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RESEARCH

Oncology nursing practices in the management of chemotherapy-related oral mucositis in accordance with evidence-based guidelines: a descriptive and cross-sectional study

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Abstract

Purpose This study aimed to explore the practices of oncology nurses in the management of chemotherapy-related oral mucositis (OM) by MASCC/ISOO guidelines.

Methods This descriptive and cross-sectional study was conducted between December 25, 2021, and January 31, 2022, with 157 oncology nurses in Turkey. Data were collected through OM Practices Assessment Form.

Results The mean age of the nurses was 29.05 ± 7.40, the majority (90.4%) of them were female and 76.4% of them have a Bachelor's degree. More of the nurses (59.9%) had a written protocol for managing OM in their institutions, 38.9% of them used the MASCC/ISOO guideline, and 63.0% of them used an OM assessment scale. Most of the nurses (99.4%) recommended mouthwash to patients and 65.6% of them recommended mouthwash four times and more a day. 54.1% of the nurses recommended saline (%10.8) or carbonate (%36.9) or a mixture of saline and carbonate (%6.4) solutions for mouthwash. Despite the lack of sufficient evidence in the MASCC/ISOO guidelines regarding black mulberry syrup, 45.2% of the nurses recommended it for the prevention of OM and 43.3% of them suggested the treatment of mucositis. It was found that 82.0% of nurses who followed MASCC/ISOO guidelines recommended to patients implement oral care four times and more a day, while 55.2% of them who did not follow MASCC/ISOO guidelines recommended four times and more a day. The difference was found to be statistically significant ($\chi^2 = 11.836$; $p = 0.01$).

Conclusion It was determined that there were deficiencies in the implementation of written protocols for OM and the use of guidelines, and there were differences between the frequency of oral care, oral care products, and the practices of nurses in the prevention and treatment of OM.

Keywords Oral mucositis · Chemotherapy · Oncology nursing · Clinical guidelines

Introduction

Cancer and its treatment are recognized as a significant public health concern on a global, economic, social, and health dimension. Multiple therapeutic approaches are used in the treatment of cancer, including surgery, chemotherapy, radiotherapy, targeted treatments, immunotherapy, and hematopoietic stem cell transplantation. More of the oncology patients (70–80%) receive chemotherapy at some point throughout their treatment. Although chemotherapy has significant advantages, it may also have several negative side effects. One of the most serious of these adverse effects is chemotherapy-related oral mucositis. The incidence of oral mucositis (OM) in patients is approximately 40–75% and it varies depending on the type, dosage, and frequency of administration of chemotherapeutic drugs [1–6]. However, it is reported at a very high incidence in patients with head and neck cancer, such as 80–100%, due to high-dose chemotherapy and radiation [7, 8]. The development of OM may cause a delay in chemotherapy treatment, a decrease in chemotherapy dosage, severe

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pain, malnutrition, and infection, all of which will have an impact on quality of life, morbidity, and mortality. Furthermore, OM-related dry mouth, difficulty swallowing, altered taste, difficulty speaking, and pain may have a significant impact on quality of life [1, 8–10]. In a study by Kanagalingam et al., it was reported that the major problems of OM were related to daily functioning (72%), such as eating, working, and talking, whereas just 29% described the pain as the greatest problem [5].

Oral mucositis is a condition that may cause financial problems as well as other problems for patients. Elting et al. conducted a study to investigate the cost of oral complications of cancer treatment; they reported that OM may increase the financial cost, and they suggested that future research should focus on patients' out-of-pocket expenses as well as the costs of oral complications of novel therapies [11]. Studies and guidelines for the prevention and treatment of OM recommend assessing an individual's risk of OM, performing an oral cavity examination, utilizing oral care, educating patients and caregivers in OM management, and following evidence-based practices [7]. Although oncology nurses have an important role in the management of OM, Araújo et al. reported that 25.3% of the patient's received guidance from nurses about self-care for OM during their treatment [12]. Based on the literature, nurses have insufficient knowledge about OM management and oral care, especially using oral care protocols or chemotherapy-specific OM protocols, applying different practices, and following evidence-based practices [13–17]. For the management of chemotherapy-induced OM, oncology nurses should follow evidence-based practices and integrate recommendations into their clinical practice. This study aimed to explore the practices of oncology nurses in the management of chemotherapy-related oral mucositis (OM) by MASCC/ISOO guidelines.

