

Original Article

## Evaluation of preventive procedures followed by the medical staff against covid-19 in the Syrian Arab Republic: A cross-sectional study

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### ABSTRACT

**Objectives:** This study was oriented to investigate the current situation of Syrian medical staff working in different fields and their response regarding the preventive procedures.

**Material and Methods:** Questionnaire was designed according to the World Health Organization guidelines and recommendations, addressing the preventive measures, which must be followed by healthcare workers to protect themselves and their community against COVID-19. The participation in the study was average as 1339 participants from medical staff (596 males and 743 females) have filled the questionnaire.

**Results:** The results displayed high percentages of commitment in general regarding preventive measures followed (health rules, personal protective equipment, and disinfection) for all healthcare workers. The proportions of responses were varied depending on job nature. In addition, the highest range of percentage of self-evaluation was 50–75% for all medical staff.

**Conclusion:** Based on the filled information, the study showed relatively good commitment to the preventive procedures by healthcare workers to control COVID-19 and prevents its spread in the community.

**Keywords:** COVID-19, Medical staff, Pandemic, Preventive procedures

### INTRODUCTION

In December 2019, a cluster of pneumonia cases due to unknown cause took place in Wuhan, Hubei Province, China, and quickly spread to many other countries around the world by travelers. A novel coronavirus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the International Virus Classification Commission [previously provisionally known as 2019 novel coronavirus (2019-nCoV)] was identified as the etiological agent, causing the outbreak of coronavirus disease 2019 (COVID-19), termed by the World Health Organization (WHO).<sup>[1,2]</sup>

On January 30, 2020, the WHO announced this outbreak as Public Health Emergency of International Concern that requires a coordinated international response.<sup>[2]</sup> Later on March 11, WHO Director - General described the COVID-19 as a pandemic.<sup>[3]</sup> According to the latest

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statistics of the WHO, up to the May 14, 2020, the number of global confirmed cases surpassed 4,200,000, of which 294,046 were dead.<sup>[4]</sup>

SARS-CoV-2 has high transmissibility<sup>[3]</sup> and might be transmitted from person to person through respiratory droplets or direct contact or by contact with contaminated surfaces.<sup>[5,6]</sup> Patients, who tested positive for COVID-19, demonstrate clinical manifestations including fever, dry cough, shortness of breath, myalgia, fatigue, and in severe cases pneumonia. However, the incubation period of SARS-CoV-2 is relatively long, ranging between 2 and 14 days, and may lead to a high rate of asymptomatic carriers and thereby as silent infection source.<sup>[1,5,7,8]</sup>

Diagnosis of COVID-19 is based on reverse transcription-polymerase chain reaction (RT-PCR) as the main method for laboratory diagnosis.<sup>[9]</sup> Computed tomography (CT) scan is done as the auxiliary diagnostic procedure.<sup>[6]</sup>

So far, there are no efficiently specific drugs or vaccine available to be used for COVID-19 treatment, which is limited to isolation and supportive therapy.<sup>[10,11]</sup> Furthermore, there are several potential therapies have been proposed and tested in limited settings such as antiviral drugs (oseltamivir, ritonavir, lopinavir, and ribavirin), chloroquine, steroids, and Chinese traditional medicines.<sup>[7,12]</sup>

To break the chain of spread of SARS-CoV-2 and decrease the infected cases, the WHO recommend to take prevention measures including frequent cleaning of hands, covering the nose and mouth with a flexed elbow or disposable tissue when coughing and sneezing; and avoiding close contact with anyone that has a fever and cough.<sup>[13]</sup> Therefore, millions of people stay at home around the world, but the health workers do the exact opposite. They go to clinics and hospitals, putting themselves at high risk from COVID-19, so that healthcare workers were advised to wear personal protective equipment (PPE).<sup>[6,14]</sup> However, when the pandemic speeds up, access to PPE for healthcare workers is a key issue. Some medical staff desperately need PPE to protect themselves from infection especially, in the front line ones.<sup>[14]</sup> In addition, medical staff exposed to several hazards including, work intensity, psychological distress, fatigue, occupational burnout, stigma, and physical and psychological violence.<sup>[13]</sup>

