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Knowledge, practice, and associated factors towards postoperative wound care among nurses working in public hospitals in Ethiopia: A multicenter cross-sectional study in low resource setting area

Melkamu A. Gizaw[1] | Mulu K. Negawo[2] | Elias T. Bala[3] | Derese B. Daba[3]

[1]Nursing Department, Jeldu Hospital, Oromia, Ethiopia

[2]Nursing Departement, College of Medicine and Health Science, Ambo University, Oromia, Ethiopia

[3]Department of Public Health, College of Medicine and Health Science, Ambo University, Oromia, Ethiopia

Correspondence
Derese B. Daba, Department of Public health, College of Medicine and Health Science, Ambo University, Oromia, Ethiopia.
Email: derestbekele@gmail.com

Abstract

Background and Aim: Postoperative wound care is irrigating the surgical wound with normal saline solution and applying sterile gauze or bandage. Even though challenges related to postoperative wound care and its complications are high, information related to the knowledge and practice of nurses on postoperative wound care are minimal. Therefore, this study aimed to find levels of knowledge and practices of nurses on postoperative wound care management and contributing factors among nurses working at public hospitals of West Showa, Oromia region, Ethiopia, 2020.

Method: A facility-based cross-sectional study was conducted among 465 Nurses working in public hospitals in West Showa Zone, Oromia, Ethiopia, from June 15 to July 10, 2020. Data were collected using a self-administered structured questionnaire that was adapted from previous studies. Descriptive statistics were performed and results were presented using tables and graphs. Bivariate and multivariable logistic regression analysis was undertaken, and variables with $p < 0.05$ at a 95% confidence interval (CI) were considered statistically significant.

Result: Only 44.3% (95% CI = 39.5%, 48.9%) and 48.0% (95% CI = 43.4%, 52.4%) of nurses have good knowledge and practice in postoperative wound care, respectively. Male nurses (adjusted odds ratio [AOR] = 1.90 (1.25–2.89), working in gynecology ward (AOR = 0.42 [0.18–0.95]), experience of ≥2 years in surgical units (AOR = 2.97 [1.10–8.02]), working in secondary hospital (AOR = 1.94 [1.16–3.26]), and working in tertiary hospital (AOR = 3.31 [1.81–6.08]) were significantly associated with the knowledge of nurses. An adequate supply of personal protective equipment (AOR = 3.38 [1.29–8.84]), using infection prevention guidelines (AOR = 5.03 [2.16–11.7]) and the presence of an adequate wound care materials (AOR = 3.67 [1.71–7.88]) were significantly associated with the practice of nurses.

Conclusion: Less than half of nurses had good knowledge and practice in postoperative wound care and several factors contribute to its improvement.

Upgrading the nurse's knowledge and practice towards postoperative wound care is essential in preventing postoperative wound infection.

KEYWORDS
knowledge, nurses, postoperative, practice, wound care

1 | INTRODUCTION

Wound care is the skill of irrigating the wound with normal saline and in case, if the wound is dirty, use povidone–iodine solution or hydrogen peroxide solution to remove exudates, slough, necrotic debris, bacterial contaminants, and dressing residue without adversely impacting cellular activity which promotes the healing process and protects the wound from further harm.[1] Due to inadequate nursing postoperative wound management, surgical site infections (SSI) are the most common postoperative complications in surgical patients that cause substantial postoperative morbidity, mortality, and disability which in turn contribute to the prolonged hospital stay, and increase healthcare costs.[2] The problem is more prominent in low-income countries where resources are scarce, and staff are always in short supply.[3] Seventy-five percent of surgical patient deaths are related to infection directly associated with poor postoperative wound management.[2] Postoperative wound infections are the major public health concerns that affect the patients' quality of life in many dimensions.[4] Pieces of literature reported that surgical site infection rates in Africa range from 2.5% to 34.6% following various types of surgical procedures.[5–8] In Ethiopia, the overall surgical site infection ranges from 9.1% to 75%.[9–11] To prevent postoperative wound infection, nurses should have good knowledge of postoperative wound care with aseptic precaution, wound assessment, wound dressing, and monitoring. The best practice of postoperative wound care can significantly decrease patient morbidity and mortality, including early and late complications.[1,12] Research conducted in Pakistan among 131 nurses revealed that about 58% of staff nurses had good practice in preventing and managing surgical wound infection.[13] Contrary to this, the research conducted in Cameroon and Tanzania revealed that about 58% of nurses had poor practice in postoperative wound care.[14,15] The study conducted in Mekele city, Ethiopia, showed that 58.2% of nurses had good practice in postoperative wound care.[16]

Postoperative wound care is an integral part of preventing postoperative wound infection, minimizing the physical trauma to the wound, preventing microbial invasion, and ensuring patient comfort.[17] Nurses can prevent 25% of postoperative infections by improving the quality of care they deliver.[18] Nurses' role is vital in preventing postoperative wound infection, and as such, they need adequate knowledge of infection control.[19]

Despite the potential importance of nurses' evidence-based practice and sufficient knowledge of postoperative wound care in the healthcare settings and the prevention of SSI, studies available in Ethiopia in general and in the study area among nurses working in public hospitals are minimal. Therefore, this study was carried out to assess the knowledge, practices, and associated factors toward postoperative wound care among nurses working in public hospitals.

