplots was used to show the linear relationship between the outcome variable and the independent variables. We conducted Cronbach's alpha for three scales: Pharmacy, patient and pharmacist-related difficulties facing community pharmacies. *P*-value of less than 0.05 was considered statistically significant.

3. RESULTS

The researchers received 211 completed surveys from community pharmacists (56.9% female and 43.1% male). Two-thirds of the participating pharmacists were in their twenties (66.4%) and 71.6% had bachelor's degree in pharmacy. Approximately three-quarters of the participants graduated from national governmental universities. The majority of the participating pharmacists were employees (67.8%), working part-time (86.7%) and in urban working areas (83.4%). Approximately two-thirds of pharmacies had 4-5 working hours (64.0%) and 1-2 pharmacy staff (66.8%) (Table 1).

The largest portion (42.7%) of the participants attended educational courses/workshops when they have time (not regularly) and most of these workshops were online (68.2%) (Table 2). Most of the participating pharmacists were self-educated about COVID-19 (71.6%). They educated themselves and pharmacy staff about preventive measures (85.3%).

The most two common sources of COVID-19 information used by the pharmacists were social media (43.7%) and scientific sources (papers and reports) (42.1%) (Figure 1A). Internet access and information brochures were the most common sources for information about pharmacy staff safety. Approximately 20% of the pharmacists were providing lectures about safety to their pharmacy staff (Figure 1B). The pharmacists were mostly attracted by COVID-19 courses related to treatment protocols (54.7%), signs and symptoms (40.5%) followed by diagnostic approaches (31.5%) and safety protocols (27.0%) (Figure 1C).

In the survey, 21 pharmacy preventive measures were studied, which were 14 actions and 7 educational notes to patients/customers (Table 3). The average score of implemented preventive measures was 12.1±4.6 (out of 21) with the range from 1.0 to 21.0. Disinfecting hands after serving patients (89.3%) and putting plastic shield on the dispensing counter (80.2%) were the most common actions while home delivering medications (27.5%), changing medicine delivery time to the pharmacy (27.9%) and using clear marks on floor to indicate distance between customer and staff (34%) were the least three actions. Most pharmacists indicated they have posted preventive notes in their pharmacies for customers. However, the least used note was "do not enter to the pharmacy if you have symptoms of COVID-19" (Table 3).

More than three-quarters of the participants were aware about the three properties of N95 face masks including fit more tightly than other masks (84.4%), prevent inhalation of small infection particles (74.9%), and are not recommended for use by the public (76.8%) (Figure 2A). In contrast, only 46.4% were aware that the main role of medical mask is to prevent the spreading of large sprays and droplets when coughing or sneezing (Figure 2A). Surprisingly, only 35.4% of the participating pharmacists implemented the proper ways of hand disinfecting: before wearing face mask, after discarding face mask and when touching contaminated surfaces (Figure 2B). Additionally, 39.8% and 58.3% of the participants were aware that sodium hypochlorite 1% and ethyl alcohol 90% need dilution to disinfect surfaces/small objects, respectively (Figure 2C). In contrast, 94.8%

Table 1. The participants' and their pharmacy characteristics.

Character	Subgroups	N	%
Gender	Female	120	56.9
	Male	91	43.1
Age	20-25	104	49.3
	26-30	36	17.1
	31-35	30	14.2
	>35	41	19.4
Degree	B.Sc. in Pharmacy	151	71.6
	Graduate degree	60	28.5
Experience years	<1	71	33.6
	1-5	79	37.4
	>10	42	19.9
Graduating university	Collage of pharmacy outside Iraq	13	6.2
	Iraqi governmental college	162	76.8
	Iraqi private college	36	17.1
Position	Employee	143	67.8
	Pharmacy owner	68	32.2
Community pharmacy work shift	Full time	28	13.3
	Part time	183	86.7
Pharmacy location	Rural	35	16.6
	Urban	176	83.4
Pharmacy working hours	≤3 hours	32	15.2
	4-5 hours	135	64.0
	6-10 hours	37	17.5
	>10 hours	7	3.3
Pharmacy staff number	1	61	28.9
	2	80	37.9
	3	51	24.2
	≥4	19	9.0
Pharmacy has enough space	No	39	18.5
	Yes	172	81.5

Table 2. Pharmacist professional information and continuous education.

