

## Enhancing Nurses' Knowledge and Skills in COVID19 through Learning Need Assessment

Adel Harb<sup>1\*</sup>, Maryam Alkhalaf<sup>2</sup>, Jessica Colquhoun<sup>3</sup>, Roua Aman<sup>4</sup>, Alya Albinali<sup>5</sup>, Fatimah Alahmed<sup>6</sup>, Suaad AlRahin<sup>7</sup> and Laila Alzara<sup>8</sup>

<sup>1</sup>Professional Development Committee – E1 Healthcare Cluster, Formal Director, Nursing Education Department, King Fahad Specialist Hospital- Dammam- KSA.

<sup>2</sup>Research and Nursing Studies Supervisor, Regional Nursing Administration.

<sup>3</sup>Chief Nursing Officer, E1 Healthcare Cluster.

<sup>4</sup>Nurse Specialist, Erada Mental Health, Dammam.

<sup>5</sup>Director of Nursing Education & Training, MCH, Dammam.

<sup>6</sup>Head of Nursing Education, Qatif Central Hospital, Qatif.

<sup>7</sup>Nurse Educator, Erada Mental Health, Dammam.

<sup>8</sup>Nurse Educator, Dahran Eye Specialist Hospital, Dahran.

### \*Corresponding author

Dr Adel Harb, Chair, Professional Development Committee – E1 Healthcare Cluster, Formal Director, Nursing Education Department, King Fahad Specialist Hospital- Dammam- KSA and Visiting Professor Assistant at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS).

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### Abstract

Preparedness of nurses who are in direct contact with COVID19 patients is a key as they can play a major role in preventing the spread of COVID-19. Enhancing nurses' knowledge and practice to gain the maximum knowledge and skills related to COVID19 can make them more competent in protecting themselves, their patients, and their communities at large.

**The aim** of this study is to identify nursing skills and knowledge deficits related to COVID19 to provide nurses with an education that enables them to provide safe and effective patient care.

**Method:** A self-administered questionnaire containing socio-demographic data, knowledge domain, and skills domain (questions indicating their current knowledge and skills in COVID19 was distributed).

**Results:** the majority of nurses at E1 cluster hospitals (n=1022) had brilliant knowledge and skills about COVID-19. The major performance gap was knowledge deficit related to infection control standards precautions.

**Conclusion:** Nurses should enhance their knowledge related to infection control standard precautions and further studies are still needed to assess nurses' attitudes as equal to knowledge and skills.

**Keywords:** Nursing Knowledge & Skills, COVID19, Learning Need Assessment.

### Introduction

Changes in today's healthcare services require nurses to stay updated in knowledge and practice. According to Schneider and Good [1]. "Continuing education and staff development are fundamental components of being a professional nurse". The learning needs assessment is a systemic process of collecting and analyzing data to bring out discrepancies in an individual's knowledge base of health practice, it is also a crucial step in the educational process to enable best practice in holistic patient centered care [2]. The questionnaire delineates both the nurse's knowledge base and educational deficits in the focused area of new knowledge and nursing practice. Learning needs are defined as any breach between a nurse's present level of comprehension and a higher level of professional performance [3]. Furthermore, it

is a "modern tool in adult learning for engaging the frontline staff in the educational process and ensure that the professional development plans are more effective and more efficient" [4].

Coronavirus Disease (COVID-19) Cases have been reported globally. According to ANA (2020), what is understood about COVID-19 till now is that it spreads person-to-person among close contacts via respiratory droplets (through coughs or sneezes) and touching infected surfaces and then touching the nose, mouth, or eyes with incubation period lasts 2-14 days. Symptoms associated with COVID-19 include mild to severe respiratory illness with symptoms of fever, cough, and shortness of breath [5].

Enhancing nurses' knowledge and practice to gain the maximum knowledge and skills related to COVID19 can make them more competent in protecting themselves, their patients and their communities at large. The gap of their current knowledge and

practice with COVID-19 will be identified through Learning Need Assessment Survey that will be conducted in the Eastern Cluster (E1) province in the Kingdom of Saudi Arabia (KSA)

### Literature Review

Dealing with COVID-19 pandemic challenges reinforces the need for assessing the nurses' knowledge and skills through a knowledge and skills survey. In the COVID-19 crisis, nurses are forced to deal with cognitive challenges, affective challenges including many nurses experience fear and concern for what lies ahead, and psychomotor challenges including nurses need to be protected with greatest precautions and training of COVID-19 protocols that exist when caring for suspected or confirmed COVID-19 cases [6].

The global challenges for COVID-19 started on 12th December 2019, when an acute respiratory illness named a novel coronavirus, severe acute respiratory syndrome coronavirus (SARS-CoV-2) strike Wuhan, China. The outbreak was thought to be initiated from an animal source to humans who visited the local animal and fish market in Wuhan, China. The World Health Organization (WHO) termed this illness as Coronavirus Disease 2019 (COVID-19) and was updating the Global Surveillance for Human Infection with COVID-19. In January 2020, the WHO considered the outbreak of COVID-19 as a community health emergency of global alarm, which activated the need to release the resources and funding [7]. After few weeks of endemic infection in China; the WHO declared the COVID-19 as a pandemic on 8th March 2020 based on how fast the disease was spreading and by the number of people that were getting affected with serious respiratory symptoms that were leading to large number of deaths [8].

