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

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Pandemic preparedness of community pharmacies for COVID-19

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ABSTRACT

Background: Community pharmacies provide an important healthcare service, which is broadly established, and constitutes the preferred and initial contact for members of the community. The significant value of community pharmacies was further highlighted during the COVID-19 pandemic crisis.
Objective: The assessment of community pharmacies preparedness for the COVID-19 pandemic.
Methods: A cross-sectional interview survey of 1018 community pharmacies working in four regions of Egypt (South, East, Centre, and North). Data collection was conducted from 8–19 April 2020.
Results: Availability of personal protective equipment (PPE) and medication was better than alcohol (70% conc.). Home delivery services were available in 49.1% of pharmacies. Infection control measures covering interactions between staff were in place in up to 99.5% of pharmacies. Conversely, there was less frequent availability of contactless payment (29.1%), hand sanitizers (62.1%) or masks (86.5%) for customer use, or a separate area for patients with suspected COVID-19 (64%). Verbal customer education (90.4%) was used preferably to written (81.3%). Despite high clinical knowledge and awareness (97.6%–99.2%), only 8.8% of pharmacists had reported suspected COVID-19 cases, however this varied significantly with pharmacist demographics (geographic region $P < 0.001$; pandemic training $p < 0.001$; position $p = 0.019$; age $p = 0.046$).
Conclusions: Government and policymakers strive to mitigate the shortage of PPE and medication. More attention should be given to infection control measures around interactions between staff and customers to ensure community pharmacists are fit and able to provide continuity in their important role. Educating customers using regularly-updated posters, banners or signs will contribute to decreasing contact with patients, and reducing the number and duration of visits to the pharmacy. Pandemic preparedness of community pharmacists must also extend to reporting procedures. By avoiding under-reporting or over-reporting, community pharmacists will contribute to accurate monitoring of the national spread of infection.

Introduction

On December 31, 2019 in the city of Wuhan, in the Hubei province of China,[1] an outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was detected. Following the initial outbreak, the virus spread to other countries *via* asynchronous patterns, a pattern typical for infectious diseases due to the presence of multiple contagion sources. On January 30, 2020, the WHO changed the status of the outbreak to confirm a Public Health Emergency of International Concern. On March 11 COVID-19 was reclassified as a pandemic by the WHO, and impacted over 100 countries over the following number of weeks.[2,3]

As reported on the 20 March, there were 769 confirmed cases of COVID-19 across 37 countries in Africa, and 15 fatalities.[4] COVID-19 first appeared in Egypt in the first week of March 2020. As of the evening (20:10) of 21st April 2020, Egypt was ranked 50th out of 212 areas and countries in terms of the number of patients infected; 147th out of all areas and countries reporting infections with regards to the total number of infected individuals reported (with 36 infections per one million population), 106th with regards to the infection recovery rate (26.6% infection recovery), and 34th with regards to the number of deaths per total infected (7.5%). Until 21st April, Egypt was reported to have had a total of 3659 infected, 935 recovered; 1270 negative test results and 276 deaths [ref: https://www.care.gov.eg/EgyptCare/Index.aspx]. It is challenging for healthcare authorities to publishing accurate figures, reflecting actual totals, and in real time. The reasons for this may well be linked to limited testing capacity and difficulties in identifying the cause of death. a 14-day quarantine period was

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implemented and other preventative measures such as a partial curfew; with the Government of Egypt announcing an extension of the nationwide curfew for two further weeks, until April 23rd, 2020.[5] The curfew covered the hours between 6:00 p.m. and 6:00 a.m. All commercial enterprises and shops were prevented from working after 6:00 p.m. except food outlets and pharmacies. From April 24th to May 23rd (during *Ramadan*) The Presidency of the Council of Egyptian Ministers relaxed some of these preventative measures such as reducing the curfew by 3 h (such that it covered 9:00 p.m. to 6:00 a.m.) and allowed some businesses and government services offices to reopen in order to stimulate the economy and facilitate cultural/social practices during *Ramadan*.

During the pandemic, medically trained personnel, as the backbone of epidemic prevention and first-line providers of infection control, endured heavy workloads, high risks of infection and unprecedented work pressures.[6,7] In low- and middle-income countries (LMICs), the role of the private sector has often been neglected in healthcare by international public health communities and governments.[8] Private community pharmacies provide a significant service in healthcare. Further, in most LMICs, private pharmacies are broadly established[9] and provide the initial point and preferred channel through which members of the community are able to obtain medications and healthcare services for the majority of the population in developing countries,[10–12] including Egypt, as only 23 of 60,000 pharmacies are government owned.[13]

The important value of private pharmacies was further highlighted during the COVID-19 pandemic crisis. However, pharmacies were unable to fulfil their classic role in healthcare as a source of medication, as pharmaceutical measures such as a COVID-19 vaccines and antiviral medicines were not available at time of writing and will not be widely available for a long time. In the current absence of medical treatment and vaccination, the unfolding COVID-19 pandemic can only be brought under control by significant, rapid and widespread behavioral changes. Social and administrative science data could help mitigate the COVID-19 crisis to provide insight into public perceptions of risk, protective behaviors and preparedness measures, public trust and knowledge as well as misinformation.[14] The methods of communication and channels of information used by the populace are changing on a continual basis; it is now of the utmost importance that social science research incorporates information from social media, as many authorities, including the WHO, use this to reach out to people.

The aim of the present study was to investigate the preparedness of private community pharmacies to pandemic COVID-19. This encompasses multiple aspects, in terms of the ability to provide medicinal products, maintain infection control in the pharmacy, and facilitate patient education. In addition, the study investigated as the levels knowledge and awareness community pharmacists had with regard to the pandemic, and the degree to which they had been reporting COVID-19 cases to the responsible healthcare authority. This cross-sectional survey was conducted from 8 to April 19, 2020, where The daily report of the Ministry of health and population in Egypt included a marked increase in the incidence of the infection from 1560 people infected on 8th April (305 recovered, 103 deaths) to 3144 people infected on 19 April (732 recovered, 239 deaths). Geo-locational data for records of COVID-19 cases may play an important role in the communication and evaluation of risk during outbreaks, especially when these data are available in real-time.[15–17]

Methods

Community pharmacies in Egypt were assessed for their preparedness for the COVID-19 pandemic using a cross-sectional survey administered by in-person interview. Approval to perform the study was granted by authors' institution. Participants had the study confidentiality statement verbally explained to them, with a signed copy of the approved confidentiality policy being provided upon request.

