Practices and associated factors of infection prevention of nurses working in public and private hospitals toward COVID-19 in Bahir Dar City, Northwest Ethiopia: Institution-based cross-sectional study

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Abstract

Objective: To assess the levels of practices and associated factors of infection prevention of nurses working in public and private hospitals toward coronavirus 2019 (COVID-19) in Bahir Dar City, Ethiopia.

Methods: Institution-based cross-sectional study design employed in public and private hospitals in Bahir Dar city from 26 March 2021 to 8 April 2021. A total of 442 study participants were recruited using stratified followed by simple random sampling techniques. A self-administered questionnaire was prepared and pretested on 5% of the total sample. The collected data were checked for completeness and consistency, and then the data were coded, entered, and cleaned with SPSS version 25 software. Descriptive statistics were carried out to display the means and proportions of sociodemographic characteristics. Logistic regression analysis was used to assess the association between the level of prevention practices and the independent variables. An adjusted odds ratio with 95% confidence interval was used to report the results. A significant association was set at *p*-value <0.05.

Results: Of the total 442 samples, 431 (with response rate of 97.5%) answered the questions completely. The mean (±standard deviation) age of the participants was 29.33 (±5.62) years and 217 (50.3%) were females. The proportion of good prevention practices of nurses toward COVID-19 was 39.4% (95% confidence interval: 35%–44%). Female (adjusted odds ratio = 1.77, 95% confidence interval: 1.18–2.68), have training on COVID-19 (adjusted odds ratio = 1.65, 95% confidence interval: 1.10–2.48), personal protective equipment access (adjusted odds ratio = 1.57, 95% confidence interval: 1.01–2.44), availability of infection prevention guideline (adjusted odds ratio = 1.63, 95% confidence interval: 1.06–2.49), and favorable attitude (adjusted odds ratio = 2.05, 95% confidence interval: 1.25–3.36) were factors significantly associated with good infection prevention practices.

Conclusion: Most nurses in Bahir Dar City public and private hospitals had poor prevention practices against COVID-19. Training provision, infection prevention guidelines distribution, sustainable personal protective equipment access, and promotion to change their attitudes are intervention areas that required emphasis.

Introduction

Coronavirus disease 2019 (COVID-19) is a highly communicable pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On 31 December 2019, 27 cases of pneumonia of unknown etiology were identified in Wuhan City, China.[1] This newly identified disease is called COVID-19, which is a contagious

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disease among respiratory diseases[2] and is becoming the current global health crisis.[3]

COVID-19 was declared a public health emergency on 30 January 2020, and its name was changed from the 2019 novel Coronavirus to COVID-19 in February 2020 by World Health Organization (WHO).[4] Countries throughout the world have used various control measures, such as early detection, isolation, treatment of cases, social distancing, hand washing, minimizing mass loading of public transportation, limiting the number of persons in public places, and finally, testing and tracing affected communities[5,6] With no healing options, strict precautions are the only way to save lives.[7,8] The disease disrupts health systems and leads to social, political, and economic crises. As of 7 July 2021, a total of 185,387,543 cases and 4,009,191 deaths have been reported worldwide. In Africa, 5,782,066 confirmed cases and 148,305 deaths were reported. In Ethiopia, 276,598 confirmed cases and 4335 deaths were registered.[9] Health care professionals are especially at high risk of the condition due to their profession and working environments. Especially, nurses are at high risk and are the vulnerable group for COVID-19.[10,11] Health professionals' knowledge, attitude, and practice status are central points in the prevention and control of diseases transmission.

A study in Bangladesh shows that 73.42% of nurses had good practices, 21.84% had fair practices, and 8.68% had bad practices.[12] In Lebanon, the majority (84.6%) of nurses said they had taken precautions to prevent and control infections.[13] A finding in Saudi Arabia shows that 39.2% of the respondents wash their hands with soap and water for at least 20 s after blowing their nose, coughing, or sneezing and 41.6% of the respondents do not clean and disinfect frequently after touched surfaces.[14] Another research finding about nurses' knowledge, attitude, and practices toward COVID-19 prevention and control practices in the Tamale Metropolis showed 79.6% always wash their hands for at least 20 s, 90.3% always use disposable gloves when handling any contaminated materials, and 82.7% always cover their nose and mouth with a tissue when coughing or sneezing.[15] Research in Nigeria also found that practicing social distancing, improved personal hygiene, and using face masks are 92.7%, 96.4%, and 82.3%, respectively. However, only 29.0% would accept COVID-19 vaccines when available.[2] In Egypt, 90% of the nurses had good prevention and control practices toward COVID-19.[16]