Hence, the WHO started making recommendations for the countries facing critical situations to adhere to strict measures needed to prevent the risk of national and global health crisis including travel bans, banning incoming flights from countries with high numbers of cases of COVID-19, screening travelers for fever, activating distance- working and online education, and finally quarantine for suspected and contact cases [8]. However, the initial global expectation was an endemic crisis thus most developed countries did not take the proper initiative to the extent that, only a few countries took a proactive approach to stop this virus from spreading.

Globally, the COVID-19 cases were increasing daily according to Johns Hopkins University-Coronavirus Resource Center [9]. On 1st May 2020 the daily rate of COVID-19 confirmed cases were (3, 213, 613), the recovered cases were (986,272) and the total death cases were (228,304). The death percentage from total confirmed cases was (30.69 %), the recovered percentage from total confirmed cases was (7.10 %). while the average daily confirmed cases reached (31,599) and the average of daily recovered cases were (9,552), average of daily death is (2,264) [10]. At that time, Saudi Arabia took this matter very serious and imposed restrictions at the national level by applying the WHO recommendations to reduce or eradicate the spread of COVID-19 through contact of their citizens and the expat population that lived in and traveled to Saudi Arabia. The first confirmed COVID-19 case announced on 2nd March 2020, for a Saudi citizen in the eastern region who had a history of traveling to the epidemic country

The Ministry of Health (MOH) in Saudi Arabia was proactive in dealing with this crisis by clear guidelines and pathways for quarantine screening and diagnosing suspected and confirmed cases through the Saudi Center for Disease Prevention and Control. Further action was taken at the national level in Saudi Arabia including the closure of the two holy mosques and "Umrah" suspension. From 2nd March 2020 till 1st May 2020, according to Ministry of Health, total COVID-19 confirmed cases in Saudi Arabia were (22,753), the recovered cases were (3162), the total death cases were (162), the death percentage from total confirmed cases was (0.71 %), the recovered percentage from total confirmed cases was (13.90%) [11]. while the average daily confirmed cases reached (216), the average of daily recovered cases was (30), average of daily death was (2) in entire regions see (figure1, 2) [10].

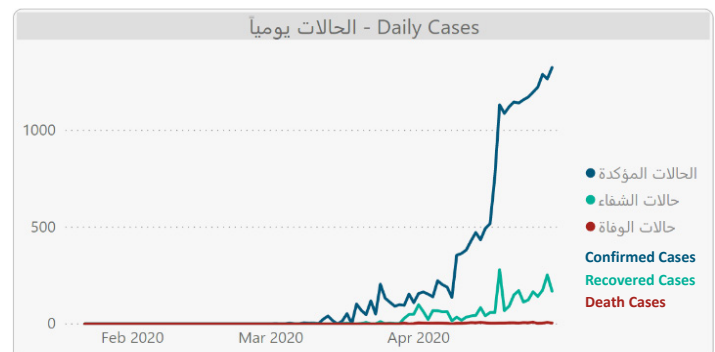


Figure 1: COVID-19 daily cases in Saudi Arabia Weqaya, 2020

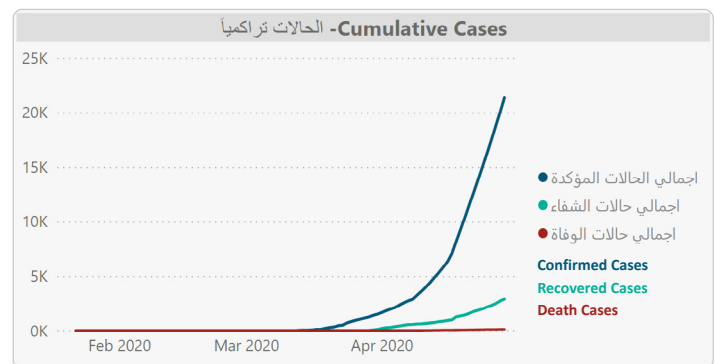


Figure 2: COVID-19 daily cumulative cases in Saudi Arabia Weqaya, 2020

The increased chaos of COVID-19 cases have an impact on the nurse knowledge and skills in how to deal with this novel virus, one way to limit and control the impact of the disease in every country is the combination of clear and coordinated management guidelines for COVID 19 handling [12]. However, the implementation of the basic infection control protocols is possible only when people and employees are aware and updated of the introduced policies as well as giving them a clear guideline. Awareness level and compliance of conducting health education for healthcare professionals play an important role in the effective and timely prevention and control of a public health crisis. To achieve sustainable development goals in a humanitarian crisis, there is a need to enhance nursing knowledge in order to be proactive with health care needs [13]. Governments and healthcare systems worldwide should recognize the true potential of nurses. However, "healthcare crises such as the COVID-19 outbreak can

be a huge challenge for critical-care physicians, who need strong comprehensive skills to respond effectively. Critical care related to continuing medical education has an important part to play in preparing for and responding to such emergencies. Availability of resources is vital in the fight against COVID-19” [8].

