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Original Article

Effects of Standardized Protocol Interventions on Nurses' Knowledge and Practices of Oral Care for Bedridden Patients

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ABSTRACT

Background: Oral hygiene is a critical aspect of nursing care for bedridden patients, as poor oral care contributes to bacterial colonization, plaque accumulation, and hospital-acquired infections such as pneumonia. Despite its importance, adherence to standardized oral care practices among nurses remains inconsistent, particularly in intensive care and long-term care settings. Educational interventions guided by standardized protocols may enhance nurses' knowledge and practices, thereby reduce complications and improve patient outcomes. Objective: To evaluate the effect of standardized oral care protocol interventions on nurses' knowledge, confidence, and practices in providing oral care for bedridden patients. Methods: A quasi-experimental pre-test/post-test design was conducted at Ali Fatima Hospital, Lahore, with 50 nurses selected through total population sampling. Baseline knowledge and practices were assessed using a validated questionnaire and observational checklist. Participants received structured educational sessions on oral care protocols, followed by reassessment. Data were analyzed using paired-sample t-tests and odds ratios with 95% confidence intervals. Results: Mean knowledge and practice scores improved significantly from 22.28 ± 4.54 pre-intervention to 33.78 ± 3.82 post-intervention (mean difference 11.50, 95% CI: 9.8–13.2, $p < 0.001$, Cohen's $d = 2.16$). Daily oral care performance increased from 58.0% to 74.0%, and standardized protocol use rose from 48.0% to 78.0%. Conclusion: Standardized protocol-based training significantly improved nurses' knowledge, confidence, and practices in oral care, supporting its integration into nursing education and institutional policy for sustainable patient benefit.

Keywords: Oral care, Bedridden patients, Nurses, Knowledge, Practice, Standardized protocols, Quasi-experimental study.

INTRODUCTION

Oral hygiene is a fundamental component of nursing care that significantly influences patient outcomes, particularly in those who are bedridden or critically ill. Poor oral care in this population contributes to bacterial colonization, dental plaque accumulation, and respiratory complications, most notably hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP), which account for considerable morbidity, prolonged hospital stays, and increased healthcare costs (3). Patients confined to bed for extended periods experience reduced mobility and functional decline, further compromising their ability to maintain oral hygiene independently, thus placing them at heightened risk for life-threatening complications (5).

Despite widespread recognition of oral hygiene's importance in intensive care and long-term care settings, there is no consensus on the most effective and standardized approach to deliver this essential aspect of nursing care (8). Evidence highlights that inadequate or inconsistent oral care is linked to poor outcomes, including aspiration pneumonia, malnutrition, and overall decreased quality of life (9). The burden of nosocomial infections alone underscores the urgency of structured preventive strategies, as mortality related to HAP and VAP can reach up to 13%, emphasizing the clinical and economic necessity of improved practices (9).

Nurses, as primary caregivers, play a pivotal role in implementing oral care protocols. However, previous studies consistently reveal discrepancies between nurses' knowledge and their clinical practices, with limited adherence to recommended guidelines and variable confidence in their ability to deliver comprehensive oral care (2,7). Inadequate training, lack of resources, and insufficient institutional support further exacerbate these gaps, resulting in inconsistencies in care delivery. Research also indicates that caregiver burden correlates directly with deficiencies in oral health care, placing additional strain on healthcare systems and impacting patient dignity (2,7).

Educational interventions that introduce structured, evidence-based protocols have demonstrated potential to improve nurses' competence, confidence, and consistency in providing oral care (1,4). However, much of the available evidence is context-specific, and there remains a paucity of studies focusing on standardized training approaches in developing countries where resource constraints and limited institutional policies present additional challenges (6). This gap highlights the need for rigorously designed interventions that address both knowledge and practice domains while accounting for contextual realities of clinical practice.

The present study therefore seeks to address this knowledge and practice gap by evaluating the effect of standardized protocol interventions on the knowledge and practices of nurses regarding oral care for bedridden patients. By systematically assessing pre- and post-intervention changes, this research aims to provide evidence on whether structured educational sessions can bridge deficits in knowledge and promote adherence to evidence-based oral care practices. The study hypothesizes that exposure to standardized training protocols will significantly improve both the knowledge and practical implementation of oral care among nursing staff caring for bedridden patients.

