Nurse-Led Intervention on Knowledge and Practices of Standard Precautions among Ancillary Healthcare Workers of a Teaching Hospital in Osogbo, Osun State

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ABSTRACT

Background: Ancillary healthcare workers (AHCWs) play a crucial role in hospital housekeeping, which exposes them to blood and body fluids, contaminated equipment, surfaces, medical waste, and sharp injuries. These increase their risk of contracting healthcare-associated infections. Adhering to Standard Precautions (SPs) minimizes direct exposure to these occupational hazards. However, AHCWs demonstrate poor knowledge, poor adherence to standard precautions. Nevertheless, most intervention studies focused on professional healthcare workers, with limited research addressing precautions specific to the AHCWs. This study assessed the effect of a nurse-led intervention on knowledge and practices of standard precautions among ancillary healthcare workers of a teaching hospital in Osun State.

Methods: The study utilized a quasi-experimental one-group pretest- post-test design. 121 participants participated in the study. A structured, validated questionnaire and a checklist were used to collect data, Pre-intervention (P1) and Post-intervention (P2). Intervention packages were implemented. Descriptive and inferential statistics were used for data analysis at a 5% level of significance.

Results: Findings revealed a 46.28 **±** 8.01 mean age for the AHCWs. The Knowledge mean scores P1 and P2 were 12.03 **±** 3.47 and 16.71 **±** 3.42, respectively. Their self-reported practice mean scores,

P1 and P2, were 13.04 **±** 2.71 and 17.89 ± 2.69, respectively and the P1 and P2 observed practice mean scores of the participants were 7.36 ±1.51 and 13.23 ± 4.54, respectively**.** Significant differences (t (240) = 10.56; $p < 0.05$) existed between the P1 and P2 knowledge mean scores of standard precautions among AHCWs and there was a significant difference between P1 and P2 observed practice mean scores of SPs among the AHCWs (t (240) =13.51; $p < 0.05$).

Conclusion**:** The nurse-led intervention positively influenced the knowledge and practices of SPs among the ancillary healthcare workers.

Keywords: Ancillary healthcare workers, Standard precautions, Practice, Nurse-led intervention Teaching Hospital

INTRODUCTION

Standard precautions are the gold standard guidelines designed to maintain a safe environment for patients, relatives, and healthcare workers. They are applied to all patients, regardless of their diagnosis or presumed infection status [1]. Infections acquired in healthcare settings are referred to as healthcare-associated infections (HAIs). They are acquired by patients for the first time either within 48 hours of hospital admission or 30 days after hospital discharge [2, 3]. They also include infections acquired within the hospital environment by healthcare personnel [4].

Globally, 136 million healthcare-associated infections occur annually [5], with 9 million in Europe's acute and long-term healthcare settings. Middle-income countries bore the highest annual burden, with 119 to 215 million cases [5], with 15 out of 100 patients acquiring healthcare-associated infections during hospitalization and 1 out of 10 dying [6]. The prevalence of HAIs in Africa is 12.76% [7] twice as higher than that of the developed countries while studies revealed that Nigeria has a 14.3% prevalence of healthcare-associated infection [8]. This prevalence is four times higher than that of developed nations and nearly twice the rate of healthcare-associated infections (HAIs) in Africa. Infection rates of 43.9% in surgical wards and 20.5% in medical wards were also reported in Nigeria [9, 8].

Healthcare-associated infections can be caused by bacteria, fungi, and viruses hosted by an immunocompromised patient and persons or indirectly contracted from hospital surfaces such as door knobs, tables, and other care equipment which come in contact with infected hands, other body parts, or pathogen's route of exit from its reservoir [10]. These routes of exit are mucous membranes, non-intact skin, genito-urinary, gastrointestinal, and respiratory tracts [1] and can be transmitted to its victim in the hospital environment mainly through direct and indirect contact. Direct transmission primarily occurs through skin-to-skin contact, as well as airborne droplets generated by coughing, sneezing, or talking [11], allowing pathogens to spread before settling on a surface such as oxygen cylinders, bedside tables, doorknobs, commodes, bed linens, bed rails, toilet apparatus, and mops and the ground [12]. Hospital waste such as blood, and body fluid-stained refuse, blood bags, infected gauze, swabs, bandages. Additionally, sharp objects like needles, syringes, and blades also play a significant role in infection transmission [1]. Other sources of work-related injuries include cleaning chemicals, disinfectants, expired medications, and contaminated vaccines [13, 12, 14, 15].