Research questions

In the management of chemotherapy-related oral mucositis:

- Do oncology nurses use a written protocol for the management/prevention of chemotherapy-induced OM in their institution?
- What types of mouthwash do nurses recommend for OM management?
- Do nurses follow MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy for the management of OM?
- What are the products nurses recommend/use for the prevention and/or treatment of OM?

Methods

This descriptive and cross-sectional study was conducted between December 25, 2021, and January 31, 2022. The questionnaire was applied online by the researchers and sent to nurses who were currently working in oncology clinics.

Study population

The target population of this study was 334 nurses working in oncology clinics in nine provinces of Turkey (Ankara, Istanbul, Izmir, Bursa, Diyarbakır, Çanakkale, Sakarya, Afyon). It was aimed to reach all target populations in this study. 157 oncology nurses who voluntarily complete the data collection form were included in this study. The inclusion criteria of the study were working as an oncology nurse who is responsible for the administration of chemotherapy and volunteering to participate. The exclusion criterion was the incomplete filling of the data collection form.

Data collection form

The data collection form was prepared by the researchers by the literature and collected through the 'Oral Mucositis Practices Assessment Form (OMPAF)', which includes the sociodemographic characteristics and professional experience of the nurses as well as their practices and approaches related to OM.

Oral mucositis practices assessment form

The first part of the form consists of nine questions containing sociodemographic characteristics of oncology nurses such as age, gender, and professional experience. The second part was created based on the literature [8, 13, 14, 16]. The second part contains 13 questions that examine the status of oncology nurses in assessing OM, oral care for OM, and using a guideline. Opinions of five experts were taken for the content validity of the form. The experts included five nurses with at least a master's degree who specialize in cancer nursing. The form was given to the experts, and they were asked to grade all items between 1 and 4 points for determining the convenience of items (1 = requires a great change, 4 = very convenient). The scores of five experts were evaluated by scope validity analysis (S-CVI) and S-CVI was found 0.99, thus indicating the agreement among the experts. According to the experts' opinions, the form was revised, and the last version was prepared.

Data collection procedure

The researcher informed the oncology nurses about the aim and the scope of the study via e-mail and invited them to participate in the study. 'Oral mucositis practices assessment

form' was sent as an online link and completed by the volunteer oncology nurses. The form was taken approximately 10–15 min to complete. The data forms were completed by 157 oncology nurses. Therefore, this study was conducted with 157 oncology nurses.

Statistical analyses

In the study, Statistical Package for Social Sciences (SPSS) 25.00 was used in the statistical analysis of the data.

The oncology nurses' characteristics were analyzed with numbers, percentage distribution, the mean, and standard deviation. Chi-square analysis was used to compare nurses' descriptive statistics such as number, percentage and mean and categorical variables. The results were evaluated with a 95% confidence interval and a $p < 0.05$ value was accepted as a significance level.

Results

The mean age of nurses was 29.05 ± 7.40, the majority (90.4%) were female, and (76.4%) had a bachelor's degree. It was determined that nearly half of the nurses (47.8%) worked in a private hospital and 35.7% worked in an inpatient oncology clinic. While 39.5% of the participants had a nursing experience of two years or less, 49% had an oncology nursing experience of two years or less. Twenty-four-point two percent of the nurses had an oncology nursing certificate from the Turkish Oncology Nursing Association (see Table 1).

It was determined that approximately half of the nurses (47.2%) received training on OM management, and 10.2% of them received training for approximately 5 h or more. Most of the nurses (94.3%) reported that they provided OM management/prevention training to patients/caregivers before chemotherapy; however, nearly half of the nurses (46.5%) reported that they also provided written training materials in addition to verbal training. It was determined that 49.7% of the nurses referred patients to the dentist before chemotherapy, and 80.3% of them provided training to patients for oral cavity evaluation. It was determined that 80.8% of the nurses did not provide nutritional education to the patients in the management of OM (see Table 2).

59.9% of nurses stated that they had a written protocol for the management of OM in their institutions, 38.9% of them followed the MASCC/ISOO guideline, and 63.0% them used an OM assessment scale (see Table 3).

