Article

PAMJ One Health

Research

Postoperative wound infection prevention practices and associated factors among nurses working for the South Gondar public hospitals, Northcentral Ethiopia triangulated with Watson's theory of transpersonal caring

Solomon Demis Kebede, Getaneh Desalew, Tigabu Munye Aytenew

Corresponding author: Solomon Demis, Department of Pediatrics and Neonatal Nursing, Debre Tabor University, Debre Tabor, Ethiopia. solomondemis@gmail.com

Received: 02 Aug 2021 - **Accepted:** 21 Nov 2021 - **Published:** 10 Dec 2021

Keywords: Postoperative wound care, nursing care, South Gondar Zone, Ethiopia

Cite this article: Solomon Demis Kebede et al. Postoperative wound Infection prevention practices and associated factors among nurses working for the South Gondar public hospitals, Northcentral Ethiopia triangulated with Watson´s theory of transpersonal caring. PAMJ - One Health. 2021;6(8). 10.11604/pamj-oh.2021.6.8.31036

Available online at: https://www.one-health.panafrican-med-journal.com/content/article/6/8/full

Postoperative wound infection prevention practices and associated factors among nurses working for the South Gondar public hospitals, Northcentral Ethiopia triangulated with Watson's theory of transpersonal caring

Solomon Demis Kebede[1,&], Getaneh Desalew[2], Tigabu Munye Aytenew[3]

[1]Department of Pediatrics and Neonatal Nursing, Debre Tabor University, Debre Tabor, Ethiopia, [2]Hiwot Fana Specialized and Teaching Hospital, Harar, Ethiopia, [3]Department of Comprehensive Nursing, Debre Tabor University, Debre Tabor, Ethiopia

[&]Corresponding author

Solomon Demis, Department of Pediatrics and Neonatal Nursing, Debre Tabor University, Debre Tabor, Ethiopia

Abstract

Introduction: *postoperative wound management is crucial to prevent the most frequent types of preventable hospital-acquired infections, leading to severe and undesirable surgical outcomes and associated with increased morbidity, mortality rates, hospital stay, readmissions, and excess costs. Transpersonal humanistic nursing caring is the most important component of nursing care. Studies suggest that the practices adopted by nurses for preventing postoperative wound infections have not been well identified according to caring theory. Moreover, in Africa, there is a paucity of information including the study area.* ***Methods:*** *an institutional-based cross-sectional study triangulated with qualitative theory-based design was conducted. A total of 515 nurses and four focus group discussions were included. Simple random sampling method and purposive sampling technique were used to select study participants. Data were collected using a pretested structured questionnaire with facilitating guiding questions to ask during FGDs. Data were checked, coded, entered and cleaned using Epi-data version 3.1 and exported to SPSS version 20 for analysis. Bivariate and multivariate analyses were carried out and p values less than 0.05 (95% confidence interval) were considered as statistically significant. Qualitatively, focus group discussions were audiotaped, transcribed and thematically organized.* ***Results:*** *the overall rate of POWI prevention practices was 40.8% (36.5-45). Nurses with a BSc and further education [aOR= 0.32, 95% CI (0.14, 0.71)], not trained on IP [aOR= 0.40, 95% CI (0.22, 0.72)], with poor knowledge [aOR= 0.45, 95% CI (0.27, 0.75)], poor attitude [aOR= 0.14, 95%CI (0.05, 0.24)], experience of less than 5 years [aOR= 0.08, 95%CI (0.04, 0.17)] were found to be statistically and inversely associated and the age group of less than 30 years [aOR=3.06, 95% CI (1.63, 5.74) was found to be statistically and positively associated with POWI prevention practices. During focus group discussions, the majority of nurses explained that caring practice such as "providing care for disease and patient" is calling for help".*

Conclusion: *this study highlights that POWI prevention was poor. Nurses with a BSc and further education, poor knowledge, poor attitude, serving for <5 years, not trained on infection prevention and the age group less than 30 years were found to be significantly associated with POWI prevention practice. Moreover, nurses´ experience in practicing transpersonal caring in accordance with the theory was limited to "caring for someone who needs help and for someone who has an illness". Strategies to improve knowledge, attitude and incorporating transpersonal caring theory into nurse's practice would result in better nursing care.*

Introduction

Postoperative wound care is an area of nursing practice in all nursing professionals and specialties by which it prevents the spread of infection. The core of the nursing profession is caring by which nurses' practice is known to be holistic to body-mind-sprit. The transpersonal caring theory perspective describes the nursing ontology of being in a relationship with the naturalistic paradigm of nursing research and practice. The transpersonal caring theory of Watson's theory explores that individual human being interconnected to others, community, and the universe at large which is a newly evolving field of nursing practice with the importance in health, education, and professionalism which in turn defines what nursing profession core competence is [1-3].

There will be the occurrence of infections on the incision or organ or space that occur within 30 days if no implant is left in place after the operation or within one year if the implant is in place [4,5]. A postoperative wound can be superficial incisional (limited to skin or subcutaneous tissue), deep incisional (limited to fascia and/or muscular layers) and organ/space (involves any part of the body, excluding the skin incision, fascia, or muscle layers that are opened or manipulated during the operative procedure) [5,6].

The nursing care in preventing postoperative wound infection is involved for expert wound care consultancy and practicing aspect of nursing as one dimension of caring in nursing. Though, there is a limitation in understanding what the nursing care of wound role entails. The nursing care conception development will result in the evolution of what the stand of nursing sciences and the nursing profession is uniquely defined [3,7]. World Health Organization (WHO) and the Centers for Disease Prevention and Control (CDC), had developed evidence-based recommendations to reduce the prevalence of postoperative wound infection [6,8-13]. Nursing care is crucial to the success of any preventive program aimed at reducing the incidence of postoperative infections. Postoperative wound infection rate is a key performance indicator of the health care system and nursing wound infection prevention is one of the most significant challenges in delivering optimal nursing care due to caring is a newly emerging nursing concept [14].