Ancillary healthcare workers are responsible for hospital housekeeping responsibilities, transportation of patients, assisting health workers, and maintaining hospital cleanliness. They are also responsible for collecting, transporting, disposing of, and storing hospital infectious and hazardous wastes [16, 17]. These responsibilities expose them to cleaning and disinfecting chemicals, including quaternary ammonium compounds, bleach, and alcohol, blood and body fluids stained waste, needle and sharps [14, 18, 19].

Knowledge and practices of standard precautions for ancillary healthcare workers, such as Environmental cleaning and disinfection, have been confirmed to reduce the risk of pathogen transmission by lowering or eliminating hospital surfaces and equipment's bio burdens [20]. Hand hygiene is another standard precaution involving washing hands with soap and water or using an alcohol-based hand rub to reduce bio burdens carried by the hands of healthcare workers, patients, and relatives, preventing the cross-transmission of infections between them [12]. PPE includes gloves, gowns, masks, and eye protection, they act as barriers preventing direct contact with infectious agents thereby reducing the risk of contamination. Proper Waste disposal ensures that medical waste is disposed of safely and properly according to local regulations and guidelines and reduces the risk of exposure to infectious agents for healthcare workers, patients, and the community [21]. Linen handling involves using precautions when handling, transporting, and processing soiled linen to avoid direct contact with skin and clothes, thereby minimizing the risk of pathogen transmission through contaminated textiles [12].

However, unpublished sources have confirmed poor standard precautions training for both newly employed and long-serving ancillary healthcare workers, cases of hepatitis B infections, and improper use of personal protective equipment (PPE) in a teaching hospital in Osun state. Studies also revealed that the ancillary healthcare workers exhibit the poorest knowledge and practices of standard precautions among healthcare workers. Among such identified were poor hand hygiene knowledge and practices, ineffective surface cleaning practices, poor personal protective equipment (PPE) usage [19, 22, 23,24, 25, 18, 26].

However, a study revealed that an intervention study on standard precautions specific to the roles and responsibilities of ancillary healthcare workers led to improved knowledge and practices of standard precautions among them [27]. Nevertheless, the majority of intervention studies conducted on knowledge and practices of standard precautions were carried out among

professional healthcare workers such as doctors, and nurses students [28, 29, 30, 31,32]. The few intervention studies that included ancillary healthcare workers alongside professional healthcare workers emphasized standard precautions that were relevant to professional healthcare workers, while the key aspects specific to ancillary roles, such as environmental cleaning and disinfection, safe waste and linen handling, were largely neglected.

Poor knowledge and practices of standard precaution among ancillary healthcare workers have been reported to be associated with higher hospital surface bio burden, increasing asthma prevalence, skin disorders and a higher risk of transmission of hospital- acquired infections specifically the highly infectious hepatitis B [25, 33,34, 35, 36].

This study aims to determine the effect of a nurse-led intervention study on knowledge and practices of standard precautions among ancillary healthcare workers of a teaching hospital in Osun State.

Methodology

Study Area and population

The study population were the ancillary healthcare workers of Uniosun Teaching Hospital, Osun State, Nigeria. Their total population according to the Uniosun Teaching Hospital Records for the population of AHCWs, 2024, was 170. **Research Design**

A quasi-experimental design of one-group pretest-posttest was used for the study **Sample size determination** Data on knowledge and self-reported practices of standard precautions were collected from 121 eligible participants across selected wards and units who willingly attended the training session and completed all aspects of the questionnaire. The sample size for direct observation of standard precaution practices was based on the WHO Hand Hygiene Technical Reference Manual [37], which recommends

200 observation opportunities per ward per observation period. Following this guideline, a minimum of 4,000 opportunities was necessary for the 20 selected wards. In total, 4,530 standard precaution opportunities were observed and documented.