Most of the nurses (99.4%) recommended mouthwash to patients and 65.6% of them recommended mouthwash four

Table 1 Socio-demographic and descriptive features of nurses

Variables		Mean *(X)* ± SD	
Age		29.05 ± 7.40	
		n	**%**
Gender	Female	142	90.4
	Male	15	9.6
Education	High school	25	15.9
	Bachelor's degree	120	76.4
	Master's degree	12	7.7
Type of hospital	Public	32	20.4
	University	50	31.8
	Private	75	47.8
Unit	Outpatient ChemotherapyUnit	50	31.8
	Inpatient Oncology Clinic	56	35.7
	Bone Marrow Transplantation Unit	29	18.5
	Hematology Clinic	22	14.0
Professional experience in nursing	2 years and less	62	39.5
	3–5 years	26	16.6
	6–10 years	28	17.8
	11 years and more	41	26.1
Professional experience in oncology	2 years and less	77	49.0
	3–5 years	28	17.8
	6–10 years	39	24.8
	11 years and more	13	8.3
Having oncology nurses certificate	Yes	38	24.2
	No	119	75.8

times and more a day. 54.1% of the nurses recommended saline (%10.8) or carbonate (%36.9) or a mixture of saline and carbonate (%6.4) solutions for mouthwash. Nurses mostly recommended black mulberry syrup products for the prevention of OM (45.2%), as well as nurses mostly recommended black mulberry syrup for the management of OM (43.3%). Twenty-four-point eight percent of nurses stated that insufficient knowledge was an obstacle in the management of OM, while 18.5% stated lack of time, and 17.8% stated lack of staff (see Table 4).

In Table 5, a comparison of nurses' practices for preventing mucositis according to the following the "MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy" was presented. Most of the nurses (96.7%) who stated that they followed the MASCC/ISOO guideline made an OM assessment, and 90.6% of the nurses who stated that they did not follow the MASCC/ISOO guideline made an OM assessment. There was no statistically significant difference between nurses' status of performing OMA according to the following MASCC/ISOO clinical practice guidelines ($\chi^2 = 2.128$; $p = 0.14$). It was found that 82.0% of nurses who followed MASCC/ISOO clinical practice guidelines recommended patients apply oral care four times and more a day, while 55.2% who did not follow MASCC/ISOO clinical practice guidelines recommended four times and more in a day, and the difference was statistically significant ($\chi^2 = 11.836$; $p = 0.01$). There was no statistically significant difference between nurses who did not follow guidelines and those who followed guidelines in terms of recommending an oral care solution ($\chi^2 = 2.789$; $p = 0.24$). When the nurses who followed and did not follow the guideline were compared in terms of recommendations for black mulberry and vitamin E for preventing of mucositis, it was determined that both groups were similar ($\chi^2 = 1.392$; $p = 0.23$; $\chi^2 = 0.932$; $p = 0.33$). When the nurses who followed and did not follow the guideline were compared in terms of recommendations for black mulberry and cryotherapy for management of

Table 3 Nurses' status of using the OM guideline and OMA scale

Characteristics		*n*	%
Mucositis protocol	Yes	94	59.9
	No	63	40.1
*Using MASCC/ISOO Clinical Practice Guidelines	Yes	61	38.9
	No	96	61.1
**Performing OMA	Yes	146	93.0
	No	11	7.0
**Using the OMA Written Scale	I don't use a scale	58	37.0
	***OAG	42	26.6
	**** NCI-CTCAE v3.0	10	6.4
	*****WHO OMAS	32	20.4
	******OMI	15	9.6

*_MASCC/ISOO_ Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy **_OMA_ Oral Mucositis Assessment

***_OAG_ Oral Assessment Guide

****_NCI-CTCAE v3.0_ National Cancer Institute Common Toxicity Criteria

*****WHO Oral Mucositis Assessment Scale

******_OMI_ Oral Mucositis Index

Table 2 The Distribution of the participants' status of receiving and providing training on OM

Characteristics		*n*	%
Receiving training on OM	Not received	83	52.8
	2 h and less	45	28.7
	2–4 h	13	8.3
	5 h and more	16	10.2
Place of training	In-service training	101	64.3
	Other (course, congress)	56	35.7
Provide training to patients/caregiver before chemotherapy	Not provided	9	5.7
	Verbal training	75	47.8
	Verbal and written training	73	46.5
Referral to the dentist before chemotherapy	Yes	78	49.7
	No	79	50.3
Providing oral cavity evaluation training	Yes	126	80.3
	No	31	19.7
Nutritional education for management OM	None	127	80.8
	Soft foods	7	4.5
	Other (protein-rich, cooked, neutropenic)	18	11.5
	Acidic foods	5	3.2