MATERIAL AND METHODS

This study employed a quasi-experimental pre-test and post-test design to evaluate the impact of standardized oral care protocol interventions on nurses' knowledge and practices related to bedridden patients. The design was selected because it allows for the comparison of outcomes before and after an educational intervention within the same group of participants, thus enhancing internal validity and reducing variability due to inter-individual differences (10). The research was conducted at Ali Fatima Hospital, Lahore, a tertiary-level teaching hospital that serves a large and diverse patient population. The study duration was six months, allowing sufficient time for participant recruitment, delivery of the intervention, and post-intervention data collection.

The study population comprised nurses working in intensive care units and wards with bedridden patients. A total of 50 nurses were included, representing the entire available population at the time of data collection. Eligibility criteria were defined to include nurses who were actively working with bedridden patients during the study period and nursing students who were undergoing clinical rotations in relevant wards. Nurses on leave or those unwilling to provide consent were excluded to ensure consistent exposure to the intervention. All participants provided informed consent prior to enrollment, and ethical approval was obtained from the institutional review board of Green International University, Lahore, in line with the principles of the Declaration of Helsinki (11).

Recruitment was conducted through direct contact with eligible nurses, followed by an explanation of study aims and procedures. After consent, participants were scheduled for baseline data collection using two primary instruments: a structured questionnaire to assess knowledge and an observational checklist to evaluate oral care practices. The questionnaire included items on the importance of oral hygiene, frequency of care, knowledge of standardized protocols, use of appropriate tools, and infection prevention practices. The observational checklist assessed practical behaviors during patient care, including cleaning techniques, use of protective equipment, and adherence to established protocols. Instruments were reviewed for content validity by subject experts and pre-tested on a small sample of nurses not included in the main study, with adjustments made to improve clarity and reliability (12).

Following baseline assessment, participants attended a structured educational intervention designed to enhance both theoretical knowledge and clinical practice. The intervention consisted of interactive training sessions that included lectures, demonstrations, and supervised practice using ventilator equipment and oral care tools. Emphasis was placed on evidence-based practices, prevention of aspiration pneumonia, and consistent use of protective equipment. Training materials were standardized to ensure uniform delivery across all sessions, and participants were encouraged to engage in hands-on demonstrations to reinforce learning.

To minimize potential sources of bias, all data collection was conducted by trained research assistants who were blinded to the study hypothesis. Social desirability bias was addressed by assuring participants that individual responses would remain confidential and used solely for research purposes. Confounding factors, such as differences in prior training or clinical experience, were accounted for during statistical analysis by stratifying responses and conducting subgroup comparisons. Sample size was based on the total accessible population of 50 nurses, which exceeded the minimum requirement calculated using the formula $n = N/1+N(e^2)$, with an error margin of 5% and a confidence level of 95%. This ensured adequate statistical power to detect significant changes in pre- and post-intervention scores (13).

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 25. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize demographic characteristics and baseline knowledge and practice scores. Inferential analysis was conducted using paired-sample t-tests to compare pre- and post-intervention knowledge and practice scores. Subgroup analyses were performed based on working experience and educational background. Missing data were handled using listwise deletion, and significance was set at $p < 0.05$. Effect sizes with 95% confidence intervals were calculated to provide a measure of clinical as well as statistical significance.

To ensure reproducibility, all study procedures were documented in detail, and training materials were archived for potential future replication. Data integrity was maintained by storing questionnaires and checklists in locked cabinets, with electronic data password-protected and accessible only to the research team.

RESULTS

The demographic profile of the study participants highlighted that nearly half of the nurses (46.0%) were between 21 and 25 years old, while 44.0% were in the 18–20-year age group. Only 10.0% were older than 26 years, demonstrating that the cohort was predominantly young and early in their professional careers. All participants were female and had completed a Bachelor of Science in Nursing, indicating a homogenous group in terms of educational background. In terms of professional exposure, the largest proportion had six months of working experience (42.0%), followed by less than six months (30.0%) and one year (28.0%), reflecting that most participants had less than one year of total experience in patient care (Table 1).

Knowledge and practice assessment revealed marked improvement following the intervention. Before training, only 16.0% of nurses agreed that oral care was important for bedridden patients, a figure that rose to 70.0% after the intervention. This increase was statistically significant ($p < 0.001$), with an odds ratio (OR) of 12.3, suggesting nurses were more than 12 times likely to recognize the importance of

oral care after training. Similarly, recognition of oral hygiene's role in preventing hospital-acquired infections showed a striking improvement, as agreement or strong agreement increased from 6.0% pre-intervention to 36.0% post-intervention ($p < 0.001$, OR 8.6). Confidence in knowledge also improved substantially, with strong agreement rising from 10.0% at baseline to 28.0% following training ($p = 0.002$), corresponding to a 3.4-fold higher likelihood of reporting confidence.