Variable	Subgroups	N	%
The impact of social media	Do not have any effect	35	16.6
	Do not use any application of social media	1	0.5
	Negatively	34	16.1
	Positively	141	66.8
Frequency of using information source	≥Monthly	37	17.5
	Every 2 weeks	21	10.0
	Once daily	45	21.3
	Once weekly	70	33.2
	Twice weekly	38	18.0
Attend educational courses/ workshops	Weekly	31	14.7
	Twice monthly	14	6.6
	Monthly	27	12.8
	Every other month	8	3.8
	When I have a chance to do that	90	42.7
	Not interested at all	41	19.4
Types of courses/workshops	In person course/workshop	67	31.8
	Online course/workshop	144	68.2
Self-educated about COVID-19	No	13	6.2
	Sometimes, when I have enough time	47	22.3
	Yes	151	71.6
Educated yourself/ pharmacy staff about preventive measures PPE	No	17	8.1
	Not necessary	14	6.6
	Yes	180	85.3
Follow international guidelines (CDC, FIP or both) for preventive measures	Yes	80	37.9

CDC=Centers for Disease Control and Prevention, FIP=The International Pharmaceutical Federation
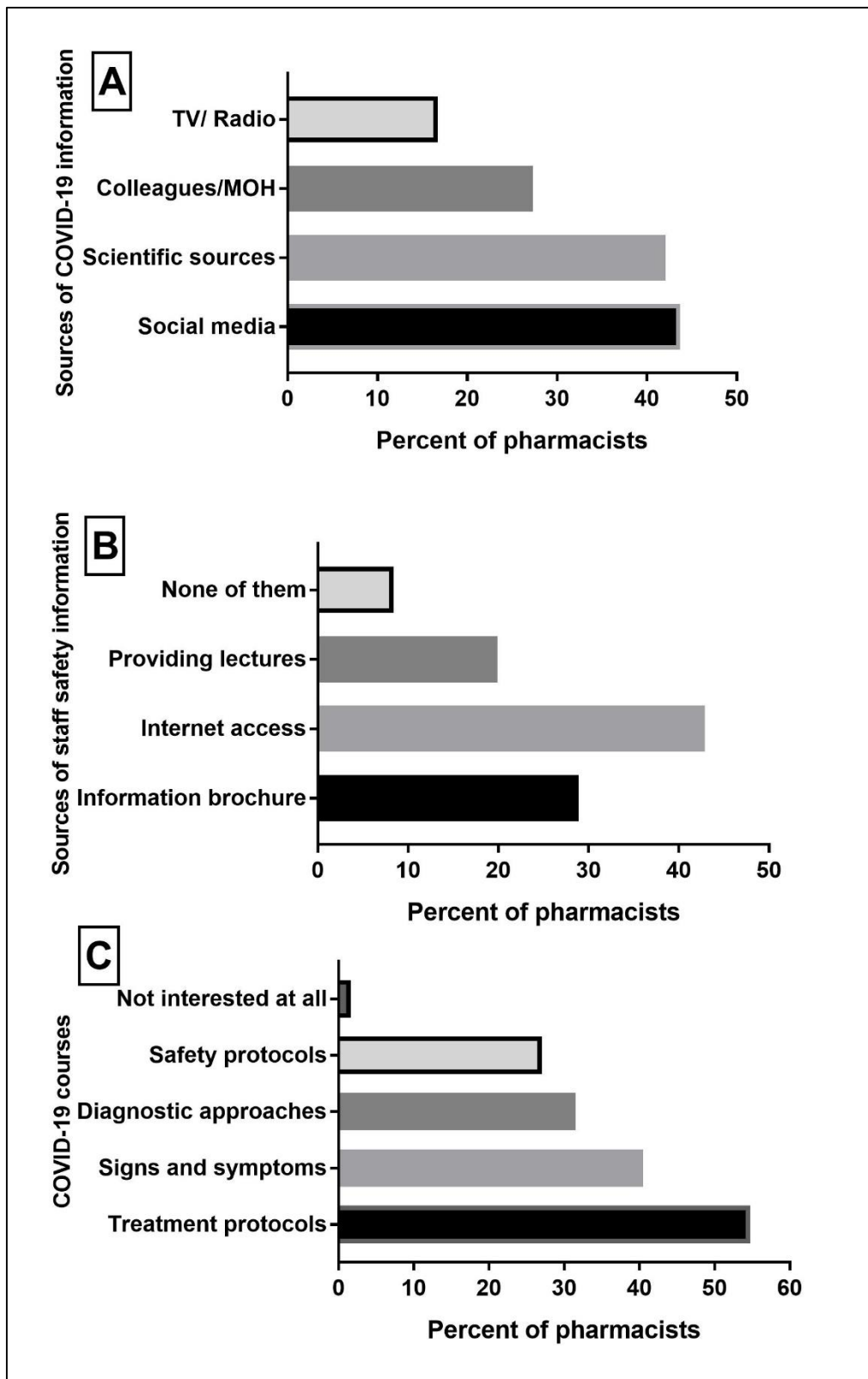