2 | METHODS AND MATERIALS

2.1 | Study design, setting, and period

A multicenter facility-based cross-sectional design was conducted in public hospitals in the West Showa Zone, Oromia, Ethiopia. According to the West Showa district Health Department Biannual Healthcare Workers profile report, the zone has eight public hospitals, 91 health centers, and 526 health posts. The public hospitals in West Showa Zone were Ambo general hospital, Ambo University referral hospital, Guder primary hospital, Jaldu primary hospital, Gindaberat general hospital, Bako primary hospital, Gedo general hospital, and Incini primary hospital. The study period was from June 15 to July 10, 2020. Nine hundred twenty-four healthcare workers were providing healthcare services during the data collection period, and of these health workers, 522 were nurses. All nurses who had been working in the surgical unit were included in the study.

2.2 | Population, sampling, and eligibility criteria

Source population: All nurses who were working in public hospitals of West Showa zone, Oromia regional state, Ethiopia were considered as source population.
Study population: All nurses who were permanent employees of each selected public hospital and also who fulfilled inclusion criteria. Generally, 465 nurses working in public facilities were censured except those working in Guder hospital (COVID-19 treatment center during the data collection period).
Study unit: A nurse who was permanently working in the selected hospitals
Exclusion criteria: Nurses who had work experience below 6 months or those who had no experience with the surgical unit.

Sample size determination and sampling techniques

The sample size was calculated using single population proportion formula considering the following assumption; 95% confidence ratio

(CI), 5% margin of error, 55.1% good knowledge, and 58.2% good practice of postoperative wound care as indicated elsewhere.[16]

$n = \left(Z\frac{\alpha}{2}\right)2\frac{pq}{d2}$, where p is the proportion of nurses with good knowledge or practice of postoperative wound care, q is the proportion of nurses with poor knowledge or practice of postoperative wound care and d is the margin of error with a 95% CI.

Using the above formula and adding a 10% nonresponse rate, the minimum possible sample size were 418 and 411 considering the proportion of good knowledge and good practices of nurses on postoperative wound management, respectively. However, the researchers decided to use a census of all 465 nurses who were working in public hospitals in the West Showa zone, Ethiopia to have better statistical power and generalizability through consecutive sampling techniques.

Eligibility criteria

Inclusion criteria: Nurses who had work experience in postoperative wounds on patients admitted to surgical wards. As the selected hospitals followed 6 month or 1-year rotation policy (inter-departmental rotation), all nurses working in hospitals were included in the study regardless of their working unit.

2.3 | Variables and measurement

2.3.1 | Dependent variables

- ✓ Nurse's knowledge of postoperative wound care
- ✓ Nurse's practices in postoperative wound care

2.3.2 | Independent variables

Sociodemographic characteristics: age, sex, marital status, level of education, working experience, learning institution.

Healthcare provider factors: position, length of work experience with the surgical unit.

Institutional factors: workload, work-related training, availability of personal protective equipment, availability of postoperative wound care material, presence of protocols and guidelines.

Thirteen multiple questions measured nurses' knowledge of postoperative wound care. A scoring system was used for the respondent's correct and incorrect responses provided for the questions were allotted "1" or "0" points, respectively. The total score of knowledge questions ranging between 0 and 13 was classified into two categories of response: good knowledge (if above the mean) and poor knowledge (equal to or below the mean).[16,20] While doing so, the normality of the continuous variable was checked by drawing histogram and boxer plots and found to be normally distributed.

The nurses' practice towards postoperative wound care was measured by 15 items with a 4-point Likert scale (never practice, rarely practice, sometimes practice, and always practice) and receives a score of "0" for never practice, rarely practice "1," sometimes practice "2," and always practice "3." The scores ranged from 0 to 45 and were transformed into a percentage for interpretation after checking for normality. Accordingly, nurses' practice towards postoperative wound care was classified into two categories: good practice (if above the mean) and poor practice (equal to or below the mean).[16,20]

2.4 | Data collection procedures and quality control

A pretested and structured self-administered English version questionnaire (as nurses use the English language as a medium of communication as well as learning proficiency in the Ethiopian context) that was adapted from related studies was used to collect the necessary data from the study participants. The data collection tool was adapted and modified from previous comparable studies.[15,16,20] Four trained nurses and two supervisors facilitated data collection. The instrument was pretested on 24 nurses (5% of the sample size) to enhance instrument reliability. The pretest was done on participants with similar characteristics to those in the study. It was conducted at Amaya hospital, which is located outside of the study area to check clarity and consistency and to make necessary amendments to the questionnaire 1 week before actual data collection. Any ambiguity, confusion, difficult words, and differences in understanding were revised based on pretest experience. Furthermore, internal consistency (reliability) of the knowledge-related question, as well as practice-related questions, was checked by calculating Cronbach's α coefficient which appeared to be 0.89 and 0.87, respectively.

