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ABSTRACT

INTRODUCTION: Infection prevention (IP) is a practical and scientifically supported technique to prevent avoidable infections. The effectiveness of IP techniques applied will depend on the knowledge, attitudes, and behaviors of healthcare professionals.

OBJECTIVE: This study aimed to assess the knowledge, attitude, and practice (KAP) of IP and its associated factors among healthcare professionals at Mizan-Tepi University Teaching Hospital (MTUTH) in southwest Ethiopia.

METHODS: A cross-sectional survey was conducted from September 1 and 15, 2021 among 196 healthcare professionals at MTUTH in south-west Ethiopia. The knowledge, attitude and practice outcome variables were measured using 13, 13, and 12 questions respectively. A logistic regression analysis was used. The level of significance was declared at a $P < .05$.

RESULTS: The level of good knowledge, favorable attitude, and good practice of IP were 71.9%, 63.8%, and 53.6% respectively. Being a GP/specialist [adjusted odds ratio (aOR) = 10.6, 95% CI (2.13-52.9)] and the presence of an IP manual at work [aOR = 3.43, 95% CI (1.33-8.82)] were factors connected with good IP knowledge. The presence of sufficient PPE in the work area [aOR = 2.73, 95% CI (1.36-5.50)] and IP training [aOR = 3.05, 95% CI (1.28-7.29)] were factors associated with a favorable attitude toward IP. Good IP practice was linked to having enough personal protective equipment (PPE) in the workplace [aOR = 3.63, 95% CI (1.71-7.72)] and having good IP knowledge [aOR = 3.08, 95% CI (1.39-6.86)].

CONCLUSION: The level of KAP of IP among study participants was poor. The provision of adequate PPE, IP manuals and in-service training will help to improve the KAP of healthcare professionals toward IP. Therefore, the hospital management authority and other concerned stakeholders like local NGOs and regional health bureau should provide consistent support to the health professionals in terms of training, resources, and infrastructure to improve and integrate universal precaution in everyday services.

KEYWORDS: Infection prevention, healthcare professionals, knowledge, attitude, practice, MTUTH, Southwest Ethiopia

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Introduction

Infection prevention (IP) is a realistic and evidence-based strategy to prevent unnecessary infections harming patients and healthcare professionals.[1-3] As well as ensuring patient safety, it raises universal health coverage standards.[4] Healthcare professionals (HCPs) can be exposed them to infectious body fluids, and blood, and body parts.[5,6] It is also common for them to be exposed to microorganisms that can cause serious and even fatal illness.[7,8]

A nosocomial infection is an infection that develops while receiving medical treatment but is absent upon admission.[9,10] Health-related nosocomial infections are on the rise worldwide.[9,11-13] The rate of healthcare-acquired infections (HAIs) ranges from 5.7% to 19.2% in low-income nations, whereas it is 7.5% in high-income ones.[14] In some countries in Europe and the United States, nosocomial infections are less than 1%, while in Asia, Latin America, and Sub-Saharan Africa they are more than 40%.[15] It is estimated that between 3% and 15% of hospital inpatients in Africa have HAIs[16] and it is found between 1.6% and 28.7% in Sub-Saharan Africa.[17] The overall HAI prevalence in Ethiopia was 16.96%.[18] The prevalence of HAI is highly dependent on the type of hospital ward or unit. For example, intensive care units typically see a much higher rate of HAI compared with general wards.[10,19-21]

Patients, healthcare professionals, and communities are at risk when IP measures are not well implemented.[11] It is essential for all medical professionals to practice IP to protect their health and to decrease nosocomial infections, thereby increasing patient safety.[22,23] Risks to HCPs are always present, including infections from infectious patients, although risks can be minimized by properly following an IP strategy.[24] How well IP methods are used depends on HCP knowledge, attitudes, and behaviors.[25] The proportion of good knowledge of IP among Ethiopian studies ranged from 50.9% to 99.3%.[4,25-30] The proportion of positive attitude among Ethiopian studies ranged from 40.8% to 93.4%.[4,27-29] The proportion of good practice of IP among Ethiopian studies ranged from 36% to 66.1%.[4,25-33]

