Author's response to reviews

Title: Knowledge and Practice of Nurses towards prevention of pressure ulcer and associated factors in Gondar University Hospital, Northwest Ethiopia.

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Knowledge of Nurses’ knowledge and Practice of Nurses' practice towards prevention of pressure ulcer and associated factors is low in Gondar University Hospital, Northwest Ethiopia.

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Abstract

Background:
Pressure ulcers are the common conditions among patients hospitalized in acute and chronic care facilities and impose a significant burden on patients, their relatives and caregivers. Pressure ulcers have been described as one of the most costly and physically debilitating complications since the 20th century. The pain and discomfort due to pressure ulcer prolongs illness, delays rehabilitation, timing of discharge, and even cause death. This study aimed to assess factors associated with knowledge and practice among nurses in Gondar University Hospital, North-west Ethiopia.

Method: An institution-based cross-sectional survey study was conducted from March 15 - April 10, 2014 among 248 nurses in Gondar University Hospital. A total of 248 nurses were participated in this study by using a pretested and structured self-administered questionnaire. Data were entered using and analyzed using an adapted SPSS version 20 statistical software package. Descriptive statistics was used to describe the study population in relation to relevant variables. Bivariate and multivariate logistic regression was also carried out to identify possible factors associated with nurses’ knowledge and practice regarding to see the effect of each independent variable on the dependent variable prevention of pressure ulcer.

Result: Nearly half (54.4%) of the nurses had good knowledge, similarly 48.4% but in contrary less than half (48.6%) of them had good practice on prevention of pressure ulcer. Educational status [Adjusted Odds Ratio (AOR)= 2.4, 95% CI (1.39-4.15)], work experience [AOR=4.8, 95% CI (1.31-10.62)] and having formal training [AOR=4.1, 95% CI (1.29-9.92)] were significantly associated with knowledge on prevention of pressure ulcer. While in addition, satisfaction with nursing leadership [AOR=1.9, 95% CI (1.04-3.82)], staff shortage [AOR=0.07, 95% CI (0.03-0.13)] and inadequate facilities and equipment [AOR=0.4, 95% CI (0.19-0.83)] were found to be significantly associated with the practice on prevention of pressure ulcer.
Conclusion and recommendation: In general, knowledge and practice of the nurses regarding prevention of pressure ulcer was found to be inadequate. Having higher educational status, attending formal training and being experienced were positively associated with knowledge; while shortage of facilities and equipments, disatisfaction with nursing leadership, inadequate staffs, facilities and equipments were factors affecting knowledge and inadequate staff number showed negative association with practice of nurse’s regarding to prevention of pressure ulcer prevention. In-service training and upgrading courses, creating nurses retaining mechanism and ensuring adequate number of human resources, availability of facilities and equipments are some of the important steps to improve nurses’ knowledge and practice on prevention of ulcer pressure. ulcer.

Key words: Pressure ulcer, Knowledge, Practice and Ethiopia
Pressure ulcers are the common conditions among patients hospitalized in acute and chronic care facilities and impose a significant burden on patients, their relatives and caregivers [1]. Now-a-days, pressure ulcers are recognized worldwide as one of the five most common causes of harm to patients and, a largely preventable patient safety problem. Also and increasingly described as an indicator of the quality of care provided by health care organizations [2-4].