Figure 1. Information sources/courses about COVID-19 and the preventive measures.
A: Information sources that use to update pharmacist knowledge about COVID-19
Scientific sources=reports and papers. Social media=Facebook, telegram, WhatsApp and YouTube. MOH=Ministry of Health.
B: Supportive sources of information about staff safety
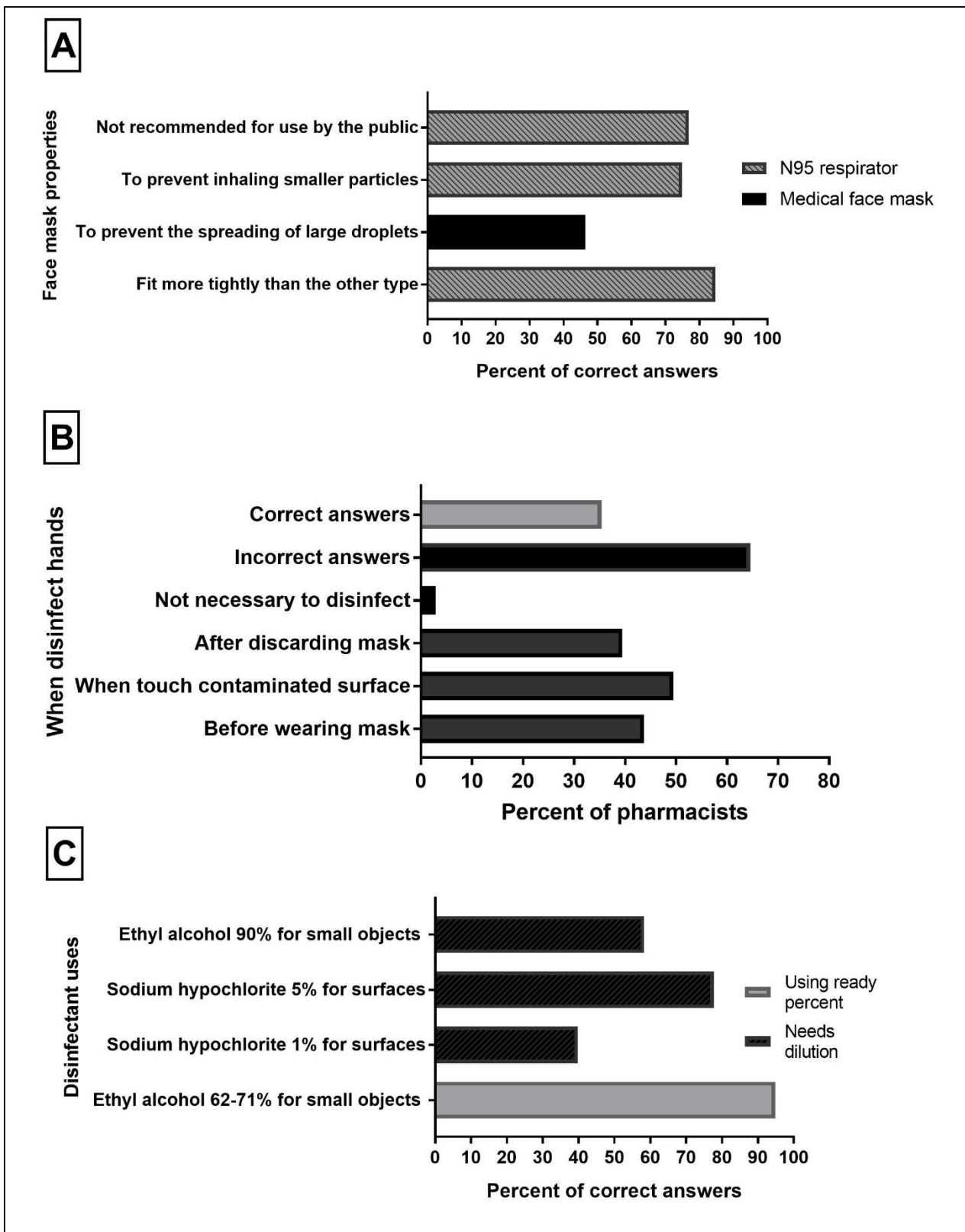C: Attractive courses regarding COVID-19

Figure 2. The pharmacist awareness and adoption of preventive measures.

    A-The main differences between medical face mask and N95 respirator

    B-When should pharmacist disinfects hands while using the medical masks

       Correct answer (in light color) = all three choices: before wearing masks, after discarding mask and when touching contaminated surface.

    C-The use of recommended disinfectants for COVID-19 virus

Table 3. Preventive measures and methods that used to reduce number of individuals at a single time inside the pharmacy during COVID-19 pandemic to ensure staff and workplace safety.

