

## 1 Introduction

2

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

10 As reported on the 20 March, there were 769 confirmed cases of COVID-19 across 37  
11 countries in Africa, and 15 fatalities<sup>4</sup>. COVID-19 first appeared in Egypt in the **first week** of March  
12 2020. As of the evening (20:10) of 21<sup>st</sup> April, 2020, Egypt was ranked 50<sup>th</sup> out of 212 areas and  
13 countries in terms of the number of patients infected; 147<sup>th</sup> out of all areas and countries reporting  
14 infections with regards to the total number of infected individuals reported (with 36 infections per  
15 one million population), 106<sup>th</sup> with regards to the infection recovery rate (26.6% infection  
16 recovery), and 34<sup>th</sup> with regards to the number of deaths per total infected (7.5%). Until 21<sup>st</sup> April,  
17 Egypt was reported to have had a total of 3659 infected, 935 recovered; 1270 negative test results  
18 and 276 deaths [ref: <https://www.care.gov.eg/EgyptCare/Index.aspx>]. **It is challenging for**  
19 **healthcare authorities to publishing accurate figures, reflecting actual totals, and in real time. The**  
20 **reasons for this may well be linked to limited testing capacity and difficulties in identifying the**  
21 **cause of death.** a 14-day quarantine period was implemented and other preventative measures such  
22 as a partial curfew; with the Government of Egypt announcing an extension of the nationwide  
23 curfew for two further weeks, until April 23<sup>rd</sup> 2020.<sup>5</sup> The curfew covered the hours between 6:00

24 pm and 6:00 am. All commercial enterprises and shops were prevented from working after 6:00  
25 pm except food outlets and pharmacies. From April 24<sup>th</sup> to May 23<sup>rd</sup> (during *Ramadan*) The  
26 Presidency of the Council of Egyptian Ministers relaxed some of these preventative measures such  
27 as reducing the curfew by 3 hours (such that it covered 9:00 pm to 6:00 am) and allowed some  
28 businesses and government services offices to reopen in order to stimulate the economy and  
29 facilitate cultural/social practices during *Ramadan*.

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

39 The important value of private pharmacies was further highlighted during the COVID-19  
40 pandemic crisis. However, pharmacies were unable to fulfil their classic role in healthcare as a  
41 source of medication, as pharmaceutical measures such as a COVID-19 vaccines and antiviral  
42 medicines were not available at time of writing and will not be widely available for a long time.  
43 In the current absence of medical treatment and vaccination, the unfolding COVID-19 pandemic  
44 can only be brought under control by significant, rapid and widespread behavioral changes. Social  
45 and administrative science data could help mitigate the COVID-19 crisis to provide insight into  
46 public perceptions of risk, protective behaviors and preparedness measures, public trust and

47 knowledge as well as misinformation.<sup>14</sup> The methods of communication and channels of  
48 information used by the populace are changing on a continual basis; it is now of the utmost  
49 importance that social science research incorporates information from social media, as many  
50 authorities, including the WHO, use this to reach out to people.

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

63

## 64 **Methods**

65

66         Community pharmacies in Egypt were assessed for their preparedness for the COVID-19  
67 pandemic using a cross-sectional survey administered by in-person interview. Approval to perform  
68 the study was granted by authors' institution. Participants had the study confidentiality statement

69 verbally explained to them, with a signed copy of the approved confidentiality policy being  
70 provided upon request.

71 The development of the questionnaire was based on existing literature (specifically that  
72 published by the WHO, and Egyptian,<sup>18,19</sup> New South Wales and UK government public health  
73 guidelines as well as The International Pharmaceutical Federation (FIP), The pharmacy Guild of  
74 Australia, The British Columbia Pharmacy Association (BCPhA), Pharmaceutical Services  
75 Negotiating Committee (PSNC), and National Institute for Health and Care Excellence (NICE))  
76 and exploratory interviews with a purposive sample of seven community pharmacists covering a  
77 range of roles and levels of experience.<sup>20</sup> This latter was conducted during the last week of March  
78 2020. The questionnaire included 84 questions divided into three sections. The first section  
79 comprised 12 questions covering pharmacists' demographics (position, years' experience, and  
80 gender), the demographics of the customers with suspected COVID-19 symptoms (age and gender)  
81 and the nature and degree of symptoms reported by customers to community pharmacists. The  
82 second section contained 69 polar alternative (yes/no answer) questions covering six domains  
83 related to the COVID-19 pandemic: (1) the ability to provide products, (2) infection control, (3)  
84 practice surrounding patient education, (4) knowledge and awareness, (5) barriers, and (6)  
85 facilitators. The final section comprised three open-ended questions pertaining to whether  
86 questions should be removed, added or modified, required sentence formatting (composition,  
87 terminology), validity of questionnaire content, and seeking any other comments. The first two  
88 sections comprised questions that were predominantly closed-ended, although space was provided  
89 for expansion. The final section provided the opportunity at the end of the questionnaire for  
90 respondents to add any further comments on the topic.