Pressure ulcers have been described as one of the most costly and physically debilitating complications since the 20th century. The pain and discomfort of due to pressure ulcer delays illness, delay rehabilitation, prolongs illness and timing of discharge, and also may contribute to disability and death. These dramatically raise health care costs raise dramatically as a result of the need for supplies and nursing hours, and cost of hospital resources become raised too [5]. Moreover, health care budgets expend billion of dollars worldwide on prevention and treatment of patients with extended hospital stays from pressure ulcer development [6]. It has been estimated that the cost of treating In USA, pressure ulcer is 2.5 times higher than the cost of preventing as remain a major health problem affecting approximately 3 million adults [7]. In USA, pressure ulcers remain a major health problem affecting approximately 3 million adults and the economic burden of pressure ulcer treatment is about $5.571.02 billion and around 60,000 deaths occurred each year due to pressure ulcer related complications [83]. A systematic review Therefore, the burden of 31 studies found that living with pressure ulcers significantly limit many aspects of an individual’s well-being, including general extends beyond costs to the health care system and physical, social, financial and psychological quality of life [88]. So, the burden - A systematic review of 31 studies found that pressure ulcers goes beyond increasing significantly.
limit many aspects of an individual’s well being, including general health care costs to loss and physical, social, financial and psychological quality of life [10]. According to an international literature, it has been identified that nurses’ knowledge of the prevention of pressure ulcers is poor, which and this poor knowledge is reflected in their practices as they do not comply with best practice guidelines [11,10]. Study conducted in Sweden on nurses’, staff nurses knowledge and practice of existing guidelines on prevention of pressure ulcer found that, majority of them nurses had inadequate knowledge and practice to implement guidelines and document the risk assessment as well as prevention and treatment of pressure ulcer [12,11]. Similarly, a study in Belgian Hospital found that knowledge of nurses about the prevention of pressure ulcers was inadequate [13,12]. Poor knowledge and practice of nurses have its own significant contribution for higher prevalence of pressure ulcers [14,13]. Moreover, a study in Bahir Dar, Ethiopia found that a total of 71 pressure ulcers were detected in 422 patients, with the prevalence rate of 16.8%. The prevalence of pressure ulcer was higher in male respondents than in female respondents.

Although the prevention of pressure ulcers is a multidisciplinary responsibility, usually nurses play a major role and it is considered to be an essential part of nursing care in high income countries [15,14]. Because, even if the prevention of pressure ulcers is a multidisciplinary responsibility, usually nurses play a major role and it is considered to be an essential part of nursing care in high income countries. Thus preventing ulcer should be the goal of all nurses but it is rarely researched in low income countries like Ethiopia. Evidence based mechanism need to be implemented to improve nursing care regarding to prevention of pressure ulcer. Development and implementation of pressure ulcer prevention protocol, increase the number of registered nurses, improving time spent at the bedside, educating staff nurses, formation of
quality indicators were found to be some of the solutions for combating pressure ulcer occurrences [16,17] but it is rarely researched in low income countries like Ethiopia.

In Ethiopia there is lack of evidence on nurses’ knowledge and practice of pressure ulcer prevention. Therefore, this study set out to assess the level of nurses’ knowledge and practice on prevention of pressure ulcer and thereby generate appropriate information that can be used by program managers and stakeholders in the prevention and interventions of pressure ulcer.

It has been estimated that the cost of treating pressure ulcer is 2.5 times of the cost of preventing them [18]. Thus preventing pus should be the goal of all nurses [14]. In Ethiopia, too little information is available about strategies for prevention on pressure ulcer and there is lack of evidence about Ethiopian nurses’ knowledge and practice regarding to prevention of pressure ulcer. Therefore, assessing nurse’s knowledge and practice regarding to prevention of pressure ulcer will produce information that can be used by program managers and stakeholders in the planning and interventions of pressure ulcer. Detecting the problem also helps to take correction measurement for improving the quality of nursing care, patient outcomes, adverse events, and quality of the hospital services.

Methods

Study design and set up

An institutional based cross sectional study was conducted among nurses working from March 15—April 10, 2014 in Gondar University hospital. The hospital which is located in Gondar town, Amhara regional state Northwest Ethiopia. Gondar is 740 kmKM away from the capital city of Ethiopia, Addis Ababa. The hospital was established in 1954 and provides services for more than 5 million peoples of the Amhara region through both
outpatient and inpatient services for more than 5 million peoples living of all departments (medical, surgical, pediatric, gynecology and obstetrics, ophthalmic and dental departments) with more than 500 Beds. The hospital has 255 nurses, 136 GPs and specialists and more than 60 laboratory technologists. Approximately 50 Patients per day are admitted in its catchment area, the hospital. The participants of this study were all nurses who were working in Gondar University Referral Hospital.