The development of the questionnaire was based on existing literature (specifically that published by the WHO, and Egyptian,[18,19] New South Wales and UK government public health guidelines as well as The International Pharmaceutical Federation (FIP), The pharmacy Guild of Australia, The British Columbia Pharmacy Association (BCPhA), Pharmaceutical Services Negotiating Committee (PSNC), and National Institute for Health and Care Excellence (NICE)) and exploratory interviews with a purposive sample of seven community pharmacists covering a range of roles and levels of experience.[20] This latter was conducted during the last week of March 2020. The questionnaire included 84 questions divided into three sections. The first section comprised 12 questions covering pharmacists' demographics (position, years' experience, and gender), the demographics of the customers with suspected COVID-19 symptoms (age and gender) and the nature and degree of symptoms reported by customers to community pharmacists. The second section contained 69 polar alternative (yes/no answer) questions covering six domains related to the COVID-19 pandemic: (1) the ability to provide products, (2) infection control, (3) practice surrounding patient education, (4) knowledge and awareness, (5) barriers, and (6) facilitators. The final section comprised three open-ended questions pertaining to whether questions should be removed, added or modified, required sentence formatting (composition, terminology), validity of questionnaire content, and seeking any other comments. The first two sections comprised questions that were predominantly closed-ended, although space was provided for expansion. The final section provided the opportunity at the end of the questionnaire for respondents to add any further comments on the topic.

Following development of the questionnaire, a pilot of 92 questions was performed between the 1st and April 6, 2020 on a random sample of 42 pharmacies in demographically similar regions in the North, Centre, South and East of Egypt. As a result of feedback obtained during the pilot, a number of changes were made to the questionnaire; namely the addition and removal of certain questions, and modifications to the formatting.

The final questionnaire comprised 87 questions in two sections; a first section containing 12 demographics questions and a second section of 69 questions covering the domains under investigation. The final section of open-ended questions was removed. Invitations to take part in the research were distributed in printed format to community pharmacies in Egypt. Envelopes were addressed to "the pharmacist" to ensure that respondents were actively working in community pharmacy, and also to maximize the response rate through obtaining the attention of the pharmacist. Data collectors then visited community pharmacists in person, to conduct the interview. One pharmacist was interviewed in each private community pharmacy. All questions had yes/no answers, except those with multiple closed options, e.g. regions (North, Centre, South, or East), position (junior, senior, or manager), and years' experience (list of numbers). Each questionnaire was assigned a specific data collector (name and ID) to allow the researcher to contact them if necessary. Data collectors were asked to complete the interviews within a two week period and submit the answers electronically using Google forms. Following electronic submission of completed responses, all participant data were anonymized. As such, the survey design had the advantages of capturing responses from individual personnel covering a large geographical range, with great rapidity. The present article covers 4 domains out of the 6 covered in the survey, comprising 45 questions out of the total 69. These 4 domains are: (1) the ability to provide products, (2) infection control, (3) knowledge and awareness, and (4) practices surrounding patient education. The results have been divided into two manuscripts as relevant to the relative directions of the objectives of the study. The present manuscript deals with the four domains covering preparedness of community pharmacies for the COVID-19 pandemic (internal consistency measured by Cronbach's alpha = 0.773). 24 further questions covering the two remaining domains (barriers and facilitators) relate to a different objective; the development and scaling up of services

provided through community pharmacies (Cronbach's alpha = 0.744).

Data were analysed in SPSS version 20 using descriptive statistics and comparative analyses between survey items were conducted using Chi-square tests.

Results

1034 questionnaires were sent out to community pharmacists, and 1018 (98.5%) of these were completed within two weeks, therefore comprising the study sample. One pharmacist was interviewed in each private community pharmacy. The formal calculations[21,22] involved values of population, confidence level, percentage of response distribution, and confidence interval, taken to be 70,000, 95%, 50%, and 3.05 respectively. Due to the presence of a small number of missing values in the data, the results tables presented here show both absolute numbers of respondents and the percentage of valid responses for transparency.

Respondents covered all three levels of community pharmacist position (junior, senior and manager) working in community pharmacies of three regions South, East, Centre, and North. Respondents had a mean age of 36.1, graduated between 1971 and 2019, and ranged in experience from 1 to 50 years (mean experience = 12.7 years). The majority of respondents had graduated from Government-funded Universities (82.2%). 21.3% of respondents had received pandemic training. .Few respondents (8.8%) had reported a suspected COVID-19 case (Table 1a), and most (62.9%) of those who had reported cases did not receive pandemic training (Table 6a). With regard to the customers presenting with suspected symptoms of COVID-19, 42.8% of cases presented with mild symptoms, (40.5%). The numbers of customers presenting with different symptom severities, together with the breakdown of customer age and gender are presented in Table 1b. (see. Table 6b)

Table 1a
Respondent demographics – pharmacists.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

	Number	Valid %
Region		
South	93	9.2%
East	75	7.4%
Centre	164	16.2%
North	681	67.2%
Missing	5	
Age (mean, range)	36.1 years	22–75 years
Missing	14	1.4%
Graduation year (mean, range)	2007	1971–2019
Missing	23	2.3%
Years' experience (mean, range)	12.7 years	1–50 years
Missing	16	1.6%
Gender		
Male	738	73%
Female	273	27%
Missing	7	
Position		
Junior	380	37.5%
Senior	229	22.6%
Manager	403	39.8%
Missing	6	
University		
Government-funded	833	82.2%
Private	180	17.8%
Missing	5	
Pandemic training		
Yes	215	21.3%
No	794	78.7%
Missing	9	
Reporter		
Yes	89	8.8%
No	923	91.2%
Missing	6	

Table 1b
Demographics of Customer having Suspected Symptoms.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

	Number	%
Symptoms		
Mild	428	42.8%
Moderate	249	24.8%
Severe	24	2.4%
Three degrees	114	11.3%
Mild and moderate	161	16.0%
Mild and severe	18	1.8%
Moderate and severe	12	1.2%
Missing	12	
Age category		
Geriatrics	290	28.9%
Adults	247	24.6%
Pediatrics	61	6.1%
Multiple	407	40.5%
Missing	13	
Gender		
Male	283	28.2%
Female	28	2.8%
Multiple	694	69.1%
Missing	13	

Availability of hand sanitizers, disinfectants, face masks, antipyretic drugs, thermometers, cold fomentation, and disposable gloves was better than the availability of alcohol (at least 70% concentration). A home delivery service was available in about one half of pharmacies, with significant differences between regions (Centre = 67.1%, North = 41.0%, South = 44.1% and East = 48.0%; $P < 0.001$). Antimalarial drugs were available only in 39.1% of pharmacies (Table 2). Most items related to infection control were available at pharmacies; the majority of behaviors advised to prevent the spread of the virus were adopted by pharmacy staff (up to 99.5%), with the exception of decreasing the numbers of unnecessary workers to decrease the likelihood of disease transmission (only adopted in 85.7% of pharmacies). However, instructing staff with chronic illnesses or any other medical vulnerability to take leave showed a great disparity in the level of adoption across regions (Centre = 91.5%, North = 97.2%, South = 97.8% and East = 97.3%; P = 0.004).