Currently, nurses are globally working at different healthcare institutions and they are assigned in clinics, hospital wards, and specialty units, in different regions, contributing to caring for COVID-19 cases. They are frequently working and dealing with a deficiency or nonexistence of essential items, besides the lack of knowledge and skills required to ensure that they are prepared and ready to care for this new virus. Gilroy (14) had conducted a survey on winter pressures in the UK in order to know if nurses feel prepared to deal with coronavirus in their workplace the results showed 47% did not feel prepared for coronavirus during winter pressure while 27% were feeling prepared. 21% said they did not know and 5% answered as not applicable.

Similarly, the recent pandemic creates an opportunity to have nurses trained so that they are aware of their needs and are capable to address their learning needs professionally and practically. This includes their knowledge in preparing to care for mild to moderate and even sick COVID 19 patients in every health-care system to be able to plan for space, equipment, and manpower to include suitably trained and adequate numbers of trained critical-care nurses. Reports indicate that nurses in many parts of the world are grappling with shortages of much-needed supplies that include Personal Protective Equipment (PPE) such as masks, gloves, and gowns, which actively embrace the challenges presented by COVID-19. However, nurses who play a vital role as the primary contact with patients infected with the dreadful COVID-19 virus must receive the highest level of protection for themselves and for their individuals and communities they are attending to. According to Nemati et al [15]. “Understanding or having enough information regarding sources, clinical manifestations, transmission routes, and prevention ways among healthcare workers can play roles for this goal assessment. Since nurses are in close contact with infected people, they are the main part of the infection transmission chain and their knowledge of COVID-19 prevention and protection procedures can help prevent the transmission chain”. This unprecedented pandemic crisis means that nurses are working beyond their exceptional abilities. Nobody was prepared or fully educated about this new strain of the virus at the beginning when it started to spread. But as a healthcare worker’s, nurses have to continue to serve and prepare their emotions and physical strength to battle these tough times.

Nurses will need to be flexible which may require working in an unfamiliar situation, working environment, and other people who are outside their usual areas for the benefit of the patients and communities [16].

Assessment of staff learning needs has different phases including learner’s definition, conduction of assessment, analyzing assessment, assessment of data, and development of master education plan [17]. The CDC and WHO are continuously giving information on how each healthcare worker should protect themselves and be safe in dealing with COVID-19 patients. Different countries all over the world who are affected by the COVID 19 pandemic have started teaching and disseminating up-

to-date information related to infection control measures to slow down and to prevent the spread of the virus . Yang (18) suggested a modified approach which designed to help nursing educators conduct education for hand hygiene as a virtual classroom education in three steps: “first, Plan appropriate tasks, Second, Select essential resources and Third, Perform effective delivery” such classes will help in fulfilling the Infection and Prevention Control (IPC) recommendations and assist to keep updating the knowledge of the health care workers [18]. The short-form course, which developed by Penn Foster in partnership with Southern New Hampshire University and Guild Education in the US, in response to the crucial and rising need for skilled nurses as a result of continuous spread of the virus revealed high attendance among the health care workers which accounted for more than 1,100 participated in one-week training, including nurses, pharmacy technicians, and medical assistants [19].

The hospitals in KSA are now conducting active research and studies to learn more about the coronavirus to know how to deal with it like the MERS-COV crisis in 2018. Since this health crisis will affect many nurse’s we are then obligated to assess the variation in learning needs among nurses working in E1 Healthcare Cluster with respect for nursing roles being provided. This study aims at identifying nursing skills and knowledge deficits related to COVID19 in order to provide nurses with an education that enables them to provide safe and effective patient care

## Methodology

**Design:** In order to assess nurses learning needs related to COVID19 and plan for a Continuing Nursing Education events, a descriptive quantitative design was used in this study. A survey is used as a method because it is cost effective, it could be distributed to a large number of participants, it is anonymous, and it is a formal method with a permanent record of stakeholders input.

**Sample:** the target population in this study were all nurses within E1 Healthcare Cluster hospitals that includes Team Leaders, Charge Nurses, Educators, Nurse Managers, Clinical Nurse Coordinators, Supervisors, Directors, and also Students were included. Any nurse under Nursing Administration was eligible in this study regardless of age, gender, units, experience, and positions. The targeted sample size was calculated based on the number of nurses working within E1 Healthcare Cluster Hospital against the level of confidence and confidence intervals. There are almost 7000 nurses currently employed in all hospitals under E1 Healthcare Cluster facilities and with +/- 5% confidence intervals and 90% confidence level, at least 265 nurses will be expected to contribute to the study.