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

96           The final questionnaire comprised 87 questions in two sections; a first section containing  
97 12 demographics questions and a second section of 69 questions covering the domains under  
98 investigation. The final section of open-ended questions was removed. Invitations to take part in  
99 the research were distributed in printed format to community pharmacies in Egypt. Envelopes were  
100 addressed to “the pharmacist” to ensure that respondents were actively working in community  
101 pharmacy, and also to maximize the response rate through obtaining the attention of the  
102 pharmacist. Data collectors then visited community pharmacists in person, to conduct the  
103 interview. One pharmacist was interviewed in each private community pharmacy. All questions  
104 had yes/no answers, except those with multiple closed options, e.g. regions (North, Centre, South,  
105 or East), position (junior, senior, or manager), and years’ experience (list of numbers). Each  
106 questionnaire was assigned a specific data collector (name and ID) to allow the researcher to  
107 contact them if necessary. Data collectors were asked to complete the interviews within a two week  
108 period and submit the answers electronically using Google forms. Following electronic submission  
109 of completed responses, all participant data were anonymized. As such, the survey design had the  
110 advantages of capturing responses from individual personnel covering a large geographical range,  
111 with great rapidity. The present article covers 4 domains out of the 6 covered in the survey,  
112 comprising 45 questions out of the total 69. These 4 domains are: (1) the ability to provide  
113 products, (2) infection control, (3) knowledge and awareness, and (4) practices surrounding patient

114 education. The results have been divided into two manuscripts as relevant to the relative directions  
115 of the objectives of the study. The present manuscript deals with the four domains covering  
116 preparedness of community pharmacies for the COVID-19 pandemic (internal consistency  
117 measured by Cronbach's alpha = 0.773). 24 further questions covering the two remaining domains  
118 (barriers and facilitators) relate to a different objective; the development and scaling up of services  
119 provided through community pharmacies (Cronbach's alpha = 0.744).

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

122

## 123 **Results**

124

125 1034 questionnaires were sent out to community pharmacists, and 1018 (98.5%) of these  
126 were completed within two weeks, therefore comprising the study sample. One pharmacist was  
127 interviewed in each private community pharmacy. The formal calculations<sup>21,22</sup> involved values of  
128 population, confidence level, percentage of response distribution, and confidence interval, taken  
129 to be 70,000, 95%, 50%, and 3.05 respectively. Due to the presence of a small number of missing  
130 values in the data, the results tables presented here show both absolute numbers of respondents  
131 and the percentage of valid responses for transparency.

132 Respondents covered all three levels of community pharmacist position (junior, senior and  
133 manager) working in community pharmacies of three regions South, East, Centre, and North.  
134 Respondents had a mean age of 36.1, graduated between 1971 and 2019, and ranged in experience  
135 from 1 to 50 years (mean experience = 12.7 years). The majority of respondents had graduated  
136 from Government-funded Universities (82.2%). 21.3% of respondents had received pandemic

137 training. Few respondents (8.8%) had reported a suspected COVID-19 case (Table 1a), and most  
138 (62.9%) of those who had reported cases did not receive pandemic training (Table 6a). With regard  
139 to the customers presenting with suspected symptoms of COVID-19, 42.8% of cases presented  
140 with mild symptoms, (40.5%). The numbers of customers presenting with different symptom  
141 severities, together with the breakdown of customer age and gender are presented in Table 1b.

142 Availability of hand sanitizers, disinfectants, face masks, antipyretic drugs, thermometers,  
143 cold fomentation, and disposable gloves was better than the availability of alcohol (at least 70%  
144 concentration). A home delivery service was available in about one half of pharmacies, with  
145 significant differences between regions (Centre = 67.1%, North = 41.0%, South = 44.1% and East  
146 = 48.0%;  $P < 0.001$ ). Antimalarial drugs were available only in 39.1% of pharmacies (Table 2).  
147 Most items related to infection control were available at pharmacies; the majority of behaviors  
148 advised to prevent the spread of the virus were adopted by pharmacy staff (up to 99.5%), with the  
149 exception of decreasing the numbers of unnecessary workers to decrease the likelihood of disease  
150 transmission (only adopted in 85.7% of pharmacies). However, instructing staff with chronic  
151 illnesses or any other medical vulnerability to take leave showed a great disparity in the level of  
152 adoption across regions (Centre = 91.5%, North = 97.2%, South = 97.8% and East = 97.3%;  
153  $P = 0.004$ ).