Sample size and sampling procedure

The sample size was determined by using the single population proportion formula with the assumption of following assumptions: 50% proportion, 95% confidence level and 5% margin of error. Given that the source population was less than 10,000, we used a correction formula was used and 5% five percent was added for the expected non-response was added, making the final sample size 201. Since the total number of nurses who were working in the hospital GUH was 255, the study involved all of them to increase the power of the study, this research involved all nurses who were working in this particular hospital.

Data collection tool and procedure

Data were collected using a structured and pretested self administered questionnaire was developed and administered to the participants. The questionnaire and the consent forms were prepared developed in English. Participants were asked 22 knowledge based and 22 practice based questions to assess their level of knowledge and practice towards prevention of pressure ulcer. Four midwife nurses and version. Before the actual work, data facilitators (BSc Midwifes) and supervisors (BSc Public Health Officers collected the data with close supervision. Data quality was controlled by giving trainings and appropriate supervisions were given intensive training for data collectors. The overall supervision was carried out by two days duration about the principal investigator. A pre-test was conducted using 6% aim of the study and procedures including ways of facilitating the data collection process. After the training, facilitators pre-tested the questionnaire on 15 (6%) nurses who were working in Bahir
Appropriate modifications were made after analyzing the pretest result before the actual data collection.

The appropriateness of the instrument was measured through a pre-testing exercise, and the constraining factors were rectified. Prior to applying the survey instrument, the researchers engaged different expert reviewers as subject matter specialists at Gondar University Hospital to evaluate and finalize the instrument. Regarding to the reliability, the study used Cronbach’s coefficient alpha to measure consistency, complementarily and correlation coefficient. To generate the Cronbach’s alpha results, validation of the instrument was conducted through a pilot study and the results obtained had an overall Cronbach’s alpha of (r) = 0.76.

Operational definitions were used:
- Pressure ulcer: A lesion of skin or underlying tissues by direct unrelieved pressure for more than 3 hours on the skin.
- Good knowledge: Nurses, who scored on prevention of pressure ulcer. Those nurses who respond above the mean knowledge score of the knowledge questions, were considered as having good knowledge on pressure ulcer regarding to prevention. But of bed sores in the contrarily, those scored hospitalized patients. Poor knowledge: Those nurses who respond below the mean value considered as having poor knowledge towards prevention of pressure ulcer.

Knowledge score: Good practice: Nurses, who scored respond above the mean score of the practice questions related score regarding to prevention of pressure ulcer were considered to have good practice. But bed sores in the contrarily, those scored hospitalized patients. Poor practice: Those nurses, who scored respond below the mean score were considered as having poor practice towards prevention of pressure ulcer.

Data processing and analysis
The questionnaires filled by the nurses were checked for completeness and entered into EPI-INFO version 3.5.3 statistical software and then exported to SPSS version 20 for further analysis.
Descriptive statistics was used to describe the study population in relation to relevant variables. Both bivariate and multivariate Multiple logistic regression models were used to identify
variables independently associated factors. Odds Ratios and their with knowledge and practice towards prevention of pressure ulcer. The strength of association was interpreted using the adjusted odds ratio with 95% Confidence Intervals were computed and variables with CI. The criterion for statistical significance was set at a p-value less than 0.05 were considered as significantly associated with the outcome variable.

Ethical considerations

Ethical clearance was obtained from University of Gondar, Department of Nursing. A formal letter of cooperation was written to Gondar University Hospital. Communication with the Nursing Department was made through formal letter obtained from the Department of Nursing. After the purpose and objective of the study had informed, verbal consent was obtained from each study participant. Data collection sessions were also informed that participation was on voluntary basis and they have the right, to withdraw at any time if they are not comfortable about the study. In order to keep confidentiality, all data were kept anonymously in the distributed questionnaire.