	Method	N	%
1	Home delivery	56	27.5
2	Telepharmacy (for counselling and patient education)	91	44.2
3	Dispensing medicines through a small window on the main pharmacy door	145	69.7
4	Putting transparent plastic shield on the counter or in front of the dispensing area	166	80.2
5	Using clear marks on the floor to indicate the 1 to 2 meters distance between customers and staff	70	34.0
6	Reducing the pharmacy stuff in the public area to prevent the unnecessary touches by customers	124	59.6
7	In case of crowding, pharmacy staff ask the patients to wait outside the pharmacy to keep the social distance	108	52.4
8	Reassigning job tasks for high-risk staff (e.g. the medically compromised staff should be away from patient contact)	133	64.6
9	Changing the drug delivery time to the pharmacy (avoiding the opening time hours)	57	27.9
10	Disinfect and clean the received medicine before putting them inside the pharmacy	118	56.7
11	Disinfect the counter after each customer	141	68.1
12	Disinfect your hands with alcohol-based solution after each customer	184	89.3
13	Do not share the counters and the office supplies with other members of the pharmacy staff	120	58.0
14	Educate pharmacy staff about avoiding wearing accessories like watches and rings	101	48.6
15	Putting a notice at the entrance of the pharmacy: "Disinfect your hands when entering the pharmacy".	146	69.2
16	"Make sure you keep a distance of 1-2 meters between you and other customers or the pharmacy staff."	141	66.8
17	"Do not walk outside the floor markings."	89	42.2
18	"If you sneeze or cough, cover your nose and mouth with a piece of tissue or cough/sneeze into your elbow."	172	81.5
19	"Avoid shaking hands in the pharmacy."	159	75.4
20	"Respect the limit of number of patients inside the pharmacy at a given time."	123	58.3
21	"Do not enter to the pharmacy if you have symptoms of COVID-19."	110	52.1

of them were aware that ethyl alcohol 62-71% can be used without dilution to disinfect small objects (Figure 2C).

The survey measured 13 barriers facing the implementation of preventive measures: seven pharmacy-related barriers, four patient-related barriers and two pharmacist-related barriers. The Cronbach's alpha was acceptable (above 0.7) for each of those 3 scales (pharmacy, patient and pharmacist-related barriers). The most three common pharmacy-related barriers included: unable to pay pharmacy rent, inadequate time to provide high-quality services and increases the prices of pharmaceutical products. In contrast, the least common perceived barriers were deficiency in disinfectants and "not enough staff in the pharmacy" (Table 4). The most prominent patient-related barriers included patients pandemic panic, increase patient influx into pharmacy and requesting unnecessary COVID-19 medicines. The two pharmacist-related barriers: worries from COVID-19 infection and inadequate information about COVID-19 reflected different perceptions as the former recorded higher value than the average while the latter recorded lower value (Table 4).

According to the linear multiple regression, four factors had significant (P-value<0.05) association with the outcome variable (total preventive measures of 21 items): Not enough time to deliver good service, pharmacy extended working time, increase influx of patients inside pharmacy and inadequate information about COVID-19 (Table 5). Inadequate information of pharmacist about COVID-19 had significant (P-value <0.05) negative association with adopting the preventive measures by a pharmacy. High influx of patients into pharmacy, insufficient time and working for extended hours had significant (P-value<0.05) positive association with pharmacy adoption of the preventive measures (Table 5).

4. DISCUSSION

The COVID-19 has been creating an urgent situation and health care crisis around the world. Measuring pharmacist and pharmacies implementation of preventive measures and identifying barriers facing them can help to save pharmacist and pharmacy customer lives through the prevention of onsite transmission. This was the first national survey that evaluated the preparedness level and knowledge adherence of Iraqi community pharmacists to international preventive guidelines during COVID-19 pandemic.

The participating community pharmacists reported that the social media was the most commonly used source of information, which could be attributed to the feasibility of use, availability wherever there is internet connection and the rapid access to the required trusted information with full explanations. Therefore, the social media (as a source of information) surpassed the use of other sources; yet it requires internet access, which might be an obstacle. Similarly, recent surveys of Iraqi healthcare providers (HCPs) found that social media is main source of their information about

Table 4. Difficulties facing community pharmacists.