The data collection tool has three parts. The first part of this questionnaire included the sociodemographic features and related factors of nurses (age, sex, marital status, profession, educational level, year of service, history of infection prevention [IP] training, and the presence of IP guidelines in their department). The second part consisted of 13 questions concerning knowledge of postoperative wound care on the following topic: general awareness regarding IP, hand washing, wound dressings, and nutritional support to post-operative patients. The third part consisted of a 15-items 4-point Likert scale (*never practice*, *rarely practice*, *sometimes practice*, and *always practice*). Supervisors supervised data collectors and a principal investigator has received a report daily. On the day of data collection, all data were checked for completeness and consistency by a principal investigator and supervisors. Data collectors and supervisors employed COVID-19 IP protocols throughout the data collection time.

2.5 | Data processing and analysis

The data were coded and entered to EPI-INFO, version 7, and then exported to the Statistical Package for Social Sciences software

(SPSS for Windows 25; SPSS Inc.) statistical software for analysis. Descriptive statistics were used to show the frequency distribution of important variables. Normality and homoscedasticity of continuous variables were checked and the mean with a standard deviation of continuous variables was reported whereas frequency and percentage scores of categorical variables were generated using tables and graphs.

The binary logistic regression model was fitted to identify associated factors for good knowledge and good practices of nurses on postoperative wound care. Chi-square (χ^2) assumptions were checked for categorical variables before identifying candidate variables on bi-variate binary logistics regression and multicollinearity was checked using the variance inflation factor. Variables with $p < 0.2$ were considered a candidate for multivariable logistic regression and those variables with $p < 0.05$ were considered statistically significant after fitting a regression model using Backward elimination methods. Model fitness was checked with Hosmer-Lemeshow goodness-of-fit test ($p > 0.05$) and a statistically significant variable with a respective adjusted odds ratio (AOR), 95% CI, and p value were generated to determine the strength of association between the outcome and explanatory variables. All tests were two-tailed and a cut-off point was set at a $p < 0.05$ for all significant statistical tests.

2.6 | Ethical consideration and consent to participate

The institutional health research ethics review committee of the college of medicine and health science, Ambo University approved this study with a reference number: (Ref. No: PGR/176/2020). A support letter was submitted to the administrative offices of each hospital to grant permission and written consent was obtained from the respondents before data collection. All of the study participants were informed about the purpose of the study, and about their right to participate or to terminate at any time if they want. Confidentiality of information gathered was assured during and after data collection by facilitators and investigators by using code numbers rather than personal identifiers.

3 | RESULTS

3.1 | Sociodemographic characteristics of participants

Four hundred and sixty-five nurses participated in the study, and 458 completed and returned the questionnaire yielding a 98.5% response rate. About half of the study participants, (51.7%) were in the age group of 25–30 years. Two hundred fifty-seven (56.1%) of them were males. In terms of marital status, among the study participants, 234 (51.1%) were single. Most of the study participants, 376 (82.1%) were BSc holders. Only 210 (45.9%) of nurses had taken training regarding IP methods. Regarding experience in the nursing profession, 321 (70.1%) of respondents had less than 5 years of work experience (Table 1).

TABLE 1 Sociodemographic characteristics and related institutional issues among Nurses working in the public hospitals in West Shoa Zone, Oromia, Ethiopia, 2020 ($n = 458$)

Characteristics	Category	Frequency	Percentage (%)
Age of participants in complete years	<25	169	36.9
	25–30	237	51.7
	30–35	43	9.4
	>35	9	2.0
Sex of participants	Male	257	56.1
	Female	201	43.9
Marital status	Single	234	51.1
	Married	217	47.4
	Widowed	3	0.7
	Divorced	2	0.4
	Separated	2	0.4
Educational status	Diploma	82	17.9
	BSc degree	376	82.1
Learning institution	Government	319	69.7
	Private	139	30.3
Monthly income in Ethiopian Birr	<5285.94	235	51.3
	>5285. 94	223	48.7
Total work experience (years)	<2	153	33.4
	2–5	168	36.7
	5–10	128	27.9
	>10	9	2.0
Current working unit	Surgical ward	136	29.7
	Pediatrics	75	16.4
	ICU ward	33	7.2
	Gynecology and labor ward	47	10.3
	Other wards	167	36.5
Level of the hospitals	Primary hospital	119	26.0
	Secondary hospital	202	44.1
	Tertiary hospital	137	29.9
Experience in a surgical ward (years)	<1	288	62.9
	1–2	138	30.1
	>2	32	7.0
Ever took training on infection prevention	Yes	210	45.9
	No	248	54.1
Number of IP trainings attended	Only once	152	72.4
	More than one	58	27.6

