# RESEARCH ARTICLE

# Can Nurses' Training and Documentation Audit Improve the Oral Care Practice among Patients Receiving Cancer Treatment? Results from the Pretest-Post-Pest Study

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## Abstract

**Background:** Oral complications arising out of radiation therapy and chemotherapy significantly affect the oral health status of patients leading to severe distress. Poor oral health can impair nutritional intake and patient recovery. Trained nurses lack knowledge of oral care of patients receiving cancer treatment. **Purpose:** The study is aimed at training the nurses and conducting a documentation audit to assess the effect of the training on their clinical practice. **Methods:** A quantitative research approach was adopted using one group pretest-post-test design to train 72 nurses on oral care of cancer patients working in radiation oncology wards of a tertiary care setting in the southern part of India. After the training program, 80 head and neck cancer patient records were audited to monitor the implementation of oral care. **Results:** After completing the training program, the knowledge score increased to 13.54 with a mean difference of 4.15 at a p-value <0.001, which indicates that the training was effective, resulting in a gain in knowledge scores. Nurses reported usage of evidence-based intervention, and patient education materials helped them in the clinical practice and a few barriers to oral care practice were identified while implementing the oral care i.e increased frequency of oral care, increased documentation, and time issues. There was poor adherence to the implementation of oral care for cancer patients after the training program, as monitored by a documentation audit. **Conclusion:** Capacity building of the nurses in providing effective oral care of cancer patients will help in improving the standards of cancer nursing practice. An implementation audit of the records would help check adherence to the new oral care practice. A hospital-instituted protocol can result in the effective implementation of the practice change rather than a researcher-introduced protocol.

**Keywords:** Nurses- training program- documentation audit- oral care- cancer patients- cancer treatment

## Introduction

Apart from the associated oral complications induced by various treatment strategies, cancer treatments themselves can significantly affect oral health and severely affect the patient's comfort and well-being (Coelho, 2012; Badr et al., 2015). With the application of nursing research and proper knowledge, the practice of oral care can provide comfort and prevent future complications (Catteau et al., 2016). Even-though nurses are aware of the importance of oral hygiene, they require skill training in oral hygiene. There was a significant correlation between knowledge about oral care and their practice among nurses, and a higher knowledge score reflected ideal performance regarding the frequency of oral care practice (Lin et al., 2011). Issues such as lack of time, increased workload, limited manpower, and lack of accountability accounted for not providing oral care regularly (Harnagea et al.,

2017; Sekse et al., 2018). Prevention of oral problems and providing comprehensive oral care can avoid serious infections and deliver better relief for patients undergoing cancer treatment (Elad et al., 2015; Sroussi et al., 2017).

The impact of educational intervention is affected by the quality of in-service education, and a strong commitment among the staff to provide daily oral care for the needy (Dharamsi et al., 2009). In Ireland, most (90%) of nurses believed that oral care is an important aspect of nursing care. However, nurses did not have adequate knowledge of oral care practices, and they had problems such as time constraints, lack of oral care kits, patients being confused or uncooperative, lack of toothpaste and brush, limited education, as well as low status attached to oral care. Nearly (70%) of them had received education on oral care for a short duration (Costello and Coyne, 2008). Understanding oral mucositis and related complications in cancer practice are critical to instituting nursing care

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that includes anticipation based on the application of an oral care plan (Araújo et al., 2015).

Nurses' knowledge and education about oral care were assessed in Udupi and Dakshina Kannada District; the majority (51.3%) of the respondents had poor knowledge, 48.1% had average, whereas (0.6%) had good knowledge. Only 27.2% of nursing staff reported receiving basic education in oral care. Around 19.62% reported that knowledge acquired through basic education was sufficient. The majority, 81%, agreed that they have knowledge of oral care in general but not of patients on cytotoxic drugs or radiation therapy. The majority (72.2%) of the respondents had received only theoretical training, whereas 26.6% expressed that they had received both theoretical and clinical training. The majority, 81% of the respondents, reported the requirement for continuing education in oral care (Pai and Ongole, 2015). More than half of the respondents did not perform oral care as part of their everyday duties (34.2%). The paucity of nursing staff, as well as the lack of standard operating procedures, were key impediments to providing dental care. Oral care was only recorded in the chart when an order was included in the care sheet, according to a documentation audit, but oral problem assessment was not recorded. There was no protocol especially created for oral care of cancer patients receiving cancer treatment in any of the four hospitals surveyed (Pai et al., 2019).