Results

Socio-demographic characteristics of the study participants

Out of the total of the expected 255 respondents, study samples 248 agreed to participate in the study, yielding a response rate of 97.3%. The mean age of the respondents was 28.25 years (SD=5.1). Around half (53.6%) were single. Nearly half of them (50.8%) were males, and two third (62.5%) of the nurses had bachelor degree. Most in nursing with majority (92.7%) of them had working experiences of less than 10 years. The mean age of the respondents was 28.25 years with standard deviation of 5.1 years and 206 (83.1%) of the respondents were in the age group of 20-30 years. Regarding marital status, more than half (53.6%) of the nurses were single (Table 1).

Organizational factors on prevention of pressure ulcer

Majority (91.1%) of the nurses had not received any formal training and 223 (89.9%) of them were not using any existing guidelines about risk assessment and prevention of pressure
ulcer. More than half of the nurses (53.2%) were not satisfied with the nursing leadership team of the hospital. More than three quarter (78.6%) of the nurses disagreed to the time were disagreeing about timing given for each patient care. While less and less than half (43.5%) of the nurses reported were agree with staff shortage, big and majority (88.3%) of them agreed in the hospital had there was inadequate facilities and equipments (Table 2).

**Knowledge Nurses’ knowledge regarding to prevention of pressure ulcer prevention**

Participants were asked by using 22 questions to assess their knowledge on pressure ulcer prevention, and they were categorized in to two groups based on their score in relation to questions, the mean. The mean score was 12.79 (SD=3.21). More than half (54.4%) knowledge score of the respondents were found to have 12.79 with a standard deviation of ±3.21 (Table 3). By taking a score of 13 as a cut off point, 135 (54.4%) study participants had good knowledge, while a substantial proportion and the remaining 113 (45.6%) of the respondents were not had poor knowledge score regarding to pressure ulcer prevention (Figure 1).

From the Based on six dimensions of knowledge regarding to prevention of pressure ulcer, the nurses had a poor knowledge level on three including out of six dimensions which included risk assessment, skin care and management for mechanical loads. But Moreover, they possessed a good level of knowledge on regarding to factors related to pressure ulcer formation (M=71.9, SD=25.2), benefit followed by nutrition to maintain healthy skin (M=69.9, SD=29.1) and importance of staff training programe for staff (M=60.7, SD=34.2).

**Nurses’ practice regarding to prevention of pressure ulcer**

By using 22 practice based questions, the mean practice score of the respondents was found to be 12.16 (SD=9.75) with a standard deviation of ±9.75 (Table 4). Nearly half. By taking a score of 12 as a cut off point, 128 (51.6%) respondents had poor practice (below or equal to score of 12) whereas the remaining 120(48.4%) of the respondents had good practice; whereas the remaining
51.6% respondents had poor practice (above or equal to score of 13) regarding to prevention of pressure ulcer prevention (Figure 1). Overall nurses’ practice regarding to prevention of pressure ulcer was at the poor level with a minimum and maximum score of 0 and 36 respectively.

Factors associated with nurses' knowledge regarding to prevention of pressure ulcer

Based on the bivariate analysis, the factors found to be significantly associated with nurses’ knowledge regarding to prevention of pressure ulcer were level of education, length of work experience, formal training on pressure ulcer and availability of guidelines about pressure ulcer prevention. However, out of variables which were entered to multiple logistic regression, level of education, length of work experience and formal training on prevention of pressure ulcer were found to have significant and independent effect on nurses’ knowledge regarding to prevention of pressure ulcer, while availability of guidelines about pressure ulcer prevention was not significantly associated at p-value of < = 0.05.

Those nurses who had bachelor degree were 2.4 times [AOR= 2.4, 95% CI (1.39-4.15)] more likely to have a good knowledge on prevention of pressure ulcer as compared to those nurses who had diploma. Those nurses who had work experience of 11-20 years were 4.8 times [AOR=4.8, 95% CI (1.31-10.62)] more likely to have good knowledge than nurses with less than 10 years of work experience.