In accordance with some studies, factors that are related to having good knowledge of IP include age, sex, the presence of IP guidelines, participation in IP training, having 5 years or more of work experience, and working in a maternity unit.[25,34-37] Sex, occupation, work history, working in an emergency room, knowing that an IP committee exists, having previously experienced HAIs, handling high-risk medical wastes—all of these factors were strongly associated with safe infection control procedures.[13,26,35]

The overall impact of HAIs in Ethiopia has received relatively little consideration.[38] In many healthcare facilities, managing the risk of nosocomial infections is difficult due to IP. This is due to the fact that control techniques for IP and patient safety in healthcare facilities will surely require resources, staff, training, policies, and standards.[39,40] A crucial initial step in creating and executing an effective infection control program is determining the current infection control KAPs among healthcare professionals.[41,42] For providing high-quality healthcare, knowledge of the relevant evidence-based recommendations is required.[37] Nurses' ignorance of the guidelines may contribute to a lack of adherence to the evidence-based recommendations for avoiding infections.[43,44]

Ethiopia's Federal Ministry of Health (FMoH) developed standards and recommendations for IP,[40] however, the implementation of IP is still not well applied in many health institutions.[45] Although there are fragments of evidence about the KAP of IP in Ethiopia,[4,25-33] nearly all research was carried out in northern and central Ethiopia, which is geographically distant from the current study area and has very different staff profiles, infrastructures, training programs, and financial support. Furthermore, as far as I am aware, no one research has been conducted in south-west Ethiopia. According to the MTUTH annual report on its health information management system, the implementation of IP is neglected, and demonstrated by a higher prevalence of HAIs.[46] For devising appropriate IP strategies, information of health professionals' KAP of IP is of paramount importance. Therefore, this study aimed to assess the KAP of IP and its associated factors among healthcare professionals at MTUTH in southwest Ethiopia.

Methods

Study design

A cross-sectional study.

Study setting

A hospital-based survey was carried out at MTUTH in south-west Ethiopia. MTUTH was established in 1986 and is one of the older hospitals in the Federal Democratic Republic of Ethiopia, found in Bench Sheko zone, southwest Ethiopia. It is situated 585 km south-west of Ethiopia's capital city of Addis Ababa. The hospital is one of the busiest in south-west Ethiopia, treating many patients for improved health and offering a variety of medical services to the local populace. The hospital received referrals and provided services for both the Gambella and south-west Ethiopia regions in Ethiopia. The hospital offers specialized obstetric/gynecological, pediatric, surgical, and medical services.

Study period

The study was conducted from September 1 to September 15, 2021.

Populations

All healthcare professionals in the hospital were the source population. The study population consisted of randomly selected healthcare professionals. All healthcare professionals who work for at least 6 months in the direct treatment of patients at Mizan-Tepi University Teaching Hospital—specialists, general practitioners, health officials, midwives, nurses, X-ray technicians, pharmacists, and medical laboratory technicians—were included. Healthcare professionals who were seriously ill, and on annual leave during data collection and not willing to participate in the survey were excluded.

Sample Size Determination

The sample size was determined using a single population proportion formula based on the following assumptions: the level of KAP of IP among healthcare professionals to be 50% (since there is no previous study done in the area related to the topic), 95% confidence level, and 5% margin of error. The calculated sample size was 384.

$$n = \frac{(Z\alpha/2)^2 p(1-p)}{d^2} = \frac{(1.96)^2 0.5(1-0.5)}{(0.05)^2} = 384$$

Since the total population is less than 10 000, the corrected sample size formula was used: $N = n/(1+(n/N)) = 384/(1+(384/333)) = 179$. After adding 10% to non-response compensation, the final sample size was 197.