A study carried out in the northern part of Ethiopia at Aksum St Mary General Hospital and Aksum Comprehensive Specialized Hospital on the knowledge, attitude, and practice of nurses showed that 67% have good infection prevention (IP) practices related to COVID-19.[17] Another study in Gamo Zone, southern Ethiopia, showed that only 35.3% of health professionals had a good practice on precautionary measures for the COVID-19 pandemic. According to this study, the use of hand sanitizer or continuous hand washing

with soap and water, covering the nose and mouth with a tissue when sneezing or coughing, and the use of face masks in crowds were 68.9%, 67.3%, and 56.8%, respectively. Good knowledge of the COVID-19 pandemic and a positive attitude toward precautionary measures for COVID-19 are good predictors to implement good prevention and control practices.[18] Another study done in northwestern Gondar, Ethiopia, on the practice of health care workers related to COVID-19 found that 40.6% of them had poor prevention practices, 73.1% of the participants used regular hand washing with soap, and 64.4% used hand disinfectants, while the rules of social distancing and wearing masks were reported to be impractical by 55.8% and 44.2%, respectively.[19]

The COVID-19 outbreak requires more attention in Ethiopia as the health system has limited capacity to control the spread of pandemics compared to other parts of the world.[20] Prevention methods such as hand washing, wearing a protective mask, and good ventilation are expected to reduce the incidence and prevalence of the most common health problems, such as acute febrile illnesses, diarrhea, and respiratory diseases in low-income countries, including Ethiopia.[21]

Nursing is an important profession for patient care, and poor patient care has a direct impact on patient outcomes. Similarly, good nurse activity during an outbreak plays a positive role in improving recovery rates, reducing hospital stays and mortality, and preventing hospital infections and occupational exposure.[22,23] Lack of knowledge and attitudes by nurses about the disease results in a delayed effect on supportive care and contributes to increasing the spread of the pandemic.[24,25] The Federal Democratic Republic of Ethiopia Ministry of Health in collaboration with WHO and the Centers for Disease Control and Prevention (CDC) trained nurses on the prevention and control of COVID-19, but the pandemic is still not under control. The worldwide and Ethiopian controlling measures, such as hand hygiene, wearing PPE, patient isolation, and social distancing in compliance with nursing staff are influenced by many factors,[26,27] such as age, gender, work experience, educational level, and marital status.

Nurses are highly vulnerable professionals during the COVID-19 pandemic preventions and control work and they face work-related risks in caring for sick patients due to the unique nature of patient contact. Since coronavirus is a contagious disease that is very fatal and does not contain appropriate medication, there is a risk to the health and life of nurses.[28] Transmission of the disease among nurses is associated with overcrowding in working areas, the absence of isolation room facilities, and environmental contamination. Incorrect practices while caring for patients directly increase the risk of infection. Understanding the level of prevention practices of nurses and possible associated factors help to predict the outcomes of planned behavior.[29] Therefore, this study aims to examine the preventive practices of nurses and factors related to COVID-19.

Methods and materials

Study area and period

The study was carried out in public and private hospitals of Bahir Dar City. Bahir Dar is the capital city of the Amhara Regional state and one of the leading tourist destinations in Ethiopia with a variety of attractions in nearby Lake Tana and the Blue Nile. In 2002, it was awarded the UNESCO Cities for Peace Prize for tackling the challenges of rapid urbanization. It is located at a distance of 565 km from Addis Ababa in the northwest directions of Ethiopia. The city has a total of 7 hospitals (3 public and 4 private hospitals) and 10 health centers to provide health services to a total population of 406,434 (202,404 males and 204,030 females).[30] In the above specified hospitals, there were 1002 nurses who engaged in the health care services provisions.

Study design, population, and period

An institution-based cross-sectional descriptive study design was used from 26 March to 8 April 2021 to assess the practices and its associated factors of nurses toward COVID-19 prevention and control in public and private hospitals. All the nurses who are working in public and private hospitals of Bahir Dar City were the source population and all nurses who are working in public and private hospitals in Bahir Dar City and randomly selected and included the study were the study population. Nurses who were present at the time of data collection and working in public and private hospitals were selected and included in the study. Those nurses who had working experience of fewer than 6 months in the study institutions and were non-willing to participate were excluded from the study.