It has been reported that a large number of medical staff has infected while working with patients who have been confirmed infected with covid-19 disease. Healthcare centers are a source of acquiring and transmitting infection between patients and medical staff due to the inability to avoid close contact with the infected people during the incubation period and this constitutes a very dangerous environment due to friction between infected and healthy people. The transmission of the disease during the incubation period poses a major threat to members of the medical staff in

various fields because of their work in the first lines as they are considered the most vulnerable group. Therefore, the medical staff should have a high level of awareness to deal with patients. As well as, the ability to control and prevents the spread of the disease to protect themselves and healthy people.

Based on the previously mentioned facts, the safety and consciousness of the health-care professionals are considered as pivotal parameters to conquer this pandemic so that in this review an evaluation of the protective measurements that are applied by the healthcare workers (doctors, dentists, pharmacists, and nurses) in the Syrian Arab Republic will be conducted to figure out the compliance of these measurement to the WHO suggested measures and assess the level of commitment to this application. Moreover, the causative relationship between these measurements and the pandemic status in Syria will be investigated as well.

## MATERIAL AND METHODS

### The study sample

The study was a cross-sectional in design. Information about preventive procedures used by caregivers was collected through an electronic questionnaire distributed to health-care staff working in the Syria (private clinics/hospitals/health centers/pharmacies) in cities and rural areas. This study was conducted in April 2020.

The total number of participants in this study ( $n = 1339$ ), distributed to four groups (375 doctor, 378 dentists, 268 pharmacists, and 318 nurse). The privacy and confidentiality of the information were preserved for all the participants in this medical survey.

### The questionnaire

The electronic questionnaire was designed using the WHO guidelines and recommendations. It was distributed and sent to the health-care staff through social networking applications such as Facebook, Telegram, and WhatsApp to be self-filled, and they were contacted individually to confirm their work by registering their place of work.

### Questionnaire questions

This questionnaire included a group of multiple-choice questions regarding personal, professional, and demographic information for all the participants. Then, the survey questions were completed according to the medical specialization as they were divided into four different professional groups.

The questionnaire has included various questions related to the measures used to control the infection level as well

as personal and general preventive methods that have been implemented to protect both medical staff and patients in either hospitals, clinics, or pharmacies.

### Statistical analysis

Data analysis was performed using the statistical package SPSS<sup>®</sup> version 21 (IBM<sup>®</sup> SPSS, USA). Descriptive statistics (frequencies and percentages) were used to describe the categorical variables included in the survey.

## RESULTS

This study included 1339 medical workers (596 males and 743 females), their ages ranged from 20 to 70 years. According to the workplace (1068 in the city and 271 in the countryside), they were distributed according to the medical sector (375 doctors, 318 nurses, 378 dentists, and 268 pharmacists) [Table 1].

The questions were divided into sections based on the profession of the participant; therefore, the questions that have presented for doctors, nurses, pharmacists, and dentists are demonstrated in Tables 2-5, respectively.

## DISCUSSION

This questionnaire provides an overview about the awareness level among Syrian healthcare workers (doctors, nurses, dentists, and pharmacists), and the implementation of the preventive procedures to control the spread of COVID-19 at the time of the outbreak in 2020.

It is widely known that Syria suffers from many difficulties in both economic and medical sectors due to the previous 9 years of crisis and war, which led to drain the economic and medical resources. So far, the number of cases of COVID-19 remains limited compared to the other Arabic countries, but the country's situation requires a high degree of sensibility and commitment to preventative procedures to avoid the consequences of spreading and losing control of the disease.

Healthcare workers are highly exposed to hazards that put them at risk of being infected and transmit the infection to healthy people. The most common factors that cause virus infection are convergence, friction, and exposure to respiratory secretions of infected patients.<sup>[15-17]</sup> Thus, the importance of this study comes from the multiple questions that have dealt with various aspects in terms of personal preventive measures and methods to ensure the safety of patients, and procedures used to sanitize (place/instruments) in clinics and hospitals.