**Setting:** This study was conducted within E1 Healthcare Cluster hospitals, Kingdom of Saudi Arabia.

**Instrument:** The survey was divided into three different parts. The first part included demographic data of the participants (age, gender, positions, hospital, unit/divisions, and years of experience). The second part evaluated the nurses’ knowledge Domain: questions indicating their current Knowledge toward COVID19. The third part of the survey evaluated the nurses’ Practice Domain: questions indicating their current skills with COVID19.

**Pilot:** The survey piloted among the coauthors and senior expert nurses (n= 6) for construct validity then it reviewed and modified to

ensure that questions are not lengthy and convenient to nurses. The survey sent to a group of nurses (107) nurses to test content validity. **Ethical Consideration:** the final survey submitted to Chief Nursing Affairs, E1 Healthcare Cluster. The study proposal was completely submitted to the Hospital Research Committee seeking IRB approval letter. Participation in this study was voluntary and the identification information of participants was not recorded anywhere on the survey.

**Data Collection:** The final tool approved and designed as a link and ready for data collection through email and via WhatsApp application. The survey and “Invitation to Participate” sent to all Nursing Leaders within E1 Healthcare Cluster requesting their support in sending the link to all frontline staff and encouraging them to participate on a voluntary basis.

### Data Analysis and Results

Data were collected and analyzed following descriptive analysis frequency statistics using Excel Spreadsheet.

**Response Rate:** Total nurses who responded to the survey were 1022 out of 6920, thus the N=1022 with a confidence interval of 0.4% and confidence level 99% that makes the study more valid.

**Demographic Data:** socio-demographic data (age, gender, positions, hospital, unit/divisions, and years of experience) were analyzed as shown below (Table 1).

**Table 1:** Socio-demographic data of the studied E1 Nurses.

Item	Variable	Category	Frequency (%)
1	Age	20 to 25	24(2.4%)
		26 to 45	583 (57.6%)
		36 to 45	295 (29.2%)
		46 to 55	295 (29.2%)
		56 or above	97 (9.6%)
2	Gender	Female	946 (93.5%)
		Male	66 (6.5%)
		Missing	11

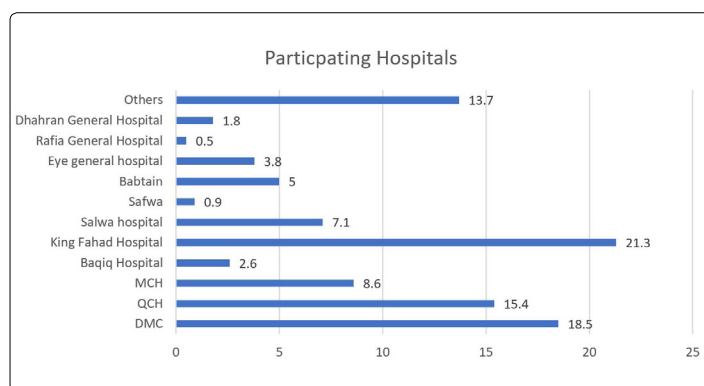
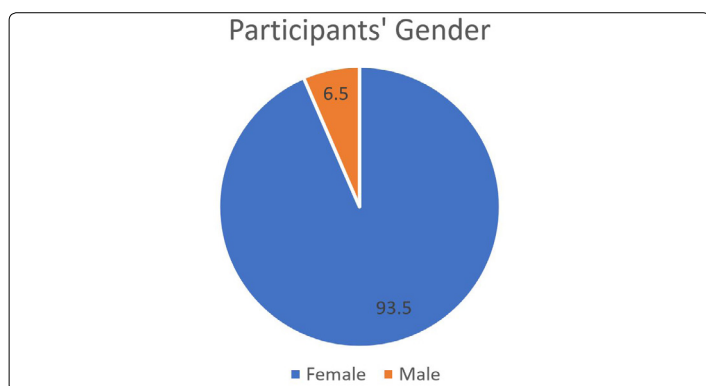
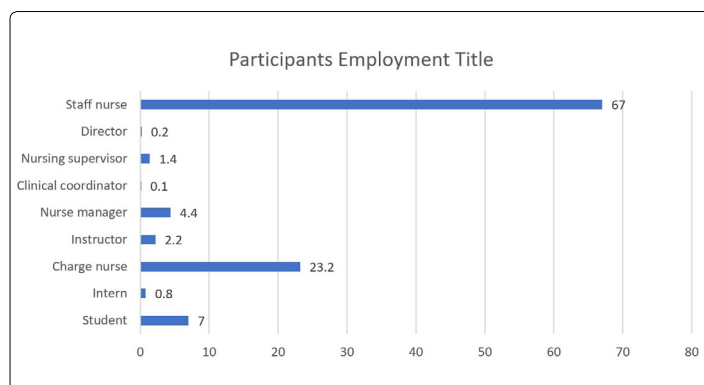
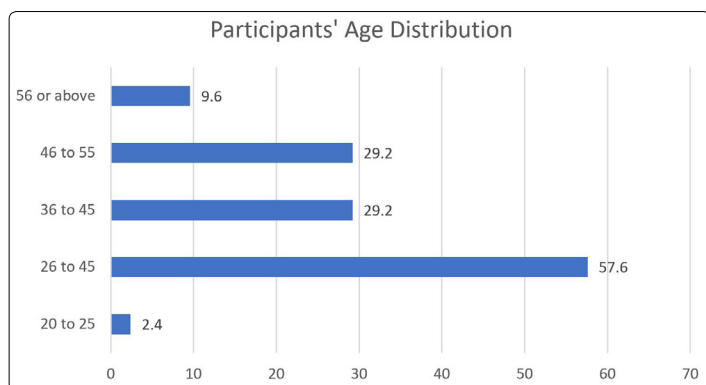
3	<b>Employment title</b>	Student	7 (07%)
		Intern	8 (0.8%)
		Charge nurse	230 (23.2%)
		Instructor	22 (2.2%)
		Nurse manager	44 (4.4%)
		Clinical coordinator	1 (0.1%)
		Nursing supervisor	14 (1.4%)
		Director	2 (0.2%)
		Staff nurse	665 (67%)
Missing	30		
4	<b>Hospital</b>	DMC	184 (18.5%)
		QCH	153 (15.4%)
		MCH	86 (8.6%)
		Baqiq Hospital	27 (2.6%)
		King Fahad Hospital	218 (21.3%)
		Salwa hospital	71 (7.1%)
		Safwa	9 (0.9%)
		Babtain	50 (5%)
		Eye general hospital	38 (3.8%)
		Rafia General Hospital	5 (0.5%)
		Dhahran General Hospital	18 (1.8%)
		Others	136 (13.7%)
Missing	28		
5	<b>Duration of work in the organization</b>	Less than 5 years	149 (14.6%)
		1 to 5 years	260 (25.5%)
		5 to 10 years	345 (33.7%)
		more than 5 years	264 (25.9%)
6	<b>Working division</b>	Medical	136 (13.9%)
		Surgical	122 (12.4%)
		ICU	153 (15.6%)
		ER	131 (13.4%)
		Pediatric	73 (7.4%)
		PHC	27 (2.8%)
		Mental health	6 (0.6%)
		Oby/Gyn	309 (31.5%)
		Community Health	21 (2.1%)
		Others	3 (0.3%)
Missing	42		