Subject inclusion and exclusion criteria

All ancillary healthcare workers deployed to the wards and units having standard precaution commodities sufficient for workers on duty, ran all three shift duties, and had worked for more than 6 months. Those on leave at the time of data collection and intervention

The instrument for data collection

A structured, validated questionnaire and a checklist with a reliability Cronbach's alpha coefficient ranging from 0.73 to 0.81 developed based on CDC (2024)'s Best Practices for Environmental Cleaning in Global Healthcare Facilities with Limited Resources, the CDC (2024) core IPC guidelines for safe healthcare delivery across all settings, and the OSHA (2023) guidelines on PPE usage were used to collect data, Pre- intervention (P1) and Post-intervention (P2). The questionnaire consists of three sections, including the socio-demographic data of the respondents, knowledge of standard precautions, and practices of standard precautions. The socio-demographic section had 10 questions on age, sex, marital status, religion, occupation, educational qualifications, work unit, length of employment, training on standard precautions, and the last time respondents had training. The knowledge scale was made up of multiple-choice questions with a total of 22 items. The scale measured knowledge of PPE usage for the roles of the ancillary healthcare workers, hand hygiene, surface cleaning and disinfection, medical waste management, sharp safety, hepatitis B prevention, and linen handling. A score of 1- 11 was considered poor, and 12-22 was considered good knowledge of standard precautions. The practice section was a yes or no response scale with a total score of 28.

1-14 was considered poor and 5-28 was considered a good practice. It had items on self-reported actual PPE worn for housekeeping roles, hand hygiene performance, actual cleaning and disinfection practices, and linen handling. The checklist was a yes or no scale with a maximum obtainable score of 19.

Method of data collection

Ethical approval with protocol number: UTH/REC/2024/06/963 was obtained from the research settings to collect data. Pre- intervention, this approval was presented to the **Directors of Nursing Services (DNS) to facilitate the release of ancillary healthcare workers under their supervision. Meetings were held with the heads of the ancillary healthcare workers to explain the study objectives, training components, and data collection procedures. These details were**

subsequently communicated to their respective staff members. An assessment of standard precaution commodities available per wards and units was conducted, and 20 wards that met the inclusion criteria were selected. Out of the 29 wards and units at the UNIOSUN Teaching Hospital, 20 were purposively selected for observational data collection based on the defined inclusion and exclusion criteria.

Training of the observer

Before commencing the observations, one observer per ward or unit (a total of 20) was trained on the AHCWs standard precaution guidelines. The training covered the CDC (2024)'s environmental cleaning procedure [38], the CDC (2024) core IPC guidelines for safe healthcare delivery across all settings [39], and the OSHA (2023) guidelines on PPE usage [40]. Observers were also assessed on their ability to conduct standard precautions compliance assessments using the structured checklist. The training included role-playing scenarios carried out by the researcher and two other infection control nurses based on the guidelines, focusing on key practices such as hand hygiene moments, selecting appropriate PPE for surface cleaning and disinfection, waste disposal, patient transportation, and proper preparation and use of cleaning solutions. Appropriate procedures for cleaning, mopping, surface disinfection, safe handling of bed linens, sharps, and medical waste were also role-played by the researcher and other experts and replayed by the research observers. Areas requiring amendments were collaboratively reviewed, discussed, and resolved. Pre-intervention **data of observed practices of standard precautions** were collected for **two weeks** using the structured checklist, while d**ata on knowledge and self-reported practices of standard precautions** were gathered immediate pre- intervention on the training day.

The educational intervention was delivered through lectures (presented by the researcher), audiovisual aids and hands-on practical sessions over two days, followed by an immediate post-training knowledge assessment. Standard precaution commodities were distributed based on ward needs. Posters on disinfectant dilution, ward mopping procedures, hand washing, and medical waste segregation were placed at strategic locations in the wards and units. Data on self-reported and observed practices of standard precautions were recollected at the 6th to 8th weeks post-intervention.