Those nurses who had formal training about pressure ulcer were 4.1 times [AOR=4.1, 95% CI (1.29-9.92)] more likely to have good knowledge than those nurses who did not took training about pressure ulcer (Table 5).

Factors associated with nurses' practice regarding to prevention of pressure ulcer prevention

Based on the bivariate analysis, the nurses’ practice towards prevention of pressure ulcer was significantly associated with level of education, length of work experience, satisfaction...
with nursing leadership. **Having formal training on pressure ulcer prevention, staff shortage and inadequate facilities and equipments.** However, from variables which were entered to multiple logistic regression, satisfaction with nursing leadership, staff shortage and inadequate facilities and equipments were found to have significant and independent effect on the significantly associated with practice of nurses’ towards prevention of pressure ulcer, while level of education, length of work experience were not significantly associated at p-value of \( \leq 0.05 \).

Nurses who were satisfied with nursing leadership were around 21.9 times [AOR=1.9, 95% CI (1.04-3.82)] more likely to have good practice towards prevention of pressure ulcer compared to those who were not. **Study participants satisfying with the nursing leadership. Those nurses who agreed about staff shortage in the work place were 93% [AOR=0.07, 95% CI (0.03-0.13)] less likely to have good practice than nurses who disagreed about the shortage of staff. Moreover, respondents nurses who agreed about inadequate facilities and equipments in the work place were 60% [AOR=0.4, 95% CI (0.19-0.83)] less likely to have good practice towards prevention of pressure ulcer as compared to those who were disagree about inadequate facilities and equipments (Table 6).

**Discussion**

Prevention: The prevention of pressure ulcers is an indicator represents a marker of quality of care. **Nursing: Pressure ulcers are a major nurse-sensitive outcome.** Hence, nursing care has a major effect on pressure ulcer development and prevention. Hence, Pressure ulcers are a major nurse-sensitive outcome [16]. So this study was aimed to describe the level of nurse’s knowledge and practice on prevention of pressure ulcers and its associated factors in Gondar University Hospital, Northwest Ethiopia.

In this study, 54.4% of the participants were found to be knowledgeable. While substantial proportions 45.6% were not, this is inadequate. Because, as they are nurses working in
recognized teaching referral hospital, and are expected to be well experienced, this level of knowledge is below the anticipated. The finding of this study is comparable with other studies conducted in different parts of the world. In a study conducted in Turkey the mean score of correct answer was 48.85% \cite{17} and the study conducted in Belgian hospital revealed that the mean knowledge score was 49.7% \cite{13}. Similarly, the study conducted in Bangladesh indicated that the overall nurses’ knowledge on pressure ulcer prevention were found to be 57.79\% \cite{18} and the other study conducted in one of the largest health insurance hospital in Alexandria, found that, the overall mean percentage score for nurses were below the minimum acceptable level \cite{19}.

Respondent’s formal education and training experience may be a factor related to this poor level of knowledge. Pressure ulcer prevention related content included in their curriculums might not be sufficient, specifically related to prevention of pressure ulcer. In addition, lack of learning resources for nurses to update their knowledge would be another reason for the poor level of knowledge. Specifically in Ethiopia, there is a limited learning resources for nurses to update their knowledge. Moreover, nursing journals are not available even at the nursing institutes or hospitals. Specific to this study 91.1\% of the participants had not received any formal training and 89.9\% of the nurses were not using any existing guidelines on risk assessment and prevention of pressure ulcer.

Respondent’s level of education was found to be significantly associated with knowledge of pressure ulcer prevention. This finding is in line with the study conducted in Sweden among registered nurses and licensed practicum nurses in which the registered nurses’ score were significantly higher than those of the licensed practicum nurses \cite{20}. This could be attributed
to the possibility that more educated respondents have a higher opportunity of exposure to different courses directly or indirectly related to prevention of pressure ulcer.