In comparison to infection control measures concerning worker-worker interactions, infection control around worker-customer interactions was given much lower priority. The availability of card payment machines (29.1% overall) was significantly different between regions (Centre = 42.1%, North = 24.5%, South = 35.5% and East = 30.7%; $P < 0.001$). As shown in Table 3, pharmacists reported low availability of free hand sanitizers (62.1%) and masks (86.5%) for customer use, low adoption of a separate area in the pharmacy for symptomatic customers (64%), and low implementation of special waste disposal measures (80.4%).

Respondents expressed a high awareness (97.6%–99.2%) of the hygiene practices required, the risk of recent travel abroad, the importance of controlling contact with infected cases, and the common symptoms of COVID-19, but only 91% of pharmacists reported awareness of all 10 possible symptoms (see Table 4). Pharmacists expressed a higher incidence of educating of costumers verbally (90.4%), compared to providing written information (81.3%). Furthermore, managers were less likely than juniors and seniors to provide customers with written educational material (managers = 78.1, juniors = 82% and seniors = 86.8%; P = 0.027), and more likely to communicate this education verbally (managers = 98.3%, juniors = 91.8% and seniors = 90%; Table 5). Only 8.8% of pharmacists had reported cases with suspected COVID-19 symptoms to the healthcare authority; the demographics of reporting pharmacists are shown in Table 6a.

Table 2
Availability of products.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

Products	Yes		Differences Between Regions (chi-square test)				
	n	%	Centre %	North %	South %	East %	P- value
Alcohol	805	79.3%	82.3%	79.0%	78.0%	77.3%	n.s.
Sanitizers	883	86.9%	86.6%	86.0%	86.8%	96.0%	n.s.
Disinfectants	871	85.8%	80.5%	86.5%	87.8%	88.0%	n.s.
Face masks	766	75.6%	75.6%	75.8%	66.3%	83.8%	n.s.
Disposable gloves	844	83.0%	85.4%	83.8%	72.8%	81.3%	0.049
Antipyretic drugs	1002	98.4%	99.4%	98.7%	98.9%	93.3%	0.003
Thermometers	950	93.3%	97.0%	93.2%	88.2%	92.0%	n.s.
Cold fomentations or ice packs	938	92.3%	92.7%	92.1%	92.5%	93.2%	n.s.
Antimalarial drugs	397	39.1%	33.5%	40.4%	38.0%	37.3%	n.s.
Home delivery service	469	49.1%	67.1%	41.0%	44.1%	48.0%	< 0.001

Discussion

Controlling the spread of COVID-19, and thus bringing the pandemic to an end, can only be achieved by widespread and rapid implementation of significant changes to human behavior. At time of writing, there is no vaccination available and insufficient supplies of the medicines use to treat the disease. Observations of a social science nature could provide insight into behaviors and perceptions among the populace, as well preparedness measures employed by authorities and the level of public trust in them.[14] The WHO reports the use of real-time geo-positioned data or information in order to effectively communicate and evaluate statistics during outbreaks.[15–17] This data can then be used to reach out to healthcare professionals and the general population. In contrast to and the majority of businesses, community pharmacies are able to supply customers in their local communities with medicines, hygiene products and essential information throughout the pandemic.[23,24] Public panic, together with significant increases in demand for products, increases the pressure on already busy pharmacy staff.[25,26] This article reports the preparedness of community pharmacists across Egypt for the COVID-19 pandemic.

Availability and distribution of products and medicines

Critical supply shortages of Personal Protective Equipment (PPE) and hygiene products during the COVID-19 Pandemic are international problem. Lack of adequate PPE for frontline healthcare workers, together with estimates that countries will need far more face masks and respirators than are currently available[27] highlight problems with the global supply chain. As at January 2020, half the world's face masks were produced in China,[28] but exports decreased as the infection spread and China's usage increased. Following the peak of the pandemic passing in China, the export of face masks increased again.[28]

In surveyed pharmacies, necessary products such as hygiene products, antipyretic drugs, cold fomentations or ice packs and PPE (Table 2) were not available at all pharmacies, especially high concentration alcohol. Although community pharmacies strive to continue functioning as a business, it becomes necessary to prioritize maintaining adequate stock of the essential items according to local customer demand. Further, modification of package sizing and imposing customer limits on purchase quantities may be necessary, for example dividing large packets of Paracetamol into smaller ones and limiting the number sold to each customer to meet unprecedented demand.[29,30]

Recent researches suggest Chloroquine and its derivatives to be effective in the treatment of COVID-19 patients.[31–36] The present study found such quinine-based antimalarial drugs only to be available in 39.1% of pharmacies, a direct result of panic buying in response to the pandemic. This resulted in a shortage of the drugs for the treatment of other immunological conditions such as rheumatoid arthritis and lupus.

Table 3
Infection control in pharmacies.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

	Yes		Differences Between Regions (chi-square test)				
	n	%	Centre %	North %	South %	East %	P- value
Inside the pharmacy							
Surfaces cleaning regularly e.g. counter tops	1011	99.5%	100%	99.6%	100%	97.3%	0.036
Floors cleaning	1009	99.5%	100%	99.3%	100%	100%	n.s.
Common used tools cleaning regularly e.g. phone	987	97.2%	96.3%	97.4%	96.8%	98.7%	n.s.
Availability of sanitizers for staff use	989	97.6%	97.0%	98.2%	95.6%	95.9%	n.s.
Disposable gloves availability for staff use	950	93.6%	90.9%	94.9%	89.1%	93.3%	n.s.
Use of face masks	936	92.2%	90.2%	92.1%	95.7%	93.3%	n.s.
Staff regularly wash hands with soap	1010	99.4%	99.4%	99.6%	100%	97.3%	n.s.
Decrease unnecessary workers (i.e. decreasing workers density)	867	85.7%	87.8%	86.0%	85.9%	77.3%	n.s.
Vulnerable staff leave (acute conditions)	969	95.7%	93.3%	95.9%	97.8%	96.0%	n.s.
Vulnerable staff leave (chronic disease or age)	978	96.4%	91.5%	97.2%	97.8%	97.3%	0.004
Waste management	816	80.4%	75.0%	80.8%	85.7%	82.7%	n.s.
Interpersonal interactions							
Taking precautions handing/dispensing prescriptions	947	93.6%	96.3%	92.8%	96.8%	90.7%	n.s.
Prevention of customer crowding	957	94.7%	90.8%	95.7%	92.3%	96.0%	n.s.
Physical distance (at least 1 m distance)	968	95.5%	93.9%	95.4%	98.9%	94.7%	n.s.
Contactless payment availability e.g. card payment machines	296	29.1%	42.1%	24.5%	35.5%	30.7%	< 0.001
Free availability of sanitizers for use by customers during visit	627	62.1%	56.1%	63.8%	64.8%	54.7%	n.s.
Free face masks for customers during visit	875	86.5%	81.7%	87.8%	86.8%	85.3%	n.s.
Define a specific area for customer having suspected symptoms	649	64.0%	59.8%	66.0%	59.8%	60.0%	n.s.