Study variables

The outcome variable was the proportion of practices of nurses toward COVID-19 prevention. Independent variables were age, gender, religion, ethnicity, income, marital status, educational level, worker experience, working departments, training on COVID-19, availability of water, soap, and PPE, isolation center, accessibility of disinfectant solution, support through organization, knowledge, and attitude of nurses toward COVID-19.

Operational definitions of the variables

Good knowledge: The one who answered ≥80% of COVID-19 prevention practice–related 27 questions.

Poor knowledge. The one who answered less than 80% of COVID-19 prevention practice–related 27 questions. Eighty percent as a cut-off point was considered because the study participants work in the health care sectors.[31]

Favorable attitude. The one who answered ≥75% of COVID-19 prevention practice–related 17 questions. The score was based on a 5-point Likert-type scale, with a rating from 1 to 5 from strongly disagree to strongly agree. Consider the cut-off point ≥75%, a value for agree and strongly agree.

Unfavorable attitude. The one who answered less than 75% of COVID-19 prevention practice–related 17 questions. A value of less than 75% was considered as an answer for strongly disagree, disagree, and neutral.[32]

Good practice. The one who answered ≥75% of COVID-19 prevention practice–related 20 questions. The evaluation of the practice was based on a 5-point scale, with a rating of 1–5 from never to always. Answering (always or mostly or sometimes) was considered.

Poor practice. The one who answers less than 75% of COVID-19 prevention practice–related 20 questions. Never or occasionally answers suggested poor practice. Consider the severity of the condition, and the study population are health professionals[32]

Personal Protective Equipment. This is equipment worn to minimize exposure to COVID-19, including N95, surgical mask, face shield, glove, apron, overcoat, traditional local made clothes, and others.

Sample size determination and sampling procedures

The sample size for the first objective was determined using the single population proportion formula and considering the following assumptions: 95% confidence level, 5% significance level, and 67% prevalence of good practices of nurses toward COVID-19 prevention according to the study findings done in the northern parts of Ethiopia.[17] Considering the above assumptions, a sample size of 340 was calculated as appropriate. The sample size for the second objective was determined by assuming that training brings a 10%–15% difference between those who get the training and those who do not get the training. Since there is no similar study in the area on nurses' prevention practices on COVID-19, 50% good prevention practices for those who get the training and 40% for those who do not get the training were considered. Following this and the assumptions of 95% confidence level, 80% power of the study, 1.5 adjusted odds ratio (AOR), and 1:1 ratio for the two groups, the calculated sample size becomes 816. However, the size of the total study population in the study area was less than 10,000 and a correction formula was implemented, and the final sample size with a 10% non-response rate becomes 442. This is higher than the sample size estimated for the first objective and taken as the study sample for both objectives. Regarding sampling procedure, first, the total estimated sample size was stratified and distributed to each hospital based on their number of nurses. Then, the sampling frame for each hospital was prepared by recording the nurses from different wards, and this record was used as sampling frame. Finally, the required respondent was selected using stratified following simple random sampling from each hospital.

Data collection tools and procedures

Structured and self-administered questionnaire was prepared and used to collect the necessary data. The questionnaire consisted of sociodemographic, facility-related, knowledge, attitude, and practice-related questions. It was prepared in English and translated into the local language (Amharic) and back into English to check its consistency. Questions were adapted from different published articles[17,32,33] with adjustments to the local context. For the Likert-type scale, agreements (strongly disagree, disagree, neutral, agree, and strongly agree) for knowledge and (never, occasionally, sometimes, mostly, and always) for practice were used. The pretest was carried out with 5% of the total sample size in other health facilities in the study area. Based on the pretest, necessary modifications and adjustments were made before the actual data collection. Two clinical nurses facilitated and assisted the respondents at the time of responding to the questions when they have faced unclarity. In addition, the principal investigator followed critically and checked the completeness of the questionnaires.