Respondents with work experience of 11-20 years had good knowledge when compared to those with work experience of \( \leq 10 \) years. Similar finding was reported in study conducted in Nigeria; where years of experience were significantly associated with clinical practice and knowledge \([21,23]\).

Other study done in Spain on Nurses’ knowledge and clinical practice of pressure ulcer care revealed that, the greater the working experience the higher the knowledge gained \([22,24]\). The reason might be nurses with more years of working experience have more chance to work with different professionals so that they can learn from their coworker’s experience. Also since they have more prolonged exposure to patient care, they have greater chance to learn how to prevent pressure ulcer even from their own mistakes as compared to those who have less years of working experience.

Nurses who took formal training on pressure ulcer prevention were found to have good knowledge be more knowledgeable than those who had not. Similarly in a study conducted in Swedish healthcare to assess knowledge, attitude and practice of nursing staff on pressure ulcer prevention; and treatment; nurses who had training were more knowledgeable than those who did not \([23,25]\). This might be due to the fact that training increases the chance of the trainees to get up to date information about pressure ulcer related preventions.

Staff shortage is one of the factors associated to predictors for nurse’s practice in related to prevention of pressure ulcer. This study also favored the above claim in which, respondent’s practice towards prevention of pressure ulcer prevention was found to be poor which was less than 50%. Similarly study conducted in England showed that, majority of the nurses reported
lack of staff and time as barrier to implement effective care practices related to prevention of pressure ulcer \[24,26\]. The poor practice can be explained by the fact that, shortage of nursing staff limits the working time available for each patient’s care. Especially in countries like Ethiopia where number of health professionals is near to the ground, inadequate nurse to patient ratio may limit the implementation of quality care related to prevention of pressure ulcer.

In this study more than three fourth of nurses did not use a risk assessment scale. Similarly the study conducted in Sydney found that 79% of the nurses did not use any assessment tool to identify patients with at risk of pressure ulcer \[25,27\]. This can be explained by lack of evidence based nursing practice and in-service training on prevention of pressure ulcer.

Respondents who were satisfied with the nursing leadership had good practice as compared to those who were not. A possible reason for this result might be nurses who are satisfied with the nursing leadership are happier on their working environment, so that they are motivated to invest all their knowledge and experiences on practices related to prevention of pressure ulcer.

Inadequate facilities and equipments in the workplace were associated with poor practice on prevention of pressure ulcer. This might be due to the fact that limited access to adequate facilities and equipments may hinder nurse’s motivation and ability to prevent patients from developing pressure ulcer.

Using a self reported questionnaire to examine the nurses’ practice towards prevention of pressure ulcer was the main limitation of this study.

**Conclusion**
Nurses’ In conclusion, majority of the nurses had poor knowledge and practice regarding to prevention of pressure ulcer was found to be inadequate. Having higher educational status, attending - Nurses with BSc degree, work experience of 11-20 years, and nurses with formal training, being more experienced showed a positive and significant association with knowledge; whereas inadequate facilities and equipments, dissatisfaction were found to be predictors of good knowledge. On the other hand, nurses who dissatisfied with the nursing leadership and agreed with staff shortage and inadequate facilities and equipments were found to be associated with predictors of poor practice towards prevention of pressure ulcer prevention. In-service training, upgrading courses, creating nurses retaining mechanism and ensuring availability of the necessary facilities and equipments adequate number of human resources are some of the important steps to improve nurses’ knowledge and practice regarding to prevention of pressure ulcer. Moreover, ensuring availability of the necessary facilities and equipments needed to carryout activities related to prevention of pressure ulcer and creating a system to facilitate both horizontal and vertical communication between top-level hospital managers and department heads are additional suggestions which are recommended to improve nurses’ practice regarding to prevention of pressure ulcer.

Competing interests

The authors declare that they have no competing interests.
Authors’ contributions

NNY, FZA and SAF were involved in the design of the study, data analysis, and interpretation of the findings, report writing and manuscript preparation. YMA was involved in the design of the study, analysis and interpretation of the data, and review of the report. All authors read and approved the final manuscript.

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