Data management

Data was analyzed using SPSS version 22. Descriptive statistics of frequencies and percentages were used to analyze participant's socio-demographic data. Mean, standard deviations, and mean

differences were used to analyze the research questions. Inferential statistics of paired t-test was used to analyze hypotheses at a 5% level of significance.

Results

Participant's socio-demographic characteristics

Of the 121 that participated in this study, 45

(37.2%) were between ages 41-47 years and

34 (28.1%) were between 48-54 years with a mean age of 46.28 ±8.01). The majority 101 (83.5%) reported having received SP training, however, a higher proportion, 52 (43.0%) reported that their last training was over three years ago, 20 (16.5%) had never received any training, Table 1a.

Pre-intervention, only 46 (38.0%) had good knowledge of standard precautions with a mean S.D. (12.033 $\pm$ 3.47) Table 2a. Far less than one-quarter (10%), knew that heavy- duty gloves, aprons/gowns, face shields, and booths constitute the complete personal protective equipment (PPE) for a terminal cleaning or a cleaning that might involve the splashing of dirty water, body fluid or blood. A few 25(13.2%) knew that heavy duty rubber glove is the most appropriate gloves for medical waste disposal, 4(2.1%) knew that latex gloves should not be used for more than one patient, 110(90.9%) sweeps the ward with a broom, 40 (33.1%) knows that the door handles, light switches and bedrails are among the area that required frequent cleaning and disinfection per shift, 35(28.9%) knows how blood/body fluid spills should be adequately taken care of 105 (86.6%) knows that the safety box is the appropriate container for the collection of sharps, Table 2b.

Pre-intervention, 29 (23.9%) self-reported good practices of standard precautions with a mean $\pm$ SD (13.041 $\pm$ 2.71) Table 2a. None of the ancillary healthcare workers 121(100%), had a personal heavy duty gloves, a few 13(6.8%) wears face shield when the cleaning of a particular place may involve splashing of dirty water, 25(20.7%) wear heavy duty rubber gloves for waste disposal, majority 107 (88.4%) washes hands after the removal of gloves, a few 27(22.3%) waits for 10 minutes for disinfectant to take effect on a blood/ body fluid stained surface, only a few 23(19%) perform a routine cleaning of highly torched surfaces such as the door knobs, bed rails and light switches of the ward and a Majority 117 (96.7%) uses a single bucket system for mopping, Table

3b. Fewer participants, 20(16.5%), displayed good practices on observation with a mean ± SD of 7.355± 1.51 Table 4a.

Post-intervention, a greater number 103(85.1%) of participants acquired good knowledge of standard precautions. There was a significant difference between the pre and post-intervention knowledge mean scores of standard precautions among the ancillary healthcare workers, Table 2a. There was a significant difference between the pre and post-intervention self-reported practice mean score, (t = 13.995, P = 0.0001), Table

3a. The overall mean score of observed practices of standard precautions improved from 7.355± 1.51 to 13.231+4.54 post- intervention with a mean difference of 5.88 and a higher number of participants, 80(66.1%), displaying good practices of standard precautions. There was a significant difference between the pre and post- intervention observed practice mean score of standard precautions among the ancillary healthcare workers (t = 13.509, P = 0.0001), Table 4a.

Table 1a: Socio-Demographic Characteristics of the Respondents

Socio-demographic Variables characteristics		F	%
Age	20-26 years	4	3.3
	27-33 years	1	.8
	34-40 years	19	15.7
	41-47 years	45	37.2
	48-54 years	34	28.1
	55-60 years	18	14.9
	Mean Age	**46.2 ± 8.01**	
Gender	Male	23	19.0
	Female	98	81.0
Marital Status	Married	99	81.8
	Divorced	1	.8
	Widowed	14	11.6
	Single	6	5.0
	Separated	1	.8
Religion	Christianity	87	71.9
	Islam	32	26.4
	Traditional Worshiper	2	1.7
Educational Level	No formal education	3	2.5
	Primary	13	10.7
	Secondary	50	41.3
	Tertiary	55	45.5
Occupation	Health Attendants	101	83.5
	Health Assistants	0	0
	Porter	20	16.5
Work/Unit	Medical wards	12	9.9
	Surgical wards	12	9.9
	Pediatric wards	14	11.6
	Theatre & ICU	13	10.7
	Mental health ward	5	4.1
	Orthopedic wards	7	5.8
	Gynecological ward	5	4.1
	Maternity wards	16	13.2
	Accident and Emergency	10	8.2
	Burns and plastic	3	2.5
	SCBU	11	9.1
	CEU	9	7.4
Period of working within this facility	less than a Year	15	12.4
	1-5 years	30	24.8
	6-10 years	39	32.2
	11-15 years	23	19.0
	16-20 years	14	11.5
	Mean year of experience	**7.94 ± 5.45**	