The infection prevention practice refers to the level of nurses´ perception of their actions in imitation, manipulation, and precision in the prevention of postoperative wound infection [15]. Moreover, nurses are expected to initiate and promote a safe healing care environment by applying "transpersonal caring theory" which is the essence of nursing as a nurse professional and is responsible to integrate all activities of the multidisciplinary team and drive new knowledge into practice. Nurses´ practice on prevention of POWI is influenced by many factors like nurses´ work experience, educational level, management support, availability of PPE, continuous supply of water, and infection prevention training in previous studies [1,16,17]. The prevention of Postoperative Wound Infection (POWI) is a serious and undesirable outcome of surgery and are a substantial burden to health-care systems, a person, and the community at large associated with increased morbidity, mortality rate and additional hospital stay, readmission, and additional costs [6,18].

Postoperative wound infection is the second most reported hospital-acquired infection (HAI), accounted for 19.6% of HAIs and is associated with 16 million extra days of hospital stay, attributable for 37, 000 deaths and an annual economic impact of 7 billion EUR in Europa and the most frequent type of HAI in low- and middle-income countries (LMICs). In Africa, it is the first most reported with a cumulative incidence ranged from 2.5% to 30.9% [10-12].

Although, up to 60% of postoperative wound infections (POWI) are preventable, with appropriate use of evidence-based nursing care practice [5]. But; the magnitude is still high despite the high number of professionals and advancement in surgical techniques which may be related to nurses´ professionals´ poor practice of infection prevention. Nurses play a major comprehensive role in the continuum of care in preventing POWI. And also, nurses are the heart, around the clock of the hospital and are responsible for postoperative site infection prevention, patient safety, and quality nursing care [19,20].

Globally, researches were conducted to describe nurses´ practice towards postoperative infection prevention practices despite many studies conducted aimed at the description and self-reported structured questionnaires which is more likely to bring empirical knowledge which might not explore holistic nurse-patient caring experience. And, it is less likely to include nursing theory-based studies as today´s nursing profession focuses on the naturalistic world viewpoint for emerging nursing problems in practice. Moreover, no evidence concerning nurses´ practice towards postoperative wound infection prevention in line with the transpersonal caring theory perspective in Ethiopia. This study, therefore, identified the actual performance of nurses´ care practice by an observational checklist triangulated with qualitative design on Watson´s transpersonal caring theory perspective.

Methods

Study design, setting and population: an institutional-based cross-sectional study supplemented with the qualitative design was conducted in South Gondar public hospitals, Northcentral Ethiopia, from January 01 to 30, 2020. There are 105 public health facilities (8 hospitals, 97 health centers in South Gondar Zone administration found in Northcentral Ethiopia. The South Gondar zone has been serving the province catchment area and currently, it delivers the health care services for more than 2.3 million populations through medical, surgical, gynecological, pediatrics, NICU, Ophthalmological wards, and 14 OPD with a total of 182 beds and more than 544 RN professionals in the zone. All nurses working in South Gondar zone public hospitals, Northcentral Ethiopia, 01 January up to 30, 2020.

Sample size determination: the sample size was calculated using the single population proportion formula for the prevalence and double population proportion for the second objective by taking into the following assumptions: prevalence [2,16] of postoperative wound care practice 30% [20] confidence level (CL) 95%, the margin of error (d) 5%, and by adding 10% for non-response rate. The sample size came up to 355. However, for the second objective double population formula using Epi Info version 7 for individual factors at 80% power and 1: 1 ratio of exposed to unexposed, the final sample size was 515. Comparing the calculated sample size of the two objectives, the final sample size used was from the second objective 515 and for a qualitative study, purposively 32 nurses of key informants were included.

Data collection tools: data were collected from the study participants using a pretested structured observational checklist and self-administered structured questionnaire for attitude and knowledge assessment. An observational checklist of nurses was developing by reviewing different literature and international guidelines. The focus group discussion questions were developed for guiding the discussion according to Watson's transpersonal caring theory perspective. The focus group facilitating guiding questions were Definition of what caring means, the perception of nurses, understanding, and what caring practice expressed by nurses with Watson's transpersonal caring perspective [13,21,22].

Data collection and procedures: the study participants were recruited among selected surgical, gynecology/maternity wards, and surgical/central intensive care units. Participants were selected using a simple random sampling technique. Surgical, gynecology/maternity, and intensive care units were selected because of the consideration that postoperative care was performed. For the qualitative part of the study, nurses with a working experience of 5 years and above were included as study participants purposively. The participants were classified into four focus group discussions consisting of 5 to 8 participants in each group.

Five BSc nurses as a data collector and one MSc nurse as a supervisor who was not working in the study sites were recruited for the data collection and training of data collectors and supervisors on objectives, checklists, and ways of conducting observation were provided by the principal investigator for two days before the actual data collection time. The observation was carried out by using an observational checklist to assess the actual postoperative wound infection prevention practice among nurses who were assigned to the surgical ward, surgical/central intensive care unit, and gynecology/maternity wards. The observation was started at the beginning of the shift and then the data collectors had been followed when the nurses give wound care for patients after surgery.

Operational definition: good knowledge- level of knowledge participants who scored above or equal to the mean (7.45) value for knowledge related questions regarding surgical site infection prevention practice otherwise “poor knowledge” [1,16]. Postoperative nursing wound care - The outcome variable for the practice of

nurses towards wound care was categorized into two (never practice and sometimes practice) on guideline was categorized as “not always practice”; and those participants who “usually” and “always” practice on wound care guideline checklist was categorized as “always practice”. Summation was computed and finally mean score of nursing wound care practice was calculated and those who score above or equal to mean (6.14) had a good practice and bellow mean were categorized as poor practice [1,16]. Good attitude- The level of attitude of participants who scored above and equal to the mean (26.68) value on attitude questions was categorized as “good attitude” and those who score below the mean value were categorized as “poor attitude” [17].