Table 4
Awareness and knowledge of pharmacists.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

			Differences Between pharmacists (positions, university type, and training) (chi-square test)									
	Yes		Position				University			Pandemic training		
	n	%	Junior %	Senior %	Manager %	*P-value*	Government %	Private %	*P-value*	Not trained %	Trained %	*P-value*
Hygiene practices	1006	99.2%	98.7%	100%	99.3%	n.s.	99.2%	99.4%	n.s.	99.2%	99.1%	n.s.
The risk of infection due to recent travels abroad (14 days)*	1001	98.8%	98.9%	96.9%	99.8%	0.007	98.8%	98.9%	n.s.	98.9%	98.6%	n.s.
One case control is making huge difference	996	97.8%	97.4%	97.4%	98.5%	n.s.	97.7%	98.3%	n.s.	98.0%	97.7%	n.s.
Familiarity with common symptoms[1]	993	97.6%	96.8%	98.7%	97.8%	n.s.	97.7%	97.2%	n.s.	97.5%	98.1%	n.s.
Familiarity with 10 symptoms[2]	923	91.0%	89.7%	93.4%	90.7%	n.s.	91.0%	91.1%	n.s.	91.0%	90.7%	n.s.

NOTES [1]NSW Health [1]; [2]Health Department of Australian Government [2].
1 New South Wales Government. Health. Tell staff immediately if …. 2020; https://www.health.nsw.gov.au/Infectious/diseases/Documents/covid-19-ed-poster.pdf. Accessed March 2020.
2 Health Department of Australian Government. covid–19: Identifying the symptoms. 2020; https://www.health.gov.au/sites/default/files/documents/2020/03/coronavirus-covid-19-identifying-the-symptoms.pdf. Accessed March 2020.

Approximately half the pharmacies surveyed reported to offer home delivery services. The need for such delivery services will vary across a region, dependent on the population it serves. Delivery drivers will also need access to the same resources afforded to pharmacy staff, such as PPE, hygiene products and education on behavioral measures to prevent the spread of COVID-19. Moreover, it may be necessary to place a limit on the quantities of certain items that can be ordered by each household. Other additional remote services should be considered to reduce contact between individuals, such as telephoning patients to let them know when their prescription is ready to be collected, as opposed to patients making multiple unnecessary visits to the pharmacy to check on the progress of a prescription.

Governments and policy makers are advised to do everything in their power to ensure availability of medicines and hygiene products. To address the PPE shortage in Egypt, the National Service Projects Organization, a department of the Egyptian Armed Forces intervened to provide alcohol, disposable gloves, sanitizers, disinfectants and face masks directly to the public from one of its owned companies (ElNast Intermediate Chemicals Co.). In the UK, the government announced plans to assist with the funding of a pharmacy delivery service to facilitate timely access to medicines for the most vulnerable patients.[37]

Infection control

In Italy, inadequate access to PPE contributed to high rates of infection and death for healthcare workers.[38] It is imperative that all healthcare workers including community pharmacists have access to adequate supplies and equipment.

Inside the pharmacy

For the majority, maintenance of a clinical environment in the pharmacy, and hygienic interactions of pharmacy staff were suitably prioritized. This included increasing the frequency of regular cleaning of clinical areas, and paying extra attention to areas known to be implicated in spreading disease (counter tops, door handles, pens, etc.). Planning is required in the implementation of these measures for the protection of patients/customers and staff.[39] By way of an example, the National Health Service in England advised community pharmacy staff to order small quantities of gloves, aprons and fluid-repellent face masks for use by staff and not to be sold to the public.[40]

Unfortunately, the disposal of used PPE and other waste management was only considered in 80.4% of the pharmacies surveyed. Adequate provision of waste bins is a necessity. Any waste likely to carry COVID-19 must be double-bagged and/or separated from general waste for 72 h disposal[41] to decrease the risk of transmission outside the pharmacy.

While some individuals do not meet the requirements for shielding, they may still be at higher risk if they contract COVID-19. If these individuals are members of pharmacy teams, plans must be made to ensure their safety while working. 85.7% of the pharmacies surveyed decreased the number of unnecessary workers onsite to decrease the likelihood of disease transmission. Vulnerable staff were allowed leave in 95.7% of pharmacies, and those chronic disease were allowed leave in 96.4% of cases, again to prevent infecting staff members who are at higher risk. However, this was not the case in all regions, with the Central region having the lowest incidence of implementing this policy, perhaps containing the capital city (Cairo) and economic centre places additional pressures on the workers. Stringent physical distancing behavior is strongly advises for high-risk individuals,[39] i.e. those aged 70 years or over, and those with underlying health conditions, such as heart disease or diabetes.

Interpersonal interactions

There is evidence of pre-symptomatic transmission from studies in Singapore and other countries,[42,43] suggesting that viral shedding occurs prior to symptom onset. Not all pharmacy workers report the use of PPE.[40] In the present study, pharmacists reported paying less attention to infection control when interacting with customers, compared to when interacting with other staff. Despite precautions taken to protect pharmacy staff, it is inevitable that they will interact with patients when dealing with crowds of customers, dispensing prescriptions and taking payments.

Due to the role of respiratory droplets in the transmission of COVID-19, transmission is accelerated by high population densities, such as those in pharmacies and other healthcare and commercial sectors. Customer crowding is important, as customers are dynamic (different people) rather than static like pharmacy staff. Avoiding customer crowding and instructing customers to keep at least 1 m distance were measures used by the community pharmacists surveyed. Community mitigation strategies, including cancelling mass gatherings, are recommended to reduce disease transmission,[44] resulting in substantial reductions in the numbers of people infected, and ultimately, deaths.[45] The success of these strategies relies on timely implementation, specifically before high levels the virus become present in the community.[46,47]

In developing countries (including Egypt), prescriptions in community pharmacies are still printed and collected in person rather than using electronic prescription services (EPS) such that are commonplace

Table 5
Patient education by pharmacists.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