Statistical analysis

The collected data were checked for completeness and consistency, and then coded, entered, and corrected with the SPSS version 25 software. A descriptive data analysis was carried out to display the means, standard deviations, and proportions of sociodemographic characteristics and prevention practices. Bivariate and multivariable binary logistic regression analyses were performed to identify factors associated with the preventive practices of nurses against COVID-19. During multivariable binary logistic regression analysis, the model fitness was checked with the Hosmer–Lemeshow goodness-of-fit test. Variables with a p-value <0.2 in the bivariate analysis were considered as candidate variables for multivariable logistic regression analysis and used to fit the multivariable model to control the confounding effect. Multivariable logistic regression analysis was used to identify factors significantly associated with prevention practices of nurses toward COVID-19, and the result is reported with AOR and 95% confidence interval (CI). The level of significance is declared at p-value <0.05.

Ethical approval and consent to participate

Ethical approval and clearance was obtained from GAMBY Medical and Business College Ethical Review Committee with ethical review committee decision number GCo-277/2013, and the Amhara Public Health Institution wrote support letter to each of the study hospital. Written informed consent was obtained from the study participants and attached with the first page of the questionnaire. Study participants were also informed about the study that they have full rights not to participate in the study if they are not ready. To ensure confidentiality, anonymity was clearly explained to the participants. At the time of data collection, the rules to prevent COVID-19 infections were strictly followed: social distancing, hand washing, putting on a face mask, and using hand sanitizer.

Results

Sociodemographic characteristics of the participants

In this study, from the total 442 samples determined, 431 (with a response rate of 97.5%) gave a complete response. The mean ($\pm$standard deviation) age of the study participants was 29.33 ($\pm$5.62) with a minimum of 20 years and a maximum of 54 years. From the total participants, 217 (50.3%) were females, 239 (55.5%) had training on COVID-19 prevention, 341 (79.1%) had an educational qualification of degree, 348 (80.7%) had a monthly income greater than or equal to 5000 birrs, 225 (52.2%) were married participants, and 245 (56.8%) had less than 5 years of work experience (Table 1).

Facility-related characteristics

In this study, 70.8% of participants stated that there was no adequate access to PPE, whereas 62.2%, answered that sufficient disinfectant solutions were available. More than 60% of the participants were aware of the availability of IP guidelines on the workstations (Table 2)

Knowledge of study participants about COVID-19

In this study, the proportion of participants who had a good knowledge level about COVID-19 was 85.8% (95% CI: 83%–89%). All participants (431 (100%)) heard about COVID-19 and their sources of information were social media 402 (93.3%), followed by training (181 (42.0%)). Most nurses (400 (92.8%)) were familiar with the causative agent of COVID-19 and stated that COVID-19 can be transmitted through breathing and 396 (91.9%) stated that fever is the most common clinical presentation of coronavirus (Table 3).

The attitude of study participants about COVID-19

The level of favorable attitude was 75.2% (95% CI: 71%–79%), while unfavorable attitude was 24.8%. In this study, 51.3% of nurses strongly agreed to the immediate isolation of COVID-19 patients to prevent the transmission of infection

Table 1. Sociodemographic characteristics of study participants in public and private hospitals of Bahir Dar City, Northwest Ethiopia, 2021 (*n* = 431).

Variables	Categories	Frequency	Percent
Age	<34 years	263	61.0
	≥34 years	168	39.0
Gender	Male	214	49.7
	Female	217	50.3
Ethnicity	Amhara	422	97.9
	Oromo	8	1.9
	Tigrie	1	0.2
Marital status	Single	198	45.9
	Married	225	52.2
	Divorced	7	1.6
	Widowed	1	0.2
Monthly income	≤3000	14	3.2
	3001–4999	69	16.0
	≥5000	348	80.7
Work experience	<5 years	245	56.8
	5–10 years	125	29.0
	>10 years	61	14.2
Education	Diploma	69	16
	Degree	341	79.1
	Masters	21	4.9
Get training	Yes	181	42.0
	No	250	58.0

Table 2. Facility-related characteristics in public and private hospitals of Bahir Dar City, Northwest Ethiopia, 2021.

Variables	Categories	Frequency	Percent
PPE access	Yes	126	29.2
	No	305	70.8
Disinfectant access	Yes	268	62.2
	No	163	37.8
Avail IP guideline	Yes	265	61.5
	No	166	38.5
Workload presence	Yes	278	64.5
	No	153	35.5
Comfortable mask	Yes	181	42.0
	No	250	58.0
Facility helps	Yes	290	67.3
	No	141	32.7
Avail masks	N95	47	10.9
	Surgical	365	84.7
	Other	19	4.4

PPE: personal protective equipment; IP: infection prevention.

from one person to another. One hundred ninety-seven (45.7%) nurses strongly agreed that nurses could get COVID-19 (Table 4).