Factors	Questions	Disagree		Neutral		Agree		Median	IQR*
		N	%	N	%	N	%	N	%
Pharmacy factors	Not enough time to deliver a good pharmaceutical care service	39	18.5	70	33.2	102	48.3	2.0	1.0
	Not Enough staff in the pharmacy	106	50.2	49	23.2	56	26.5	1.0	2.0
	Deficiency of protective equipment in your pharmacy	82	38.9	43	20.4	86	40.8	2.0	2.0
	Deficiency of disinfectant that required to disinfect your pharmacy	115	54.5	40	19.0	56	26.5	1.0	2.0
	Pharmacy extended working time	53	25.1	69	32.7	89	42.2	2.0	2.0
	Price increase of pharmaceutical products in the pharmacy	43	20.4	53	25.1	115	54.5	3.0	1.0
	Unable to pay the pharmacy rent or stuff cost to the seller	33	15.6	77	36.5	101	47.9	2.0	1.0
Patients factors	Increase influx of patients inside the pharmacy	31	14.7	48	22.7	132	62.6	3.0	1.0
	Patients pandemic panic	21	10.0	53	25.1	137	64.9	3.0	1.0
	Patients buying unnecessary products and drugs	37	17.5	55	26.1	119	56.4	3.0	1.0
	Insistence of the patients to buy the antiviral, antipyretics and antibiotic drugs without a need to them	34	16.1	34	16.1	143	67.8	3.0	1.0
Pharmacist factors	Inadequate and miss information about COVID-19	51	24.2	56	26.5	104	49.3	2.0	1.0
	Worries about getting infected yourself with COVID-19	29	13.7	42	19.9	140	66.4	3.0	1.0

*IQR=Interquartile Range

Table 5. Multiple linear regression of factors influencing on pharmacy adoption of preventive measures.

Independent variable	Standardized Coefficients	*P*-value	Collinearity Statistics	
	Beta		Tolerance	VIF
Not enough time to deliver good service	0.152	0.035*	0.80	1.26
Not enough staff in Pharmacy	0.119	0.121	0.70	1.43
Deficiency of PPE in pharmacy	-0.105	0.222	0.56	1.80
Deficiency of disinfectant	0.138	0.106	0.56	1.78
Pharmacy extended working time	0.158	0.027*	0.81	1.23
Price increase of Medicines	0.021	0.777	0.77	1.31
Unable to pay rent	0.059	0.428	0.75	1.34
Increase influx patient inside pharmacy	0.165	0.018*	0.85	1.17
Inadequate information about COVID-19	-0.213	0.004*	0.76	1.31

*Significant (*P*-value<0.05). Dependent Variable: Total preventive measures of 21 items. R-Square=0.18

COVID-19[28] and COVID-19 vaccines[29]. This finding came in agreement with a couple of studies in 2020 that investigated the effect of social media in Arabic pharmacists' population. About 60% of the participants were preferred the use of the social media as a source of COVID-19 information update[18,30]. In another study in 2019, the knowledge and practices among HCPs were compared during the Middle East Respiratory Syndrome (MERS) outbreak in 2012 and it was found that the social media and internet (45%) came secondly after seminars and workshops (48%)[31]. According to the importance of the social media and internet as sources of information, it is recommended that pharmacy owners/managers support a good internet access to their pharmacies specially during health crises (for example, during the COVID-19 pandemic). Additionally, the availability of good internet service at home could help the pharmacists to attend more online courses related to the COVID-19 disease.

Because community pharmacists are the most accessible HCPs who receive questions about therapies, the majority of respondents were interested to attend the treatment protocols courses, while the safety protocol courses were the least popular. This finding indicates that more pharmacists' awareness toward the safety protocols courses should be advised to improve their pharmacy staff/customers safety.

Due to the crucial impact of implementing the preventive measures in the pharmacies, this study quantified the actual adoption of preventive measures in community pharmacies. Because the hand disinfection after serving each patient represented the most common implemented measure, it is essential that pharmacists be aware of the side effects of alcohol-

based hand disinfectants such as skin dehydration, irritation and crack formation. Moreover, alcohol-based solutions have the ability to remove oil on skin surfaces and reduces its ability to retain moisture; hence, the temporary loss of these moisture and oils can lead to symptoms of dermatitis[32]. To reduce these side effects, pharmacists should be advised to wear gloves and change them frequently in order to keep their skin structure healthy and moist. This comes in agreement with a recent recommendation by a study conducted in Australia, in which the use of gloves during the process of cleansing and disinfecting pharmacies was analyzed. This study revealed that less than half of the pharmacists were wearing gloves during the cleansing/disinfecting process, thus recommending the wear of gloves because they act as physical barriers that can protect hands from chemicals[19].

Putting transparent plastic shield on the counter between the pharmacists and patients was ranked secondly, while using clear marks on floor to keep social distance represented the least based action in the community pharmacies in terms of patient/staff safety. Although most pharmacists perceived they have enough space in their pharmacies, the majority did not use clear mark on the floor to indicate distance between patients and pharmacist. This might be attributed to limited spaces of the community pharmacies in Iraq because the minimum required surface area to authenticate a pharmacy opening is 20 square meters according to the regulations of the Syndicate of Iraqi Pharmacists[33]. In contrast, Sum and Ow found that ground signs were the most commonly used action while the Plexiglas shield represented one of the least actions that adopted in the Australian pharmacies to limit the pharmacists and patients contact[19]. This could be attributed to the large surface area of the community pharmacies in developed countries like Australia.