154 In comparison to infection control measures concerning worker-worker interactions,  
155 infection control around worker-customer interactions was given much lower priority. The  
156 availability of card payment machines (29.1% overall) was significantly different between regions  
157 (Centre = 42.1%, North = 24.5%, South = 35.5% and East = 30.7%;  $P < 0.001$ ). As shown in Table  
158 3, pharmacists reported low availability of free hand sanitizers (62.1%) and masks (86.5%) for

159 customer use, low adoption of a separate area in the pharmacy for symptomatic customers (64%),  
160 and low implementation of special waste disposal measures (80.4%).

161 Respondents expressed a high awareness (97.6% - 99.2%) of the hygiene practices  
162 required, the risk of recent travel abroad, the importance of controlling contact with infected cases,  
163 and the common symptoms of COVID-19, but only 91% of pharmacists reported awareness of all  
164 10 possible symptoms (see Table 4). Pharmacists expressed a higher incidence of educating of  
165 costumers verbally (90.4%), compared to providing written information (81.3%). Furthermore,  
166 managers were less likely than juniors and seniors to provide customers with written educational  
167 material (managers = 78.1, juniors = 82% and seniors = 86.8%; P=0.027), and more likely to  
168 communicate this education verbally (managers = 98.3%, juniors = 91.8% and seniors = 90%;  
169 Table 5). Only 8.8% of pharmacists had reported cases with suspected COVID-19 symptoms to  
170 the healthcare authority; the demographics of reporting pharmacists are shown in Table 6a.

171

## 172 **Discussion**

173

174 Controlling the spread of COVID-19, and thus bringing the pandemic to an end, can only  
175 be achieved by widespread and rapid implementation of significant changes to human behavior.  
176 At time of writing, there is no vaccination available and insufficient supplies of the medicines use  
177 to treat the disease. Observations of a social science nature could provide insight into behaviors  
178 and perceptions among the populace, as well preparedness measures employed by authorities and  
179 the level of public trust in them.<sup>14</sup> The WHO reports the use of real-time geo-positioned data or  
180 information in order to effectively communicate and evaluate statistics during outbreaks.<sup>15-17</sup> This  
181 data can then be used to reach out to healthcare professionals and the general population. In



182 contrast to and the majority of businesses, community pharmacies are able to supply customers in  
183 their local communities with medicines, hygiene products and essential information throughout  
184 the pandemic.<sup>23,24</sup> Public panic, together with significant increases in demand for products,  
185 increases the pressure on already busy pharmacy staff.<sup>25,26</sup> This article reports the preparedness of  
186 community pharmacists across Egypt for the COVID-19 pandemic.

187

### 188 **Availability and distribution of products and medicines**

189

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

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

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

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

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

226

227 **Infection control**

228

229           In Italy, inadequate access to PPE contributed to high rates of infection and death for  
230 healthcare workers.<sup>38</sup> It is imperative that all healthcare workers including community pharmacists  
231 have access to adequate supplies and equipment.

232

233 **- Inside the pharmacy**

234

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

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

247           While some individuals do not meet the requirements for shielding, they may still be at  
248 higher risk if they contract COVID-19. If these individuals are members of pharmacy teams, plans  
249 must be made to ensure their safety while working. 85.7% of the pharmacies surveyed decreased  
250 the number of unnecessary workers onsite to decrease the likelihood of disease transmission.

251 Vulnerable staff were allowed leave in 95.7% of pharmacies, and those chronic disease were  
252 allowed leave in 96.4% of cases, again to prevent infecting staff members who are at higher risk.  
253 However, this was not the case in all regions, with the Central region having the lowest incidence  
254 of implementing this policy, perhaps containing the capital city (Cairo) and economic center places  
255 additional pressures on the workers. Stringent physical distancing behavior is strongly advises for  
256 high-risk individuals,<sup>39</sup> i.e. those aged 70 years or over, and those with underlying health  
257 conditions, such as heart disease or diabetes.

258

### 259 - **Interpersonal interactions**

260

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

267 Due to the role of respiratory droplets in the transmission of COVID-19, transmission is  
268 accelerated by high population densities, such as those in pharmacies and other healthcare and  
269 commercial sectors. Customer crowding is important, as customers are dynamic (different people)  
270 rather than static like pharmacy staff. Avoiding customer crowding and instructing customers to  
271 keep at least one meter distance were measures used by the community pharmacists surveyed.  
272 Community mitigation strategies, including cancelling mass gatherings, are recommended to  
273 reduce disease transmission,<sup>44</sup> resulting in substantial reductions in the numbers of people infected,

274 and ultimately, deaths.<sup>45</sup> The success of these strategies relies on timely implementation,  
275 specifically before high levels the virus become present in the community.<sup>46,47</sup>

276 In developing countries (including Egypt), prescriptions in community pharmacies are still  
277 printed and collected in person rather than using electronic prescription services (EPS) such that  
278 are commonplace in developed countries (including the UK). Efficient planning is required to  
279 ensure that prescriptions are collected while minimizing contact,<sup>48</sup> including provision for general  
280 practitioners to send paper prescriptions directly to pharmacies.<sup>49</sup>

281 Interactions around payments can also be implemented, including the widespread use of  
282 contactless payment where possible. Unfortunately, card payment machines were only available  
283 29.1% of the pharmacies surveyed. Use of these machines would help reduce the role of cash as a  
284 source of disease transmission, and further reduce physical contact. Availability of card payment  
285 was also significantly different across regions, with the Central region again as the country's  
286 capital having a more developed infrastructure and wider availability of card payment.