The practice level of study participants about COVID-19

The proportion of nurses who had good IP practices toward COVID-19 was found to be 39.4% (95% CI: 35%–44%).

One hundred seventeen (27.1%) nurses have never worn face masks when leaving home, 134 (31.1%) nurses always removed PPE carefully after it was used, and 161 (37.4%) always used soap to wash hands and face. Most of the time, 137 (31.8%) avoided touching face with unwashed hands, and 113 (26.2%) never practiced social distancing (at least 1 m distance from others) while walking; it was also only 164 (38.1%) nurses who disposed of the used tissue during sneezing properly to the dustbin (Table 5).

Table 3. Knowledge of nurses about COVID-19 in public and private hospitals of Bahir Dar City, Northwest Ethiopia, 2021 ($n = 431$).

Variables	Category	Frequency	Percent
Level of knowledge	Good	370	85.8
	Poor	61	14.2
Heard about COVID-19	Yes	431	1000
Source of information about COVID-19	Social media	402	93.3
	TV/radio	294	68.2
	Friends	247	57.3
	Training	181	42.0
Cause of COVID-19	Viral	400	92.8
	Bacterial	15	3.5
	Protozoa	5	1.2
	Fungal	4	0.9
	I do not know	7	1.6
Means of transmission	By breathing	400	92.8
	Physical contact	344	79.8
	Coughing and sneezing	343	79.6
	I do not know	12	2.8
Signs and symptoms	Fever	396	91.9
	Sore throat	358	83.1
	Cough	400	92.8
	Shortness of breathing	336	78.0
	I do not know	5	1.2
COVID-19 sample is taken from	Oropharyngeal	401	93.0
	Nasopharyngeal	348	80.7
	Blood	304	70.5
Who will take samples	Laboratory expert	431	100
	Trained personnel	306	71.0
The incubation period of COVID-19	<1 week	40	9.3
	1–2 weeks	31	71.9
	>2 weeks	60	13.9
	I do not know	21	4.9
COVID-19 like SARS-CoV and MERS-CoV	Yes	237	55.0
	No	90	20.9
	I do not know	104	24.1
COVID-19 same as common cold	Yes	270	62.6
	No	151	35.0
	I do not know	10	2.3
COVID-19 confirmed by laboratory test	Yes	393	91.2
	No	34	7.9
	I do not know	4	0.9
COVID-19 transmitted without symptoms	Yes	354	82.1
	No	54	12.5
	I do not know	23	5.3
Old-age risk of developing the infection	Yes	413	95.8
	No	16	3.7
	I do not know	2	0.5
Comorbidity risk of developing an infection	Yes	405	94.0
	No	12	2.8
	I do not know	14	3.2
HCW risk of acquiring the infection	Yes	424	98.4
	No	7	1.6
Admitted with COVID-19 patient is risk	Yes	408	94.7
	No	16	3.7
	I do not know	7	1.6

(Continued)

Table 3. (Continued)

Variables	Category	Frequency	Percent
Crowded places at risk of getting COVID-19	Yes	418	97.0
	No	11	2.6
	I do not know	2	0.5
COVID-19 can cause serious illness	Yes	413	95.8
	No	12	2.8
	I do not know	6	1.4
Isolate and treat COVID-19 patient	Yes	397	92.1
	No	28	6.5
	I do not know	6	1.4
Vaccines are available for COVID-19	Yes	431	100

COVID-19: coronavirus disease; SARS-CoV: severe acute respiratory syndrome coronavirus ; MERS-CoV: Middle East respiratory syndrome corona-virus; HCW: health care workers.

Table 4. Attitude of nurses toward COVID-19 in public and private hospitals of Bahir Dar City, Northwest Ethiopia, 2021.