Data quality control: to ensure the quality of data training was given for data collectors and supervisors for two days regarding the objective of the study, data collection tool, and ways of data collection. Before actual data collection, a pretest was conducted on 30 study participants at Addis Zemen hospital. After the pretest, any ambiguity, confusion, difficult words, and differences in understanding were revised based on pretest experience. All data were checked for completeness and consistency by the principal investigator and supervisors, on the day of data collection. Double data entry was done by two data clerks and consistency of the entered data was cross-checked by comparing the two separately entered data. Simple frequencies and cross-tabulation was done for missing values and cross-checked with hard copies of the collected data.

Data analysis: the data were coded, entered, and cleaned using Epi-Data version 4.2 software and finally, it was exported into SPSS version 24 for analysis. Univariate analysis such as simple frequencies, measures of central tendency, and measures of variability was done to describe the characteristics of participants, and information was presented using tables and figures. Bivariate analysis, crude odds ratio with a 95% confidence interval was computed to see the association between the independent variable and the outcome variable by using binary logistic regression. Independent variables with p-values of =0.25 were included in the multivariable analysis to control confounding factors. For model fitness, Hosmer Lemeshow (0.59) and Omnibus tests (0.00) were computed. P values less than 0.05 at a 95% confidence interval were considered as statistically significant. For qualitatively, the content analysis of the FGD was used to arrive at four thematic areas on Watson´s transpersonal caring theory.

Informed verbal consent for observation and informed voluntary written and signed consent for focus group discussion were obtained from all respondents before the study. The study obtained ethical approval from Debre Tabor University, college of health science, Institutional Health Research Ethics Review Committee. Permission was also secured from the Debre Tabor comprehensive and specialized hospital. To maintain the confidentiality of information gathered from each study participant, a code number was used throughout the study.

Results

Socio-demographic characteristics: in this study, a total of 515 study participants were involved, making a response rate of 100%. From the total number of respondents, 276 (53.6%) were males. Almost half, 260(50.5%) of the study participants were with age group less than 30 years. More than four-fifth, 432(83.9%) of study participants were BSc and above holder nurses. Almost half of the study participants 260(50.5%) were married. The majority of them had working experience of five and above which accounted for 342(66.4) and the majority of the 437(92.59%) graduated from government institutions (Table 1).

Nurse related characteristics: the majority 353(68.5%) of study participants utilize PPE accordingly ever in their POWI prevention practices among participants who had a supply of PPE. One hundred thirty-nine (27.0%) study participants reported washing their hands before and after the

procedure, and 425(82.5%) of nurses reported not wash their hands before wearing sterile gloves. Less than half 253(49.10%) of the respondents had good knowledge of POWI prevention practices and also about half, 236(45.8%) of them had a good attitude toward POWI prevention practices (Figure 1).

The qualitative part of this study consists of four focused group discussions of which all members of the group have been working for at least five years and above to be key informants in their experience as a nurse professional. Upon the findings of the discussion, the three guiding areas were implemented when the discussion session which was: 1). Awareness towards wound care, 2). Attitude towards wound caring and 3). The practical occasion in perspective to nursing care theory.

Awareness towards nursing care in Watson´s transpersonal caring theory: as nurses´ description of nursing caring concept explores nurses´ awareness towards nursing caring theory was undertaken. The major points raised by FGD groups were having clients in a hospital with wound care based on their diagnosis and ordered wound care based on twenty-four hours basis. And, other FGDs have also described as nurses were knowledgeable in wound care as it is the major part of nursing cares listing the following; assessing the wound condition, properly cleansing, dressing, the progress of healing, proper frequency of caring as ordered, and pain management.

*I was caring for wounds to facilitate the wound healing process by decreasing microbial through antibiotics, cleaning, and dressing as per hospital protocol. I assess wound type and its degree of severity hereby we basis our care (**the BSc nurse with 7 years of work experience, FGD 1**). There might be a pain as a wound had formed due to injury in our case surgical procedures, hence, I am going to provide analgesics according to my clients´ request. I have experienced that pain is the most frequent complaint among patients with a surgical wound. Therefore, pain management is very crucial in nursing care (**The BSc Nurse with more than 10 years of working experience, FGD 3**).*

On the other hand regarding the concept of caring in nursing, the focus group discussants were described as follows: the caring concept in nursing described as; *caring is the process of responding our patients' request or disease condition who are admitted to get treatment. It is our professional duty to help patents as a nurse based on cases diagnosed which merely depends on our prioritization to set nursing goals. As far as my concern, caring in nursing is administrating patients´ medical intervention appropriately as protocol and managing cases strictly (**The BSc. Nurse with seven years´ work experience, FGD 2**).*

Similarly in this (**FGD 2, the nurse with 5 years´ work experience**) explained that; *caring in nursing is about properly administrating nursing process, by which all aspect of nursing care is included. The nursing process is all to have patients treated properly. Other caring aspects might include following the patient's progress, taking their vital signs as protocol and intervene accordingly, and providing wound care as per protocol*.

Caring for, for example; those with surgical wound patients is the process of providing all available services in the hospital. As a nurse in duty, we are expected to deliver nursing cares such as wound cleaning and dressing, managing pain via nursing pain management or analgesics according to the severity of pain. We are also expected to comfort and plan for our patients upon their diagnosis. For instance, we might apply our clinical experience on cases to enhance the healing process by planning accordingly (**The MSc nurse with six years´ work experience as a clinician as well as surgical ward coordinator, FGD 4**).