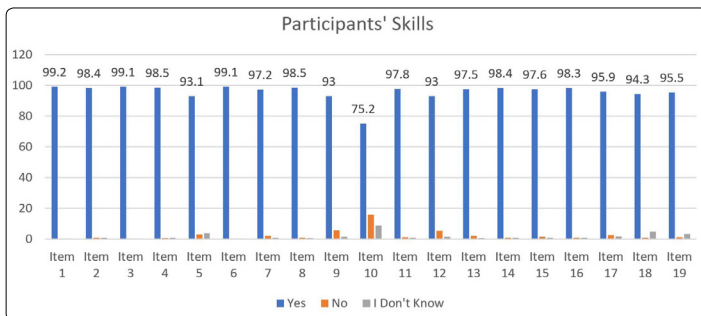
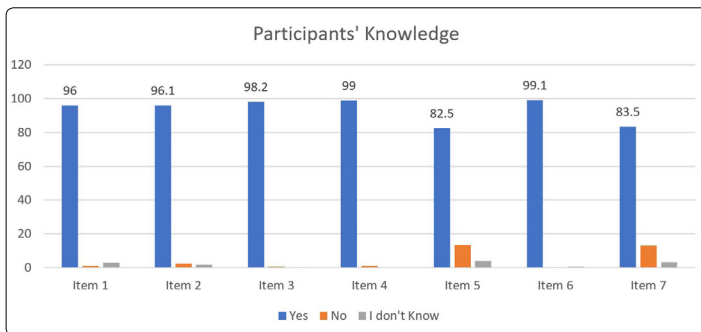
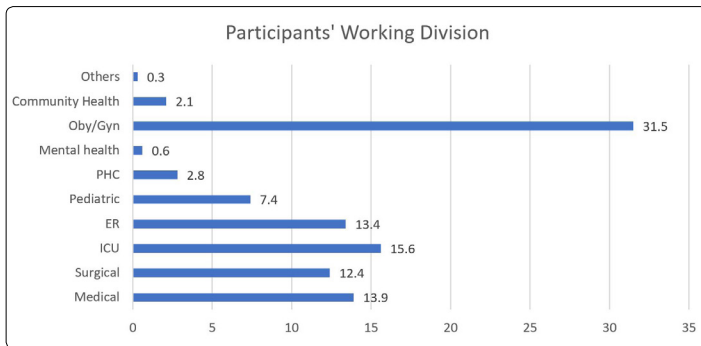
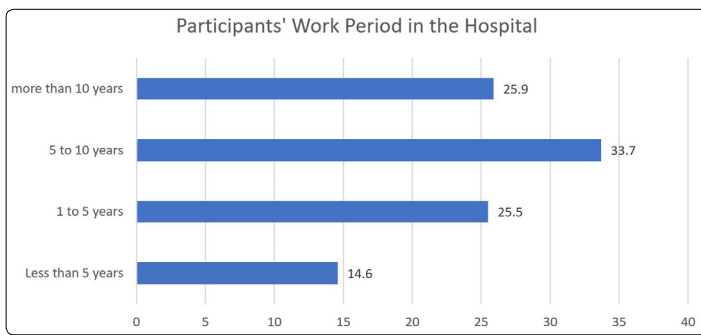
**Table 2:** Knowledge domain of the studied E1 Nurses.