The study sample included (1339) participants, distributed as the following (375) doctors, (378) dentists, (268) pharmacists, and (318) nurses. This high rate of participation reflects the

**Table 1:** The characteristics of 1339 medical staff enrolled in the study.

Variable	n	%
Gender		
Male	596	44.5
Female	743	55.5
Age (Years)		
20–30	838	62.7
30–40	340	25.4
40–50	106	7.9
50–60	50	3.5
60>	5	0.3
Work place		
City	1068	79.8
Countryside	271	20.2
Medical staff		
Doctor	375	28
Nurse	318	24
Dentist	378	28
Pharmacist	268	20

high level of awareness that helps in controlling the infection and preventing the spread of disease in clinics and hospitals. The male to female ratio in this sample was 44.5/55.5, and ages ranged from 20 to 70 years old.

Since the outbreak of COVID-19 in December 2019, WHO has started campaigns on the visual and electronic media to spread awareness and highlight the preventive procedures to be followed to avoid the infection. In addition, numerous scientific articles have been published aiming to raise the consciousness and emphasize on the necessity of applying the preventive measures.<sup>[13,18]</sup> These campaigns and articles have helped healthcare workers to protect themselves and their patients, and break the chain of disease spread.

The current approaches of controlling COVID-19 are to control the infection sources, use preventive procedures to reduce the risk of transmission as well as to provide early diagnosis, isolation, and care for infected patients.<sup>[19]</sup>

The medical staff has relied on many sources to receive accurate information about the methods needed to control the infection. The majority of the participants have obtained their knowledge from scientific articles that focus on the preventive guidelines and recommendations of the Centers for Disease Control and Prevention (CDC) and WHO (doctors 91.2%, dentists 87.8%, and pharmacists 67.9%). Furthermore, both nurses and doctors have received special local training programs in the hospitals. These trainings were the primary source of information for the majority of nurses (81.1%) along with visual and social media information that represents the recommendations of the Syrian Ministry of Health and local authorities.<sup>[20,21]</sup> Even though the most

**Table 2:** Preventive procedures taken by doctors to deal with COVID-19 infection.

		Doctor working in hospital or clinic or both (375)	
		<i>n</i>	%
Source of information about prevention measures	Training in hospital	163	43.5
	Media + Social media	65	17.3
	Scientific sources (WHO, scientific papers)	342	91.2
Preventive measures in hospital	Frequent cleaning of hands using alcohol or soap and water	359	95.7
	Personal protective equipment	212	56.5
	Continuous monitoring	196	52.3
	Healthy diet to enhance immune system	65	17.3
Personal protective equipment in hospital	Gowns/aprons (Clothing)	212	56.5
	Gloves	326	86.9
	Goggles	179	47.7
	Face shields	131	34.9
	Surgical masks	359	95.7
	Head covers	229	61
	Shoe/shoe covers	229	61
	Procedures used to ensure the safety of healthcare workers in hospital	Monitor the body temperature	294
	Record physical or psychological changes	163	43.5
	Monitor the rise of any symptoms especially respiratory ones.	261	69.6
Disinfecting operations in hospital	Disinfect the walls, floors and possibly contaminated surfaces	359	95.7
	Disinfect tools, equipment and instruments	326	86.9
	Disinfect fabrics, bedspreads, coverings, and furniture	245	65.3
	Waste disposal	310	82.6
	Air filtration(Air purification)	98	26.1
Methods of disinfection used in hospitals	Water and soap	359	95.7
	Alcohol	342	91.4
	Sodium hypochlorite	196	52.3
	UV sterilizer	179	47.7
	Air Purifiers (Air filters)	98	26.1
Preventive measures in clinic	Frequent cleaning of hands using alcohol or soap and water	375	100
	Personal protective equipment	245	65.3
	Distancing between doctor and patient	327	87.2
	Distancing among patients in waiting room	245	65.3
	Preventive measures followed after each examination	327	87.2
Personal protective equipment in clinic	Gowns/aprons (Clothing)	131	34.9
	Gloves	310	82.6
	Goggles	98	26.1
	Face shields	131	34.9
	Surgical masks	359	95.7
	Head covers	98	26.1
	Shoe/shoe covers	98	26.1
Disinfection materials and instruments in clinic	Water and soap	343	91.4
	Alcohol	375	100
	Sodium hypochlorite	163	43.5
	Ultraviolet sterilizer	49	13
	Air Purifiers (Air filters)	81	21.6
Go to patient's home	Yes	65	17.3
	No	310	82.6
Self-evaluation of the commitment to the preventive procedures	0–25	32	8.5
	25–50	33	8.8
	50–75	212	56.5
	75–100	98	26.1