Table 4 Nurses' recommendations on oral care, prevention and management of OM and the obstacles in the management of OM

Characteristics		*n*	%
Recommended frequency of oral care	None	1	0.6
	2 times	9	5.8
	3 times	44	28.0
	4 times	58	36.9
	5 times	3	1.9
	6 times	42	26.8
Recommended oral care solution	None	17	10.9
	Water	8	5.1
	Saline	17	10.8
	Carbonate	58	36.9
	Saline and carbonate solution	10	6.4
	Chlorhexidine	47	29.9
The product recommended to prevent OM*	Black mulberry	71	45.2
	Cryotherapy	21	13.4
	Vitamin E	16	10.2
	Other (cytokine, honey)	67	42.7
The recommended product for the treatment of OM after its development*	Black mulberry	68	43.3
	Cryotherapy	24	15.3
	Cytokine	5	3.2
	Vitamin E	18	11.5
	Other (cytokine, honey)	73	46.5
Obstacles in the management of OM	Inadequate knowledge	39	24.8
	Lack of staff	28	17.8
	Lack of time	29	18.5
	None	92	58.6

*Nurses responded to more than one option

mucositis, it was determined that both groups were similar ($\chi^2 = 0.220$; $p = 0.63$; $\chi^2 = 0.022$; $p = 0.88$).

Discussion

In this study, oncology nurses' training on chemotherapy-induced OM, the management of OM education to patients/caregivers, the use of written protocols/guidelines in OM management, the frequency of oral care and oral care solutions that nurses recommend to patients, and the barriers they perceive for OM management were examined.

Training nurses in the management of OM may be useful in improving the implementation of oral care practices as well as the prevention and management of mucositis [18–20]. In a study by Southern, it was reported that more of the oncology nurses (62.9%) received oral care training [13]. Sharour reported that 40.7% of oncology nurses in Jordan had an unsatisfactory level of knowledge and they had insufficient knowledge about the pathology, OM definition, assessment, scoring, treatment, and patient education and advice [16]. In a study conducted by Huang et al., 40% of nurses had received education to prevent oral mucositis [21], and Chan and Hui-Ling explored oral care practices among critical care nurses in Singapore and they found that 66.3% of nurses had adequate oral care training [22]. In the current study, similar to the literature, it was found that approximately half of the nurses (47.2%) received training on OM management, and 10.2% of them received training for approximately 5 h or more. In this study, it is thought that the low number of oncology nurses trained in OM management and the difference in the training periods received are due to the fact that the content and standards of the OM training courses for oncology nurses have not been established.

OM training will increase self-care and oral care compliance; therefore, it is recommended to be given to patients/caregivers [7, 23, 24]. Huang et al. reported that the OM education importantly showed an improvement; patients who received education about oral care protocols increased from 23 to 98%, and patients who followed oral hygiene care protocols, including brushing of teeth, increased from 27 to 96% [21]. In a study by Öhrn et al., it was found that 49% of nurses informed patients about OM before the start of cytotoxic treatment [25], and Pai et al. reported that 32.91% of nurses provided training on how to carry out oral care to

Table 5 Comparison of nurses' practices according to the follow of the "MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy"

Status of using "MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary **to** Cancer Therapy''	MASCC/ISOO Clinical Practice Guideline Follower Nurses		MASCC/ISOO Clinical Practice Guideline Unfollower Nurses			
	n	%	*n*	%	*P	$^{\&}\chi^2$
Status of performing OMA						
Yes	59	96.7	87	90.6	0.14	2.128
No	2	3.3	9	9.4		
Recommend frequency of oral care						
Less than 4 times in a day	11	18.0	43	44.8	**0.01***	11.836
4 times and more in a day	50	82.0	53	55.2		
Recommend oral care solution						
None	6	9.8	11	11.5		
Chlorhexidine	14	23.0	33	34.4	0.24	2.789
Solutions recommended in the guidelines (water, saline, carbonate, saline, and carbonate)	41	67.2	52	54.1		
Recommend black mulberry to prevent mucositis						
Yes	24	39.3	47	49.0	0.23	1.392
No	37	60.7	49	51.0		
Recommend vitamin E to prevent mucositis						
Yes	8	13.1	8	8.3	0.33	0.932
No	53	86.9	88	91.7		
Recommend black mulberry for mucositis treatment						
Yes	25	41.0	43	44.8		
No	36	59.0	53	55.2	0.63	0.220
Recommend cryotherapy for mucositis treatment						
Yes	9	14.8	15	15.6	0.88	0.022
No	52	85.2	81	84.4		

$^{\&}\chi^2$ chi-square

$^{*}P < 0.05$

patients/caregivers [17]. In this study, most of the nurses (94.3%) reported that they provided OM management/prevention training to patients/caregivers before chemotherapy; however, nearly half of the nurses (46.5%) reported that they also provided written training materials in addition to verbal training. There is thought to be a need for written training materials.