Sampling Technique

Study participants were selected using a systematic random sampling technique. The staff list from the hospital record was used as a sampling frame. Then, the sampling interval (which was 2) was calculated by dividing the total staff number by the calculated sample size for the study. A random start from 1 and 2 (the first person to be included in the sample) was chosen randomly then it was 2. Finally, every 2 (sampling interval) healthcare professionals were recruited until the required sample size was obtained.

$$\begin{aligned} K\,(\text{sampling interval}) &= N\,(\text{source population}) \\ &\quad / n\,(\text{sample size}) \\ &= 333/197 = 1.69 \approx 2(\text{every two}) \end{aligned}$$

Study Variables

KAP of IP were dependent variables. Socio-demographic characteristics (age, sex, marital status, educational status, professional qualification, and work experience) and occupational factors (availability of sufficient PPE, availability of IP manuals, and availability of IP training) were independent variables.

Operational Definitions

Good knowledge was defined as healthcare professionals who answered ⩾70% of knowledge-based questions correctly, low scores were considered as poor knowledge.[27] Favorable attitude was defined as healthcare professionals who answer ⩾70% of attitude-related questions positively, low scores were considered as an unfavorable attitude.[27] Good practice was defined as healthcare professionals who properly practiced ⩾70% of practice-related questions, low scores were considered as poor practice.[27] Based on this cutoff value, a scoring system was used; 1 point was awarded for each correct response to good knowledge, favorable attitudes, and good practices. Meanwhile, poor knowledge, negative attitudes, and poor practices were given 0 points. Sufficient PPE: the availability of enough PPE for daily activity in the hospital wards/units. IP manual at work: the presence of recent and updated standard precautions documents with the minimum IP and control practices that must be always used for protecting all patients and healthcare professionals in the hospital wards/units. Taking IP training: if the health professional took IP training in the last 12 months regardless of the frequency of training.

Data Collection Instrument and Procedures

A self-administered structured questionnaire was developed after reviewing relevant literature. After preparing the English version it was translated first into Amharic and then back to English to keep its consistency. The questionnaires included questions about KAP toward IP as well as socio-demographic characteristics of the respondents. A university instructor who was a specialist in occupational health conducted the face validity study. Cronbach's alpha was used to assess the analyses' reliability, and the reliability coefficient was high (Cronbach's alpha: .82). A pretest was conducted on 5% of the study population who were not part of the actual data collection in Chena hospital before data collection commenced. The pre-test was used to assess whether the questionnaire measured what it was supposed to measure and to assess the presence of any ambiguous question in the questionnaire. Data collectors and supervisors were trained concerning the objective and process of data collection. They were also trained to discuss the presence of an ambiguous question in the questionnaire.

Data Processing and Analysis

SPSS version 21 was used to input and analyze the data. Using tables, the categorical variables were presented and displayed as frequencies and percentages. Continuous variables were summarized using mean and standard deviation. Bivariate logistic regression analysis was used to pinpoint the independent factors connected to the dependent variables. The multivariable logistic regression analysis was conducted to control the confounding variables. The multivariable logistic regression model included independent variables with a *P*-value of $<.25$ in bivariate logistic regression analysis. The variance inflation factor (VIF) was determined to be acceptable (less than2) after the multicollinearity of the model's independent variables was examined. The model met the requirements for a good fit to the data, according to the Hosmer-Lemeshow goodness of fit test ($P=.456$). *P*-values $<.05$ were used to define significance levels.

Ethics Approval and Consent to Participate

The Mizan-Tepi University Ethical Review Committee approved the study. Ethical approval was given on 06/06/2021 with MTUERC/29/2021. The Declaration of Helsinki was followed when conducting this study. Participants were told of its aim, their freedom to decline participation, the study's anonymity, and data confidentiality. Participants in the study provided written informed consent.

Results

Sociodemographic characteristics and health facility factors

Of the 197 respondents recruited, 196 participated, resulting in a response rate of 99.5%. The mean age of the participants was 28.3 (±3.2 SD) with a range of ages from 24 to 43 years. The mean work experience was 3.1 (±2.2 SD) years, ranging from 1 to 13 years. One hundred fifty-nine (81.1%) and 148 (75.5%) of participants had IP training in the last 12 months and reported the presence of IP manual at their workplace, respectively (Table 1).