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

293 Another measure often employed is to define a specific area within the pharmacy for  
294 customers with suspected COVID-19 symptoms so as to reduce infection transmission. This  
295 practice was implemented by 64% of pharmacies surveyed, however not all pharmacies have such  
296 a space available inside the pharmacy, with some pharmacies having a total area as small as 25 m<sup>2</sup>

297 (29.89 sq yd) according to Egyptian regulations. In such a small pharmacy, staff may need to  
298 reconsider the use of space. It may be necessary to rearrange the working area to allow more space  
299 between employees, for example to expand a small dispensary area into part of the pharmacy store.  
300 This further may reduce the total number of customers who can enter the store at once, resulting  
301 in queues out of the door. Although not ideal, these temporary measures may be crucial in  
302 protecting pharmacy staff and customers.

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

308

### 309 **Customer education**

310

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

317 Pharmacists preferentially used oral communication (90.4%), rather than written (81.3%)  
318 in educating costumers. Further, managers, were less likely to use written communications than  
319 more junior grades of staff, and more likely to use oral communications. In the contrary, the

320 opposite is recommended; written communication may be more adequate in the current pandemic  
321 situation; decreasing the time a customer spends in the pharmacy, and as such decreasing  
322 overcrowding and decreasing contact time between customers and pharmacists. Therefore, such  
323 communication can be assisted and reinforced using posters, banners or signs on display in a  
324 prominent position, for example on the door as they enter, to inform patients about services the  
325 pharmacy can provide at this time as well as educating them as to best practice behaviors. This  
326 will also assist in limiting the number of people entering the store at one time and ensuring people  
327 only shop when it is essential to do so. Attention can be drawn specifically to these information  
328 posters by temporarily removing any other posters that may distract customers from information  
329 related to COVID-19. Further, any information presented must be reviewed daily to ensure that it  
330 is current and correct.<sup>51</sup>

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

338

339 **Awareness and reporting**

340

341 It is difficult for healthcare practitioners to keep up to date with constantly changing  
342 guidance, but lessons from previous pandemics are available. Authority in epidemic response must

343 be evidence based. Similar to a community pharmacist’s preparedness to perform their important  
344 role in the spontaneous reporting of adverse drug reactions, the reporting of suspected COVID-19  
345 cases is equally crucial.

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

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



365 low transmission due to highly efficacious community mitigation efforts which are not reflected  
366 in this scale of analysis.<sup>55</sup>

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

377

## 378 **Conclusions**

379

380 In the current absence of medical treatment, social science data provides an invaluable  
381 addition to clinical data in mitigating the crisis. With a significant increase in demand for the  
382 supply of information and medicines, community pharmacies will continue to serve local  
383 communities, unlike many other services and businesses. As a result, community pharmacies  
384 preparedness for this role is crucial. There are global shortages of PPE and medicines. As a result,  
385 governments and policymakers are doing all they can to address this shortage. Community  
386 pharmacists are exposed to high infection risks, and are especially vulnerable due to frequent  
387 contact with patients. Accordingly, infection control measures should be considered during all staff

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

400

#### 401 **REFERENCES (AMA, EndNote)**

- 402 1. Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-  
403 Infected Pneumonia. *N Engl J Med*. Mar 26 2020;382(13):1199-1207 DOI:  
404 10.1056/NEJMoa2001316. <https://www.nejm.org/doi/full/10.1056/NEJMoa2001316>.
- 405 2. La Maestra S, Abbondandolo A, De Flora S. Epidemiological trends of COVID-19 epidemic in Italy  
406 during March 2020. From 1,000 to 100,000 cases. *J Med Virol*. Apr 21 2020 DOI:  
407 10.1002/jmv.25908. [https://www.thelancet.com/journals/lancet/article/PIIS0140-](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30627-9/fulltext)  
408 [6736\(20\)30627-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30627-9/fulltext).
- 409 3. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet*. Apr 11 2020;395(10231):1225-  
410 1228 DOI: 10.1016/s0140-6736(20)30627-9.  
411 [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30627-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30627-9/fulltext).
- 412 4. Payne C. COVID-19 in Africa. *Nature Human Behaviour*. 2020/04/03 2020;2020(April) DOI:  
413 10.1038/s41562-020-0870-5. <https://doi.org/10.1038/s41562-020-0870-5>.
- 414 5. United States Embassy in Egypt. COVID-19 Information. 2020; [https://eg.usembassy.gov/u-s-](https://eg.usembassy.gov/u-s-citizen-services/covid-19-information)  
415 [citizen-services/covid-19-information](https://eg.usembassy.gov/u-s-citizen-services/covid-19-information). Accessed April, 2020.
- 416 6. Wu W, Zhang Y, Wang P, et al. Psychological stress of medical staffs during outbreak of COVID-  
417 19 and adjustment strategy. *J Med Virol*. Apr 21 2020 DOI: 10.1002/jmv.25914.  
418 <https://onlinelibrary.wiley.com/doi/abs/10.1002/jmv.25914>.
- 419 7. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19  
420 pandemic: A cross-sectional study. *Psychiatry Research*. 2020:112936 DOI:

- 421 <https://doi.org/10.1016/j.psychres.2020.112936>.
- 422 <https://www.sciencedirect.com/science/article/pii/S0165178120305850?via%3Dihub>.
- 423 8. Bigdeli MP, David; Wagner, Anita, Alliance for Health Policy and Systems Research, World Health  
424 Organization. Medicines in Health Systems: Advancing access, affordability and appropriate use.  
425 2014; <https://www.who.int/alliance-hpsr/resources/publications/9789241507622/en/>.  
426 Accessed April, 2020.
- 427 9. Nepal A, Hendrie D, Robinson S, Selvey LA. Survey of the pattern of antibiotic dispensing in  
428 private pharmacies in Nepal. *BMJ Open*. Oct 10 2019;9(10):e032422 DOI: 10.1136/bmjopen-  
429 2019-032422. <https://www.ncbi.nlm.nih.gov/pubmed/31601603>.
- 430 10. Smith F. The quality of private pharmacy services in low and middle-income countries: a  
431 systematic review. *Pharm World Sci*. Jun 2009;31(3):351-361 DOI: 10.1007/s11096-009-9294-z.  
432 <https://link.springer.com/article/10.1007/s11096-009-9294-z>.
- 433 11. Trostle J. Inappropriate distribution of medicines by professionals in developing countries. *Soc*  
434 *Sci Med*. Apr 1996;42(8):1117-1120 DOI: 10.1016/0277-9536(95)00384-3.  
435 <https://www.sciencedirect.com/science/article/abs/pii/S0277953695003843?via%3Dihub>.
- 436 12. Stenson B, Syhaxhang L, Eriksson B, Tomson G. Real world pharmacy: assessing the quality of  
437 private pharmacy practice in the Lao People's Democratic Republic. *Soc Sci Med*. Feb  
438 2001;52(3):393-404 DOI: 10.1016/S0277-9536(00)00142-8.  
439 <https://www.sciencedirect.com/science/article/abs/pii/S0277953600001428?via%3Dihub>.
- 440 13. Said R. Government pharmacies to overcome "Mafia of Medicine", *Vetogate*.  
441 [www.vetogate.com/2597826](http://www.vetogate.com/2597826). Accessed May 25, 2019.
- 442 14. Betsch C. How behavioural science data helps mitigate the COVID-19 crisis. *Nature Human*  
443 *Behaviour*. 2020/03/27 2020;2020(March 29) DOI: 10.1038/s41562-020-0866-1.  
444 <https://www.nature.com/articles/s41562-020-0866-1>.
- 445 15. Xu B, Gutierrez B, Mekaru S, et al. Epidemiological data from the COVID-19 outbreak, real-time  
446 case information. *Scientific Data*. 2020/03/24 2020;7(1):106 DOI: 10.1038/s41597-020-0448-0.  
447 <https://doi.org/10.1038/s41597-020-0448-0>.
- 448 16. Xu B, Kraemer MU, Group DC. Open access epidemiological data from the COVID-19 outbreak.  
449 *The Lancet. Infectious Diseases*. 2020 DOI: [https://doi.org/10.1016/S1473-3099\(20\)30119-5](https://doi.org/10.1016/S1473-3099(20)30119-5).  
450 [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30119-5/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30119-5/fulltext).
- 451 17. Brownstein JS, Freifeld CC, Madoff LC. Digital Disease Detection — Harnessing the Web for  
452 Public Health Surveillance. *New England Journal of Medicine*. 2009;360(21):2153-2157 DOI:  
453 10.1056/NEJMp0900702. <https://www.nejm.org/doi/full/10.1056/NEJMp0900702>.
- 454 18. The Presidency of the Council of Egyptian Ministers. Coronavirus disease. 2020;  
455 <https://www.care.gov.eg/EgyptCare/Index.aspx>. Accessed March, 2020.
- 456 19. Egyptian Ministry of Health and Population. 2020; <http://www.moHP.gov.eg/>. Accessed March,  
457 2020.
- 458 20. Hughes ML, Weiss M. Adverse drug reaction reporting by community pharmacists-The barriers  
459 and facilitators. *Pharmacoepidemiology and drug safety*. Dec 2019;28(12):1552-1559 DOI:  
460 10.1002/pds.4800. <https://onlinelibrary.wiley.com/doi/full/10.1002/pds.4800>.
- 461 21. Morris C. *Quantitative approaches in business studies*. Pearson Education; 2008.
- 462 22. Creative Research Systems. Sample Size Calculator. 1982;  
463 <https://www.surveysystem.com/sscalc.htm>. Accessed April, 2020.
- 464 23. Gov.uk. PM statement on coronavirus: 16 March 2020. 2020;  
465 <https://www.gov.uk/government/speeches/pm-statement-on-coronavirus-16-march-2020>.
- 466 24. Gov.uk. PM statement on coronavirus: 18 March 2020. 2020;  
467 <https://www.gov.uk/government/speeches/pm-statement-on-coronavirus-18-march-2020>.  
468 Accessed April 27, 2020.