TABLE 1 (Continued)

Characteristics	Category	Frequency	Percentage (%)
Presence of standards (protocols, manual, etc.)	Yes	238	52.0
	No	220	48. 0
An adequate supply of PPE	Yes	350	76.4
	No	108	23.6
Position of nurses	Staff nurse	414	90.4
	Head nurse	44	9.6
The workload in postoperative wound care	Yes	372	81.2
	No	86	18.8
Availability of adequate wound care materials[a]	Yes	206	45.0
	No	252	55.0
Availability of SSI guidelines	Yes	201	43.9
	No	257	56.1
Usage of IP guidelines	Yes	120	59.7
	No	81	40.1

Abbreviations: IP, infection prevention; PPE, personal protective equipment; SSI, surgical site infection.

[a]Adequate availability of wound care materials in the practice area including kidney dish, artery forceps, scissors, and other necessary materials for wound care.

3.2 | Knowledge of nurses related to postoperative wound care

The mean knowledge score of the study participants was found to be 7.17 ± 2.30 (SD), with a minimum score of 01 and a maximum score of 13. In this study, less than half (44.3%) (95% CI = 39.5%, 48.9%) of the respondents had good knowledge of postoperative wound care (Figure 1).

3.3 | Factors associated with knowledge of postoperative wound care among nurses

In bivariate logistic regression, age and sex of participants, types of hospitals, education level, learning institution, surgical unit experience, monthly income, current working unit, taking training on surgical site infection, number of training on surgical site infection, presence of standards (protocols, manual), workload, and availability of SSI guidelines were significantly associated with the knowledge towards postoperative wound care among nurses working in public hospitals.

All variables with $p < 0.2$ in the bivariate analysis were candidates for multivariate analysis. But, on multivariate logistic regression analysis, sex of the participants, current working unit, surgical unit experience, and type of hospital were significantly associated with the knowledge of postoperative wound care among nurses working in public hospitals at a $p < 0.05$.

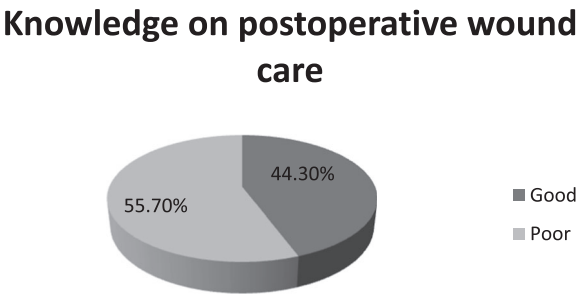

FIGURE 1 Study participants' knowledge of postoperative wound care among nurses working in public hospitals in West Shoa, Oromia, Ethiopia, 2020.

This study revealed that the odds of having good knowledge of postoperative wound care were almost two times more likely among male than female nurses (AOR = 1.90 [1.25, 2.89]). Nurses working in the gynecology and labor unit were 58% less likely to have good knowledge of postoperative wound care than nurses working in the surgical unit (AOR = 0.42 [0.18–0.95]). The odds of having good knowledge of postoperative wound care were around three times more likely among nurses working in tertiary hospitals than those working in primary hospitals (AOR = 3.31 [1.81, 6.08]). The odds of having good knowledge of postoperative wound care were also nearly two times higher among nurses working in a general hospital than in a primary hospital (AOR = 1.94 [1.16–3.26]). Moreover, the odds of having good knowledge of postoperative wound care were nearly three times more likely among those who had ≥2 years of work experience in the surgical unit than nurses who had less than 2 years of work experience in surgical units (AOR = 2.97 [1.10, 8.02]). The current study also revealed that the odds of having good knowledge about postoperative wound care were nearly three times higher among those who had taken training than those who had not (AOR = 2.89 [1.38–6.02]) (Table 2).

3.4 | Nurses practice postoperative wound care

A mean ± SD practice score of the study participants yielded 33.17 ± 7.86 with a minimum score of 14 and a maximum score of 45 that was employed to measure the practice of nurses toward postoperative wound care. In this study, around half, 48.0% (95% CI = 43.4%, 52.4%) of the nurses had good practice in postoperative wound care (Figure 2).