Knowledge of healthcare professionals about IP

All respondents knew how to use PPE and 174 (88.8%) knew wearing PPE reduces infection risk. One hundred twenty-four (63.3%) and 165 (84.2%) of the respondents were aware of the maximum number of supplies that should be kept in the safety box containing sharp medical supplies and WHO recommended maximum delay to start HIV post-exposure prophylaxis respectively (Table 2). The mean IP knowledge score was 9.8 (±1.6 SD) out of 13, ranging from 5 to 11. The level of good IP knowledge was 141 (71.9%) (Figure 1).

Healthcare professionals' attitude toward IP

One hundred eighty-seven (95.4%) and 183 (93.3%) of the respondents agreed occupational health and safety training is critical for healthcare professionals and healthcare professionals are at high risk of infection respectively. More than three-fourths (78.1%) of respondents disagreed regarding "needles should be capped after use" (Table 3). The mean IP attitude

Table 1. Sociodemographic characteristics and health facility-related factors among healthcare professionals in Southwest Ethiopia.

VARIABLES	CATEGORIES	FREQUENCY	PERCENT
Gender	Male	114	58.2
	Female	82	41.8
Age (y)	<29	137	69.9
	⩾29	59	30.1
Marital status	Unmarried	122	62.2
	Married	74	37.8
Professional qualifications	GP/Specialist	43	22
	Nurses and other allied health professionals	153	78
Working departments	Outpatient	51	26
	Ward	93	47.4
	Laboratory	10	5.1
	Emergency	37	18.9
	Others	5	2.6
Work experience (y)	<5	182	92.9
	⩾5	14	7.1
Sufficient PPE in the work area	Present	119	60.7
	Absent	77	39.3
IP manual at work	Present	148	75.5
	Absent	48	24.5
Taking IP training	Yes	159	81.1
	No	37	18.9

score was 35.2 (±3.6 SD) out of 13, ranging from 13 to 39. The level of positive attitude toward IP was 125 (63.8%) (Figure 1).

Healthcare professionals practice IP

One hundred seventy-five (89.3%) and 117 (59.7%) of respondents always wear gloves during risky procedures and use proper PPE during professional practice respectively. One hundred seventy-one (87.2%) and 153 (78.1%) of the respondents always practice proper disposal of clinical waste and change gloves between contacts with different patients respectively (Table 4). The mean IP practice score was 18 (±3.6 SD) out of 12, ranging from 12 to 30. Good IP practice was 105 (53.6%) (Figure 1).

Factors associated with the knowledge, attitude, and practice of IP

A multivariable logistic regression analysis was performed for controlling potential confounding variables. Being a General Practitioner (GP)/specialist [aOR = 10.6, 95% CI (2.13-52.9)] and having an IP manual at work [aOR = 3.43, 95% CI (1.33-8.82)] were factors linked to good IP knowledge (Table 5). The presence of sufficient PPE in the work area [aOR = 2.73, 95% CI (1.36-5.50)] and taking IP training [aOR = 3.05, 95% CI (1.28-7.29)] were factors associated with favorable attitudes toward IP (Table 6). Having good IP knowledge [aOR = 3.08, 95% CI (1.39-6.86)] and the presence of sufficient PPE in the work area [aOR = 3.63, 95% CI (1.71-7.72)] were factors linked to good IP practice (Table 7).

Discussion

HAIs are a factor in lengthened hospital stays, increased mortality, and increased healthcare expenses.[38] HAI prevention and management is a crucial public health issue.[35] Determining the present infection control KAPs among healthcare professionals is a critical first step in developing and implementing an effective infection control program.[41,47] Therefore, this study aimed to assess KAP of IP among healthcare professionals at MTUTH in southwest Ethiopia.

Table 2. Knowledge-related questions of IP among healthcare professionals in Southwest Ethiopia.