The medications-home delivery method is commonly used internationally and highly recommended during COVID-19 pandemic for pharmacy customers with chronic disease and self-isolation[18,34-35]. Despite prohibition of this practice by the Syndicate of Iraqi Pharmacists, 27.5% of the pharmacists relied on home delivery method to provide the required medicines to patients during this healthcare crisis. This facilitated the medication supply to special population patients (like disabled patients) and helped in reducing the number of individuals at a single time inside the pharmacy. Hence, it is recommended to amend the law to meet the critical need of the drug market specially during the healthcare crisis. If this service will be considered, it should be scientifically based applied by collaborating with other healthcare professionals in order to guarantee that medications-related instructions and guidance are available to all without posing a potential risk to the pharmacists and patients during COVID-19 time, in which stay-at-home is the new normal lifestyle.

Wearing masks during work in British community pharmacies was evaluated by Zaidi and Hasan; they found that more than 70% of the community pharmacists wearing the medical mask or N95 respirator[36]. However, this study did not evaluate the pharmacists' knowledge about the properties and the differences between mask types. This type of information could be helpful as it could assist the community pharmacists to choose the appropriate type for them and to advise the public about the suitable mask during their daily routine during COVID-19 pandemic. This issue was covered in our study and fortunately more than 75% of the pharmacists knew the basic properties of N95 respirators but 35.4% of them could not recognize that the medical mask has been designed to prevent the spreading of large sprays and droplets when coughing or sneezing. This might be attributed to pharmacists' disinclination of updating their knowledge about the safety protocols, which were recorded in this study as the least attractive courses to the pharmacists.

In spite of the international recommendations of hand disinfection (FIP guidelines) while putting on, using, and putting off the masks[16], the vast majority of the participating community pharmacists did not follow the correct protocol of hand disinfection. This might lead to serious consequences and increase the probability of getting coronavirus infection among the community pharmacists. In addition, more than 40% of the pharmacists were not aware that the 1% sodium hypochlorite and 90% of ethyl alcohol need dilution before surface and small objects disinfection. Again, this might be attributed to the unwillingness of community pharmacists to attend safety protocols courses and non-sustainability of information update as more than 40% of the pharmacists update their information only when they have time to do so. To minimize the consequences of this problem and motivate pharmacists to attend more courses or update their information more regularly about safety protocols during COVID-19 pandemic, it is recommended that the Syndicate of Iraqi Pharmacists holds online courses/workshops that deal with healthcare crises and list the safety protocols in their formal pharmacy inspection program.

The difficulties experienced by community pharmacists may adversely impact the adoption of precautionary measurements. The inadequate information about COVID-19 led to neglecting the implementation of preventive measures in the community pharmacies, hence increasing the potential risk of getting infected with COVID-19. This was confirmed in this study when 66% of the pharmacists considered the worries about getting infected with COVID-19 as the main difficulty they faced (pharmacist's factor). Similarly, a recent Iraqi survey evaluating the impact

of COVID-19 on HCPs shows that 87% of HCPs are concerned about getting infected due to their jobs[37].

On the other hand, although it has no significant association with the preventive measures in the regression analysis, about half of the participants admitted they had inability to pay the rent or stuff cost to the sellers during COVID-19 pandemic. Thus it can be a real barrier preventing community pharmacists/ pharmacies from implementing precautionary measures. This finding agrees with Hoti et al., who reported that the high cost of adopting the preventive measures and deficiency of the important items stand behind the refrainment of community pharmacists from applying the preventive measures in Kosovo[23]. This controversy may be attributed to the national economic crisis that affect countries in different levels.

Factors that positively impacted the adoption of precautionary measurements are the higher patient influx, insufficient time and extended working time motivated the pharmacists to apply the preventive measures more than the others (who did not experience these difficulties). That means pharmacists in busy pharmacies may have more incentives to follow preventive measures as they see many patients per day and their risk of infection is higher than less crowded pharmacies. Likewise, previous study considered staff safety, patient safety and prevention of COVID-19 as the main drivers to follow preventive measures in pharmacy[23].

Regarding limitations of the study, convenience sampling and relatively small sample size were considered the main shortcomings of this study. In addition, due to the COVID-19 pandemic lock down, the sample collection relied mainly on the social media platforms that included the pharmacists who are registered in the Syndicate of Iraqi pharmacists. Finally, the participants may not represent all Iraqi provinces.