**Table 3:** Preventive procedures taken by nurses to deal with COVID-19 infection.

		<i>n</i>	%
Source of information about prevention measures	Training in hospital	258	81.1
	Media + Social media	204	64.2
	Scientific sources (WHO, scientific papers)	84	26.4
Preventive measures in hospital	Frequent cleaning of hands using alcohol or soap and water	306	96.2
	Personal protective equipment	222	69.8
	Continuous monitoring	240	75.5
Personal protective equipment in hospital	Healthy diet to enhance immune system	60	18.9
	Gowns/aprons (Clothing)	216	67.9
	Gloves	312	98.1
	Goggles	114	35.8
	Face shields	66	20.8
	Surgical masks	312	98.1
	Head covers	222	69.8
Procedures used to ensure the safety of healthcare workers in hospital	Shoe/shoe covers	234	73.6
	Monitor the body temperature	282	88.7
	Record physical or psychological changes	168	52.8
	Monitor the rise of any symptoms especially respiratory ones.	288	90.6
	Disinfecting operations in hospital	306	96.2
Methods of disinfection used in hospitals	Disinfect the walls, floors and possibly contaminated surfaces	306	96.2
	Disinfect tools, equipment and instruments	276	86.8
	Disinfect fabrics, bedspreads, coverings and	258	81.1
	Waste disposal	282	88.7
	Air filtration(Air purification)	186	58.5
	Water and soap	312	98.1
	Alcohol	300	94.3
Self-evaluation of the commitment to the preventive procedures	Sodium hypochlorite	216	67.9
	Ultraviolet sterilizer	132	41.5
	Air Purifiers (Air filters)	168	52.8
	0–25	12	3.8
	25–50	30	9.4
	50–75	120	37.7
	75–100	156	49.1

fundamental role in the confrontation was for doctors and nurses, yet both pharmacists and dentists (99%) have confirmed that their role is essential in spreading awareness and knowledge between people about COVID-19.<sup>[22,23]</sup>

The medical staff have committed to personal protective procedures, sterilization, and periodic disinfection of instruments and equipment in clinics and hospitals. As far as, preventive procedures are concerned, the methods used by health-care professionals have varied depending on their role and place of work. All participants have emphasized on the importance of respecting the health rules and washing hands constantly as the proportion of those committed to this procedure exceeded 90% among all medical staff. Whereas the percentages of doctors committed to wearing surgical masks and medical gloves have reached 95.7% and 86.9%, respectively, the percentage of nurses who followed these two protective measures was 98%. The situation was different in other sectors. For example, the percentage of committed pharmacists to wearing surgical mask was 71% while it was 64% for wearing gloves.

The results also showed that health workers in direct contact with patients such as doctors, nurses, and dentists tend to wear medical uniform to protect themselves from possible infection, which was not the case for pharmacists.