QUESTIONS	YES	NO
	N (%)	N (%)
Is occupational safety a problem for healthcare organizations?	143 (73)	53 (27)
Are healthcare professionals responsible for occupational health and safety?	186 (94.9)	10 (5.1)
Do you know how to use PPE?	196 (100)	0 (0)
Does wearing PPE reduce the risk of infection?	174 (88.8)	22 (11.2)
Do you know how to perform a risk assessment?	161 (82.1)	35 (17.9)
Do you know the transmission mechanisms of infectious agents?	184 (93.9)	12 (6.1)
Does washing hands before and after contact with patients reduce infection?	155 (79.1)	41 (20.9)
Are you aware of the risks of your working environment?	179 (91.3)	17 (8.7)
Do you know how to handle used needles and sharps safely?	181 (92.3)	15 (7.7)
Do you know about color coding segregation of healthcare wastes?	181 (92.3)	15 (7.7)
How maximum full should be the safety box with used sharp materials?	124 (63.3)	72 (36.7)
What is the WHO recommended maximum delay to start HIV post-exposure prophylaxis?	165 (84.2)	31 (15.8)
Is there any health hazard associated with healthcare waste?	172 (87.8)	24 (12.2)

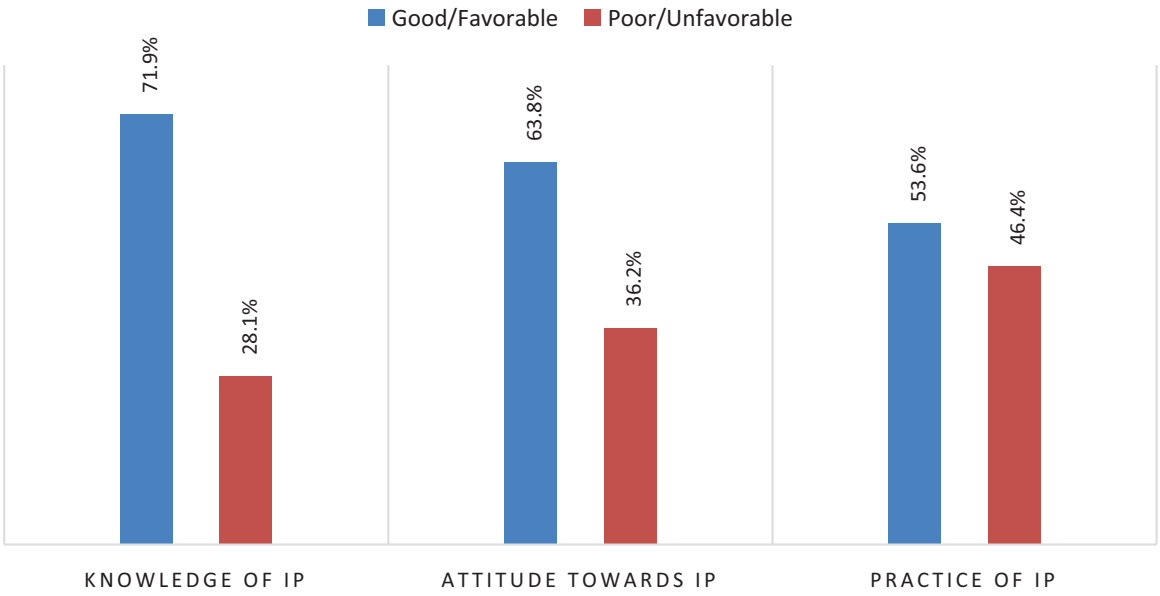

Figure 1. The KAP of IP status among respondents at MTUTH in southwest Ethiopia.

The level of good IP knowledge was 71.9%, 95% CI (65.6%-77.2%). This finding was consistent with 67.6% in Saudi Arabia[35] and 70.8% in Ethiopia.[25] This finding was lower than 86.4%,[48] 99.3%,[28] and 90%[27] found in other studies in Ethiopia. However, this finding was higher than 20.3% in Trinidad and Tobago,[7] 53.9% in Palestine,[8] 60.4% in Saudi Arabia,[13] 51.1% in Nigeria,[23] and 59.7% in Ethiopia.[4]