3.5 | Factors associated with nurse's practice toward postoperative wound care

In the bivariate regression analysis of binary logistic regression; age and sex of participant, learning institution, current working units, presence of

TABLE 2 Binary Logistic regression analysis display of factors associated with the knowledge of postoperative wound care among nurses working in the public hospitals in West Shoa Zone, Oromia, Ethiopia, 2020 ($n = 458$)

Variables	Categories	Knowledge of nurses		COR (95% CI)	AOR (95% CI)
		Good	Poor		
Age (years)	<25	73 (43.2%)	96 (56.8%)	1	1
	25–30	113 (47.7%)	124 (52.3)	2.66 (0.54–13.19)	1.42 (0.91–2.23)
	30–35	15 (34.9%)	28 (65.1%)	3.19 (0.65–15.67)	1.02 (0.47–2.22)
	>35	2 (22.2%)	7 (77.8%)	1.86 (0.35–10.18)	0.36 (0.05–2.45)
Sex	Male	134 (52.1%)	123 (47.9%)	2.08 (1.4–3.05)	1.90 (1.25–2.89)*
	Female	69 (34.3%)	132 (65.7%)	1	1
Educational status	Diploma	25 (30.5%)	57 (69.5%)	1	1
	BSc degree	178 (47.3%)	198 (53.1%)	2.05 (1.23–3.42)	1.26 (0.67–2.35)
Learning institution	Government	149 (46.7%)	170 (52.7%)	1	1
	Private	54 (38.8%)	85 (61.2%)	1.38 (0.92–2.07)	0.97 (0.61–1.56)
Monthly income	<5285.94	98 (41.7%)	137 (58.3%)	1	1
	>5285.94	105 (47.1%)	118 (52.9%)	1.24 (0.86–1.80)	1.47 (0.94–2.30)
Current working unit	Surgical ward	59 (43.4%)	77 (56.6%)	1	1
	Pediatrics	26 (34.7%)	49 (65.3%)	0.692 (0.39–1.24)	0.77 (0.41–1.44)
	ICU ward	15 (45.5%)	18 (54.5%)	1.09 (0.51–2.34)	0.70 (0.29–1.65)
	Gynecology and labor	12 (25.5%)	35 (74.5%)	0.45 (0.21–0.94)	0.42 (0.18–0.95)*
	Other wards	91 (54.5%)	76 (45.5%)	1.56 (0.99–2.47)	1.45 (0.87–2.43)
Work experience in surgical units (year)	<1	154 (53.5%)	134 (46.5%)	1	1
	1–2	76 (55.1%)	62 (44.9%)	0.94 (0.62–1.41)	2.01 (0.76–5.37)
	≥2	25 (78.1%)	7 (21.9%)	0.32 (0.14–0.77)	2.97 (1.10–8.02)*
Level of hospital	Primary	37 (31.1%)	82 (68.9%)	1	1
	General	83 (41.1%)	119 (58.9%)	1.55 (0.96–2.50)	1.94 (1.16–3.26)*
	Tertiary	83 (60.6%)	54 (39.4%)	3.41 (2.03–5.72)	3.31 (1.81–6.08)*
Ever took training	Yes	82 (39.0%)	128 (61.0%)	1.49 (1.03–2.16)	2.89 (1.38–6.02)*
	No	121 (48.8%)	127 (51.2%)	1	1
Training attended	Only once	68 (44.4%)	84 (55.6%)	1	1
	>one	14 (24.1%)	44 (75.9%)	2.54 (1.29–5.03)	0.72 (0.04–12.23)
Presence of protocols, manual	Yes	97 (40.8%)	141 (59.2%)	1.41 (0.97–2.06)	1.42 (0.91–2.22)
	No	106 (49.3%)	114 (50.7%)	1	1
Work load	Agree	172 (46.2%)	200 (53.8%)	1	1
	Disagree	31 (36.1%)	55 (63.9%)	0.66 (0.40–1.07)	0.63 (0.38–1.04)
Availability of SSI guidelines	Yes	79 (39.3%)	122 (60.7%)	0.70 (0.48–1.01)	0.89 (0.56–1.39)
	No	124 (48.2%)	133 (51.8%)	1	1

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; ICU, intensive care unit.

*Variables that were significant in multivariate analysis at $p < 0.05$.

standards (protocols, manual) related to postoperative wound care, position of nurses, adequate supply of personal protective equipment (PPE), availability of wound care materials in the practice area (kidney dish, artery forceps, scissors… and other necessary material for wound care) and using available IP guidelines were associated with the practice of nurses towards postoperative wound care.

All variables with $p < 0.2$ in bivariate logistic regression were candidates for multivariable logistic regression analysis. However, on

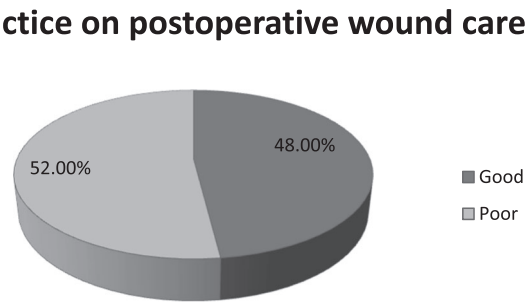

FIGURE 2 Study participants' practice towards postoperative wound care among nurses working in public hospitals in West Shoa, Oromia, Ethiopia, 2020.

multivariable logistic regression analysis, adequate supply of PPE, using available IP guidelines, and availability of wound care materials (kidney dish, artery forceps, scissors… and other necessary materials for wound care) at the practice area were significantly associated with the practice of nurses towards postoperative wound care at $p < 0.05$.