Caring in nursing consists of physical, social, cultural, psychological, and spiritual components to be addressed while providing nursing services in health institutions. Providing care in those aspects of health is the so-called nursing care; by which it is not either solely physical care, social care,

*psychological care, or spiritual care. It is a care consist of all being physical, mental, and spiritual which can be described in another term as body-mind-spirit (**The MSc nurse with five years´ work experience, FGD 3**).*

Attitude towards wound care in Watson´s nursing caring theory: *wound care is very important for enhancing the cure for our patients. I deliver the care as a hospital guideline for those who need wound care. I try to minimize pain and suffer as much as possible to all in nurses' profession code of ethics manner (**The BSc nurse with nine years of work experience, FGD 5**).* Nursing care differs from other disciplines in that it bases its scope of practice on human caring professionally by which we are so expected to help the ill compassionately and respectfully. I get engaged with my patients´ health problems during my duty time, sometimes; I feel great sorrow which in turn affects my day-to-day life. I think that I am empathetic for my patients (**The BSc nurse with three years´ work experience, FGD 3**). Other nurses with the Bsc holder with five years´ work experience in this FGD has also described that we the nurses´ staff would try to have patients healed from their postoperative surgical wound primarily or to have aesthetically better result and function after the healing process.

*I provide postoperative wound care to all patients in companionate and respectfully without bias and malpractice. I care about the health problem of my patients; hereby, I deliver my daily nursing tasks to all indiscriminately by their attributes. I would try to control my emotion and workload stress while treating the patient to have good communication with them (**The BSc nurse with ten years of work experience, FGD 1**). I provide to all patients health education about their disease process to have a minimum required health information about treatment regimen and requirements expected as the patient in the hospital* (**The diploma degree nurse with eleven years´ work experience, FGD 4**).

Work Environment related characteristics: regarding the presence of infection prevention guidelines, 288(56%) respondents reported they had no infection prevention guidelines in their working unit and 76(33.6%) of study participants reported that they didn´t get a supply of PPE. Moreover, 325(63%) of study participants did not get a continuous supply of water for postoperative wound infection prevention practices. Regarding workload 205(63.1%) of nurses working inpatient and ICU reported they had workload. Two hundred nine (40.6%) of study participants were trained on infection prevention practice but 306(59.4%) of them were not trained.

Regarding the inhibiting factors that lead the nurses not to give quality "nursing care" as they verbalized in the focus group, the discussion was the inadequacy of the personal protective equipment. They have mentioned that there was a workload that greatly influences their caring activity. They stated as follows: *I was forced to give only the routine nursing care i.e. wound cleaning and dressing, taking vital signs, and medication administration; this is resulted in not have patient satisfaction with our care. If I tried to implement all nursing interventions in that context, not that I should take care of eight patients in different cases, then I would have missed their ordered medications and daily nursing care. I think it is better for the patients at least to have routine nursing care for all patients in case of such large workload nurses facing nowadays. The higher management should, in my suggestion, consider these bottlenecks to alleviate the problem (**The BSc nurse with 5 years´ work experience, FGD 2**).*

Let me tell you what I faced during medication administration time, about 6 PM, and last year in 2019. I was administrating antibiotics to my patient aged 35, two days postoperative day. When I gave the medication, he has asked me about his procedures done and others his concern because of his hospitalization. He was agitated and aggressive expressions with a bit louder shouting at me saying tell me what you all, the doctors? Doing on me? When do I get out of this ugliest room, uhh…. On that occasion, I thought that it is the real nurse-patient communication time even though I could not do so due to that it was a critical time to

*administer their 6 PM medication; five patients were waiting for me to have their treatment. Then what should I reply to my patient shouting? Oh, it was a really difficult time for me to build a trustful relationship with my patients in the last five years, and the situation is continuing. The unresolved major problem for nurses not to practice nursing care by nursing theories, specifically, caring (**The MSc nurse with 5 years´ work experiences, FGD 3**).*

*I fell sorrow when my patients faced difficulties in their self-care ability, I mean that patients with partially or totally dependent on others, on their attendants and nurses; and when I could not help them due to resource constraints, for example, I encountered the patient who could not afford to medication. Can we nurses able to help with money? How can it be? In the worst scenario, there was an ethical dilemma between critical patients but with no ability to afford them. We also deal with financial, social, bureaucratic, management, and other issues not only disease processes. My colleagues, then what would be best to act up on to have better nursing care? On physical disorder, on societal, on financial issues as a manager or somebody else, or on what issues of the patient? I was distracted by many cases mentioned above which hinders me to provide optimal nursing care to my patients as I planned in the nursing process. To sum up, it is this kind of difficulty that makes the nursing care not to be as designed in theory, caring as the core of the nursing profession (**The BSc nurse with ten years work experience, FGD 4**).*

The practice of postoperative wound infection prevention: the overall observation postoperative wound infection prevention practices score was found to be 40.8% (36.5, 45 %), and none of the participants washed their hands before and after a procedure. A Hundred ninety (37%) of study participants used sterile materials and 182 (35.4%) of them used aseptic technique when dressing wounds.