In a pre-and post-audit study, the findings demonstrated that the study improved nurses' oral care knowledge and practices, particularly regarding nurses following prescribed interventions and correctly using oral care items to clean patients' mouths. During their physical examinations of oral cavities, auditors observed an improvement in their oral hygiene (Chan et al., 2011).

In England, the nursing staff stated that they had little experience with oral care. Time and patient compliance were the two most significant impediments to providing oral hygiene. Almost 89 % said they were confident in recognizing dry mouth, 78% in recognizing thrush, 70% in recognizing ulcers, 14% in recognizing oral cancer, and 6% in recognizing none of these disorders. The study concluded that mouth care training for nursing personnel would be beneficial in examining the mouth and providing mouth care to all inpatients (Doshi et al., 2021). Cancer management requires a combined effort by the oncologists, oral physicians, oncology nurses, and patient caregivers. Apart from these, providing psychological support to the patient needs to be considered. It is a well-known fact that nurses providing care to cancer patients are not trained adequately to identify and manage oral complications. As the present nursing curriculum does not include a specific aspect regarding the assessment and prevention of oral problems associated with cancer treatments (Pai et al., 2019).

Trained nurses had a lack of knowledge of oral health, resulting in the inadequate oral care of patients. A research report revealed gaps in knowledge of oral care practices. This study even reported a lack of examination and documentation. The nurses reported interest in updating the knowledge in the oral care of cancer patients (Harris et al., 2008). An oral health assessment upon hospital admission delivers an opportunity for nurses to monitor for oral problems and permits nurses to perform a greater role in comprehensive patient care (Elting et al., 2008).

Significant changes were found in the scores for knowledge and skills before and after the training program. Observations displayed that nurses who attended the training session applied the oral care protocol significantly better than others. Training in oral care influenced the knowledge and skills of nurses in caring for patients at risk of developing oral problems. But this study did not show any change in documenting oral care (Cooper et al., 2017).

Many studies also highlight the need to educate nurses in the oral care of cancer patients, as they lack sufficient knowledge to deliver effective care (Hilton et al., 2016; Shah et al., 2016; Jiang et al., 2018). A challenge would be to include more oral care in the basic education of nursing staff and provide a continuing education program repeatedly, and evaluate if such education has any impact on attitudes and if it is beneficial for patients (Cooper et al., 2017; Fried et al., 2017; Watt et al., 2019). In addition, the baseline audit results revealed practice areas requiring improvement; facilitators of and barriers to nursing documentation and practice improvement were identified (Eeltink et al., 2019; Dos Santos et al., 2020).

The findings mentioned in the above literature highlight the importance of this research aiming at assessing patients' patterns of oral complications, providing training to the nurses, and provision of oral care interventions to the patients.

*Objectives of the study*

The objective of the study was to

i. assess the knowledge of oral care among oncology nurses

ii. determine the effectiveness of the oral care training program

iii. conduct documentation audit of the patient records on oral care

## Materials and Methods

*Study design*

A quantitative research approach and the one-group pretest-post-test design were used in this study. The data was collected from the nurses between March 2015-January 2018 in oncology- wards of a tertiary care setting in the southern part of India. The sample for the study comprised 72 registered Nurses from oncology wards selected using the purposive sampling technique. Nurses who got the posting in oncology- wards were included, such as radiation oncology wards, OPDs, radiation therapy rooms, and special wards with a specific focus on the care of head and neck cancer patients.

*Data collection*

Informed consent was taken from the participants, and Tool 1 Demographic Proforma and a pretest knowledge questionnaire were administered to the Nurses. A training module on oral care of cancer patients was distributed to them. During the training phase, Nurses were trained regarding oral care intervention, and the post-test

followed this training session to determine the changes in knowledge scores. A documentation audit was carried out by nurses checking the head and neck cancer patient records for oral care documentation during patient assessment.

The demographic proforma of Nurses included information on age, gender, qualification, special education, and experience in general. The content validity index score for the demographic proforma was 0.90. The knowledge questionnaire concentrated on oral care, the effects of chemotherapy and radiation therapy on oral health, oral complications, and best practice guidelines. One score was given for each right answer, and the further category was formulated as good knowledge [score 18 and> (75%)], average knowledge [12-15 (50-74%)], and poor knowledge [11 and below (<50%)]. This questionnaire was administered twice, just before the training program and after the completion of the training program. The content validity index score was 0.81, and reliability was computed with a split-half method with an estimated r value of 0.88. Oral care practice after training was audited after the discharge of the patients by auditing the patient care sheet. The tool consisted of 6 items, namely assessment of oral health, patient/relative health teaching, oral care intervention reinforcement, daily documentation of oral care, and if the staff signs the assessment. Each item had the option of Yes -1 and No – 0 and was rated accordingly.