Availability of wound care materials in the practice area was identified as significant to affect nurses' practice towards postoperative wound care. The odds of having good practice in postoperative wound care were nearly four times more likely among nurses who had access to wound care materials in their practice area as compared to nurses who did not have (AOR = 3.67 [1.71–7.88]). Furthermore, the odds of having good practice in postoperative wound care were around three times more likely among those nurses who got a supply of PPE than those who did not get a supply of PPE (AOR = 3.38 [1.29–8.84]). Finally, this study showed that the odds of having good postoperative wound care practice were almost five times higher among those nurses who use IP guidelines than those who did not use them (AOR = 5.03 [2.16–11.7]) (Table 3).

4 | DISCUSSION

This study was conducted to assess the knowledge and practice aspect of nurses on postoperative wound care as well as associated factors for the good outcome of it, especially for those working in resource-limited areas in Ethiopia. It was evident that 44.3% (95% CI = 39.5%, 48.9%) of nurses have good knowledge about postoperative wound care. This articulates that more than half of the nurses have poor knowledge of postoperative wound care. This result was lower than the findings of a study done in Egypt[21] and Mekele, Ethiopia,[16] in which 80% and 55.1% of nurses had good knowledge, respectively. The possible clarification could be the discrepancy in in-service training, training curriculum, and institutional policy regarding protocols and guidelines. On the contrary, this finding was higher than the findings in a study done in Nigeria,[19] Amhara regional states,[22] where only 32% and 40.7% of the nurses had good knowledge. This might be because of the differences in the educational level of the study participants and the participant training on surgical site infection. But it was lower compared to the study conducted in Mekele city in which about 55.1% of nurses scored above the mean knowledge score towards postoperative wound care.[16] This inconsistency might be related to the difference in a study setting, different sample sizes, and sampling techniques.

The current study also revealed that a participant's sex was significantly associated with knowledge of postoperative wound care. The odds of having good knowledge of postoperative wound care were almost two times more likely among male than female nurses (AOR = 1.90 [1.25, 2.89]). This could be explained in terms of the educational level of male nurses as compared to females. In this study, the majority (59%) of the Bachelor of Science (BSc) holders were male nurses. Therefore, the difference in knowledge score could be due to the difference in educational level as those participants who had a BSc degree are more likely to have better knowledge than diploma holders. This study agrees with a study conducted in the Amhara region[22] and Addis Ababa,[20] indicating that male nurses were more knowledgeable than female nurses.

Types of a hospital in which nurses working in were another factor that was significantly associated with knowledge of post-operative wound care. The odds of having good knowledge of postoperative wound care were around three times more likely among nurses working in tertiary hospitals than those working in primary hospitals (AOR = 3.31 [1.81, 6.08]). Furthermore, the odds of having good knowledge were almost two times higher among those who were working in a general hospital than those who were working in a primary hospital. These were justified by the fact that general and tertiary hospitals are more prone to better access to material and in-service training.

Work experience specifically in the surgical unit was also one of a factor that affects the knowledge of a nurse on postoperative wound care. This study revealed that the odds of having good knowledge of postoperative wound care were almost three times more likely among those who worked in the surgical unit for two or more years than those who worked for less than a year (AOR = 2.97 [1.10–8.02]). This was justified by the fact that as the time of exposure to surgical procedures increases in the surgical unit, exposure to training, short discussions, and debates with staff may increase leading to increased knowledge. This finding was in line with findings from Bahirdar[23] and Amhara regional state.[22] Unfortunately, this study showed a reverse association between the current working unit and good knowledge of postoperative wound care. The odds of having good knowledge about postoperative wound care were 58% less likely among those who work in the gynecology and labor ward than those nurses working in the surgical ward (AOR = 0.42 [0.18–0.95]). The justification for this might be the fact that nurses working in the surgical ward are more exposed to invasive and complex surgical operations and wound care which helps in enhancing once knowledge whereas nurses working in the gynecology and labor ward are simply expected to care for a wound of Caesarian section or episiotomy which is less knowledge demanding with a possibility to referring to nurses in the surgical unit for the worst scenario.