			Differences Between Pharmacists (positions, university type, and completion of pandemic training) (chi-square test)									
	Yes		Position				University			Trained		
	n	%	Junior %	Senior %	Manager %	*P-value*	Government %	Private %	*P-value*	Not trained %	Trained %	*P-value*
Oral education	916	90.4%	91.8%	90.0%	98.3%	n.s.	90.8%	88.3%	n.s.	90.8%	89.3%	n.s.
Written education e.g. posters	820	81.3%	82.0%	86.8%	78.1%	0.027	81.7%	80.3%	n.s.	79.7%	87.3%	n.s.
Special attention to geriatric education	960	94.7%	95.5%	96.1%	93.0%	n.s.	94.5%	95.6%	n.s.	93.8%	97.7%	n.s.
Special attention to chronic disease education	968	95.8%	95.5%	96.0%	96.0%	n.s.	96.3%	94.4%	n.s.	95.7%	97.7%	n.s.
Personal hygiene e.g. hand washing and toilet use	1004	98.9%	98.7%	99.1%	99.0%	n.s.	98.8%	99.4%	n.s.	98.9%	99.1%	n.s.
Avoiding touching the face	999	98.4%	98.4%	99.6%	97.8%	n.s.	98.6%	97.8%	n.s.	98.1%	99.5%	n.s.
Care when sneezing or coughing (avoiding people, directing into elbow)	1005	99.1%	98.2%	99.6%	99.8%	0.043	99.2%	98.9%	n.s.	99.0%	99.5%	n.s.
Avoiding unnecessary travel	991	97.7%	97.1%	98.3%	98.0%	n.s.	98.0%	96.7%	n.s.	98.0%	96.7%	n.s.
Staying at home and keeping physical distance	1006	99.1%	99.2%	99.1%	99.0%	n.s.	99.2%	98.9%	n.s.	99.1%	99.1%	n.s.
Awareness of common symptoms	994	98.2%	98.7%	99.1%	97.3%	n.s.	98.6%	96.6%	n.s.	98.4%	98.1%	n.s.
Access to national services (where to do the test, phone lines, regional quarantine hospital)	992	97.7%	97.3%	97.3%	98.0%	n.s.	97.6%	98.3%	n.s.	97.3%	99.1%	n.s.
Modes of disease transmission from infected person to others	985	97.1%	96.6%	97.4%	97.5%	n.s.	97.1%	97.2%	n.s.	96.6%	99.1%	n.s.

Table 6a
Case reporting – demographics of reporters (pharmacists).
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

	Reporter		Differences between Reporters and Non-reporters (chi-square test)P- value
	Yes		
	n	%	
Position	(n = 88)		p = 0.019
Junior		44.3%	
Senior		29.5%	
Manager		26.1%	
University	(n = 89)		n.s.
Government		86.5%	
State		13.5%	
Pandemic training	(n = 89)		p < 0.001
No		62.9%	
Yes		37.1%	
Region	(n = 89)		p < 0.001
Centre		22.5%	
North		50.6%	
South		6.7%	
East		20.2%	
Age	(n = 89)		p = 0.046
Gender	(n = 89)		n.s.
Male		74.2%	
Female		25.8%	
Graduation year	(n = 86)		n.s.
Years' experience	(n = 89)		n.s.

Table 6b
Case reporting - characteristics of cases reported.
SOURCE Analysis of cross-sectional survey of 1018 community pharmacies in Egypt by SPSS version 20.0, April 8–19, 2020.

	Reporter		Differences Between Cases Reported (chi-square test)P- value
	Yes		
	n	%	
Symptoms	(n = 89)		p < 0.001
Mild		21.3%	
Moderate		31.5%	
Severe		5.6%	
Three degrees		24.7%	
Mild or moderate		14.6%	
Mild or severe		2.2%	
Moderate or severe		–	
Age category	(n = 89)		P = 0.004
Geriatrics		13.5%	
Adults		36.0%	
Pediatrics		6.7%	
Multiple		43.8%	
Gender	(n = 89)		n.s.
Male		23.6%	
Female		1.1%	
Multiple		75.3%	

in developed countries (including the UK). Efficient planning is required to ensure that prescriptions are collected while minimizing contact,[48] including provision for general practitioners to send paper prescriptions directly to pharmacies.[49]

Interactions around payments can also be implemented, including the widespread use of contactless payment where possible. Unfortunately, card payment machines were only available 29.1% of the pharmacies surveyed. Use of these machines would help reduce the role of cash as a source of disease transmission, and further reduce physical contact. Availability of card payment was also significantly different across regions, with the Central region again as the country's capital having a more developed infrastructure and wider availability of

card payment.

Pharmacy staff working in any national crisis endure risks in fulfilling their role and all possible measures must be taken to ensure their continued safety. Free sanitizers (62.1%), and masks (86.5%) were provided for customer use in surveyed pharmacies, to provide some protection from transmission. A high degree of anxiety will be experienced by staff about their patient-facing role and it is important to address these concerns and to advise pharmacy staff to adopt risk-minimizing behaviors. It is also important to mitigate staff exhaustion where possible.

Another measure often employed is to define a specific area within the pharmacy for customers with suspected COVID-19 symptoms so as to reduce infection transmission. This practice was implemented by 64% of pharmacies surveyed, however not all pharmacies have such a space available inside the pharmacy, with some pharmacies having a total area as small as 25 m^2 (29.89 sq yd) according to Egyptian regulations. In such a small pharmacy, staff may need to reconsider the use of space. It may be necessary to rearrange the working area to allow more space between employees, for example to expand a small dispensary area into part of the pharmacy store. This further may reduce the total number of customers who can enter the store at once, resulting in queues out of the door. Although not ideal, these temporary measures may be crucial in protecting pharmacy staff and customers.

However, it is appreciated that such physical distancing measures are not practical in all pharmacies, the next line of defense is to use PPE. Public Health England (PHE) regularly updates guidance on PPE use for healthcare professionals. Most recently (as at April 10, 2020) the recommendation was that for pharmacy staff, fluid-resistant masks should only be worn when in “contact with possible or confirmed cases of COVID-19”.[50]

Customer education

Due to measures in place during the pandemic, a pharmacy may need to decrease their focus on retail and increase the focus on education and the dispensing of information. Pharmacists surveyed reported educating costumers in behaviors such as avoiding touching the face, avoiding sneezing or coughing near people, sneezing or coughing into the elbow, avoiding unnecessary travel, staying at home and communicating where possible by telephone, and accessing healthcare services in the event of a suspected infection.

Pharmacists preferentially used oral communication (90.4%), rather than written (81.3%) in educating costumers. Further, managers, were less likely to use written communications than more junior grades of staff, and more likely to use oral communications. In the contrary, the opposite is recommended; written communication may be more adequate in the current pandemic situation; decreasing the time a customer spends in the pharmacy, and as such decreasing overcrowding and decreasing contact time between customers and pharmacists. Therefore, such communication can be assisted and reinforced using posters, banners or signs on display in a prominent position, for example on the door as they enter, to inform patients about services the pharmacy can provide at this time as well as educating them as to best practice behaviors. This will also assist in limiting the number of people entering the store at one time and ensuring people only shop when it is essential to do so. Attention can be drawn specifically to these information posters by temporarily removing any other posters that may distract customers from information related to COVID-19. Further, any information presented must be reviewed daily to ensure that it is current and correct.[51]

Early figures from the U.S. reported 80% of deaths to be in people over the age of 65, with the risk significantly increasing in individuals from around 80 years of age with underlying conditions.[52] Pharmacists surveyed showed high consideration for the education of vulnerable people, for example geriatrics and patients with chronic diseases. This is necessary to reduce suffering at the end of life, and help people with serious or life-limiting illness to maintain autonomy and dignity.[53] To neglect to pay close attention when educating these groups results in costly, ineffective and inefficient care.