No	Item	Yes	No	I don't know
1	Do you know if the world health organization WHO has declared the COVID-19 outbreak as a pandemic	974 (96%)	11 (1.1%)	30 (3%)
2	Do you know if the Corona virus are a large family of enveloped RNA viruses, some of which cause illness in people (e.g common cold, SARS, MERS CoV)	975 (96.1%)	22 (2.2%)	18 (1.8%)
3	Do you know if the Corona virus causes a sever acute respiratory infection	1005 (98.2%)	5 (0.5%)	4 (0.4%)
4	Do you know if the spread is by person-to-person contact in the community and healthcare settings?	1002 (99%)	10 (1%)	0
5	Do you know if COVID-19 is transmitted/ 12 is detected in blood, saliva, tears, conjunctival secretions, and feces.	835 (82.5%)	138 (13.5%)	39 (3.9%)
6	Do you know if it is important to wash your hands with soap and sanitizer prior to putting on a face mask	1005 (99.1%)	4 (0.4%)	5 (0.5%)
7	Do the symptoms of COVID-19 includes dizziness, sore throat, diarrhea, chest pain, hemoptysis and diarrhea?	844 (83.5%)	134 (13.1%)	33 (3.3%)

**Table 3: Skills domain of the studied E1 Nurses.**

No	Item	Agree	Disagree	I don't know
1	I should wash hands often with soap and with an alcohol-based hand sanitizer and avoid touching the e1, 2se, and mouth with unwashed hands	1004 (99.2%)	5 (0.5%)	3 (0.3%)
2	One should avoid close contact with people (i.e., maintain a distance of at least 1 meter), partially with those who have a fever 12 are coughing 12 sneezing	993 (98.4%)	8 (0.8%)	8 (0.8%)
3	One should practice respiratory hygiene (i.e., cover your mouth and 2se when coughing 12 sneezing, discard tissue immediately in a closed bin, and wash hands).	1002 (99.1%)	5 (0.5%)	4 (0.4%)
4	One should seek 1care early if they have a fever, cough, and difficulty breathing, and share their previous travel and contact history with their healthcare provide.	995 (98.5%)	6 (0.6%)	9 (0.9%)
5	One should avoid direct unprotected contact with live animals and surfaces in contact with live animals when visiting live markets in affected areas	942 (93.1%)	32 (3.1 %)	38 (3.8%)
6	Practice hand and respiratory hygiene	1001 (99.1%)	4 (0.4%)	5 (0.5%)
7	My mask should be worn by patient who are infected or suspected of being infected with COVID19	984 (97.2%)	19 (1.9%)	9 (0.9%)
8	Personal protective equipment are required when caring for a patient with COVID 19.	992 (98.5%)	8 (0.8%)	7 (0.7%)
9	Patients should be placed in adequately ventilated single rooms	938 (93%)	56 (5.6)	15 (1.5%)
10	Are you at risk when you caring for a patient with COVID 19 if you have a needle stick and sharps injury	757 (75.2%)	160 (15.9%)	90 (8.9%)
11	Practice safe waste management, environmental cleaning, and sterilization of patient care equipment and linen	986 (97.8%)	13 (1.3%)	9 (0.9%)
12	Patients should be placed in adequately ventilated single rooms	938 (93%)	56 (5.5%)	15 (1.5%)
13	I should wear a mask, gloves, an appropriate gown, and eye/facial protection (e.g.,	986 (97.5%)	19 (1.9%)	6 (0.6%)
14	Use single-use of disposable equipment	995 (98.4%)	8 (0.8%)	8 (0.8%)
15	When single rooms are not available, place all suspected cases together in the same ward/unit.	986 (97.6%)	15 (1.5%)	9 (0.9%)
16	Ensure optimal patient care and psychosocial support for the patient	994 (98.3%)	9 (0.9%)	8 (0.8%)
17	Place patients in negative pressure rooms, if available	971 (95.9%)	26 (2.6%)	16 (1.6%)
18	Implement airborne precautions when performing aresol-generating procedures.	952 (94.3%)	8 (0.8%)	50 (5%)
19	All specimens collected for lab investigations are re regarded as potentially infectious	961 (95.5%)	13 (1.3%)	32 (3.2%)





## Discussion

The novel coronavirus COVID-19 poses a direct threat to an overburdened Saudi Arabia. Health care providers, especially nurses, are at the frontline of response efforts and they have close contact with infected patients. Nurses play a critical role in health promotion, disease prevention, and delivering primary and community care. Their up-to-date knowledge and skills can be a cornerstone in the prevention of virus spread [20]. Saudi Arabia is one of the top countries in the Middle East that have the highest incidence of infection and investigation of nurses' knowledge and skills about COVID-19 can be an essential step in controlling infectious disease.