TABLE 3 Logistic regression analysis result of factors associated with the practice of postoperative wound care among nurses working in the public hospitals in West Shoa Zone, Oromia, Ethiopia, 2020 ($n = 458$)

Variables		Practice of nurses		COR (95% CI)	AOR (95% CI)
		Good	Poor		
Age of participants in complete years	<25	79 (46.7%)	90 (53.3%)	1	1
	25–30	110 (46.4%)	127 (53.4%)	0.99 (0.66–1.47)	0.61 (0.28–1.30)
	30–35	24 (55.8%)	19 (44.2%)	1.44 (0.73–2.82)	1.54 (0.42–5.67)
	>35	7 (77.8%)	2 (22.2%)	3.99 (0.80–19.75)	2.33 (0.15–35.35)
Sex	Male	136 (52.9%)	121 (47.1%)	1.57 (1.08–2.27)	1.29 (0.60–2.58)
	Female	84 (41.8%)	117 (58.2%)	1	1
Learning institution	Government	162 (50.8%)	157 (49.2%)	1	1
	Private	58 (41.7%)	81 (58.3%)	1.44 (0.96–2.16)	0.99 (0.44–2.23)
Current working unit	Surgical ward	50 (36.8%)	86 (63.2%)	1	1
	Pediatrics	37 (49.3%)	38 (50.7%)	1.68 (0.95–2.96)	2.08 (0.70–6.19)
	ICU ward	13 (39.4%)	20 (60.6%)	1.12 (0.51–2.44)	0.83 (0.22–3.18)
	Gynecology and labor	28 (59.6%)	19 (40.4%)	2.54 (1.29–5.00)	1.57 (0.37–6.66)
	Other wards	92 (55.1%)	75 (44.9%)	2.11 (1.33–3.35)	0.99 (0.41–2.39)
Presence of standards	Yes	139 (58.4%)	99 (41.6%)	2.41 (1.65–3.51)	1.34 (0.58–3.09)
	No	81 (35.0%)	139 (65.0%)	1	1
Position of nurses	Staff nurses	195 (47.1%)	219 (52.9%)	1	1
	Head nurses	25 (56.8%)	19 (43.2%)	1.48 (0.79–2.77)	1.41 (0.43–4.69)
Availability of adequate wound care materials	Yes	53 (25.7%)	153 (74.3%)	5.67 (3.78–8.52)	3.67 (1.71–7.88)*
	No	167 (66.3%)	85 (33.7%)	1	1
An adequate supply of PPE	Yes	141 (40.3%)	209 (59.7%)	4.04 (2.51–6.50)	3.38 (1.29–8.84)*
	No	79 (73.1%)	29 (26.9%)	1	1
Usage of IP guidelines	Yes	83 (69.2%)	37 (30.8%)	7.73 (4.02–14.8)	5.03 (2.16–11.7)*
	No	18 (22.5%)	62 (77.5%)	1	1

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; ICU, intensive care unit; IP, infection prevention; PPE, personal protective equipment.

*Variables that were significant in multivariate analysis at a $p < 0.05$.

The current study also revealed that the odds of having good knowledge about postoperative wound care were nearly three times higher among those who had taken training than those who had not (AOR = 2.89 [1.38–6.02]). This finding was supported by studies conducted in Amhara regional states[22] and Bahirdar.[23] It's factual that on-the-job training has the capability in enhancing or updating the memory of the nurses and refreshes their knowledge. Furthermore, the current IP guideline of Ethiopia has incorporated detailed information resulting in a better understanding and longer knowledge about IP approaches for those who had taken the training.

Lastly, the study also showed the relationship between knowledge and the presence of protocols, manuals, and guidelines. The odds of having good knowledge were nearly two times higher among those who can access protocols, guidelines, and manuals than those who did not (AOR = 1.42 [0.91–2.22]). This is because of the fact that those who can access guidelines, protocols, and manuals get the chance to read more about IP approaches and mechanisms to prevent SSI. But, those who cannot access it are getting far from the knowledge of preventing SSI.

Regarding nurses' practice, this study indicated that around half, 48.0% (95% CI = 43.4%, 52.4%) of the participants had good practice in postoperative wound care. The findings of this study were comparable with the results of the studies conducted in Bangladesh,[18] Amhara regional state,[22] and Bahirdar hospitals[23] in which the level of nurses' practice towards surgical wound IP activities was 44.5%, 48.7%, and 45.1%, had good practice respectively. However, this result was lower than a study done in Pakistan,[13] in which about 58% of staff nurses had good practice in managing surgical wound

infection. This disparity might be attributed to sampling size, facility or setting, and availability of training. It might also be due to variations in the developmental level of the countries and the resulting shortage of wound care materials, as nurses reported that lack of wound care materials was one of the significant factors affecting their practice regarding postoperative wound care. This study was also lower than the study conducted in Mekele city[16] in which about 58.2% of nurses have good practice of postoperative wound care. The possible variation could be attributed to different sample sizes, training curricula, and included different types of hospitals.