As for dental clinics, the results have demonstrated a fall in the number of dentists who follow some instructions such as wearing surgical gown and shoe cover, using double-layer marked package bags and “gooseneck” ligation to get rid of the medical waste, and the frequent sterilization of air-conditioning systems. Interestingly, the largest percentage of dentists have used the face shield more than the surgical mask unlike the other groups of caregivers as they consider the surgical masks secondary preventive procedures that are not necessary. This might be due to their perceptions of the methods of transmission that mainly occur through direct contact between the mucous membranes, respiratory secretions, and contaminated hands.<sup>[24]</sup> Hence, the face shield leads to greater protection for the entire face.<sup>[23,25]</sup>

**Table 4:** Preventive procedures taken by pharmacists to deal with COVID-19 infection.

		<i>n</i>	%
Source of information about prevention measures	Training in hospital	28	10.4
	Media + Social media	128	47.8
	Scientific sources (WHO, scientific papers)	182	67.9
Use the physical barrier between the pharmacist and patients	Yes	110	41
	No	158	59
Personal protective equipment and procedures	Frequent washing of hands	244	91
	Gowns/aprons (Clothing)	38	14.2
	Gloves	172	64.2
	Goggles	28	10.4
	Face shields	24	9
	Surgical masks	192	71.6
	Head covers	30	11.2
	Shoe/shoe covers	18	6.7
Methods of disinfection used in pharmacies	Water and soap	214	79.9
	Alcohol	238	88.8
	Sodium hypochlorite	110	41
Apply the social distancing among patients within Pharmacy	Yes	192	71.6
	No	76	28.4
Self-evaluation of the commitment to the preventive procedures	0–25	14	5.2
	25–50	62	23.1
	50–75	128	47.8
	75–100	64	23.9

Furthermore, 85% of doctors and nurses working in hospitals emphasized on the sterilization procedures that have been followed by public and private hospitals for floors, walls, furniture, tools, and equipment. They also confirmed the good application of the rules and regulations used in the disposal of different waste in the hospital.

Based on the symptoms caused by COVID-19, healthcare workers have had to investigate the infection by measuring patients' temperature as a routine procedure. In addition to building a medical profile for each patient that includes information about the general health status, prior contact with a person who had been infected or recently returned from a travel to one of the affected countries.<sup>[26]</sup> As part of protecting the patients, it was necessary to provide them and accompanying persons with surgical masks when entering the clinic (medical and dental) or hospital, as well as maintaining appropriate physical distancing among patients and between the medical staff and patients. Despite of the small percentage of dentists (6.9%) who did not see need to obligate the patients to wear surgical masks in the waiting room; the majority of the medical staff adhered to the social distancing instructions (doctors 65.3% and dentists 83.6%). As part of the protective measures, the entire medical staff members committed to the periodical measurement of their bodies temperature with various commitment rates (doctors 78.4%, dentists 38.1%, and nurses 88.7%). Concerning the disinfection methods that have been used, the results have shown that washing hands

with soap and water and using alcohol sterilizers were more frequent compared to sodium hypochlorite in pharmacies, medical, and dental clinics, while UV sterilization was observed in hospitals and surgical rooms in particular.<sup>[27-29]</sup>

While doctors have continued their work in their clinics, this was accompanied with a decrease in the rate of visiting patients in their homes. The questionnaire showed that 82% of doctors refuse to visit patients in their homes during this pandemic outbreak and this differs from the previous conditions. In contrast, a good percentage of dentists stopped scheduling patients (74.6%) with emphasizing on the need of postpone the unnecessary appointments, and treatment was limited to emergency cases only. These emergency treatments have held using the previously mentioned prevention methods and a rubber dam with high-volume suction, especially in aerosol producing procedures, aiming to reduce the production and spread of respiratory droplets.<sup>[30]</sup> This was in line with the recommendations of ADA.<sup>[31]</sup> Although pharmacists were among the people who continued to work in these conditions, more than half of the pharmacists participating in the questionnaire (59%) did not use the physical protective barrier that separates them from the patients who visiting the pharmacies.

At the end of the questionnaire, the medical staff was asked to evaluate the commitment to the recommended personal and general prevention methods. Herein, the estimated level of commitment that has been given by the majority of healthcare workers was 50–75%.