Table 1b: Training on standard precautions among AHCWs

Training on standard precautions pre-intervention	**Variables**	AHCWs	
		F	**%**
Have you ever been trained on how to do your work?	Yes	101	83.5
	No	20	16.5
When last did you had training on how you should do your hospital work, such as cleaning the ward and disposing of waste?	6 months ago	9	7.4
	More than 1 year ago	5	4.1
	More than 3 years ago	52	43.0
	Never	20	16.5
	At employment	35	28.9

Table 2a showing the pre and post-intervention knowledge of participants

Knowledge level		
	Pre-intervention	**Post-intervention**
	F (%)	**F (%)**
Good Knowledge	46 (38.0)	103 (85.1)
Poor Knowledge	75 (62.0)	18 (14.9)
Total	**121 (100.0)**	**121 (100.0)**
Mean	12.033 ± 3.47	16.710 ± 3.42
Mean difference	4.677	
t-test	10.560	
Df	240	
P-value	0.0001	
CI	3.805-5.549	
Maximum	18	22
Minimum	6	9
Range	12	13

Scores: Poor knowledge (1-11); Good Knowledge (12-22)

Table 2a shows that the pre-intervention knowledge mean score of the participants was 12.033 ±

3.47, which became 16.71 ± 3.42 post-intervention with a mean difference of

Table 2b Pre-Intervention Knowledge of Standard Precautions among the Ancillary Healthcare Workers

KNOWLEDGE OF S.Ps	PRE-INTERVENTION	F	%
Which of the following should be worn if the cleaning of a particular place may involve Splashing of dirty water, body fluid or blood?	Heavy-duty gloves, apron/gown, face shield and booths	19	10.0
	Latex gloves, face mask, apron/gown and booths	77	40.5
	Latex gloves, apron/gown, face shield and booths	16	8.4
	Heavy-duty gloves, apron/gown, face mask and booths	9	4.9
Which of the following personal protective Equipment should be worn for waste disposal?	Heavy-duty gloves, apron/gown, face shield and booths	25	13.2
	latex gloves, face mask, apron/gown and booths	80	42.1
	latex gloves, apron/gown, face shield and booths	4	2.1
	Heavy-duty gloves, apron/gown, face mask and booths	12	6.3
Which of the following should not be used More than one patient?	Gown	1	0.5
	latex gloves	4	2.1
	face mask	100	82.6
	latex gloves and any other PPE required based on patients condition	16	13.2
When working around a patient who is and sneezing all the time, which of the following should you encourage the	Latex gloves	4	3.3
	Face shield	10	8.3
	Boots	3	2.5
	Face mask	104	86.0
For how long are you supposed to wash your Hands to remove germs?	10 seconds	17	14
	At least 20 to 30 seconds	34	28.1
	40 to 60 seconds	12	9.9
	There's no need for time-checking	58	47.9
Which of the following should be done before mopping	Sweep the floor with a broom	110	90.9
	Hand pick dirties on the floor	4	3.3
	Begin to mop the floor straight away	3	2.5
	Broom wash the whole floor	4	3.3
Which of these parts of the ward needs to be cleaned more often per shift	Door handles, switch of light, bedside rails	40	33.1