- 469 25. Andalo D. Unprecedented demand' for OTC painkillers as COVID-19 outbreak spreads. 2020;  
470 DOI: 0.1211/PJ.2020.20207830. Available at: [https://www.pharmaceutical-journal.com/cpd-](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)  
471 [and-learning/learning-article/how-to-keep-your-community-pharmacy-running-during-the-](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)  
472 [covid-19-pandemic/news-and-analysis/news/unprecedented-demand-for-otc-painkillers-as-](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)  
473 [covid-19-outbreak-spreads/20207830.article](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 April 27, 2020.
- 474 26. BBC. Coronavirus: Europe looking to extend virus lockdowns. 2020. 2020;  
475 <https://www.bbc.com/news/world-europe-51959243>. Accessed April 27, 2020.
- 476 27. Jacobs A, Richtel M, Baker M. At war with no ammo': doctors say shortage of protective gear is  
477 dire. *The New York Times Website*. March. 2020;19  
478 <https://www.nytimes.com/2020/03/19/health/coronavirus-masks-shortage.html>.
- 479 28. Bradsher K AL. The world needs masks. China makes them — but has been hoarding them. New  
480 York Times. . 2020; [https://www.nytimes.com/2020/03/13/business/masks-china-](https://www.nytimes.com/2020/03/13/business/masks-china-coronavirus.html)  
481 [coronavirus.html](https://www.nytimes.com/2020/03/13/business/masks-china-coronavirus.html). Accessed March 16 2020.
- 482 29. National Pharmacy Association. Repackaging paracetamol during the coronavirus (COVID-19)  
483 pandemic. 2020; [https://www.npa.co.uk/news-and-events/news-item/repackaging-](https://www.npa.co.uk/news-and-events/news-item/repackaging-paracetamol-during-the-coronavirus-covid-19-pandemic/)  
484 [paracetamol-during-the-coronavirus-covid-19-pandemic/](https://www.npa.co.uk/news-and-events/news-item/repackaging-paracetamol-during-the-coronavirus-covid-19-pandemic/). Accessed April 26, 2020.
- 485 30. General Pharmaceutical Council. Q&A: Coronavirus. 2020;  
486 <https://www.pharmacyregulation.org/standards/guidance/questions-and-answers-coronavirus>.  
487 Accessed April, 2020.
- 488 31. Vincent MJ, Bergeron E, Benjannet S, et al. Chloroquine is a potent inhibitor of SARS coronavirus  
489 infection and spread. *Virology journal*. 2005;2(1):69 DOI: 10.1186/1743-422X-2-69.  
490 <https://virologyj.biomedcentral.com/articles/10.1186/1743-422X-2-69>.
- 491 32. Keyaerts E, Vijgen L, Maes P, Neyts J, Van Ranst M. In vitro inhibition of severe acute respiratory  
492 syndrome coronavirus by chloroquine. *Biochemical and biophysical research communications*.  
493 2004;264-268 DOI: 10.1016/j.bbrc.2004.08.085.  
494 <https://www.sciencedirect.com/science/article/pii/S0006291X0401839X?via%3Dihub>.
- 495 33. Jie Z, He H, Xi H, Zhi Z. Expert consensus on chloroquine phosphate for the treatment of novel  
496 coronavirus pneumonia. *Zhonghua Jie He He Hu Xi Za Zhi*. 2020;43:E019 DOI:  
497 10.3760/cma.j.issn.1001-0939.2020.03.009.  
498 <http://rs.yiigle.com/CN112147202003/1184469.htm>.
- 499 34. Wang M, Cao R, Zhang L, et al. Remdesivir and chloroquine effectively inhibit the recently  
500 emerged novel coronavirus (2019-nCoV) in vitro. *Cell research*. 2020;30(3):269-271 DOI:  
501 <https://doi.org/10.1038/s41422-020-0282-0>. [https://www.nature.com/articles/s41422-020-](https://www.nature.com/articles/s41422-020-0282-0)  
502 [0282-0](https://www.nature.com/articles/s41422-020-0282-0).
- 503 35. Gao J, Tian Z, Yang X. Breakthrough: Chloroquine phosphate has shown apparent efficacy in  
504 treatment of COVID-19 associated pneumonia in clinical studies. *Bioscience trends*. 2020 DOI:  
505 10.5582/bst.2020.01047. [https://www.ijstage.jst.go.jp/article/bst/14/1/14\\_2020.01047/](https://www.ijstage.jst.go.jp/article/bst/14/1/14_2020.01047/article) [article](https://www.ijstage.jst.go.jp/article/bst/14/1/14_2020.01047/article).
- 506 36. Gautret P, Lagier J-C, Parola P, et al. Hydroxychloroquine and azithromycin as a treatment of  
507 COVID-19: results of an open-label non-randomized clinical trial. *International journal of*  
508 *antimicrobial agents*. 2020;105949 DOI: 10.1016/j.ijantimicag.2020.105949.  
509 <https://www.sciencedirect.com/science/article/pii/S0924857920300996?via%3Dihub>.
- 510 37. NHS England. Joint letter from Simon Stevens and Amanda Pritchard. 2020;  
511 [https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/20200317-](https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/20200317-NHS-COVID-letter-FINAL.pdf)  
512 [NHS-COVID-letter-FINAL.pdf](https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/20200317-NHS-COVID-letter-FINAL.pdf). Accessed April 26, 2020.
- 513 38. Balmer C PE. Italy's Lombardy asks retired health workers to join coronavirus fight. World  
514 Economic Forum, Reuters. . 2020; [https://www.weforum.org/agenda/2020/03/italys-lombardy-](https://www.weforum.org/agenda/2020/03/italys-lombardy-tired-health-workers-coronavirus-covid19-pandemic)  
515 [tired-health-workers-coronavirus-covid19-pandemic](https://www.weforum.org/agenda/2020/03/italys-lombardy-tired-health-workers-coronavirus-covid19-pandemic). Accessed April 26, 2020.