**Table 5:** Preventive procedures taken by dentists to deal with COVID-19 infection.

		<i>n</i>	%
Source of information for prevention measures	Training in hospital	36	9.5
	Media + Social media	154	40.7
	Scientific sources (WHO, scientific papers)	332	87.8
Role of the dentist in spreading awareness, education about the prevention methods	Very important	288	76.2
	Partially important	86	22.8
	Not important	4	1.1
Personal protective procedures followed by the dentists	Frequent cleaning of hands using alcohol or soap and water	356	94.2
	Wearing medical gloves	370	97.9
	Wearing surgical masks	188	49.7
	Wearing face shields	276	73
	Wearing a medical uniform	314	83.1
	Wearing a surgical gowns	146	38.6
Personal protective procedures followed by the assistant medical staff	Wearing the shoe covers	82	21.7
	Frequent cleaning of hands using alcohol or soap and water	342	90.5
	Wearing medical gloves	350	92.6
	Wearing surgical masks	120	31.7
	Wearing face shields	168	44.4
	Wearing a medical uniform	324	85.7
Protective procedures in the dental clinic	Wearing a surgical gowns	40	10.6
	Wearing the shoe covers	70	18.5
	Refreshing the clinic air periodically	344	91
	Sterilizing air-conditioning system frequently	102	27
	Periodic and comprehensive sterilization	338	89.4
	Sterilizing the dental unit and work surfaces	340	89.9
	Cleaning personal treatment tools	350	92.6
Procedures used to organize patient reception in the dental clinic	Sterilizing the medical equipment	262	69.3
	Use Double-layer marked package bags and “gooseneck” ligation	134	35.4
	Completely closed	108	28.6
	Non-scheduling patients and receiving emergency cases only	282	74.6
Procedures used to investigate the medical history of patients	Receiving all patients	24	6.3
	Not receiving patients with symptoms of respiratory disease	108	28.6
	Presence of respiratory symptoms during the past 7 days	322	85.2
	Contacting with the covid-19 patients	140	37
Protective procedures followed to protect the patient in waiting room	Temperature measurement	144	38.1
	Detecting for chronic diseases	288	76.2
	Distancing between patients	316	83.6
	Not presence accompanying patient	236	62.4
	Wearing the face masks for patients	26	6.9
Protective procedures followed to protect the patient in the treatment room	Distancing between the assistant medical staff and the patients and within patients	200	52.9
	Ask the patients to wash their hands before entering the treatment room	174	46
	Using anti-retraction valves hand pieces	106	28
	Using a rubber dam with high-volume suction	242	64
Self-evaluation for applying of preventive procedures	Mouth rinse the patient	200	52.9
	Manual devices, such as Carisolv and hand scaler	126	33.3
	0–25	10	2.6
	25–50	44	11.6
	50–75	194	51.3
	75–100	130	34.4

The results presented in this survey are good and able to reflect a medical population that is committed to the recommended preventive measures despite the great difficulties experienced in Syria. Although the survey can be

considered as representative and sample size is average, it is important to emphasize that this survey suffers from some limitations that prevent the ability to generalize our results including the relatively low response rate, which led to a

smaller sample size than expected. This can be due to the current conditions of caregivers being busy watching news, caring about personal and professional affairs and following the home quarantine not to mention the effect of the short time given for the caregivers to participate in this study. This means that people who were active on social media were the only ones who had the opportunity to participate in the study.

## CONCLUSION

Since after the outbreak of the COVID-19 pandemic, the efforts of all organizations and governments have been focused on preventing and controlling the spread of the virus. Despite the difficult circumstances in Syria due to the long time crisis, the results of this study have demonstrated relatively good commitment of medical staff to the preventive measures that have been recommended by the WHO. Nevertheless, these results cannot be generalized as the rate of participation was average and further studies should be conducted regarding the level of commitment of caregivers to the recommended preventive measures and the role of this on the containment of the virus spread.

## Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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