	the floor	67	55.4
	Windows	5	4.1
	the matron's office	9	7.4
How should blood or body fluid spills be taken care of?	Confine and clean up the blood with a towel, wash the area with detergent, apply Jik solution on the surface, and wait for	35	28.9
	Wash the area with water and pack with a packer	10	8.3
	Put Jik solution on the area and wash with detergent or soap	73	60.3
	Spill water on the blood and mop it up.	3	2.5
Which waste should be discarded separately from other wastes?	Blood and blood-stained waste	90	74.4
	Dry waste	5	4.1
	Water bottles	10	8.3
	Expired drugs	16	13.2
Scalpels and surgical blades should be discarded in what type of container	General waste container	11	9.1
	black waste container	4	3.3
	Safety box	105	86.6
	Yellow waste container	1	0.5
How should hospital dirty bed linen or cloth handled?	Shake it off to remove any visible debris and place it in the clean linen	18	14.9
	Fold it neatly and place it back in the patient's room for reuse	12	9.9
	Handled with gloves and place it in a designated laundry bag or bin	87	71.9
	Pack clean linen with the bare hands and place it in a designated	4	3.3

Multiple choice questions

Table 3a showing the Pre and post-intervention self-reported practices of standard precautions among participants

Self-reported practice	Pre-intervention	Post-intervention
	F (%)	**F (%)**
Good Practice	29 (23.9)	90 (74.0)
Poor Practice	92 (76.1)	31 (26.0)
Total	**121 (100.0)**	**121 (100.0)**
Mean	13.041 ± 2.71	17.899 ± 2.69
Mean difference	4.857	
t-test	15.995	
Df	240	
	0.0001	
	4.238-5.476	
Maximum	20	23
Minimum	8	13
Range	12	10

Table 3b Pre-intervention self-reported practices of standard precautions

The self-reported practices of Standard Precautions among AHCWs		Pre-intervention	
		F	%
I have my personal heavy-duty rubber gloves	Yes	0	0
	No	121	100
I wash my hands with soap and water after removing gloves	Yes	46	37.7
	No	75	61.5
I wear heavy-duty rubber gloves for terminal cleaning (cleaning after patient	Yes	21	17.4
	No	99	81.8
I wear disposable gloves for everyday (routine) cleaning	Yes	108	89.3
	No	13	10.7
I wear an apron/gown if cleaning of a particular place may involve splashing	Yes	36	29.8
	No	85	70.2
I wear a face shield if cleaning of a particular place may involve splashing of	Yes	13	6.8
	No	108	89.3
I wear heavy-duty rubber gloves for the disposal of waste to the collection site	Yes	25	20.7
	No	96	79.3
I wear boots for floor mopping	Yes	27	22.3
	No	74	77.7
I check the patient's condition to determine what to wear for safe patient	Yes	38	31.4
	No	83	68.6
I wash my hands after coming in contact with dirty water, body fluids or blood	Yes	107	88.4
	No	14	11.6
I use a separate mopping stick for cleaning the offices, wards, and toilets	Yes	119	98.3
	No	2	1.7
When a surface is stained with blood, I wash it with detergent and then with	Yes	100	82.6
	No	21	17.4
I dilute and use jik according to the manufacturer's instructions	Yes	50	41.3
	No	71	58.7
I wait for at least 10 minutes anytime I put jik solution on a surface before	Yes	27	22.3
	No	94	77.7

When I discover sharp objects while tying the linen, same are discarded in the	Yes	114	94.2
	No	7	5.8
I handle bed linen with gloved hands	Yes	116	95.9
	No	5	4.1
I perform a thorough cleaning of door knobs, bed rails and light switches at all	Yes	23	19.0
	No	98	81.0
I use a broom to sweep the ward before mopping	Yes	110	90.9
	No	11	9.1
I use a one-bucket system for mopping	Yes	117	96.7
	No	4	3.3
I use a two-bucket system for mopping	Yes	0	0
	No	121	100
I perform mopping in figure 8 pattern	Yes	97	80.2
	No	24	19.8
I start mopping from cleaner area to dirtier area	Yes	97	80.2
	No	24	19.8

Table 4a Pre and post-intervention observed practices of standard precautions among participants