- 516 39. UK Government. Guidance on social distancing for everyone in the UK. 2020;  
517 [https://www.gov.uk/government/publications/covid-19-guidance-on-social-distancing-and-for-](https://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)  
518 [vulnerable-people/guidance-on-social-distancing-for-everyone-in-the-uk-and-protecting-older-](https://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)  
519 [people-and-vulnerable-adults](https://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 April 26, 2020.
- 520 40. NHS England and NHS Improvement. Letter to community pharmacy. . 2020;  
521 [https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/preparedness-](https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/preparedness-letter-primary-care-pharmacy-9-march.pdf)  
522 [letter-primary-care-pharmacy-9-march.pdf](https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/preparedness-letter-primary-care-pharmacy-9-march.pdf). Accessed April 26, 2020.
- 523 41. UK Government. COVID-19: guidance for supported living provision. . 2020;  
524 [https://www.gov.uk/government/publications/covid-19-residential-care-supported-living-and-](https://www.gov.uk/government/publications/covid-19-residential-care-supported-living-and-home-care-guidance/covid-19-guidance-for-supported-living-provision)  
525 [home-care-guidance/covid-19-guidance-for-supported-living-provision](https://www.gov.uk/government/publications/covid-19-residential-care-supported-living-and-home-care-guidance/covid-19-guidance-for-supported-living-provision). Accessed April 26, 2020.
- 526 42. Hu Z, Song C, Xu C, et al. Clinical characteristics of 24 asymptomatic infections with COVID-19  
527 screened among close contacts in Nanjing, China. *Science China Life Sciences*. 2020:1-6 DOI:  
528 10.1007/s11427-020-1661-4. <https://link.springer.com/article/10.1007%2Fs11427-020-1661-4>.
- 529 43. Wang Y, Liu Y, Liu L, Wang X, Luo N, Ling L. Clinical outcome of 55 asymptomatic cases at the  
530 time of hospital admission infected with SARS-Coronavirus-2 in Shenzhen, China. *The Journal of*  
531 *infectious diseases*. 2020 DOI: <https://doi.org/10.1093/infdis/jiaa119>.  
532 <https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiaa119/5807958>.
- 533 44. Qualls N, Levitt A, Kanade N, et al. Community mitigation guidelines to prevent pandemic  
534 influenza—United States, 2017. *MMWR Recommendations and Reports*. 2017;66(1):1 DOI:  
535 <http://dx.doi.org/10.15585/mmwr.rr6601a1external>.  
536 <https://www.cdc.gov/mmwr/volumes/66/rr/rr6601a1.htm>.
- 537 45. Walker P WC, Watson O, et al. . COVID-19 reports: report 12: the global impact of covid-19 and  
538 strategies for mitigation and suppression. London, United Kingdom: Imperial College of London.  
539 2020; [https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-12-](https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-12-global-impact-covid-19/)  
540 [global-impact-covid-19/](https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-12-global-impact-covid-19/). Accessed April, 2020.
- 541 46. Kelso JK, Milne GJ, Kelly H. Simulation suggests that rapid activation of social distancing can  
542 arrest epidemic development due to a novel strain of influenza. *BMC public health*.  
543 2009;9(1):117 DOI: <https://doi.org/10.1186/1471-2458-9-117>.  
544 <https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-9-117>.
- 545 47. Tian H, Liu Y, Li Y, et al. An investigation of transmission control measures during the first 50  
546 days of the COVID-19 epidemic in China. *Science*. 2020 DOI: 10.1126/science.abb6105.  
547 <https://science.sciencemag.org/content/early/2020/03/30/science.abb6105>.
- 548 48. NHS digital. Coronavirus (COVID-19). 2020. . 2020; [https://digital.nhs.uk/services/electronic-](https://digital.nhs.uk/services/electronic-prescription-service)  
549 [prescription-service](https://digital.nhs.uk/services/electronic-prescription-service). Accessed April 26, 2020.
- 550 49. Community Pharmacy Scotland. Journey of Prescriptions. 2020;  
551 <https://www.cps.scot/pharmacy-services/prescriptions/journey-of-prescriptions/>. Accessed  
552 April, 2020.
- 553 50. Wickware C. Public Health England changes guidance on wearing masks in community pharmacy  
554 amid confusion. *The Pharmaceutical Journal*. April 14, 2020;2020(April 24)  
555 [https://www.pharmaceutical-journal.com/cpd-and-learning/learning-article/how-to-keep-your-](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)  
556 [community-pharmacy-running-during-the-covid-19-pandemic/news-and-analysis/news/public-](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)  
557 [health-england-changes-guidance-on-wearing-masks-in-community-pharmacy-amid-](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)  
558 [confusion/20207896.article?firstPass=false](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).
- 559 51. UK Government. Coronavirus (COVID-19): what you need to do. 2020;  
560 <https://www.gov.uk/coronavirus>. Accessed April 26, 2020.
- 561 52. COVID C, Team R. Severe outcomes among patients with coronavirus disease 2019 (COVID-19)—  
562 United States, February 12–March 16, 2020. *MMWR Morb Mortal Wkly Rep*.  
563 2020;2020(April):343-346 <https://www.cdc.gov/mmwr/volumes/69/wr/mm6912e2.htm>.