Acceptability of the new oral care protocol, introduced in the ward, was assessed by a questionnaire consisting of helpfulness, content coverage, clinical applicability, self-explanatory ability, and ability of the Nurses to identify the signs and symptoms of complications. This was a self-rated checklist that had responses to be rated as yes or no. These items did not have any scoring as they were meant to collect practical information from the trained Nurses. This information was collected during the visit to cancer wards after completing the intended oral care training program. Nurses were even given an open-ended questionnaire on the strengths, weaknesses, and suggestions on the usage of oral care for cancer patients.

*The oral care training program*

Nurses working in the cancer wards were trained regarding oral care of cancer patients, with particular emphasis on oral complications arising from head and neck radiation and chemoradiation/chemotherapy. Oral care training included a structured oral care protocol intervention, and a module was handed over to the Nurses. The training was conducted for 2 hours and they were conducted as part of the hospital's continuing education program. The repeated individual session was done when new nurses joined the oncology- wards ensuring 100% of Nurses were trained in the wards. The training phase included oral care module development, PowerPoint presentation, and demonstration of oral care.

*Data analysis*

Descriptive and inferential statistics were used for the study. Sample characteristics, new oral care protocol acceptability and utility among nurses, opinionnaire on implementation of new oral care protocol, and documentation audit reported with frequency and percentage. Pretest post-test knowledge score interpretation was done using paired sample t-test.

## Results

A total of 72 Nurses working in oncology-related areas were trained in the implementation of a new oral care protocol for cancer patients receiving chemotherapy and head and neck radiation therapy. Nurses posted during the study period were trained in the oral care of cancer patients with the newly implemented protocol in the study setting.

*Sample characteristics*

The mean age of participants was 32.74 ± 11.42, and most of them (98.6%) were females. Nearly 70.8% of
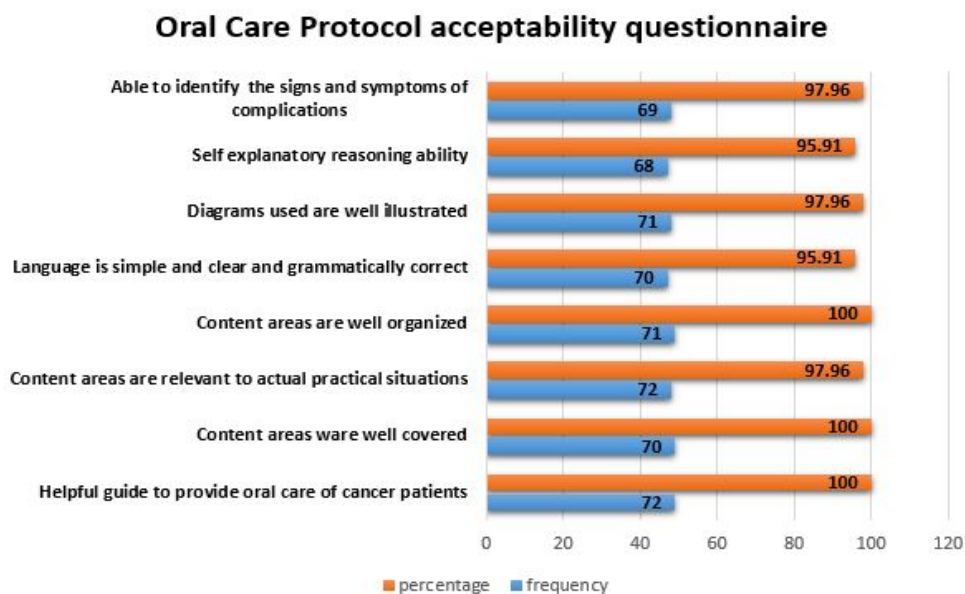