Observe practice scores	**Pre-intervention**	**Post-intervention**
	F (%)	**F (%)**
Good Practice	20 (16.5)	80 (66.1)
Poor Practice	101 (83.5)	41 (33.9)
Total	**121 (100)**	**121 (100)**
Mean	7.355± 1.51	13.231+4.54
Mean difference	5.876	
t-test	13.509	
Df	240	
P-value	0.0001	
CI	5.018-6.732	
Maximum	10	19
Minimum	6	5
Range	4	14

Table 4b Pre-intervention observed practices of standard precautions among participants

Observed practices of standard precautions	**Pre-intervention**		
Y= yes n= No OP= Opportunities		**F (opportunities)**	**%**
washes hands after contact with dirty water, body fluids or blood	Yes	202	72.1
	No	76	27.1
Washes hands with soap and water after removing gloves	Yes	83	29.7
	No	196	70.3
Wears heavy-duty rubber gloves for terminal cleaning (cleaning of discharged patient care	Yes	0	0
	No	270	97.5
wears an apron or gown if cleaning of a particular place may involve splashing of dirty	Yes	95	36.0
	No	163	61.7
Wears a face shield if cleaning of a particular place may involve splashing of dirty water,	Yes	0	0
	No	280	100
Wears boots while mopping	Yes	92	33.1
	No	186	66.9
Wears heavy-duty rubber gloves when taking waste to the collection site	Yes	8	3.1
	No	254	96.9
Uses his/ her personal heavy-duty rubber gloves	Yes	0	0
	No	82	100
Avoid using brooms to sweep the wards before mopping	Yes	29	10.4
	No	244	87.1
Uses separate mopping sticks for cleaning offices, ward and toilets	Yes	179	64.2
	No	100	35.8
When a surface is stained with blood he/she cleans with a detergent solution first and after	Yes	150	53.6
	No	126	45.0
Waits for at-least 10 minutes anytime he/ she put Jik solution on a surface before cleaning	Yes	170	62.5
	No	102	37.5
discards sharps in the safety boxes	Yes	213	96.1
	No	19	8.2
Handles dirty linen with gloved hands	Yes	154	92.8
	No	12	6
Uses a two way bucket system for mopping	Yes	0	0
	No	267	99.6
Engages in thorough cleaning of high torched areas such as door knob, light switches at	Yes	75	27.3
	No	200	72.7
Performs mopping in a figure 8 pattern	Yes	101	87.1
	No	15	12.9
Start mopping from a cleaner area to a dirtier area	Yes	9	8.3
	No	100	91.7
Dilutes and uses Jik correctly	Yes	73	26.1
	No	205	73.2
		4530	

Discussion

The study findings revealed that more than 50% of the participants are older adults, predominantly females and married individuals, indicating that while all healthcare workers are at higher risk of HAIs, this particular population faces an even higher risk due to age-related declines in immunity. Consequently, adherence to standard precautions is crucial to safeguarding both the workers and the communities they return to after their daily routines. Also, despite their older age, nearly half of the participants had attained tertiary education, equipping them with the ability to quickly grasp new concepts and effectively transfer knowledge to others. However, the majority had not received training on standard precautions in over three years, indicating a gap in their preparedness for infection control. Therefore, the implemented nurse-led training package will not only enhance their competency in applying standard precautions but also strengthen their capacity to train both current and future staff, reinforcing its overall value.

In support of the findings from this study, Ndu et al. [24] reported, in their study on hand hygiene knowledge and practices among healthcare workers, including ancillary healthcare workers, an age range of 19 to 59 years. The work of Tesfaye et al [41] in his study on infection prevention, control practices and associated factors among healthcare cleaners also supported that the majority of the AHCWs were females and married. In contrast to the findings of this study, Abalkhali et al [42] reported a younger age range of 22-34 years for AHCWs, who are predominantly male, with more than 6 years of experience, in their quasi- experimental study on waste management among AHCWs. This disparity might be as a result of societal expectations regarding physically demanding roles like waste management.