The practice of postoperative wound care in Watson´s caring theory: in this part of the focus group, the discussion question was 'have you been as a professional nurse implement caring for your client?' The facilitator has used additional clarifying questions while facilitating the discussion. Caring as nurses´ implementation in Watson´s human caring theory perspective by the participants stated as follows: *I have been providing nursing care for the last 6 years in this hospital (i.e. Neonatal ICU, in pediatrics ward, medical, and now in the surgical ward) as a nurse. I provide my fullest endeavor to satisfy my patients based on the client first. What I have been done practically in respect to the caring theory of nursing is that I assess my patients using the nursing process format, plan goals, and objectives, and then I implement my plan I had prioritized. Besides, I would administer the medication or any other care plan ordered by my colleagues or by physicians. I follow closely my patients and if subjective or objective data is founded, I will intervene accordingly or I will consult the seniors assigned in that ward (**The BSc nurse with 6 years´ work experience, FGD 1**).*

*In addition to what my coworker stated, I will explain the disease process of my patient, what kind of treatment he /she is taking, and what they want to have or to be done for them. I answered what the patients requested whether it was solved by me or another team of staff in the hospital. I felt optimistic about any questions raised them because they are in a health problem seeking our help, hereby, they felt confident, at least their psychological aspects of their health. I asked the patients what they need especially those who are newly admitted (**The BSc nurse with five years´ work experience, FGD 1**). What I have been doing for my clients, irrespective of their diagnosis or their other merits, I reassure their treatment progress, what expected in their diagnosis and treatment regimen, what they are expected to do and not to do, and to have a call to me or any other if they want to do so. In other ways, I have been providing health information or sometimes health education when conditions allow, or at discharge for follow up, according to their cases (**The BSc nurse with 12 years of work experience, FGD 4**).*

*When I supervised and during my duty time, I have tried to have nurse-patient therapeutic communication about their disease or treatment by attentively listening to them. I remember that the 34 years old male patient with colostomy refuses to listen to me while I was doing wound care. After having finished the routine care, I went to his bedside and narrated other patients discharged in his by age and case, i.e. undergone surgery. He insisted to discuss with care firstly and complains of his fate, bored with the societal and familial roles he had been responsible for 5 years. He then told me that he had an examination for employment in a company though he accidentally acquired the problem whereby he admitted to the hospital. He said that he felt so story due to this hospitalization as he lost the job opportunity, as he missed the exam. Having talked a lot; he felt relaxed, deeply breathe, and thanked me, nothing I did for him except listening to him. What I learned from that occasion that our clients need listening, being with them, and know who he/she is in a patient-centered manner. Hence listening to the client is very vital for nursing care (**The MSc nurse with five years´ work experience, FGD 3**).*

*As I understood and practiced, I made a conducive environment to nature act up on my clients. For example, I followed the aseptic techniques to prevent the spread of microbes. I strictly follow standard precautions during procedures. In our cases, surgical ward, infection prevention guidelines, I applied. Therefore, practicing in the nursing domain, i.e. responding on the physical ailment, psychological, and mental aspects of health, I tried to incorporate into my care plan, I think it would be caring at its fullest level to be done as a nurse. I have been responded on disease manifestations, for example; for pain as a sign, I intervene by providing analgesics, and reassuring, for fever tepid sponging i.e. nursing or pharmacological management (**the BSc nurse with six years´ work experience, FGD 4**).*

Factors associated with postoperative wound infection prevention: the bivariate analysis result showed that educational qualification level, work experience, training on infection prevention, learning institution, nurses´ age, knowledge, attitude, management support, and PPE availability were significantly associated. In multivariate logistic regression analysis, however, management support and PPE availability were not significantly associated with POWI prevention practice. Nurses who had poor attitudes were 86% less likely to practice POWI prevention practice compared with good attitude [AOR= 0.14, 95% CI (0.05, 0.24)]. Participants who had poor knowledge compared to good knowledge were 55% less likely to prevent the practice of POWI [AOR= 0.45, 95% CI (0.28, 0.75)]. The odds of POWI prevention practice were 60% less likely among nurses with training on infection prevention compared to those who had no training [AOR= 0.40, 95% CI (0.22, 0.72)]. According to educational level, nurses who hold BSc and above were 68% less likely to practice POWI prevention compared to those who holds diploma [AOR= 0.32, 95%CI (0.14, 0.71)] and nurses in the age group 30 and fewer years were 3 times more likely to practice compared to those in 30 and above years [AOR= 3.06, 95% CI (1.63, 5.74)]. Participants who had less than 5 years of work experience were 92% less likely than those who had 5 years and [AOR= 0.08, 95% CI (0.04, 0.17)] (Table 2).

Discussion

Postoperative wound infection prevention practice: the level of postoperative wound infection prevention practice was found to be 40.8% (36.5% -45%) among study participants. The finding of this study is comparable with the results of the studies conducted in Bahir Dar and Bangladesh [1,15,19]. However, the result is lower than in India, Zambia, Palestine, Gondar, and in Jordan [23-26], the difference could be probably explained by the differences in the operational definition of POWI prevention practice, study setting, sampling technique and availability of resources.

Moreover, the result is higher than a study conducted in Yemen and Iran [27,28]. The

dissimilarity could be hospital facilities, in the operational definition of POWI prevention practice, participant related factors, sociodemographic characteristics, study setting, sample size, and sampling technique. For example, only 85 study participants in private hospitals were included and 60% of study participants were three-year diploma holders and also only 4% of them have good knowledge and in Iran, only 145 study participants were included.

Factors associated with postoperative wound care practices: the study participants with experience of fewer than five years of work experience were less likely to practice compared to participants who have more than five years´ work experience. The finding is comparable with Debre Markos, Bahir Dar, and Jimma Ethiopia [1,28-30]. This could be mean that as the number of years of practice decreases, nurses are less likely to be exposed repeatedly to surgical environments and become less experienced. In another word, as the number of years of practice in nursing increases, the importance of lifelong learning is understood within the meaning of maintaining competency, providing high-quality nursing care, and enhancing future career opportunities [9].

The findings of this study revealed that participants with BSc and above were less likely to practice postoperative wound care activities compared with the diploma. This contradicts a study in Debre Markos, Ethiopia [29], eastern Ethiopia [16], the difference might be due to the BSc and above follows updates that disregard the current guideline implemented in the hospitals. The participants who had not taken IP training were less likely to perform quality care of postoperative wound care compared with participants who were trained. This means that the nurses who took training were more likely to practice hereby it is in line with a study conducted in Gondar and Bahir Dar, Ethiopia [1,31]. The possible explanation for this finding could be the fact that training on current guidelines could upgrade the knowledge and skill of professionals in that they would easily understand basic principles, recommendations, and standards of practice and implement them consistently.