Figure 1. Protocol Acceptability Questionnaire

Table 1. Socio-Demographic Characteristics of the Sample in Frequency and Percentage n= 72

| Sl no | Areas | Frequency | Percentage (%) |
|---|---|---|---|
| 1 | Age (in years) (mean) | 32.74±11.72 | |
| 2 | Gender | | |
| | Male | 1 | 1.4 |
| | Female | 71 | 98.6 |
| 3 | Qualification: | | |
| | GNM | 51 | 70.8 |
| | BSc | 21 | 29.1 |
| 4 | Any special education | | |
| | Diploma in cancer nursing | 1 | 1.4 |
| | Certificate course in cancer nursing | 3 | 4.2 |
| | No special education in cancer Nursing | 68 | 94.4 |
| 5 | Designation: | | |
| | Ward in charge | 11 | 15.3 |
| | Senior Staff Nurse | 2 | 2.8 |
| | Staff Nurse | 49 | 68 |
| | Nurse supervisor | 10 | 13.9 |
| 6 | Years of work experience: - | | |
| | 1-5 | 38 | 52.8 |
| | 6-10 | 12 | 16.7 |
| | 11-20 | 5 | 6.9 |
| 7 | Years of experience in cancer wards: - | | |
| | 1-5 | 69 | 95.8 |
| | 6-10 | 2 | 2.8 |
| | 11-20 | 1 | 1.4 |
| 8 | Area of work: | | |
| | Medical oncology | 18 | 25 |
| | Radiation oncology | 14 | 19.4 |
| | Special/private wards | 26 | 36.1 |
| | Surgical oncology | 6 | 8.3 |
| | Oncology daycare | 8 | 11.1 |
| 9 | Information classes | | |
| | Yes | 17 | 23.6 |
| | No | 55 | 76.4 |
| 10 | If yes, the source of information | | |
| | CNE classes | | |
| | During study period | 4 | 5.5 |
| | Workshop/conferences | - | - |
| | From colleagues | 5 | 6.9 |
| | By self-study | 8 | 11.1 |

the nurses were General Nursing Midwifery qualified, and 94.4% did not receive any special education in the oral care of cancer patients. The majority, 68% of the participants, were nurses. Regarding work experience, 52.8% have 1-5 years of experience, and 95.8% of respondents had 1-5 years of work experience in the cancer ward. Most 36.1 % worked in special or private wards, and 76.4% reported that they did not attend any special classes regarding oral care in cancer patients. Around 11.1% gained knowledge about oral care through self-study (Table 1).

*Description of knowledge scores (Pre and Post training) of Nurses working on oncology- wards*

Pre and post-training data were analyzed using the paired sample t-test used to compare the mean knowledge scores. The mean pretest score was 9.39, and after the training, the score increased to 13.54 with a mean difference of 4.15 at a p-value <0.001, which is significant indicating that the training was effective resulting in a gain in the knowledge scores (Table 2).

The pre and post-test knowledge scores of nurses showed that the post-training majority possessed average knowledge in knowledge scores (pre-training 75% and post-training 69.4%). There were no nurses who had poor knowledge (from 5.6% decreased to nil), and the score was increased in the category of good knowledge increased from 19.4% to 30.6%.

*Association between pretest knowledge score and baseline characteristics*

A significant association was found between the Nurses' area of work (<0.001) and years of experience (<0.001) with pretest knowledge scores. It can be inferred that the majority of the Nurses, who had more than ten years of experience, and those who were working in medical oncology/special/semi-private wards were having better pretest knowledge scores indicating a possible relation between experience and exposure to the knowledge of the Nurses (Table 3).

*Description of the new oral care acceptability*

The new oral care intervention was introduced as part of nurses' oral care training and was checked for its acceptability among nurses. All respondents agreed that the following areas, like well-organized content, covered all aspects and it would serve to help provide oral care for cancer patients (Figure 1).

Table 2. Comparison between the Mean Knowledge Scores in the Pre and Post-Test Group n=72

| Variable | F(%) | Mean (SD) | Mean difference | CI (difference) | p value |
|---|---|---|---|---|---|
| Pretest knowledge | | 9.39 (3.38) | 4.153 | 4.78 upper | <0.001 * |
| Good | 14 (19.4) | | | 3.52 lower | |
| Average | 54 (75) | | | | |
| Poor | 4 (5.6) | | | | |
| Posttest knowledge | | 13.54 (3.52) | | | |
| Good | 22 (30.6) | | | | |
| Average | 50 (69.4) | | | | |
| Poor | 0 | | | | |