To prevent oral problems that may occur due to mucosal involvement and immunosuppression during chemotherapy, dental evaluation is important before chemotherapy treatment and cooperation with dentists is recommended. Studies have reported that 54–79.2% of oncology nurses refer patients to the dentist before chemotherapy treatment [15, 23]. The result of this study is also similar to the literature, and nearly half of the nurses (49.7%) stated that they referred patients to the dentist before chemotherapy. The management of OM related to cancer treatments is quite complex, and it is considered that actions should be taken to ensure that health care professionals such as oncology nurses, oncologists, and dietitians work together as well as increase cooperation with dentists. In a study conducted by Kandwal et al., to standardize and validate the supportive oral care protocol (SOCP) for dentists working for head and neck cancer patients in a tertiary cancer center in India, they found that the protocol improved the patient quality of life by reducing oral-dental complications due to cancer treatments. Oral and dental supportive care and rehabilitation practices are recommended as a part of comprehensive care in patients with head and neck cancer [26].

The utilization of a standardized oral care protocol for mucositis management reduced the incidence, duration, and severity of mucositis, as well as the overall negative effect of mucositis [27, 28]. In a study, 41.7% of nurses reported that they used a special guide in oral assessment, while 35% of oncologists reported that they followed the guidelines for OM treatment [13], and 58% of them used

an OM assessment scale [5]. In a study by Avcı ve Sarı, they educated nurses about Evidence-Based Nursing Intervention for the Diagnosis of Oral Mucositis and the rate of OM diagnosis performed by nurses, which was 2.8% before the program and increased to 8.7% after the program [29]. In present study's finding is similar to the literature, more of the oncology nurses (93.0%) performed Oral Mucositis Assessment, and more of them (63.0%) stated that they had a written OM protocol for the management of OM in their institutions. It is found that 38.9% of the oncology nurses followed "MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy" updated in 2020 by examining the evidence obtained from 1197 publications and 13 guides on the management of OM [7], and the number of the nurses who follow the MASCC/ISOO Clinical Practice Guidelines was low. The use of written oral care protocols prepared according to the guidelines such as "MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy" by nurses in clinics will ensure more effective management of OM. Therefore, nurses should use the MASCC/ISOO Clinical Practice Guidelines and integrate the guidelines' recommendations into their clinical practice.

Basic oral care is recommended because it reduces the bacterial load in the mouth, removes food residues in the mouth, provides oral hygiene, and increases the freshness of the oral cavity. Despite the limited data on the effectiveness of both sodium bicarbonate in the prevention and treatment of OM, it is recommended to regularly use these solutions and to avoid using alcohol-based mouthwashes [7, 23, 24]. In a study by Pai et al., 32.91% of nurses stated that they provide training on how to carry out oral hygiene to patients/caregivers [17], and in another study, most of the patients (87.8%) stated that they did not receive any information about oral care [6]. More studies are needed to determine the effectiveness of applying oral care at least four times a day using normal saline, sodium bicarbonate, or water [30], using vitamin E, honey, and black mulberry syrup [7, 31]. In this study, it was reported that more of the nurses (65.6%) recommend mouthwash four times and more a day. 54.1% of the nurses recommended saline (10.8%) or carbonate (36.9%) or a mixture of saline and carbonate (6.4%) solutions for mouthwash (Table 4). It was found that 29.9% of nurses recommended using chlorhexidine in oral care. Although there are studies related to chlorhexidine, the use of chlorhexidine is not recommended by the guidelines for the prevention and treatment of OM in patients receiving chemotherapy [7, 24]. In line with these results, it is recommended to use the results of studies with high levels of evidence and the recommendations of the guidelines in nurse education and in the preparation of OM care guidelines.