Variables	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	N (%)	N (%)	N (%)	N (%)	N (%)
COVID-19 patients immediately isolated	32 (7.4)	30 (7.0)	11 (2.6)	137 (31.8)	221 (51.3)
Transmitted by coughing and sneezing	20 (4.6)	18 (4.2)	17 (3.9)	128 (29.7)	248 (57.5)
Nurses can get the disease	23 (5.3)	29 (6.7)	34 (7.9)	148 (34.3)	197 (45.7)
Other health professionals get COVID	21 (4.9)	24 (5.6)	26 (6.0)	178 (41.3)	182 (42.2)
Washing hands and face with water	22 (5.1)	27 (6.3)	24 (5.6)	186 (43.2)	172 (39.9)
Washing hands with antiseptics and sanitizers	22 (5.1)	21 (4.9)	18 (4.2)	172 (39.9)	198 (45.9)
Antibiotics prevent COVID-19	119 (27.6)	126 (29.7)	51 (11.8)	70 (16.2)	63 (14.6)
Restricting travel of COVID-19 patients	26 (6.0)	41 (9.5)	32 (7.4)	179 (41.5)	153 (35.5)
Prevent movement of healthy people	22 (5.1)	29 (6.7)	32 (7.4)	181 (42.0)	167 (38.7)
Avoiding touching the face reduces the risk	22 (5.1)	17 (3.9)	15 (3.5)	148 (34.3)	229 (53.1)
COVID-19 information for nurses	24 (5.6)	18 (4.2)	30 (7.0)	143 (33.2)	216 (50.1)
Vaccine reduces COVID-19 speared	34 (7.9)	38 (8.8)	78 (18.1)	159 (36.9)	122 (28.3)
Nurses take vaccine than others	22 (5.1)	57 (13.2)	59 (13.7)	149 (34.6)	144 (33.4)
COVID-19 patient kept in isolation ward	23 (5.3)	21 (4.9)	19 (4.4)	145 (33.6)	223 (51.7)
Health care supplies to prevent	83 (19.3)	93 (22.5)	43 (10.0)	124 (28.8)	84 (19.5)
Nurses' role to prevent COVID-19	25 (5.8)	38 (8.8)	26 (6.0)	158 (36.7)	184 (42.7)
Can Ethiopia control COVID-19	67 (15.5)	99 (23.0)	85 (19.7)	116 (26.9)	64 (14.8)

COVID-19: coronavirus disease.

Associated factors toward COVID-19 preventive practices

In the bivariate analysis, gender, educational status, training, working hospitals, access to PPE, availability of guidelines for IP, access to disinfectant, workload, organizational support, and favorable attitude were the identified candidate variables for multiple logistic regression. Gender, have got training, access to PPE, the presence of IP guidelines, and favorable attitudes were the variables significantly associated with nurses' infection preventive practices against COVID-19.

The odds of female nurses to practice IP toward COVID-19 was 1.77 times higher than the odds of male nurses (AOR = 1.77, 95% CI: 1.18–2.68, p = 0.006). The odds of a nurse having training on COVID-19 prevention and control was 1.65 times higher to perform prevention practices of COVID-19 than the odds of a nurse having no training (AOR = 1.65, 95% CI: 1.10–2.48, p = 0.016). The odds of nurses accessing PPE increased by 57% to have good prevention practices of COVID-19 than the odds of nurses who have not accessed it (AOR = 1.57, 95% CI: 1.01–2.44, p = 0.044). Similarly, the odds of nurses accessing IP guidelines in the working sites was 1.63 times higher to have good COVID-19 prevention practices than the odds of nurses who have not accessed the IP guideline in the working sites (AOR = 1.63, 95% CI: 1.06–2.49, p = 0.025). The odds of nurses who have a favorable attitude toward COVID-19 prevention was 2.05 times higher to have good prevention practices than the odds of nurses who have an unfavorable attitude (AOR = 2.05, 95% CI: 1.25–3.36, p = 0.005), whereas variables like educational status, type of organization (public

Table 5. Practice of nurses toward COVID-19 in public and private hospitals of Bahir Dar City, Northwest Ethiopia, 2021 ($n=431$).