The nurses who had poor knowledge were less likely to practice than those with good knowledge. This finding is in line with a study in Ethiopia [32]. As knowledge is a critical component of nurses´ decision-making, therefore, nursing practice is accomplished through the application of critical thinking, judgment, and skill which is grounded in the principles of nursing. Moreover, it increases the confidence and readiness of nurses in the implementation of quality postoperative wound care strategies. Participants who had poor attitudes toward postoperative wound care were less likely to practice compared with a good attitude. This result is comparable in Ethiopia [32]. This could be linked to the fact that as attitude is a way of reasoning formed through experience that influences behavior or individual choice of action, it positively translated into actual practice. The nurses in the age group less than 30, were more likely to practice than those in the age group 30 and above. This might be due to newly employed energetic young nurses with an updated nursing body of knowledge in caring wound infection prevention practice.

Strength and limitation: the strength of this study was using observational checklist as a tool and the limitation was information bias. The bias was minimized by triangulation, data analysis model and supervision of observers critically and using more than one observer per ward and unit.

Conclusion

Postoperative wound care practices were low. The conceptual understanding of Caring in nursing in terms of Watson's theory of human caring is explored as "caring about patients request for and caring about disease". Being BSc and above, being with poor knowledge and had poor attitude for postoperative wound care, serving for < 5 years, and had not trained on IP were found to be significantly associated with nurses´ postoperative

wound care practices inversely. And nurses with age group less than 30, was found to be directly associated with postoperative wound infection prevention practice. As nursing professionals, human caring is all about nursing so that it would be better to practicing Watson´s theory which brings nursing excellence as it is a humanistic approach; nursing is a holistic body-mind-sprit. And finally, what would be the anxiety level of patients admitted in hospitals? It would answer how big the health problem is neglected by the empirical body-focused approach of nursing care.

What is known about this topic

- *The practice of postop wound infection practice varies place to place in health setup among health professionals; and scholars have recommended further studies to be conducted in specifically among nurses;*
- *A major challenge to have optimal health care systems in low income countries was transmission of infections (nosocomial infections) results in delayed wound healing.*

What this study adds

- *Nurses´ experience in practicing transpersonal caring as the theory was limited to "caring for the request for help and caring for disease";*
- *Nurses hindering factors towards quality postoperative wound infection prevention practices by nurses with interview and observational checklist;*
- *The level of nurse-led nursing care which provides with what factors majorly challenge the nursing care practice, and come up with a base line evidence for future applied research and training on "concept of nursing care" knowledge and managerial intervention like induction of transpersonal nursing theory based practice in the hospitals.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Solomon Demis Kebede: conceptualized the topic, has supervised data collection and has written manuscript. Getaneh Desalew: analyzed the data and has edited the draft manuscript. Tigabu Munye Aytenew: prepared proposal and analyzed the collected data.

Acknowledgments

The authors acknowledge the Debre Tabor University, College of health sciences, Department of nursing, the data collectors, the supervisors for their inevitable support and encouragement in carrying out this research.

Tables and figure

Table 1: sociodemographic characteristics on POWI prevention practices among nurses working in South Gondar public hospitals, Northcentral, Ethiopia, 2020

Table 2: factors associated with POWI prevention practice among nurses working in South Gondar public hospitals, Northcentral Ethiopia, 2020

Figure 1: knowledge and attitude on POWI prevention practices activities among nurses working in South Gondar zone, Northcentral Ethiopia, 2020

References

1. Teshager FA, Engeda EH, Worku WZ. Knowledge, practice, and associated factors towards prevention of surgical site infection among nurses working in Amhara regional state referral hospitals, Northwest Ethiopia. Surgery Research and Practice. 2015;2015. **PubMed** | **Google Scholar**