The level of favorable attitude to IP was 63.8%, 95% CI (57.1%-70.5%). This finding was consistent with 61.5% in Saudi Arabia[35] and 57.2% in Ethiopia.[27] This finding was lower than 78.6% in Nigeria[23] and 76.4%,[48] and 93.4%[28] studies in Ethiopia. However, this finding was higher than 46.7% in Trinidad and Tobago[7] and 40.8% in Ethiopia.[4]

The level of good IP practice was 53.6%, 95% CI (46.6%-60.6%). This finding was consistent with 47.7% in Nigeria[23] and 54.8%,[4] 55%,[25] 60.5%,[28] and 60.4%[26] studies in Ethiopia. This finding was lower than 91.1% in Palestine,[8] 73.2% in Saudi Arabia,[35] and 77% in Ethiopia.[48] However, this finding

Table 3. Attitude-related questions of IP among healthcare professionals in Southwest Ethiopia.

QUESTIONS	DISAGREE	NEUTRAL	AGREE
	N (%)	N (%)	N (%)
IP is important for healthcare organizations	61 (31.1)	120 (61.2)	15 (7.7)
Occupational health and safety training is important for healthcare professionals	4 (2)	5 (2.6)	187 (95.4)
Your healthcare environment may expose you to occupational hazards	12 (6.1)	15 (7.7)	169 (86.2)
Healthcare professionals are at high risk of infection	7 (3.6)	6 (3.1)	183(93.3)
All PPE should be accessible in the working department/section of the healthcare facility.	20 (10.2)	7 (3.6)	169 (86.2)
Individual workplace risk exposure should be considered a crisis for the community	31 (15.8)	30 (15.3)	135 (68.9)
Risk assessment is important for IP	10 (5.1)	6 (3.1)	180 (91.8)
Sharp materials should be discarded in a safety box	2 (1)	2 (1)	192 (98)
Needles should be recapped after use	153 (78.1)	40 (20.4)	3 (1.5)
If you didn't take the HBV vaccine before, are you willing to take it?	66 (33.7)	118 (60.2)	12 (6.1)
Wearing a facemask and eye goggles during procedures with aerosol production is mandatory	13 (6.6)	27 (13.8)	156 (79.6)
Vaccination for healthcare professionals is mandatory	11 (5.6)	7 (3.6)	178 (90.8)
Hepatitis B virus may be transmitted through biomedical wastes	17 (8.7)	17 (8.7)	162 (82.6)

Table 4. Practice-related questions of IP among healthcare professionals in Southwest Ethiopia.

QUESTIONS	ALWAYS	SOMETIMES	NEVER
	N (%)	N (%)	N (%)
When needed, how often do you use IP guidelines/manuals at your workplace?	61 (31.1)	120 (61.2)	15 (7.7)
How often do you wear gloves during risky procedures?	175 (89.3)	16 (8.1)	5 (2.6)
How often do you wash your hands with proper detergent after contact with patients/working time?	81 (41.3)	113 (57.7)	2 (1)
How often do you use proper PPE during your professional practice?	117 (59.7)	74 (37.7)	5 (2.6)
How often do you clean your working area after the end of the working shift?	72 (36.7)	103 (52.6)	21 (10.7)
How often do you monitor your working area waste management system?	81 (41.3)	91 (46.4)	24 (12.3)
How often do you practice separate disposal of healthcare wastes?	171 (87.3)	22 (11.2)	3 (1.5)
How often do you perform risk assessment in your working department/section?	93 (47.4)	78 (39.8)	25 (12.8)
How often do you change gloves between contacts with different patients?	153 (78.1)	40 (20.4)	3 (1.5)
How often do wash your hands after the removal of gloves?	66 (33.7)	118 (60.2)	12 (6.1)
How often do you recap used needles?	143 (73)	38 (19.3)	15 (7.7)
How often do you treat infectious wastes with disinfectants?	110 (56.1)	66 (33.7)	20 (10.2)

was higher than 44% in Trinidad and Tobago,[7] 24.6% in Saudi Arabia,[13] and 36% in Ethiopia.[27]

The variation observed between this, and other studies could be due to the difference in the sample size, number of questions and the operational definition used. The increment and decrement of the proportion of the outcome variables greatly depend on the sample size used. The number of questions used to measure the KAP of IP is not uniform across studies (some studies used as few as 5 questions, and some used as much as 22 questions). The use of different cut-off values to categorize the KAP of IP as good/favorable and poor/unfavorable was mentioned as a cause of the variation. Some studies used mean value as a cutoff value, some used median value as cutoff value and some others used percentage like 70%

Table 5. Factors associated with knowledge of IP among healthcare professionals in southwest Ethiopia.