5. CONCLUSIONS

This study showed variation in some aspects of implementing the precautionary measures, and pharmacists' knowledge about safety protocols to limit the COVID-19 transmissions in community pharmacies. The study identified the real-world difficulties that faced the community pharmacists and hindered the implementation of preventive measures. High influx of patients into pharmacy and working for extended hours were the main drivers to follow preventive measures. The inadequate information about COVID-19 represented the main barriers to implementing the precautionary measures. Health and public health officials might need to develop and enforce national guidelines for community pharmacies to enhance pharmacist and patient safety during health care crises like the COVID-19 pandemic.

REFERENCES

1. Cadogan CA, Hughes CM. On the frontline against COVID-19: Community pharmacists' contribution during a public health crisis. Res Social Adm Pharm. 2020;17(1):2032-5.
2. World Health Organization. WHO Director-General's opening remarks at the Mission briefing on COVID-19-12 March 2020 [document on the Internet]. [accessed 2021 Mar 23] Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-mission-briefing-on-covid-19---12-march-2020.
3. The Johns Hopkins Coronavirus Resource Center. COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) [document on the Internet]. 2021 [accessed 2021 Mar 23] Available from: https://www.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6.
4. Mikhael EM, Al-Jumaili AA. Can developing countries face novel coronavirus outbreak alone? The Iraqi situation. Public Health Pract (Oxf). 2020;1:100004.
5. The Johns Hopkins Coronavirus Resource Center. COVID-19 Statistics in Iraq: Johns Hopkins University (JHU) [document on the Internet]. 2021 [accessed 2021 Mar 23] Available from: htts://coronavirus.jhu.edu/map.html.
6. World Health Organization. Distribution of Healtth Care Provider Confirmed Cases by DoH [document on Internet]. 2021 [2021 Feb 24] Available from: https://app.powerbi.com/view?r=eyJrIjoiNjljMDhiYmItZTlhMS00MDlhLTg3MjItMDNmM2FhNzE5NmM4IiwidCI6ImY2MTBjMGI3LWJkMjQtNGIzOS04MTBiLTNkYzI4MGFmYjU5MCIsImMiOjh9&fbclid=IwAR103S2zi1uIkPQjANdUe4Ys_Km7qeHZNYVKtAeTbDxmGi1i73jrTppjAp8.
7. World Health Organization. Corona virus disease (COVID-19) Infograph Dashboard for Iraq [document on Internet]. 2021 [accessed 2021 Feb 24] Available from: https://app.powerbi.com/view?r=eyJrIjoiNjljMDhiYmItZTlhMS00MDlhLTg3MjItMDNmM2FhNzE5NmM4IiwidCI6ImY2MTBjMGI3LWJkMjQtNGIzOS04MTBiLTNkYzI4MGFmYjU5MCIsImMiOjh

9&fbclid=IwAR103S2zi1uIkPQjANdUe4Ys_Km7qeHZNYV KtAeTbDxmGi1i73jrTppjAp8.

8. Miller S, Patel N, Vadala T, Abrons J, Cerulli J. Defining the pharmacist role in the pandemic outbreak of novel H1N1 influenza. J Am Pharm Assoc. 2012;52(6):763-7.

9. Chin TW, Chant C, Tanzini R, Wells J. Severe acute respiratory syndrome (SARS): the pharmacist's role. Pharmacotherapy. 2004;24(6):705-12.

10. Dineen-Griffin S, Benrimoj SI, Garcia-Cardenas V. Primary health care policy and vision for community pharmacy and pharmacists in Australia. Pharm Pract (Granada). 2020;18(2): 1967.

11. Basheti IA, Mhaidat NM, Alqudah R, Nassar R, Othman B, Mukattash TL. Primary health care policy and vision for community pharmacy and pharmacists in Jordan. Pharm Pract (Granada). 2020;18(4):2184.

12. Mukattash TL, Jarab AS, Abu-Farha RK, Nusair M, Mukattash IL, Obaidat RM, et al. Willingness and readiness to test for COVID-19; A qualitative exploration of community pharmacists. Int J Clin Pract. 2020;74(12):e13620.

13. Al-Jumaili A, Younus M, Kannan Y, Nooruldeen Z, Al-Nuseirat A. Pharmaceutical regulations in Iraq: from medicine approval to post-marketing. East Mediterr Health J. 2021;27(10):1007-15.

14. Ibrahim IR, Wayyes AR. Pharmacy practice in Iraq. Pharmacy practice in developing countries: Elsevier; 2016. p. 199-210.

15. Ibrahim IR, Ibrahim MI, Majeed IA, Alkhafaje Z. Assessment of job satisfaction among community pharmacists in Baghdad, Iraq: a cross-sectional study. Pharm Pract (Granada). 2021;19 (1):2190.

16. International Pharmaceutical Federation. COVID-19: Guidelines for Pharmacists and the Pharmacy Workforce [document on Internet]. Netherlands; 2021 [accessed 2021 Feb 24] Available from: https://www.fip.org/file/4729.