2. Walker PH, Neuman BM. Blueprint for use of nursing models: education, research, practice, and administration. Jones & Bartlett Learning. 1996. **PubMed**| **Google Scholar**
3. Dutton M, Chiarella M, Curtis K. The role of the wound care nurse: an integrative review. British Journal of Community Nursing. 2014;19(Sup3): S39-S47. **PubMed**| **Google Scholar**
4. Smith MA, Dahlen NR, Bruemmer A, Davis S, Heishman C. Clinical practice guideline surgical site infection prevention. Orthopaedic Nursing. 2013;32(5): 242-8. **PubMed**| **Google Scholar**
5. Anderson DJ, Podgorny K, Berrios-Torres SI, Bratzler DW, Dellinger EP, Greene L *et al*. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. Infection Control & Hospital Epidemiology. 2014;35(S2): S66-S88. **PubMed**| **Google Scholar**
6. Berríos-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR *et al*. Centers for disease control and prevention guideline for the prevention of surgical site infection, 2017. JAMA surgery. 2017;152(8): 784-91. **Google Scholar**
7. Salehian M, Heydari A, Moonaghi HK, Aghebati N. Developing the concept of caring in nursing education. Electronic Physician. 2017;9(5): 4425. **PubMed**| **Google Scholar**
8. Mawalla B, Mshana SE, Chaya PL, Imirzalioglu C, Mahalu W. Predictors of surgical site infections among patients undergoing major surgery at Bugando Medical Centre in Northwestern Tanzania. BMC Surgery. 2011;11(1): 21. **PubMed**| **Google Scholar**
9. Olowo-okere A, Ibrahim YKE, Sani AS, Olayinka BO. The occurrence of surgical site infections at a tertiary healthcare facility in Abuja, Nigeria: a prospective observational study. Medical Sciences. 2018;6(3): 60. **PubMed**| **Google Scholar**
10. Ameh EA, Mshelbwala PM, Nasir AA, Lukong CS, Jabo BA, Anumah MA *et al*. Surgical site infection in children: prospective analysis of the burden and risk factors in a sub-Saharan African setting. Surgical Infections. 2009;10(2): 105-9. **PubMed**| **Google Scholar**
11. Gelaw KA, Aweke AM, Astawesegn FH, Demissie BW, Zeleke LB. Surgical site infection and its associated factors following cesarean section: a cross-sectional study from a public hospital in Ethiopia. Patient Safety in Surgery. 2017;11(1): 18. **PubMed**| **Google Scholar**
12. Allegranzi B, Bischoff P, de Jonge S, Kubilay NZ, Zayed B, Gomes SM *et al*. New WHO recommendations on preoperative measures for surgical site infection prevention: an evidence-based global perspective. The Lancet Infectious Diseases. 2016;16(12): e276-e87. **PubMed**| **Google Scholar**
13. Palumbo V, Bruno A, Di Trapani B, Tomasello G. 2016 WHO global guidelines for the preventions of surgical site infection: a new step to improve patient's safety before and during surgery. 2017. **Google Scholar**
14. Blasdell ND. The meaning of caring in nursing practice. Int J Nurs Clin Pract. 2017;4(238): 2. **Google Scholar**
15. Sickder HK. Nurses´ knowledge and practice regarding prevention of surgical site infection in Bangladesh: Prince of Songkla University. Songkla University. 2010. **PubMed**| **Google Scholar**
16. Desalew G, Geda B, Mengistie B, Demis A, Demis S. Surgical Site Infection Prevention Practices and Associated Factors among Nurses Working in Government Hospitals of Harari Regional State and Dire Dawa City Administration, Eastern Ethiopia. TMR Integrative Nursing. 2019;3(6): 214-25. **Google Scholar**

17. Gulilat K, Tiruneh G. Assessment of knowledge, attitude, and practice of health care workers on infection prevention in health institution Bahir Dar city administration. Science Journal of Public Health. 2014;2(5): 384-93. **Google Scholar**
18. Badia J, Casey A, Petrosillo N, Hudson P, Mitchell S, Crosby C. Impact of surgical site infection on healthcare costs and patient outcomes: a systematic review in six European countries. Journal of Hospital Infection. 2017;96(1): 1-15. **PubMed**| **Google Scholar**
19. Sickder HK, Lertwathanawilat W, Sethabouppha H, Viseskul N. Nurses´ surgical site infection prevention practices in Bangladesh. Pacific Rim International Journal of Nursing Research. 2017;21(3): 244-57. **Google Scholar**
20. Tewabe T, Mehariw Y, Negatie E, Yibeltal B. Neonatal mortality in the case of Felege Hiwot referral hospital, Bahir Dar, Amhara Regional State, North West Ethiopia 2016: a one-year retrospective chart review. Italian Journal of Pediatrics. 2018;44(1): 57. **PubMed**| **Google Scholar**
21. Allegranzi B. The burden of surgical site infections worldwide-Burden of SSI in high-income countries (LMICs) LMICs. World Health Organisation, (March). 2014: 12-5. **Google Scholar**
22. Alligood MR. Nursing theorists and their work-e-book. Elsevier Health Sciences. 2017. **Google Scholar**
23. Patil VB, Raval RM, Chavan G. Knowledge, and practices of health care professionals to prevent surgical site infection in a tertiary health care center. International Surgery Journal. 2018;5(6): 2248-51. **Google Scholar**
24. Chitimwango PC. Knowledge, attitudes, and practices of nurses in infection prevention and control within a tertiary hospital in Zambia: Stellenbosch. Stellenbosch University. 2017. **Google Scholar**
25. Fashafsheh I, Ayed A, Eqtait F, Harazneh L. Knowledge and practice of nursing staff towards infection control measures in the Palestinian hospitals. Journal of Education and Practice. 2015;6(4): 79-90. **Google Scholar**
26. AL-Rawajfah OM. Infection control practices among intensive care unit registered nurses: a Jordanian national study. Nursing in Critical Care. 2016;21(2): e20-e7. **PubMed**| **Google Scholar**
27. Alrubaiee G, Baharom A, Shahar HK, Daud SM, Basaleem HO. Knowledge and practices of nurses regarding nosocomial infection control measures in private hospitals in Sana´a City, Yemen. Safety in Health. 2017;3(1): 1-6. **Google Scholar**
28. Sarani H, Balouchi A, Masinaeinezhad N, Ebrahimitabs E. Knowledge, attitude and practice of nurses about standard precautions for hospital-acquired infection in teaching hospitals affiliated to Zabol University of Medical Sciences (2014). Global Journal of Health Science. 2016;8(3): 193. **PubMed**| **Google Scholar**
29. Desta M, Ayenew T, Sitotaw N, Tegegne N, Dires M, Getie M. Knowledge, practice and associated factors of infection prevention among healthcare workers in Debre Markos referral hospital, Northwest Ethiopia. BMC health Services Research. 2018;18(1): 1-10. **PubMed**| **Google Scholar**
30. Bekele I, Yimam I, Akele G. Adherence to Infection prevention and factors among nurses in Jimma university medical center. Immunome Research. 2018;14(2): 1-7. **Google Scholar**
31. Haile TG, Engeda EH, Abdo AA. Compliance with standard precautions and associated factors among healthcare workers in Gondar University Comprehensive Specialized Hospital, Northwest Ethiopia. Journal of Environmental and Public Health. 2017;2017. **PubMed**| **Google Scholar**

32. Sahiledengle B, Gebresilassie A, Getahun T, Hiko D. Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa. Ethiopian Journal of Health Sciences. 2018;28(2): 177-86. **PubMed| Google Scholar**