Table 3. Association between Pretest Knowledge Score and Baseline Characteristics

| Selected variable | Knowledge scores | | | p-value |
|---|---|---|---|---|
| | Good | Average | Poor | |
| | n=14 f (%) | n=54 f (%) | n=4 f (%) | |
| Work experience (in years) | | | | |
| 1-5 | 6 (42.86) | 32 (59.26) | 0 | <0.001* |
| 6-10 | 0 | 11 (20.37) | 1 (25) | |
| 11-20 | 0 | 3 (5.56) | 2 (50) | |
| 21 & above | 8 (57.14) | 8 (14.81) | 1 (25) | |
| Area of work | | | | |
| Medical oncology | 0 | 18 (33.33) | 0 | |
| Radiation oncology | 1 (7.14) | 8 (14.81) | 1 (25) | <0.001* |
| Special/private wards | 6 (42.86) | 20 (37.04) | 2 (50) | |
| Surgical oncology | 1 (7.14) | 5 (9.26) | 1 (25) | |
| Daycare | 6 (42.86) | 2 (3.7) | 0 | |

*Distribution of strengths, weaknesses, and areas for improvement*

Nurses were asked to give an opinion regarding the strengths, weaknesses, and areas for improvement in oral care after completing intended oral care training. It was an open-ended questionnaire, and a few nurses opined and mentioned the usefulness of all evidence-based intervention use and patient education materials and few challenges expressed by them are increased frequency of oral care, improved documentation, and time issues with implementing the oral care (Table 4).

*Description of documentation audit*

A documentation audit was conducted during the post-nurse training session to determine the adherence to implementing oral care in practice. 80 patient records were audited. Only 21 out of 80 records showed that all areas of oral assessments were recorded. About 15 of the records showed patient relative teaching documentation, reinforcement of the oral care intervention, and duly signed for each oral evaluation. In contrast, only 12 records showed consistent documentation of oral care intervention in the nurses' records, indicating that there was poor adherence to the implementation of oral care among cancer patients after the training program (Table 5)

## Discussion

The present training program of nurses was analyzed using a paired sample t-test to compare the mean knowledge scores in both pre and post-training among 72 Nurses. The result revealed that the training effectively improves knowledge (mean difference 4.153, t = 13.31, p = <0.001), inferring a significant difference between both

Table 4. Opinionnaire of Nurses Regarding Implementation of Oral Care Protocol

| Sl no | Opinions | |
|---|---|---|
| Strengths | | |
| 1 | Evidence-based interventions | 8 (11.11) |
| 2 | The dietary plan is well written | 11 (15.28) |
| 3 | Patient education materials are suitable and can be easily understood | 17 (23.61) |
| 4 | Each intervention is explained with the rationale | 3 (4.17) |
| 5 | Oral kit components are simple and practically can be implemented in the ward | 6 (8.33) |
| 6 | A useful guide for reference | 4 (5.56) |
| 7 | The module is very simple and specific | 13 (18.06) |
| Weakness | | |
| 1 | Increased frequency of oral care including oral rinsing, brushing, Chewy Tube© use | 22 (30.56) |
| 2 | Increased documentation tasks for Nurses | 12 (18.06) |
| 3 | Lack of time for oral care reinforcement and patient education | 28 (38.89) |
| Areas for improvement | | |
| 1 | Need a structured menu plan for the entire week | 2 (2.78) |
| 2 | The varied use of rinsing agents, needs to be clarified | 5 (6.94) |
| 3 | Artificial saliva use instead of Chewy Tube© | 1 (1.39) |
| 4 | Standing order for nurses to independently implement these interventions | 3 (4.17) |

Table 5. Documentation Audit of Patient Records by the Investigator n=80

| Sl no | Areas | Yes F (%) | No F (%) |
|---|---|---|---|
| 1 | All sections of the assessment were correctly completed | 21 (26.25) | 69 (73.75) |
| 2 | Patient/ relative teaching was documented. | 15 (18.75) | 8 (81.25) |
| 3 | Each oral care intervention is reinforced to the patient and recorded in the nurse's record | 15 (18.75) | 8 (81.25) |
| 4 | Oral care protocol is followed throughout the patient's stay in the hospital | 12 (15) | 65 (81.25) |
| 5 | Each assessment is signed | 15 (18.75) | 68 (85) |