564 53. Block BL, Jeon SY, Sudore RL, Matthay MA, Boscardin WJ, Smith AK. Patterns and Trends in  
565 Advance Care Planning Among Older Adults Who Received Intensive Care at the End of Life.  
566 *JAMA Internal Medicine*. 2020;2020(April) DOI: 10.1001/jamainternmed.2019.7535.  
567 <https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2762574>.

568 54. Lipsitch M, Finelli L, Heffernan RT, Leung GM, Redd, for the H1N1 Surveillance Group SC.  
569 Improving the evidence base for decision making during a pandemic: the example of 2009  
570 influenza A/H1N1. *Biosecurity and bioterrorism: biodefense strategy, practice, and science*.  
571 2011;9(2):89-115 DOI: 10.1089/bsp.2011.0007.  
572 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3102310/>.

573 55. Bialek S, Bowen V, Chow N, et al. Geographic differences in COVID-19 cases, deaths, and  
574 incidence—United States, February 12–April 7, 2020. 2020;  
575 <https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e4.htm>. Accessed April, 2020.

576 56. Christian MD, Sprung CL, King MA, et al. Triage: care of the critically ill and injured during  
577 pandemics and disasters: CHEST consensus statement. *Chest*. 2014;2020(April):e61S-e74S DOI:  
578 [https://journal.chestnet.org/article/S0012-3692\(15\)51990-9/fulltext](https://journal.chestnet.org/article/S0012-3692(15)51990-9/fulltext).  
579 [https://journal.chestnet.org/article/S0012-3692\(15\)51990-9/fulltext](https://journal.chestnet.org/article/S0012-3692(15)51990-9/fulltext).

580 57. Patient care: strategies for scarce resource situations. St. Paul: Minnesota Department of  
581 Health. 2019; <https://www.health.state.mn.us/communities/ep/surge/crisis/standards.pdf>.  
582 Accessed April 26, 2020.

583