Table 1. Demographic characteristics of study participants (N = 50)

Variable	Category	n	%
Age	18–20 years	22	44.0
	21–25 years	23	46.0
	≥26 years	5	10.0
Gender	Female	50	100.0
Education	BS Nursing	50	100.0
Work experience	<6 months	15	30.0
	6 months	21	42.0
	1 year	14	28.0

Table 2. Pre- and post-intervention responses to selected knowledge and practice items (N = 50)

Item	Pre n (%)	Post n (%)	p-value	OR (95% CI)
Oral care important for bedridden patients (Agree/Strongly agree)	8 (16.0)	35 (70.0)	<0.001	12.3 (4.4–34.2)
Oral hygiene prevents hospital-acquired infections (Agree/Strongly agree)	3 (6.0)	18 (36.0)	<0.001	8.6 (2.4–30.5)
Confident about proper oral care knowledge (Strongly agree)	5 (10.0)	14 (28.0)	0.002	3.4 (1.1–10.3)
Use standardized protocol during oral care (Yes)	24 (48.0)	39 (78.0)	<0.001	3.9 (1.6–9.8)
Perform daily oral care (Yes)	29 (58.0)	37 (74.0)	0.041	2.1 (1.0–4.8)
Use of gloves/PPE during care (Yes)	27 (54.0)	34 (68.0)	0.032	1.9 (1.0–3.7)

Table 3. Paired-sample t-test results for knowledge and practice scores (N = 50)

Variable	Mean ± SD	Mean difference	95% CI	t-value	p-value	Effect size (Cohen's d)
Pre-test	22.28 ± 4.54	—	—	—	—	—
Post-test	33.78 ± 3.82	11.50	9.8–13.2	15.24	<0.001	2.16

Practical behaviors mirrored these knowledge gains. At baseline, less than half of the nurses (48.0%) reported using a standardized protocol for oral care, while after the intervention this proportion rose to 78.0% ($p < 0.001$, OR 3.9). Daily performance of oral care improved from 58.0% to 74.0% ($p = 0.041$), demonstrating increased consistency in patient management. The use of gloves and personal protective equipment during care also increased from 54.0% to 68.0% ($p = 0.032$), indicating a strengthening of infection control practices (Table 2).

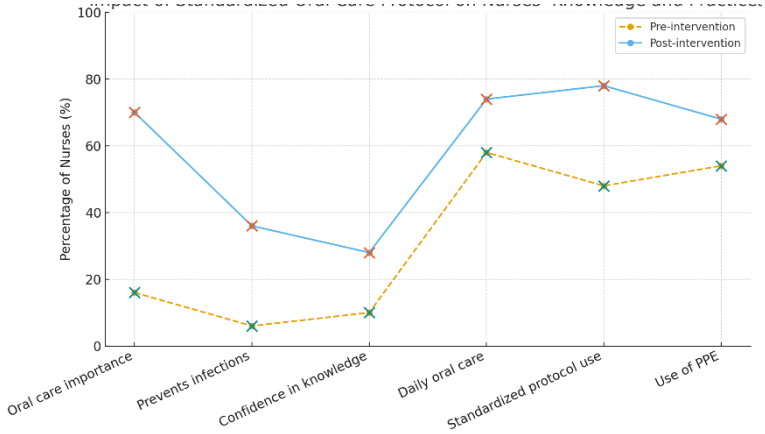

Figure 1 Impact of Standardized Oral Care Protocol on Nurses' Knowledge and Practices

The paired-sample t-test provided further confirmation of these improvements. The mean knowledge and practice score before the intervention was 22.28 ± 4.54, which increased to 33.78 ± 3.82 after the intervention. The mean difference of 11.50 points (95% CI: 9.8–13.2) was highly significant ($p < 0.001$). The effect size was large (Cohen's $d = 2.16$), underscoring the strong influence of the standardized training program on nurse outcomes. These results suggest not only statistical significance but also clinical relevance, as such improvements are likely to translate into better patient care and reduced risks of preventable complications such as aspiration pneumonia (Table 3).