VARIABLES	CATEGORIES	KNOWLEDGE OF IP		COR (95% CI)	AOR (95% CI)	*P*-VALUE
		POOR (N)	GOOD (N)			
Age	<29	42	95	1	1	
	⩾29	13	46	1.56 (0.77-3.20)*	0.92 (0.41-2.07)	0.836
Sex	Male	39	75	1	1	
	Female	16	66	2.15 (1.10-4.19)**	1.11 (0.51-2.44)	0.792
Professional qualification	GP/Specialist	2	41	10.9 (2.53-46.7)**	10.6 (2.13-52.9)	0.004
	Nurses and other allied health professionals	53	100	1	1	
Sufficient PPE in the work area	Present	26	93	2.16 (1.15-4.07)**	1.26 (0.57-2.81)	0.574
	Absent	29	48	1	1	
IP manual at work	Present	30	118	4.28 (2.14-8.56)**	3.43 (1.33-8.82)	0.011
	Absent	25	23	1	1	
Taking IP training	Yes	32	127	6.52 (3.02-14.1)**	2.34 (0.92-5.97)	0.075
	No	23	14	1	1	

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; GP, general practitioner; PPE, personal protective equipment.
*$P < .25$. **$P < .05$.

Table 6. Factors associated with attitude toward IP among healthcare professionals in southwest Ethiopia.

VARIABLES	CATEGORIES	ATTITUDE TOWARD IP		COR (95% CI)	AOR (95% CI)	P-VALUE
		UNFAVORABLE (N)	FAVORABLE (N)			
Marital status	Unmarried	38	84	1.78 (0.98-3.23)*	1.79 (0.89-3.57)	0.101
	Married	33	41	1	1	
Work experience (y)	<5	62	120	3.48 (1.12-10.8)**	1.97 (1.87-7.51)	0.320
	⩾5	9	5	1	1	
Knowledge of IP	Poor	25	30	1	1	
	Good	46	95	1.72 (0.91-3.25)*	1.52 (0.82-3.47)	0.152
Sufficient PPE in the work area	Present	30	89	3.38 (1.84-6.22)**	2.73 (1.36-5.50)	0.005
	Absent	41	36	1	1	
IP manual at work	Present	46	12	2.41 (1.24-4.69)**	0.92 (0.38-2.20)	0.843
	Absent	25	23	1	1	
Taking IP training	Yes	48	111	3.80 (1.80-8.01)**	3.05 (1.28-7.29)	0.012
	No	23	14	1	1	

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; PPE, Personal protective equipment.
*$P < .25$. **$P < .05$.

including this study as a cutoff value to categorize the KAP of IP as good/favorable and poor/unfavorable, while some previous studies used ⩾80% cut-off point).

GP/Specialists were 11 times more likely [aOR = 10.6, 95% CI (2.13, 52.9)] to know IP than other health professionals. This finding was consistent with studies conducted in Nigeria[23] and

Table 7. Factors associated with practice toward IP among healthcare professionals in southwest Ethiopia.