Variables	Never	Occasionally	Sometimes	Most of the time	Always
	N (%)	N (%)	N (%)	N (%)	N (%)
Wear mask when leaving home	117 (27.1)	48 (11.1)	99 (23.0)	98 (22.7)	69 (16.0)
Remove PPEs carefully	13 (3.0)	40 (9.3)	92 (21.3)	152 (35.5)	134 (31.1)
Put used tissues during sneezing in the dustbin	26 (6.0)	38 (8.8)	93 (21.6)	164 (38.1)	110 (25.5)
Put face masks after use safely	29 (6.7)	38 (8.8)	57 (13.2)	159 (36.9)	148 (34.3)
Put isolation gowns in dustbin	66 (15.3)	39 (9.0)	78 (18.1)	118 (27.4)	130 (30.2)
Seated in distance in transportation	124 (28.8)	74 (17.2)	80 (18.6)	86 (20)	67 (15.5)
Social distancing while walking	113 (26.2)	75 (17.4)	92 (21.3)	84 (19.5)	67 (15.5)
Use soap to wash hands and face	5 (1.2)	43 (10.0)	84 (19.5)	138 (32.0)	161 (37.4)
Use sanitizers to clean your hand	6 (1.4)	44 (10.1)	102 (23.7)	139 (32.3)	140 (32.5)
Avoid contact having cough out of the working area	20 (4.6)	61 (14.2)	91 (21.1)	139 (32.3)	120 (27.8)
During interaction with COVID-19 patient wear the necessary PPE	32 (7.4)	58 (13.5)	65 (15.1)	119 (27.6)	157 (36.4)
Hand hygiene before touching the patient	24 (5.6)	56 (13.0)	95 (22.0)	122 (28.3)	134 (31.1)
Hand hygiene after touching the patient	12 (2.8)	45 (10.4)	67 (15.5)	144 (33.4)	163 (37.8)
Hand hygiene after touching the surrounding patient	21 (4.9)	45 (10.4)	90 (20.9)	142 (32.9)	133 (30.9)
Gone to crowded place in the last 14 days	62 (14.4)	61 (14.2)	99 (23.0)	109 (25.3)	100 (23.2)
Disinfect rooms before work	45 (10.4)	68 (15.8)	107 (24.8)	110 (25.5)	101 (23.4)
Disinfect rooms after work	48 (11.1)	67 (15.5)	106 (24.6)	106 (24.6)	104 (24.1)
Avoid touching face with unwashed hands	33 (7.7)	40 (9.3)	104 (24.1)	137 (31.8)	117 (27.1)
Frequency of used glove	30 (7.0)	55 (12.8)	100 (23.2)	132 (30.6)	114 (26.5)
Frequent of hand rap	16 (3.7)	50 (11.6)	91 (21.1)	146 (33.9)	128 (29.7)

COVID-19: coronavirus disease 2019; PPE: personal protective equipment.

or private), accessing PPEs, workload, and availability of disinfectants have no significant association with IP practices of nurses toward COVID-19 (Table 6).

Discussion

This study assessed the prevention and control practices of nurses and identified factors associated with these practices toward COVID-19 in public and private hospitals of Bahir Dar City. The result of this study is crucial to nurses, health officials, regional health bureau, Bahir Dar City private and public hospital leaders, and research communities in the area of prevention and control of COVID-19 spread.[32] This is because nurses are at the forefront of the COVID-19 prevention system and are at the highest risk of acquiring the infection and spreads it to their families and the community at large.[34]

According to the result of the study, only 39.4% (95% CI: 35%–44%) of the nurses had good prevention and control practices toward COVID-19. This finding is comparable with findings from the Gamo Zone, southern Ethiopia[18] and Gondar, Northwest Ethiopia that were done on health care workers,[20] but higher than findings from residents of Gedeo zone, southern Ethiopia.[35] This difference might be because the research in Gedeo zone focused on all residents in addition to nurses. However, it is lower than the results from Aksum, the Northern part of Ethiopia,[17] Egypt,[16] Bangladesh,[12] and Lebanon.[13] The differences might be the timing of the previous studies when COVID-19 was on its

onset and the participants emphasized more and worried about the pandemic. The other reason for this difference might be associated with socioeconomic status of the counties in which the specified countries are found at the better socioeconomic status compared to Ethiopia. This is to mean that the economic status could influence the availability and accessibility of preventive devices and information, which in turn affect the prevention and control practices.

In this study, COVID-19 prevention and control practice was significantly associated with gender, getting training on COVID-19 prevention and control, access to PPE, availability of IP guidelines and positive attitude. Female nurses follow good preventive practices compared to males. This finding agrees with studies in Oman and Saudi Arabia[14,36] where females implemented good prevention and control practices than males. Similarly, another study in Uganda found that women are better at implementing prevention measures against the coronavirus.[37] This could be due to the responsibility of women in looking after children and families, which may lead them to be more careful in implementing prevention practices.