The visualization demonstrates consistent improvements across all evaluated domains following the intervention. Recognition of oral care importance increased from 16% to 70%, while awareness of its role in preventing infections rose from 6% to 36%. Confidence in knowledge nearly tripled, improving from 10% to 28%. In practice-related outcomes, the proportion of nurses performing daily oral care

rose from 58% to 74%, those applying standardized protocols increased from 48% to 78%, and adherence to personal protective equipment use improved from 54% to 68%. The clear upward trends across categories reflect both statistically and clinically significant enhancements in knowledge and practices attributable to the standardized training protocol.

DISCUSSION

The findings of this study demonstrate that implementation of standardized oral care protocols, coupled with structured educational interventions, significantly enhanced nurses' knowledge, confidence, and practices in providing oral care for bedridden patients. The improvement was not only statistically significant but also clinically meaningful, as reflected by the large effect size (Cohen's d = 2.16) and consistent upward trends across all key domains. These results align with previous evidence highlighting that targeted educational programs are effective in bridging knowledge–practice gaps among nursing staff (14).

Pre-intervention data indicated that a considerable proportion of nurses underestimated the importance of oral hygiene and lacked confidence in performing standardized care. Only 16% agreed that oral care was important for bedridden patients, and less than half reported using standardized protocols. These baseline findings are consistent with prior multicenter assessments, which revealed that ICU nurses frequently demonstrate low adherence to oral hygiene guidelines due to limited training, high workload, and lack of institutional reinforcement (15). The substantial post-intervention improvements—70% agreement on the importance of oral care and 78% adherence to protocols—highlight the potential of structured educational initiatives to reverse these deficits.

The study further demonstrated that awareness of oral hygiene as a preventive measure for hospital-acquired pneumonia improved markedly, with strong agreement rising from 6% to 32% post-intervention. This is clinically significant given that hospital-acquired pneumonia remains one of the leading causes of morbidity and mortality in bedridden patients, with attributable mortality rates reported as high as 13% (9). The intervention's impact is supported by international findings showing that adoption of standardized oral care protocols reduces bacterial colonization and incidence of pneumonia among high-risk patients (16).

The observed improvement in nurses' confidence from 10% to 28% in strong agreement suggests that structured interventions enhance self-efficacy, which is critical for consistent clinical application. Similar findings were reported by Croft et al., who noted that nurses' confidence in providing oral care was directly correlated with both training exposure and protocol availability (17). The practical improvements in daily oral care delivery, increased use of personal protective equipment, and strengthened infection control practices reflect both attitudinal and behavioral changes, which are essential for sustaining improved patient outcomes.

Despite these encouraging findings, persistent challenges remain. While the proportion of nurses updating their practice based on the latest guidelines improved, only 50% reported consistent adherence, suggesting that knowledge translation into long-term practice may require reinforcement strategies. This is consistent with Schafthuizen et al., who found that even after successful implementation of oral care protocols, compliance declined over time without ongoing monitoring and institutional support (18). Sustained supervision, regular refresher training, and incorporation of oral care into broader graded nursing strategies are therefore essential to consolidate and maintain the observed gains.

Another critical implication of this study is its relevance to health systems in low- and middle-income countries, where resource constraints and limited policy directives often hinder adoption of standardized protocols. By demonstrating that significant improvements are possible through low-cost educational interventions, this study supports the argument for integrating structured oral care training into routine nursing curricula and continuous professional development programs (19).

In summary, this study provides evidence that standardized oral care protocols and structured education significantly improve nurses' knowledge and practices, aligning with global literature on evidence-based nursing interventions. However, sustainability requires institutional commitment to continuous education, supervision, and resource allocation. Addressing systemic barriers such as staffing limitations and workload pressures will be critical to ensuring long-term adherence and maximizing patient benefit.

CONCLUSION

This study demonstrated that the introduction of standardized oral care protocols, reinforced through structured educational interventions, significantly improved nurses' knowledge, confidence, and practices in caring for bedridden patients. The large effect size and consistent improvements across multiple domains underscore the clinical importance of such interventions in preventing hospital-acquired infections, enhancing patient comfort, and promoting evidence-based nursing practices. However, persistent gaps in consistent supervision and long-term adherence to updated guidelines highlight the need for sustained educational reinforcement and institutional support. Integration of standardized oral care protocols into routine nursing education, coupled with ongoing monitoring and administrative commitment, will be essential to ensure lasting impact and improved patient outcomes.

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