The current study of 1022 nurses working in E1 Healthcare cluster hospitals revealed that the predominant proportion of participants (93.5%) were female and only 6.5% were male. This result is in concordance with a study conducted by Nemati assessing knowledge, attitude, and behavior of Iranian nurses concerning COVID-19 that found out 85.9% of respondents were female. Other studies revealed that most of the respondents were female [21]. This may reflect the high ratio of female nurses comparing to male nurses in E1 Cluster hospitals. Furthermore, historically, majority of the nursing workforce has always been female. On the other hand, this result contradicted with Bhagavathula, who investigated COVID-19 knowledge and perceptions among Healthcare Workers and demonstrated the dominance of males [22].

Majority of the respondents had a high level of awareness and knowledge toward COVID-19 infection. About (99%) of nurses knew about the mode of transmission, (98.2%) about causes, (96.1%) about the definition, (96%) about the WHO declaration of a global pandemic, and (83.5%) about clinical symptoms. This may be explained by the fact of extensive efforts by Saudi MOH and the successful distribution of educational materials. Besides, the WHO and other credible websites initiated online training courses about COVID 19, which may have a significant impact on keeping the nurses up to date and refining their knowledge during the pandemic outbreak. These results are in agreement with recent study demonstrated that 89.51%, of the medical staff of psychiatric hospitals studied had extensive knowledge of COVID-19 and found that 64.63% of them received relevant training in hospitals [23]. It is also congruent with a study conducted in Iran among 85 nurses and their information rated as high. Further studies revealed good knowledge and positive attitude towards COVID 19 among 327 health care workers in Vietnam, and another cross-sectional study was conducted on Healthcare Workers in primary health care centers and hospitals at Najran about MERS-CoV and found that more than 80% of Healthcare Workers were aware of MERS-CoV etiology, mode of transmission, risk factors, and signs and symptoms [24].

In the light of the current study, nearly all of the respondents (99.1%) had curial need of hand washing with soap and sanitizer before putting on a face mask. This result is consistent with the study conducted in Vietnam among health care workers, where appropriate use of facemasks and respirators considered as an effective approach of preventing respiratory infections and providing the desired level of protection, most participants described facemasks/respirators as the only and the best protective method available to protect Healthcare Workers from respiratory infections [25]. Unfortunately, there is a dearth of literature investigated the nurse's skills toward the COVID-19 so, the current study findings have been compared with other related conditions such as MERS.

Concerning to assessment of nurses' skills and their learning needs towards COVID-19, it was obvious that the majority of nurses had excellent knowledge regarding the general precautions and infection prevention strategies. More than (95%) of nurses were aware of the right infection control measures. This study demonstrated that E1 Healthcare cluster nurses from different hospitals agreed on the same principles and measures related to hand washing, respiratory hygiene, social distance, and the proper use of PPEs. This may attribute to practice standards precautions

and infection control measures as an integral part of safe, effective, and competent patient care. According to WHO hand hygiene, practice respiratory hygiene considered protective, effective and preventive measures to reduce the spread and pathogens and prevent infections including the COVID 19 [26]. The health workers and community members alike can play a role in preventing infections by practicing respiratory hygiene, regular and frequent hand washing. Besides, the WHO, CDC, and Saudi Center for Disease Prevention, and Control emphasize compliance with principles of Infection Control and Safety measures which are essential to achieve a high level of effectiveness in the response to the COVID-19 outbreak.

In this study, the majority of the participants (97.8%) were aware of practice safe waste management, environmental cleaning, and sterilization of patient care equipment and linen. These findings were similar to a study that was done in Nigeria about knowledge and practice of medical waste management among healthcare workers and revealed that nurses practice safe waste management, environmental cleaning, and were aware of the hazardous consequences of improper medical waste handling [27]. Furthermore, WHO revealed that cleaning environmental surfaces with water and detergent and applying commonly used hospital-level disinfectants are effective and sufficient procedures? Medical devices and equipment should be managed by safe routine procedures

Although 94.3% of the respondents agreed to implement airborne precautions when performing aerosol-generating procedures as well as they were aware that all specimens collected for lab investigations are considered as potentially infectious, but 3.2% of them stated they were unsure. According to Saudi MOH guidelines, all specimens collected for lab investigations are regarded as potentially infectious, besides the respiratory specimen should be collected under the aerosol-generating procedure, moreover, as a part of the great infection control plan must ensure that Healthcare worker who collects specimens uses appropriate PPEs (eye protection, medical mask, long-sleeved gown, gloves) [28].