pre and post-test values. A study conducted to examine the nurses' knowledge and abilities while providing oral care to hemato-oncology patients revealed a significant difference in the staff's knowledge and skills after the education program was implemented (Potting et al., 2008). Another study that investigated the awareness of oral care among nursing personnel caring for cancer patients found that both registered nurses (p=0.003) and auxiliary nurses (p=0.009) lacked knowledge about oral care and oral issues. Furthermore, registered nurses and auxiliary nurses discovered no significant differences in other aspects of expertise (Wårdh et al., 2009). A pretest/post-test methodology was used in a study involving acute oncology nurses and hospitalized patients undergoing chemotherapy in Virginia, USA, to implement and evaluate an evidence-based nursing practice regimen for oral mucositis. This study used a standard oral cavity evaluation tool, an oral cavity assessment education guide, and oral cavity education materials for patients. According to the findings, oral care intervention aided in the care of cancer patients undergoing treatment (DeGennaro et al., 2010). In a supporting study, the number of residents left to care for their teeth decreased significantly following staff training. Denture hygiene has improved considerably, and the number of residents wearing dentures overnight has reduced. This education program successfully modified oral healthcare methods at long-term care facilities for the elderly, resulting in measurable improvements in the residents' oral health (Nicol et al., 2005). In the supporting study, the pre-and post-evaluation mean scores were 31.70 ±11.31 and 48.20 ±11.16, respectively. The difference between the mean ratings of the pre and post-evaluations was statistically significant (P<0.05), indicating improved oral health due to the training program (Dedeke et al., 2013).

There is a significant association between the nurses' area of work (<0.001) and years of experience (<0.001) with pretest knowledge scores. However, the literature search did show a lack of articles to compare this association. In the supporting study, There was a statistically significant difference in average oral care knowledge between cancer nurses (mean=5.7, SD=0.90) and general nurses (mean=5.3, SD=0.9); t (70) =1.991, P=0.05) (Southern, 2007). A study earlier conducted by the authors demonstrated the association between knowledge and the variables such as designation (p=0.005), years of work experience (p=0.040), and years of experience in the cancer ward (p=0.000) among nurses at a 0.05 level of significance (Pai and Ongole, 2015).

The present study showed that only 21 out of 80 records had all areas of oral assessments documented. As this documentation audit was conducted in the post-training phase, it can be interpreted that the training effectively sensitized the nurses regarding the importance of writing the aspects of oral care and patient education apart from their day-to-day routine patient care. In the implementation of this new oral care, 65.21% compliance was found among supportive healthcare workers in a study conducted by the Oral Care Study group of the Multinational Association of Supportive Care in Cancer and the International Society for Oral Oncology, and there was a report on improving nursing evaluation and patient education documentation of the oral cavity in cancer (Barker et al., 2005).

According to a study on the efficacy of a hospital oral care routine and documentation of oral mucositis among pediatric cancer patients, 34% of documentation on the incidence of mucositis was present. In comparison, another 20% of people did not have a definitive diagnosis (Qutob et al., 2013). The impact of an oral care education module on patient care and nursing documentation demonstrated that teaching during admission, educating patients and families, and oral care practices all enhanced documentation and patient teaching after the educational module was implemented (Coke et al., 2015). A program led by nursing staff and Macmillan nurses at a hospital in central England to improve dental care practice and staff knowledge. A baseline audit (audit I) was conducted to investigate all aspects of current oral care practice and nursing expertise, such as assessment, implementation, prescribing, and evaluation of care. Then came the introduction of oral care guidelines and a ward-based instruction program. A follow-up audit (audit II) was performed a few months later. All aspects of dental care and staff knowledge improved because of the study. Improvements in professional relationships were also a result of this procedure (Lee et al., 2001).

*Limitation*

Trained Nurses were on rotation to non-cancer-related wards either once a year or twice a year, making the researcher conduct repeated training for the new nurses. Taking all the nurses working in the cancer-related areas using enumerative sampling is another limitation that would further bind the generalization of the research findings.

In conclusion, Knowledge of oral care of cancer patients receiving cancer treatment with an emphasis on simple oral care intervention will undoubtedly help the nurses build capacity in cancer nursing practice. The

gain in the mean knowledge score was 10.02, which is statistically significant (p<.001). Though there was a gain in knowledge on oral care, the audit record showed poor adherence to the oral care assessment and intervention. This study suggests the initiation of a hospital-instituted oral care protocol, then the researcher introduced a protocol for effective implementation of oral care and to increase compliance with documentation.

## Author Contribution Statement

Ms. Radhika R Pai conducted a literature review for this manuscript, developed an introduction section of the manuscript, findings, collected data, and analyzed the data. Dr. Ravikiran Ongole and Dr. Sourjya Banerjee contributed to the discussion and analyzed the findings of the study and participated in manuscript preparation and review. All the authors read and approved the final manuscript. .

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*Availability of data*

The research data details are available with the researcher.

*Any conflict of interest*

The authors declare there is no conflict of interest regarding the publication of this article.

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