Awareness and reporting

It is difficult for healthcare practitioners to keep up to date with constantly changing guidance, but lessons from previous pandemics are available. Authority in epidemic response must be evidence based. Similar to a community pharmacist's preparedness to perform their important role in the spontaneous reporting of adverse drug reactions, the reporting of suspected COVID-19 cases is equally crucial.

Pharmacists reported high clinical knowledge and awareness of practicing good hygiene, the risk of recent travel abroad, and both common and uncommon symptoms that differentiate a COVID-19 infection. Similarly, pharmacists understood the importance of controlling contact with infected patients, but only 8.8% had the courage to report symptomatic cases to the healthcare authority. However, partial reporting of cases suspected cases in such conditions is better than not reporting at all, as it contributes to simultaneous surveillance studies, epidemiological field investigations and case series[54] in helping to develop national reports about disease incidence.

Significant differences in the demographics of pharmacists were found between non-reporters and reporters; namely geographic region ($p < 0.001$), whether or not COVID-19 training had been completed ($p < 0.001$; surprisingly, most of those to have reported cases had not been trained for the COVID-19 pandemic), their position ($p = 0.019$), and age ($p = 0.046$; Table 6a). These are in line with similar findings of the CDC COVID-19 Response Team published in their Morbidity and Mortality Weekly Report entitled “Geographic Differences in COVID-19 Cases, Deaths, and Incidence — United States”. The number of reported cases was seen as likely to be an underestimate due to incomplete detection of cases and delays in case reporting. A geographical variation in reporting completeness was attributed to differing testing and reporting practices across jurisdictions, and differing capacities across jurisdictions to cope with the sudden high demand on health department infrastructure. Further, transmission rates, incidence and death rates may genuinely differ on a regional basis. There may be “hot spots” and also areas of extremely low transmission due to highly efficacious community mitigation efforts which are not reflected in this scale of analysis.[55]

The preparedness of community pharmacists for a pandemic outbreak such as COVID-19 is not limited to the classic role in the pharmacy, but should also be considered to cover the role of adequately reporting suspected COVID-19 cases to healthcare authorities, hence monitoring disease spread and contributing to the reliability and validity of national figures. A parallel should be drawn with the pharmacist's role of reporting adverse drug reactions, especially at the current time of pandemic. As such, it is beneficial to avoid under-reporting or over reporting that affect the accuracy of reports. It is also beneficial to keep up to date with reliable information sources about pandemic progress and with published guidelines.[56,57] Efficient and effective routine reporting of suspected cases benefits healthcare workers and the general population in enduring COVID-19 pandemic.

Conclusions

In the current absence of medical treatment, social science data provides an invaluable addition to clinical data in mitigating the crisis. With a significant increase in demand for the supply of information and medicines, community pharmacies will continue to serve local communities, unlike many other services and businesses. As a result, community pharmacies preparedness for this role is crucial. There are global shortages of PPE and medicines. As a result, governments and policymakers are doing all they can to address this shortage. Community pharmacists are exposed to high infection risks, and are

especially vulnerable due to frequent contact with patients. Accordingly, infection control measures should be considered during all staff interactions with each other (maintaining workplace hygiene and waste management) and with customers (maintaining physical distance, taking care handling prescriptions, use of contactless payment methods, and providing suspected COVID-19 patients with their own definite area and free masks and hand sanitizers). It is paramount to ensure the health and safety of frontline pharmacists amongst other healthcare professionals to ensure continuity and functionally of their roles in the community. Educating customers, especially those at high risk, is essential during a pandemic. Posters, banners or signs must include regularly updated information so as to decrease patient contact and reduce crowding in-store. Pharmacists' own awareness and up-to-date knowledge are also essential. Accordingly, pandemic preparedness of pharmacists must not be overlooked, and should be extended to knowledge of accurate reporting procedures. Avoidance of under-reporting and over-reporting is important in order that pharmacists' reports of suspected infected cases contribute constructively to national reports of the spread of infection.

Limitations

The manuscript concerns a global pandemic, however, in designing the study and writing the manuscript, the authors consulted existing literature published in English and Arabic languages, in addition to translated published literature from other languages, into English and Arabic, such as translated WHO reports and publications, or research originally published in Chinese (please see the list of references).

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Ethical approvals

1. Approval of study protocol by the institute of authors
2. Copy of the confidentiality of information and its use for study purpose

CRediT authorship contribution statement

Mohamed Bahlol: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Visualization, Project administration. **Rebecca Susan Dewey:** Writing - original draft, Writing - review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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References

1. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med. Mar 26.* 2020;382(13):1199–1207. https://doi.org/10.1056/NEJMoa2001316https://www.nejm.org/doi/full/10.1056/NEJMoa2001316.
2. La Maestra S, Abbondandolo A, De Flora S. Epidemiological trends of COVID-19 epidemic in Italy during March 2020. From 1,000 to 100,000 cases. *J Med Virol.* Apr 21 2020. https://doi.org/10.1002/jmv.25908https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30627-9/fulltext.
3. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet.* Apr 11 2020;395(10231):1225–1228. https://doi.org/10.1016/s0140-6736(20)30627-9https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30627-9/fulltext.
4. Payne C. COVID-19 in Africa. *Nature Human Behaviour.* 2020(April) https://doi.org/10.1038/s41562-020-0870-5 10.1038/s41562-020-0870-5, 2020/04/03 2020.
5. United States Embasy in Egypt. *COVID-19 Information.* 2020; 2020https://eg.usembassy.gov/u-s-citizen-services/covid-19-information, Accessed date: April 2020.
6. Wu W, Zhang Y, Wang P, et al. Psychological stress of medical staffs during outbreak of COVID-19 and adjustment strategy. *J Med Virol.* Apr 21 2020. https://doi.org/10.1002/jmv.25914https://onlinelibrary.wiley.com/doi/abs/10.1002/jmv.25914.
7. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study. *Psychiatr Res.* 2020:112936. https://doi.org/10.1016/j.psychres.2020.112936https://www.sciencedirect.com/science/article/pii/S0165178120305850?via%3Dihub.
8. Bigdeli MP, David, Wagner Anita. *Alliance for Health Policy and Systems Research, World Health Organization. Medicines in Health Systems: Advancing Access, Affordability and Appropriate Use.* 2014; 2014https://www.who.int/alliance-hpsr/resources/publications/9789241507622/en/, Accessed date: April 2020.
9. Nepal A, Hendrie D, Robinson S, Selvey LA. Survey of the pattern of antibiotic dispensing in private pharmacies in Nepal. *BMJ Open.* Oct 10 2019;9(10):e032422https://doi.org/10.1136/bmjopen-2019-032422https://www.ncbi.nlm.nih.gov/pubmed/31601603.
10. Smith F. The quality of private pharmacy services in low and middle-income countries: a systematic review. *Pharm World Sci. Jun.* 2009;31(3):351–361. https://doi.org/10.1007/s11096-009-9294-zhttps://link.springer.com/article/10.1007/s11096-009-9294-z.
11. Trostle J. Inappropriate distribution of medicines by professionals in developing countries. *Soc Sci Med. Apr.* 1996;42(8):1117–1120. https://doi.org/10.1016/0277-9536(95)00384-3https://www.sciencedirect.com/science/article/abs/pii/0277953695003843?via%3Dihub.
12. Stenson B, Syhakhang L, Eriksson B, Tomson G. Real world pharmacy: assessing the quality of private pharmacy practice in the Lao People's Democratic Republic. *Soc Sci Med. Feb.* 2001;52(3):393–404. https://doi.org/10.1016/s0277-9536(00)00142-8https://www.sciencedirect.com/science/article/abs/pii/S0277953600001428?via%3Dihub.
13. Said R. Government pharmacies to overcome "Mafia of Medicine",Vetogate. www.vetogate.com/2597826, Accessed date: 25 May 2019.
14. Betsch C. How behavioural science data helps mitigate the COVID-19 crisis. 2020/03/27 *Nature Human Behaviour.* 2020. https://doi.org/10.1038/s41562-020-0866-1 2020(March 29 https://www.nature.com/articles/s41562-020-0866-1.
15. Xu B, Gutierrez B, Mekaru S, et al. Epidemiological data from the COVID-19 outbreak, real-time case information. 2020/03/24 *Scientific Data.* 2020;7(1):106. https://doi.org/10.1038/s41597-020-0448-0 10.1038/s41597-020-0448-0.
16. Xu B, Kraemer MU. Open COVID-19 Data Curation Group. Open access epidemiological data from the COVID-19 outbreak. *Lancet Infect Dis.* 2020;20(5):534. https://doi.org/10.1016/S1473-3099(20)30119-5https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30119-5/fulltext.
17. Brownstein JS, Freifeld CC, Madoff LC. Digital disease detection — harnessing the Web for public health surveillance. *N Engl J Med.* 2009;360(21):2153–2157. https://doi.org/10.1056/NEJMp0900702https://www.nejm.org/doi/full/10.1056/NEJMp0900702.
18. *The Presidency of the Council of Egyptian Ministers.* Coronavirus disease; 2020https://www.care.gov.eg/EgyptCare/Index.aspx, Accessed date: March 2020.
19. *Egyptian Ministry of Health and Population.* 2020; 2020http://www.mohp.gov.eg/, Accessed date: March 2020.
20. Hughes ML, Weiss M. Adverse drug reaction reporting by community pharmacists-The barriers and facilitators. *Pharmacoepidemiol Drug Saf.* Dec 2019;28(12):1552–1559. https://doi.org/10.1002/pds.4800https://onlinelibrary.wiley.com/doi/full/10.1002/pds.4800.
21. Morris C. *Quantitative Approaches in Business Studies.* Pearson Education; 2008.
22. Creative Research Systems. *Sample Size Calculator.* 1982; 1982https://www.surveysystem.com/sscalc.htm, Accessed date: April 2020.
23. Govuk. *PM Statement on Coronavirus: 16 March 2020.* 2020; 2020https://www.gov.uk/government/speeches/pm-statement-on-coronavirus-16-march-2020.
24. Govuk. *PM Statement on Coronavirus: 18 March 2020.* 2020; 2020https://www.gov.uk/government/speeches/pm-statement-on-coronavirus-18-march-2020, Accessed date: 27 April 2020.
25. Andalo D. *Unprecedented Demand' for OTC Painkillers as COVID-19 Outbreak Spreads.* 2020; 2020https://doi.org/10.1211/PJ.2020.20207830 Available at: https://www.pharmaceutical-journal.com/cpd-and-learning/learning-article/how-to-keep-your-community-pharmacy-running-during-the-covid-19-pandemic/news-and-analysis/