This study revealed that, at the pre- intervention stage, a bit above one-quarter of participants had a good level of knowledge regarding standard precautions. This may be attributed to the older age group that dominated the study population. Although they were more educated, they may not have been as actively engaged or proficient in using digital devices, which provide access to educational resources on social media and various online platforms apart from traditional physical training. The baseline percentages of ancillary healthcare workers with good knowledge of standard precautions in this study were higher than the findings of Osagiede et al. [43], who reported that none of the AHCWs in public primary and secondary health facilities had good knowledge of standard precautions. This difference could be attributed to the disparity in research settings. This study was conducted in a teaching hospital, a tertiary- level facility where continuous education and exposure to updated medical practices are more prevalent in contrast to primary and secondary

healthcare facility levels where Osagiede et al [43] conducted their study. This might have contributed to better baseline knowledge of standard precautions among the participants.

Following the intervention, the participants demonstrated a significant improvement in their mean knowledge scores. These findings indicated that the educational intervention was effective in improving the knowledge levels of the participants. This finding is supported by the finding of Battan et al [44], who revealed a significant improvement in the post-intervention performance of staff after training sections focusing on standard precautions specific to the roles of the ancillary healthcare workers.

The study findings revealed that a lower proportion of the participants reported good practice of standard precautions at the pre- intervention stage. None of the participants had personal heavy-duty rubber gloves, few wear heavy-duty rubber gloves for terminal cleaning and waste disposal, the majority did not know how to manage blood or body fluid stains and use disinfectant appropriately. These findings is in tandem with the pre- intervention findings of Singh et al [45] and Kandeel et al [46] where almost all of the AHCWs do not wear necessary PPE for cleaning. These practices are in contrast with the specification of the CDC [38], which stated that heavy-duty rubber gloves should be used in the above scenarios and disinfectant constituted according to the manufacturer's guide. This might be due to organizational issues of poor provision of PPE and poor understanding of its importance in infection prevention among the AHCWs as a result of their poor training. Also, less than 50% of the participants perform hand hygiene after removal of any type of gloves, though the majority claimed that they do when their hands are exposed to body fluids. This finding is in tandem with the findings of He et al [27] where hand hygiene compliance among the hospital cleaning staff was below 50% pre- intervention but in contrast with the findings of Kielar et al [47] where hand hygiene pre- intervention among the AHCWs was as low as 9%. This might be due to higher educational qualification of this study population.

This study also revealed that a single bucket system is still being used for mopping and the majority of the AHCWs do not routinely clean the highly torched surface areas. This is in tandem with the findings of Singh et al [45] where almost all the AHCWs had poor cleaning practices of highly torched areas pre-intervention.

After the study intervention, the participants showed increased self-reported practices. The mean standard precaution self-reported practice scores of the participants showed a marked increase. These results suggest that the educational intervention significantly enhanced the self-reported

practices of standard precautions of the participants. In tandem with this, studies of Mitchell et al. [46] Singh et al[45], and Battan et al. [44] showed improvement in the practice of standard precautions in those specified areas following educational intervention programs among the ancillary healthcare workers. This showed that the knowledge of the participants reinforced by educational intervention has significantly improved compliance with standard precautions. Findings for the observed practices further showed that less than a quarter of the participant had good practices of standard precautions, as a lower percentage of them had good observed practices of standard precautions compared to their self-reported practices pre-intervention. This was in agreement but higher than the findings of Kielar et al. [47], who reported that almost all the ancillary healthcare workers had poor observed practices of standard precautions pre-intervention. This might be attributed to a higher educational qualification of this research population. However, after the intervention, the percentage of participants with good observed practices in the various aspects of S.Ps increased significantly. The observed practice mean scores further support these findings. These results indicate that the participants exhibited more significant changes in observed practices.

Conclusion

The Nurse-led intervention demonstrated a positive impact, particularly in enhancing knowledge, narrowing the gaps in the pre and post intervention self-reported and observed practices of standard precautions.

Limitation

This study was conducted in a single teaching hospital which may limit the generalizability of the findings to other healthcare settings

Recommendations

Standard precaution intervention package including the provision of its roles specific commodities and equipment should be sustained routinely and expanded to other ancillary healthcare workers and other levels of healthcare settings to replicate its success.

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