On the contrary, a study done on health workers in Ilu Aba Bor and Buno Bedelle zones, southwestern Ethiopia[38] reported that males are better to implemented COVID-19 prevention practices than females. Another finding among health workers in India showed that men better promoted infection prevention and control behavior compared to women.[6,39] This may be due to sociodemographic characteristic differences between Ethiopia and India, which might

Table 6. Associated factors of nurses' preventive practice toward COVID-19 in public and private hospitals of Bahir Dar City, Northwest Ethiopia, 2021 (*n* = 431).

Variables	Practice level		COR (95% CI)	AOR (95% CI)
	Good	Poor		
Gender				
Female	98	119	1.62 (1.10–2.2.39)	1.77 (1.18, 2.68)**
Male	72	142	1.00	1.00
Education				
Diploma	34	35	1.00	
Degree	127	214	0.61	0.62 (0.36, 1.07)
Master	9	12	0.77	0.64 (0.23, 1.81)
Training				
Yes	83	98	1.59 (1.07–2.35)	1.65 (1.10, 2.48)**
No	87	163	1.00	1.00
Organization				
Public	136	224	0.66 (0.39–1.10)	0.79 (0.46, 1.35)
Private	34	37	1.00	1.00
PPE access				
Yes	61	65	1.69 (1.11–2.57)	1.57 (1.01, 2.44)*
No	109	196	1.00	1.00
IP guideline				
Yes	120	145	1.92 (1.27–2.89)	1.63 (1.06, 2.49)*
No	50	116	1.00	1.00
Disinfectant avail				
Yes	118	150	1.68 (1.12–2.53)	1.33 (0.86, 2.07)
No	52	111	1.00	1.00
Workload				
Yes	116	162	1.31 (0.87–1.98)	1.03 (0.66, 1.59)
No	54	99	1.00	1.00
Hospital help				
Yes	122	168	1.41 (0.93–2.14	1.12 (0.72, 1.76)
No	48	93	1.00	1.00
Level of attitude				
Favorable	139	185	1.84 (1.15–2.95)	2.05 (1.25, 3.36)**
Unfavorable	31	76	1.00	1.00

COR: crude odds ratio; CI: confidence interval; AOR: adjusted odds ratio; PPE: personal protective equipment; IP: infection prevention.
*$p < 0.05$; **$p < 0.01$.

have impact on the implementation of prevention and control practices.

Nurses trained on coronavirus prevention had good practice than those untrained; this is supported by a previous study conducted on factors determining the knowledge and prevention practice of health workers in Ethiopia[32,40] and India[39] where nurses who have been trained had a good practice on COVID-19. This is an expected fact in that those who had training ought to improve infection prevention practices.

The presence of PPE in hospitals is positively associated with prevention and control practices of nurses against COVID-19. These results are supported by an earlier study on health workers[38,39] which reported that the availability of PPE was a predictor of improvements in the prevention practice of nursing staff.

The availability of infection prevention guidelines in working wards is a good interpreter of improving nurses' prevention practices, and this finding is strengthened by the result from knowledge and preventive practices toward COVID-19 and associated factors among health care workers in selected health facilities of Ilu Aba Bor and Buno Bedelle Zones, Southwest Ethiopia.[38] This is because, when there are reference manuals on the working stations, nurses have the opportunity to read more and improve their prevention practices.

Furthermore, nurses who have a favorable attitude toward COVID-19 prevention and control practices were more likely to implement it. This finding is in line with studies conducted on knowledge, attitude, and practice of nurses in China, which states that nurses who have a favorable attitude are more likely to exercise preventive practices.[41]

As a limitation, this study included only nurses who worked in Bahir Dar City hospitals, leaving other professionals and health facilities; therefore, the result cannot apply to other categories of health professionals like physicians,

pharmacies, laboratories, and the likes and facilities, such as health centers, clinics, and health posts. The study also failed to consider proper hand washing practices, disposal of used items, and use of face mask. These can have limitations in the generalizability of the research results if one considers all the nursing staff in this area. Since this study is a one-time study, it has the limitations of establishing a cause-and-effect relationship as a cross-sectional study.

Conclusion

In this study, it is found that more than 60% of the nurses in Bahir Dar City public and private hospitals had poor prevention and control practices to limit the spread of COVID-19. Gender, access to training on COVID-19, access to personal preventive equipment, access to infection prevention manuals, and favorable attitudes were significantly associated factors of nurses' prevention practices toward COVID-19. Therefore, continuous training on COVID-19 prevention practices, availing infection prevention guidelines in the working wards, improving their attitudes by providing different training, and consistently providing PPE for proper intervention are very mandatory.

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