news/unprecedented-demand-for-otc-painkillers-as-covid-19-outbreak-spreads/20207830.article, Accessed date: 27 April 2020.
26. BBC. *Coronavirus: Europe Looking to Extend Virus Lockdowns.* 2020; 2020 2020 https://www.bbc.com/news/world-europe-51959243, Accessed date: 27 April 2020.
27. Jacobs A, Richtel M, Baker M. *At War with No Ammo': Doctors Say Shortage of Protective Gear Is Dire.* The New York Times Website; March. 2020;19https://www.nytimes.com/2020/03/19/health/coronavirus-masks-shortage.html.
28. Bradsher KAL. *The World Needs Masks. China Makes Them — but Has Been Hoarding Them.* New York Times; 2020https://www.nytimes.com/2020/03/13/business/masks-china-coronavirus.html, Accessed date: 16 March 2020.
29. National Pharmacy Association. *Repackaging Paracetamol during the Coronavirus (COVID-19) Pandemic.* 2020; 2020https://www.npa.co.uk/news-and-events/news-item/repackaging-paracetamol-during-the-coronavirus-covid-19-pandemic/, Accessed date: 26 April 2020.
30. General Pharmaceutical Council. *Q&A: Coronavirus.* 2020; 2020https://www.pharmacyregulation.org/standards/guidance/questions-and-answers-coronavirus, Accessed date: April 2020.
31. Vincent MJ, Bergeron E, Benjannet S, et al. Chloroquine is a potent inhibitor of SARS coronavirus infection and spread. *Virol J.* 2005;2(1):69. https://doi.org/10.1186/1743-422X-2-69https://virologyj.biomedcentral.com/articles/10.1186/1743-422X-2-69.
32. Keyaerts E, Vijgen L, Maes P, Neyts J, Van Ranst M. In vitro inhibition of severe acute respiratory syndrome coronavirus by chloroquine. *Biochem Biophys Res Commun.* 2004:264–268. https://doi.org/10.1016/j.bbrc.2004.08.085https://www.sciencedirect.com/science/article/pii/S0006291X0401839X?via%3Dihub.
33. Jie Z, He H, Xi H, Zhi Z. Expert consensus on chloroquine phosphate for the treatment of novel coronavirus pneumonia. *Zhonghua Jiehe He Huxi Zazhi.* 2020;43:E019. https://doi.org/10.3760/cma.j.issn.1001-0939.2020.03.009http://rs.yiigle.com/CN112147202003/1184469.htm.
34. Wang M, Cao R, Zhang L, et al. Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. *Cell Res.* 2020;30(3):269–271https://www.nature.com/articles/s41422-020-0282-0.
35. Gao J, Tian Z, Breakthrough Yang X. Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. *Bioscience trends.* 2020. https://doi.org/10.5582/bst.2020.01047https://www.jstage.jst.go.jp/article/bst/14/1/14_2020.01047/_article.
36. Gautret P, Lagier J-C, Parola P, et al. Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial. *Int J Antimicrob Agents.* 2020:105949. https://doi.org/10.1016/j.ijantimicag.2020.105949https://www.sciencedirect.com/science/article/pii/S0924857920300996?via%3Dihub.
37. NHS England. *Joint Letter from Simon Stevens and Amanda Pritchard.* 2020; 2020https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/20200317-NHS-COVID-letter-FINAL.pdf, Accessed date: 26 April 2020.
38. Balmer CPE. *Italy's Lombardy Asks Retired Health Workers to Join Coronavirus Fight.* World Economic Forum, Reuters; 2020https://www.weforum.org/agenda/2020/03/italys-lombardy-etired-health-workers-coronavirus-covid19-pandemic, Accessed date: 26 April 2020.
39. UK Government. *Guidance on Social Distancing for Everyone in the UK.* 2020; 2020https://www.gov.uk/government/publications/covid-19-guidance-on-social-distancing-and-for-vulnerable-people/guidance-on-social-distancing-for-everyone-in-the-uk-and-protecting-older-people-and-vulnerable-adults, Accessed date: 26 April 2020.
40. NHS England and NHS Improvement. *Letter to Community Pharmacy.* 2020; 2020https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/preparedness-letter-primary-care-pharmacy-9-march.pdf, Accessed date: 26 April 2020.
41. UK Government. *COVID-19: Guidance for Supported Living Provision.* 2020; 2020https://www.gov.uk/government/publications/covid-19-residential-care-supported-living-and-home-care-guidance/covid-19-guidance-for-supported-living-provision, Accessed date: 26 April 2020.
42. Hu Z, Song C, Xu C, et al. Clinical characteristics of 24 asymptomatic infections with COVID-19 screened among close contacts in Nanjing, China. *Sci China Life Sci.* 2020:1–6. https://doi.org/10.1007/s11427-020-1661-4https://link.springer.com/article/10.1007%2Fs11427-020-1661-4.
43. Wang Y, Liu Y, Liu L, Wang X, Luo N, Ling L. Clinical outcome of 55 asymptomatic cases at the time of hospital admission infected with SARS-Coronavirus-2 in Shenzhen, China. *J Infect Dis.* 2020. https://doi.org/10.1093/infdis/jiaa119https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiaa119/5807958.
44. Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic influenza—United States, 2017. *MMWR Recomm Rep (Morb Mortal Wkly Rep).* 2017;66(1):1. https://doi.org/10.15585/mmwr.rr6601a1externalhttps://www.cdc.gov/mmwr/volumes/66/rr/rr6601a1.htm.
45. Walker PWC, Watson O, et al. *COVID-19 Reports: Report 12: The Global Impact of Covid-19 and Strategies for Mitigation and Suppression.* London, United Kingdom: Imperial College of London; 2020https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-12-global-impact-covid-19/, Accessed date: April 2020.
46. Kelso JK, Milne GJ, Kelly H. Simulation suggests that rapid activation of social distancing can arrest epidemic development due to a novel strain of influenza. *BMC Publ Health.* 2009;9(1):117. https://doi.org/10.1186/1471-2458-9-117https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-9-117.
47. Tian H, Liu Y, Li Y, et al. An investigation of transmission control measures during the first 50 days of the COVID-19 epidemic in China. *Science.* 2020. https://doi.org/10.1126/science.abb6105https://science.sciencemag.org/content/early/2020/03/30/science.abb6105.
48. *NHS Digital. Coronavirus (COVID-19).* 2020; 2020 2020 https://digital.nhs.uk/services/electronic-prescription-service, Accessed date: 26 April 2020.
49. *Community Pharmacy Scotland. Journey of Prescriptions.* 2020; 2020https://www.cps.scot/pharmacy-services/prescriptions/journey-of-prescriptions/, Accessed date: April 2020.
50. Wickware C. Public Health England changes guidance on wearing masks in community pharmacy amid confusion. April 14 *Pharmaceut J.* 2020 2020(April 24). https://www.pharmaceutical-journal.com/cpd-and-learning/learning-article/how-to-keep-your-community-pharmacy-running-during-the-covid-19-pandemic/news-and-analysis/news/public-health-england-changes-guidance-on-wearing-masks-in-community-pharmacy-amid-confusion/20207896.article?firstPass=false.
51. UK Government. *Coronavirus (COVID-19): What You Need to Do.* 2020; 2020https://www.gov.uk/coronavirus, Accessed date: 26 April 2020.
52. COVID C, Team R. Severe outcomes among patients with coronavirus disease 2019 (COVID-19)—United States, February 12–March 16, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;2020(April):343–346https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm.
53. Block BL, Jeon SY, Sudore RL, Matthay MA, Boscardin WJ, Smith AK. Patterns and trends in advance care planning among older adults who received intensive care at the end of life. *JAMA Internal Medicine.* 2020;2020(April) https://doi.org/10.1001/jamainternmed.2019.7535https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2762574.
54. Lipsitch M, Finelli L, Heffernan RT, Leung GM. Redd, for the H1N1 Surveillance Group SC. Improving the evidence base for decision making during a pandemic: the example of 2009 influenza A/H1N1. *Biosecur Bioterrorism Biodefense Strategy, Pract Sci.* 2011;9(2):89–115. https://doi.org/10.1089/bsp.2011.0007https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3102310/.
55. Bialek S, Bowen V, Chow N, et al. Geographic differences in COVID-19 cases, deaths, and incidence—United States, February 12–April 7, 2020. https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e4.htm; 2020, Accessed date: April 2020.
56. Christian MD, Sprung CL, King MA, et al. Triage: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest.* 2014;2020(April):e61S–e74Shttps://journal.chestnet.org/article/S0012-3692(15)51990-9/fulltexthttps://journal.chestnet.org/article/S0012-3692(15)51990-9/fulltext.
57. *Patient Care: Strategies for Scarce Resource Situations.* St. Paul: Minnesota Department of Health; 2019https://www.health.state.mn.us/communities/ep/surge/crisis/standards.pdf, Accessed date: 26 April 2020.