17. International Pharmaceutical Federation. Introduction to FIP and its history [document on Internet]. 2021 [accessed 2021 Sep 16] Available from: https://www.fip.org/files/fip/History_ of_FIP.pdf.

18. Karasneh R, Al-Azzam S, Muflih S, Soudah O, Hawamdeh S, Khader Y. Media's effect on shaping knowledge, awareness risk perceptions and communication practices of pandemic COVID-19 among pharmacists. Res Social Adm Pharm. 2021; 17(1):1897-902.

19. Sum ZZ, Ow CJ. Community pharmacy response to infection control during COVID-19. A cross-sectional survey. Res Social Adm Pharm. 2020;17(1):1845-52.

20. Basheti IA, Nassar R, Barakat M, Alqudah R, Abufarha R, Mukattash TL, et al. Pharmacists' readiness to deal with the coronavirus pandemic: assessing awareness and perception of roles. Res Social Adm Pharm. 2021;17(3):514-22.

21. Alshahrani A. Readiness of Community Pharmacists to Play a Supportive and Advocacy Role in the Fight Against Corona Virus Disease. Risk Manag Healthc Policy. 2020;13:3121.

22. Dawoud D. Emerging from the other end: Key measures for a successful COVID-19 lockdown exit strategy and the potential contribution of pharmacists. Res Social Adm Pharm. 2021;17 (1):1950-3.

23. 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;42(4):1197-206.

24. Strand MA, Bratberg J, Eukel H, Hardy M, Williams C. Peer Reviewed: Community Pharmacists' Contributions to Disease Management During the COVID-19 Pandemic. Prev Chronic Dis. 2020;17:E69.

25. Hedima EW, Adeyemi MS, Ikunaiye NY. Community pharmacists: on the frontline of health service against COVID-19 in LMICs. Res Social Adm Pharm. 2021;17(1):1964-6.

26. Atif M, Malik I. COVID-19 and community pharmacy services in Pakistan: challenges, barriers and solution for progress. J Pharm Policy Pract. 2020;13(1):1-4.

27. Zheng SQ, Yang L, Zhou PX, Li HB, Liu F, Zhao RS. Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: a China perspective. Res Social Adm Pharm. 2020;17(1):1819-24.

28. Aladul MI, Al-Qazaz HK, Allela OQ. Healthcare professionals' knowledge, perception and practice towards COVID-19: A cross-sectional web-survey. J Pharm Health Serv Res. 2020;11 (4):355-63.

29. Al-Metwali BZ, Al-Jumaili AA, Al-Alag ZA, Sorofman B. Exploring the acceptance of COVID-19 vaccine among healthcare workers and general population using health belief model. J Eval Clin Pract. 2021;27(5):1112-22.

30. Basheti I, El-Hajji FD, Nassar R, Thiab S, Barakat M, Basheti M, et al. Pharmacists' Awareness of COVID-19 and Perceptions of their Roles, Barriers, and Roles of Policymakers: exploring the Middle East and North Africa (MENA). Authorea. 2020.

31. Albarrak AI, Mohammed R, Al Elayan A, Al Fawaz F, Al Masry M, Al Shammari M, et al. Middle East Respiratory Syndrome (MERS): Comparing the knowledge, attitude and practices of different health care workers. J Infect Public Health. 2019;14(1):89-96.

32. Oluwatuyi SV, Agbele AT, Ogunrinde ME, Ayo ATV, Ayo AM, Fayoke AB, et al. Alcohol-Based Hand Sanitizers: Review of Efficacy and Adverse Effect. J Health Med and Nurs. 2020;81 :1-12.

33. Al-Jumaili AA, Hussain SA, Sorofman B. Pharmacy in Iraq: history, current status, and future directions. Am J Health Syst Pharm. 2013;70(4):368-72.

34. Aruru M, Truong HA, Clark S. 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 Social Adm Pharm. 2020;17(1): 1967-77.

35. Brey Z, Mash R, Goliath C, Roman D. Home delivery of medication during coronavirus disease 2019, Cape Town, South Africa. Afr J Prim Health Care Fam Med. 2020;12(1):2449-52.

36. Zaidi STR, Hasan SS. Personal protective practices and pharmacy services delivery by community pharmacists during COVID-19 pandemic: Results from a national survey. Res Social Adm Pharm. 2020;17(1):1832-7.

37. Al-Jumaili A, Al-Fatlawi B, Al-Jalehawi A, Al-Hamadani FY, Sajjad. U. Impact of COVID-19 Pandemic on Healthcare Providers: Save the Frontline Fighters. Int J Pharm Pract. (Forthcoming) 2021;29(4):369-75.