In this study, it was determined that the most used product in the prevention and treatment of OM was black mulberry syrup, cryotherapy in the treatment of 5-Fluorouracil, and vitamin E. Limited studies are showing that black mulberry and grape extract are effective in preventing radiotherapy-related mucositis in head and neck cancers [32, 33]. Although it is not among the recommendations of the MASCC/ISOO guideline because there is not enough evidence, it is suggested that black mulberry syrup/extract is often used in Turkey for the management of OM and should be evaluated in more detail. Although there are many studies on the effectiveness of herbal or different applications in the prevention of OM such as cryotherapy in the treatment of 5-Fluorouracil, and vitamin E, it is recommended to be used carefully because of the level of evidence is low [7]. Nurses stated that they applied cryotherapy in patients who received 5-Fluorouracil treatment in the second place after black mulberry molasses in the prevention and treatment of OM. Oral cryotherapy is recommended for the prevention of OM due to high-dose melphalan regimens used in autologous hematopoietic stem cell transplantation and bolus 5-fluorouracil used for the treatment of solid tumors [7, 34]. It is thought that the heterogeneity of nurses' practices related to oral care, prevention, and treatment of mucositis is due to the absence of written OM protocols, lack of applying evidence-based intervention, and lack of following the clinical guidelines.

In the management of OM, evidence-based information, multidisciplinary team cooperation, institution-specific written standards oral care protocol and evidence-based practice and evaluation systems must be established. In this study, more than half of the nurses (58.6%) stated that they did not experience any obstacles in the management of OM, while 24.8% of the nurses reported that lack of knowledge, 18.5% lack of time, and 17.8% lack of staff were an obstacle to the management of oral mucositis. Pai et al. stated that lack of staff, time, lack of knowledge, and different practices were the main obstacles to applying oral care [17], Avci and Sari stated that the reasons of nurses for not performing OM diagnoses were the absence of standard OM diagnosis parameters in the clinic (88.9%), intensive working environment (excessive workload) (33.3%), and lack of knowledge (11.1%) [29]. Oral care is recommended four times a day for patients at risk of OM. While nurses who stated that they followed MASCC/ISOO guideline recommended the frequency of oral care as four times and more a day, which is significantly more than those who did not follow the guidelines, no other difference was found between the two groups. It was thought that nurses do not sufficiently benefit from the MASCC/ISOO Clinical Practice Guidelines for the Management of Mucositis Secondary to Cancer Therapy. For this reason, it is recommended that future studies should carry out studies on how to use the guide more effectively. Oncology nurses have important roles in the education of patients

and caregivers regarding the evaluation and management of OM. Oncology nurses' continuation of traditional practices, in addition to obstacles such as lack of knowledge about oral mucositis, and lack of time and staff, prevent the integration of evidence-based practices into the clinic. Considering all these problems, multi-disciplinary cooperation should be established for the management of OM.

Limitations of the research

The research was conducted with 157 nurses working in oncology clinics. Therefore, it may create limitations in the generalization of the research results. However, considering that the study was conducted with oncology nurses working in nine different provinces in Turkey, this limitation may not be considered important.

Conclusion

The fact that oncology nurses are knowledgeable and competent in the management of OM enables them to be effective in the prevention and management of OM. However, as a result of this study, it was determined that there is a lack of education among nurses in the management of OM and there are inadequacies in the education of patients/caregivers. It was found that there are also deficiencies in developing written protocols and using the guidelines for OM and that there are different applications in oral care frequency, oral care products, and prevention and treatment implementations of OM. It was determined that black mulberry syrup and cryotherapy are used mostly in the prevention and management of OM. In future studies, it is recommended to carry out studies to evaluate of effectiveness black mulberry and cryotherapy application on OM. Nurses stated that the barriers in the management of OM were lack of knowledge, lack of time, and lack of staff. It is recommended that future studies should evaluate the protocols created in clinics for the prevention and treatment of OM in detail and investigate why OM guidelines are not used sufficiently. It is also recommended to establish collaboration with Oncology Nursing Societies to develop the oral care protocol and standard assessment tools and diagnostic procedure for OM.

Authors' contributions All authors contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by Dr. Fatma, and Dr. Serap. The first draft of the manuscript was written by Dr. Fatma, and Dr. Serap and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of KTO Karatay University (Date: December 20, 2021/No. 2021/002).

Consent for publication Not applicable. The manuscript does not contain any individual images or videos.

Competing interests The authors declare that they have no competing interests.

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