The study showed that 98.3% of the nurses reported that they must ensure optimal patient care and psychosocial support for the patient. According to Zhang *et al*, the absence of mental health and psychosocial support systems increased the risks of psychological distress and progression to psychopathology, so it is important to provide psychosocial support for the isolated patients, suspected patients, and close contacts, primarily through telephone hotline and Internet [29-34].

Unfortunately, a higher percentage (97.6%) of respondents agreed to place all suspected cases together in the same ward/unit when single rooms are not available. This may be interpreted as a knowledge deficit or can be connected to the fact that nurses have observed, in some health facilities, infected patients are sharing rooms and assumes that isolation is not needed. The role of infection control department and nurse educators to make it clear for all nurses, particularly charge nurses who are responsible for patients' placement to always try their best in the process of isolating suspected or confirmed COVID-19 in private rooms with the door closed and with private bathrooms.

Finally, three fourth of respondents (75.2%) agreed that they were at risk when caring for a patient with COVID 19 if they had a

needle stick and only (15.9%) believed that they were not at risk at all while (8.9%) of them were unsure about it. Based on CDC (9), avoidance of needle injury considered a part of standard precautions for nurses especially when dealing with infectious disease. so, this result might be reflected as insufficient knowledge and/or inefficient practice and suggest that nurse educators and infection control departments should clarify that even though, COVID-19 is a respiratory disease, standard precautions related to prevention of needle stick and sharp injury precautions should always be practiced.

Overall findings showed the majority of nurses at E1 cluster hospital had excellent knowledge and skills about COVID-19, but unfortunately, we found some knowledge deficit related to infection control standards precautions, that call for appropriate enhancement to gain the maximum knowledge and skills about COVID-19.

### **Recommendations and Implication for Nursing Practice**

Taking into consideration the current spread of COVID-19 in Saudi Arabia and globally, each of the nurses working with these COVID-19 patients is potentially putting their own health at risk, thus nurses must remain calm, use their best judgment, apply the scientific principles of disease containment to community and clinical care, and continue our commitment to improving individual and population health outcomes.

Despite the knowledge deficit related to infection control standards precautions that was found in this study, each hospital within E1 Healthcare Cluster including senior management, Nursing Services, Infection Control & Prevention, and Quality Departments must continuously enhance nurses' knowledge and skills in COVID 19 to keep their nurses and patients safe. At a minimum, topics to cover include:

- Surveillance and Detection
- Isolation, Quarantine, and Containment
- Standard, Contact and Airborne Precautions
- Proper Handwashing, Cough, and Respiratory Etiquette
- Selection and Appropriate Use of Personal Protective Equipment (PPE)

During COVID-19 pandemic, Nursing Affairs at E1 Healthcare Cluster was communicating with all Nursing Directors of hospitals within the cluster to share and discuss the following activities:

1. Staffing, Contingency plan and bed management.
2. Urgently prioritize ready access to sufficient quantity of high-quality and appropriate personal protective equipment (PPE) for nurses and other healthcare workers
3. Ensure all nurses are updated with the evidence-based infection prevention and control related to COVID19. The latest COVID-19-specific MOH Guidelines and protocols followed by a standard competency checklist were circulated to all E1 Healthcare Cluster facilities. Furthermore, Clinical Guidelines for Nursing & Midwifery Practice during the Coronavirus (COVID-19) Pandemic and Nursing Protocol for Quarantine Facilities during COVID-19 Pandemic were also shared with all cluster hospitals.

4. Rapidly implement/scale-up comprehensive surveillance systems to track and investigate healthcare worker infection
5. Provide a safe and effective Registration and Regulatory response when rapidly expanding the nursing workforce
6. Ensure a safe and effective deployment of nursing staff to areas of high demand and high complexity as the need arises
7. Encourage, develop and support new models of care and innovation
8. Develop and implement a comprehensive, coordinated COVID-19 Online Folder shared with all nurses through Nursing Leadership in each hospital within E1 Healthcare Cluster
9. Learn from the COVID-19 pandemic to be prepared for the future in order to capitalize on nursing leadership and support Succession Plan for Nurse Leaders and Managers.

### Limitations

Despite the useful results and the above-listed recommendations, the study has some limitations, they are but are not limited to:

- Study had focused on assessing knowledge and skills related to COVID19 and did not involve the attitude domain. In a learning environment, there are three domains: cognitive (knowledge), psychomotor (skills), and affective (Attitude) and these KSA's counterparts that identify end states of training (objectives) and then accordingly we could set educational programs to enhance their performance based on their objectives in these three domains.
- Study design was descriptive quantitative. The integration of both quantitative and qualitative approaches will provide more data and perceptions that could be significant in assessing nurses' deficits in knowledge and skills related to COVID19.

### Conclusion

Nurses at E1 cluster hospital had great knowledge about COVID-19 and the majority of them are competent in dealing with COVID-19. The deficit was related to knowledge in infection control standards precautions that should be enhanced. However, more information still must be provided by the WHO and the MOH for nurses for the better control of the disease. Further qualitative and quantitative studies are still needed to assess nurses' attitude as equal to knowledge and skills.

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