VARIABLES	CATEGORIES	PRACTICE OF IP		COR (95% CI)	AOR (95% CI)	*P*-VALUE
		POOR (N)	GOOD (N)			
Professional qualification	GP/Specialist	27	16	2.35 (1.67-4.71)**	1.99 (0.89-4.42)	0.093
	Nurses and other allied health professionals	64	89	1	1	
The attitude toward IP	Unfavorable	28	43	1	1	
	Favorable	63	62	0.64 (0.36-1.56)*	0.88 (0.45-1.73)	0.708
Knowledge of IP	Poor	14	41	1	1	
	Good	77	64	3.52 (1.77-7.03)**	3.08 (1.39-6.86)	0.006
Sufficient PPE in the work area	Present	68	51	3.13 (1.70-5.75)**	3.63 (1.71-7.72)	0.001
	Absent	23	54	1	1	
IP manual at work	Present	73	75	1.62 (0.83-3.16)*	1.60 (0.64-3.99)	0.317
	Absent	18	30	1	1	
Taking IP training	Yes	79	80	0.49 (0.23-1.03)*	1.19 (0.44-3.20)	0.728
	No	12	25	1	1	

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; GP, general practitioner; PPE, personal protective equipment.
*$P < .25$. **$P < .05$.

Saudi Arabia.[49] This could be due to GP/Specialists taking more infection-related courses than other healthcare professionals.[8,50]

Healthcare professionals who had an IP manual in their working room were 3times more likely [aOR = 3.43, 95% CI (1.33, 8.82)] to know IP than those who did not. This finding was consistent with a study done in Northeast Ethiopia.[25] This may be explained by the higher likelihood of receiving updated information for healthcare professionals with IP guides that increases their IP understanding. Nurses' ignorance of the guidelines may contribute to a lack of adherence to the evidence-based recommendations for avoiding infections.[44]

Healthcare professionals who had sufficient PPE in their working room were 3 times more likely [aOR = 2.73, 95% CI (1.36, 5.50)] to have a favorable attitude toward IP than those who did not. This finding was consistent with a study conducted in Jordan,[51] which revealed that the lack of PPE and inadequate infection control training associated with poor attitude toward IP. When there is a sense of a safe working environment (the availability of enough PPE), health professionals exhibit positive attitudes toward IP.[52]

Healthcare professionals who previously took IP training were 3 times more likely [aOR = 3.05, 95% CI (1.28-7.29)] to have a favorable attitude toward IP than those who did not. This finding was consistent with a study conducted in Saudi Arabia.[49] Training program are very effective and that all health professionals should be exposed to infection control training to equip them with the necessary knowledge, better attitudes, and skills.[53]

Healthcare professionals with good IP knowledge were 3 times more likely [aOR = 3.08, 95% CI (1.39-6.86)] to have good IP practice than those with poor IP knowledge. This finding was consistent with studies conducted in Ethiopia.[31,32] A possible explanation could be that the more you know about it, the better you do it. However, the finding was inconsistent with other studies,[54,55] which revealed good knowledge does not necessarily predict good IP practice. Implementing IP measures is hindered by a lack of awareness regarding IP. Ensuring the implementation of the measures requires consistent infrastructure, training, and resources.[56]

Healthcare professionals who had sufficient PPE in their working room were 3.6 times more likely [aOR = 3.63, 95% CI (1.71-7.72)] to have good IP practices than those who did not. This finding was consistent with studies conducted in Ethiopia.[29-31] The first step to practicing IP activities is to have sufficient PPE. Without sufficient PPE, it is difficult to implement IP practices.[33] Lack of materials and equipment both contributed to and exacerbated the issue of non-compliance with recommended precautionary measures.[57]

Limitations of the Study

The study has some flaws. First, the small sample size and the utilization of a single institution may restrict the generalizability of the study findings. Second, the study findings were analyzed using self-reported questionnaires with a possible self-preservation bias when reporting practice questions.

Conclusion

The level of KAP of IP among study participants was poor. The study also discovered that sociodemographic and health

facility-related characteristics are connected to IP KAP. The provision of adequate PPE, IP manuals and in-service training will help to improve the KAP of healthcare professionals toward IP. Therefore, the hospital management authority and other concerned stakeholders like local NGOs and regional health bureau should provide consistent support to the health professionals in terms of training, resources, and infrastructure to improve and integrate universal precaution in everyday services.

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Availability of Data and Materials

The data set is handled by the corresponding author and can be provided upon request.

Consent for Publication

Not applicable.

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