Table 1: sociodemographic characteristics on POWI prevention practices among nurses working in South Gondar Public hospitals, Northcentral, Ethiopia, 2020

Variable	Category	Frequency (%)
Sex	Male	276(53.6)
	Female	239(46.4)
Marital status	Single	215(41.7)
	Married	260(50.5)
	Divorced	35(6.8)
	Other	5(1.0)
Age	< 30 years	260(50.5)
	≥30 years	255(49.5)
Experience	<5 years	173(33.6)
	≥5years	342(66.4)
Educational qualification	Diploma	83(16.1)
	BSc and above	432(83.9)
Graduate institution	Government	437(92.59)
	Private	35(7.41)

Table 2: factors associated with POWI prevention practice among nurses working in South Gondar public hospitals, Northcentral Ethiopia, 2020				
	Practice		**95% CI**	
	Poor	**Good**	**COR**	**AOR**
Attitude				
Poor	231(82.8%)	48(17.2%)	10.53(6.96, 15.95)	0.14(0.06, 0.24)***
Good	74(31.4%)	162(68.6%)	1	1
Knowledge				
Poor	198(75.6%)	64(24.4%)	0.24(0.16, 0.35)	0.46(0.28, 0.76) ***
Good	107(42.3%)	146(57.7%)	1	1
Training				
Yes	72(34.4%)	137(65.6%)	0.17(0.10, 0.24)	0.40(0.22, 0.72) ***
No	233(76.1%)	72(23.9%)	1	1
Education				
BSc and above	233(54.1%)	198(45.9%)	0.20(0.10, 0.37)	0.32(0.14, 0.71) ***
Diploma	72(85.7%)	12(14.3%)	1	1
Age				
<30 years	138(54.1%)	117(45.9)	0.72(0.46, 0.93)	3.06(1.63, 5.74)*
>=30 years	167(64.2%)	93(35.8%)	1	1
Experience				
<5 years	154(45%)	188(55%)	0.12(0.07, 0.20)	0.08(0.04, 0.17)***
= > 5 years	151(87.3%)	22(12.7%)	1	1
PPE availability				
Yes	92(40.9%)	133(59.1%)	0.25(0.17, 0.36)	0.59(0.33, 1.005)
No	213(73.4%)	77(26.6%)	1	1
Management support				
Yes	76(37.6%)	126(62.4%)	0.22(0.15, 0.32)	0.63(0.35, 1.14)
No	229(73.2%)	84(26.8%)	1	1
Significant at *P<0.05, ***P<0.001, 1= constant; **CI=** Confidence Interval, **COR**= Crude odds Ratio, **AOR=** Adjusted Odds Ratio				

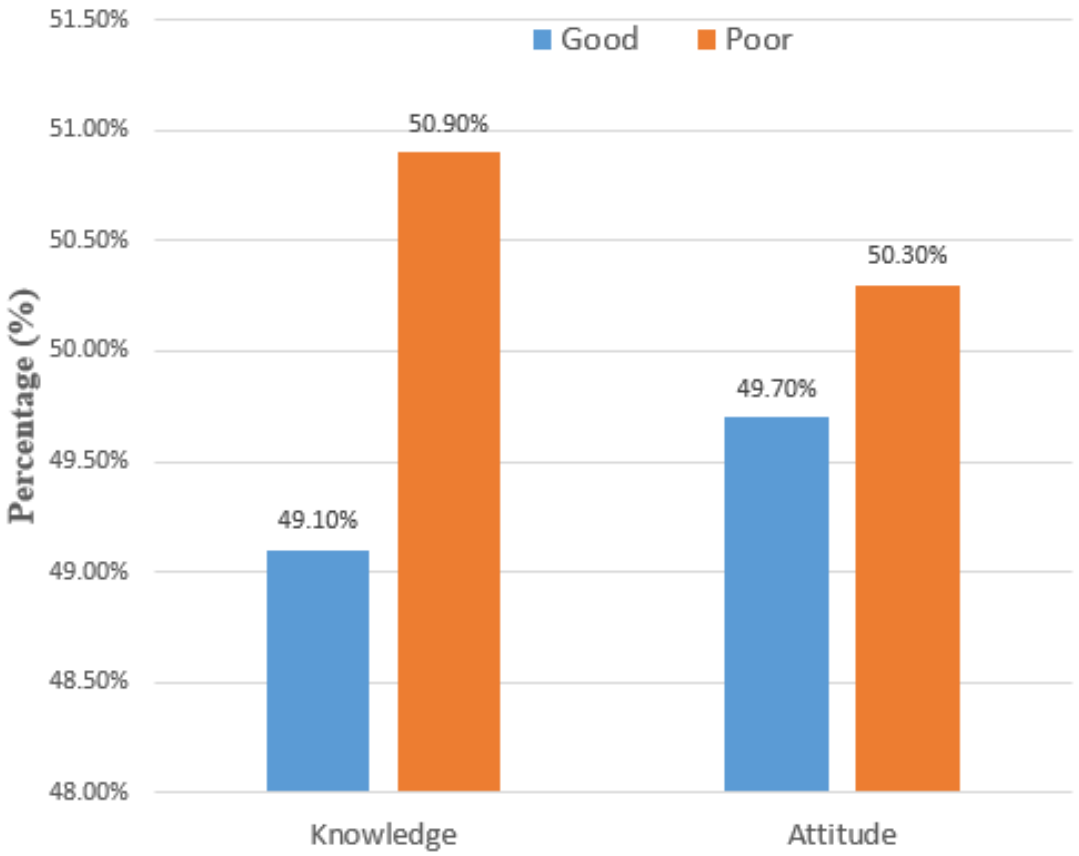

Figure 1: knowledge and attitude on POWI prevention practices activities among nurses working in South Gondar zone, Northcentral Ethiopia, 2020