The result of this study was also higher than the findings in the study done in Tanzania[15] and Cameroon[14] revealing that about 58% of participants reported poor postoperative wound care practice. The possible reason for the variation could be the education level of participants, sample size, and different sample techniques. For instance, in Cameroon, 60.6% of respondents reported having a diploma level of education, using a small sample size, and only one district hospital. In Tanzania, only 71 study participants in Muhimbili National hospital were included. This study showed that only 185 (40.4%) of nurses were reported to always wash their hands before and after changing wound dressing and touching the surgical wound. This finding is lower than research conducted in Pakistan,[13] Bangladesh,[18] and Tanzania,[15] where around half of the nurses always washed their hands before and after changing wound dressing and touching the surgical wound. The dissimilarity could be attributed to hospital facilities, Institutional policy regarding IP, and the study setting. This finding is also lower than the research conducted in Mekele city[16] in which about 85.4% of nurses reported that they clean the wound from clean to the less clean area always in their practice. The possible dissimilarity could be the study setting, sampling technique, and different sample sizes.

Findings from this study also showed that the availability of wound care materials in their practice area was one of the institutional factors which were significantly associated with the practice of postoperative wound care. The odds of having good practice of postoperative wound care were almost four times more likely among those who had access to wound care materials in their practice area when compared with those who did not have access to wound care materials in their practice area (AOR = 3.67 [1.71–7.88]). This study was supported by the research conducted in Australia in which available wound care material is essential in managing postsurgical wounds to reduce hospital readmissions and improve patients' quality of life.[24] On the contrary, guideline usage was another factor that was significantly associated with good practice toward postoperative wound care. The odds of having good postoperative practice were almost five times more likely among nurses who did use guidelines in their routine practice than those who did not use them in their regular practice (AOR = 5.03 [2.16–11.7]). This finding was agreed with the study conducted in Addis Ababa city among nurses working in the surgical units of public hospitals.[20] An adequate supply of personal protective equipment was significantly associated with the good practice toward postoperative wound care in the study area. The odds of having good postoperative practice were almost three times more likely among those who had a supply of PPE than those who had not (AOR = 3.38 [(1.29–8.84]). This could be explained by the fact that more kinds of PPE must be accessible at the point of use. The implication is that postoperative wound care practice level is higher among nurses who had an adequate supply of PPE. Moreover, frequent inaccessibility of personal protective equipment could decrease the motivation of energetic staff and could be a reason for poor practice. This finding agrees with the study done in Harari regional state and Dire Dawa city[25] administration, Eastern Ethiopia.

Limitation of the study

Because of the cross-sectional nature of the design, temporal relationships cannot be set between the explanatory and outcome variables of postoperative wound care knowledge and practice. Social desirability bias could happen because participants might not give honest responses on the self-administered questionnaire, favoring socially acceptable responses over their actual day-to-day practice.

5 | CONCLUSION AND RECOMMENDATION

The study found that the knowledge, and practice toward post-operative wound care among nurses working in public Hospitals in West Showa Zone, Oromia, Ethiopia, was below average. Being male, working in secondary & tertiary hospitals, ever took training work experience in the surgical unit, and the presence of protocols and manuals were significantly and positively associated with good knowledge of postoperative wound care. But, working in the gynecology and labor ward unit was negatively associated with good knowledge of postoperative wound care.

On the contrary, availability of wound care materials in the practice area (kidney dish, artery forceps, scissors, and other necessary materials for wound care), an adequate supply of PPE, and guidelines usage in their regular practice were significantly and positively associated with good practice of postoperative wound care.

Therefore, sustainable on-the-job training should be planned to update the knowledge of nurses regarding postoperative wound care. Hence, upgrading the nurse's knowledge and practice towards postoperative wound care on the developed global and national guidelines, like the WHO guideline, is essential in postoperative wound IP efforts. Hospital administrators should provide on job continuous educational training to create awareness on IP; emphasizing the latest evidence-based SSI prevention practice guidelines and offering more resources to manage postoperative wound care. Future researchers should consider stronger observational study designs to validate nurses' self-reported practice and determine actual practices.

AUTHOR CONTRIBUTIONS

Melkamu A. Gizaw: conceptualization; data curation; formal analysis; investigation; methodology; software; visualization; writing–original draft; writing–review & editing. **Mulu K. Negawo**: conceptualization; data curation; formal analysis; methodology; supervision; validation; writing–original draft; writing–review & editing. **Elias T. Bala**: conceptualization; data curation; formal analysis; methodology; validation; visualization; writing–review & editing. **Derese B. Daba**: data curation; formal analysis; methodology; software; visualization; writing–original draft; writing–review & editing. All authors have read and approved the final version of the manuscript. The corresponding author had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author upon request. The corresponding author had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

TRANSPARENCY STATEMENT

Derese B. Daba affirmed that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

ORCID

Mulu K. Negawo http://orcid.org/0000-0002-1477-3405
Derese B. Daba https://orcid.org/0000-0002-7599-8886

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