

Oral Care for Head and Neck Cancer Symptom Management

Piloting an evidence-based practice change at a radiation oncology center.

ABSTRACT: An evidence-based practice change at a radiation oncology center in a large academic medical center was designed to reduce the severity of oral mucositis in adults receiving radiation treatment for head and neck cancer. In the intervention described, patients were given newly created oral care kits and educational materials to improve their oral hygiene. Evaluations were conducted at three points during the project (before radiation treatment, during week 4 to 5 of treatment, and one month after treatment). At week 4 to 5—when the severity of oral mucositis is expected to peak—patients reported improved oral hygiene practices and reduced oral mucositis severity. The authors conclude that the use of these oral care kits and educational materials lessened the effects of oral mucositis during and after radiation treatment.

Keywords: evidence-based practice, head and neck cancer, oral care, oral mucositis, quality improvement, radiation therapy, symptom management

When patients are told they have cancer, the diagnosis can be overwhelming. As a result, many don't consider the treatment side effects that can occur. Nurses, as essential members of the interprofessional team, play a key role in supporting and guiding patients through treatment decisions and symptom management. For people with head and neck cancer, the treatment journey often includes surgery, chemotherapy, and radiation. Most patients will experience oral mucositis, an almost universal and painful side effect of treatment for head and neck cancer. Oral mucositis results from molecular, cellular, and tissue injuries that cause local

and systemic changes, and it requires preventive and treatment interventions. Patient-friendly oral care (care that is convenient and easy to use) is thus an essential part of a comprehensive cancer symptom management program, and nurses are the ideal health care providers to direct and oversee such care.

A radiation oncology center in a large academic medical center in the Midwest implemented and evaluated a practice change using an evidence-based oral care intervention to reduce oral mucositis severity and discomfort in adults treated for head and neck cancer. This project is part of a multiyear, evidence-based practice program for oral mucositis and cancer symptom



Nurse Cindy Dawson provides patient education on the oral care kit used in a nurse-led intervention to reduce oral mucositis severity in adults treated for head and neck cancer. Photo courtesy of Kay Klein.

management across the institution. Three staff nurses who worked on adult inpatient oncology units and at the outpatient clinic were instrumental in providing the impetus for the formation of the interprofessional oral mucositis committee that has overseen this program. The institution's Office of Nursing Research, Evidence-Based Practice, and Quality supported this initiative, and the revised Iowa Model provided the project framework (see *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care*).^{1,2}

BACKGROUND

More than 36,000 Americans were diagnosed with head and neck cancer in 2010.³ By 2020, the National Cancer Institute predicts that approximately 300,000 people will have been diagnosed with head and neck cancer,⁴ and total treatment expenditures for these types of cancer will likely exceed \$4 billion.⁵ Tobacco and alcohol use continue to be major risk factors for head and neck cancer, and the incidence of human papillomavirus-related head and neck cancer is increasing.⁶

People with head and neck cancer are at high risk for experiencing treatment side effects. Oral mucositis is among the most distressing of these and develops

on a continuum, from inflammatory changes to ulcerative lesions.^{7,8} Mucosal injury to normal oral cavity tissue is stimulated by toxicity that correlates with radiation treatment or a chemotherapy dose.^{8,9} Oral mucositis occurs in almost all patients receiving treatment for head and neck cancer and has been found to peak (is at its highest severity) around treatment week 5 in patients receiving radiation.¹⁰ Ninety-three percent of patients experience xerostomia (dry mouth) during radiation, and this problem persists in nearly three-quarters of patients for one to three months after treatment.¹¹ Both chemotherapy and radiation therapy induce cytotoxic effects on the epithelial cells of the oral mucosa and on the salivary glands. Although oral mucositis and xerostomia are separate side effects of treatment, the presence of xerostomia can make patients more likely to experience the more significant and severe effects of oral mucositis.¹²

Oral mucositis is painful, interferes with eating and drinking, increases the risk of infection, and impacts quality of life.^{9,13,14} Oral symptoms continue throughout treatment and can lead to a less than optimal treatment dose, negatively impacting survivorship.¹¹ Goals for care include reducing the severity of oral mucositis and managing its symptoms. Evidence-based interventions are needed.

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care¹

The initial steps in the Iowa Model include identifying a practice problem or issue that triggers the project, and formulating a clear, concise purpose statement to set boundaries around the project's work. Ensuring that the issue is aligned with the organization's priorities helps garner resources to support the execution of the project. After the project is deemed a priority, an interprofessional team is formed to develop, implement, and evaluate the practice change.

The next step in the Iowa Model includes conducting a comprehensive literature search, so the team can assemble, appraise, and synthesize the body of evidence and determine if there is sufficient evidence to pilot a change in practice or if additional research needs to be conducted. Designing and piloting the practice change is multifactorial (and includes, for example, developing a localized protocol, creating an evaluation plan, and developing a phased approach to implementation) and critical to determining the feasibility and effectiveness of the practice recommendations. After the pilot data are collected and analyzed, the team must decide if the change is appropriate for adoption in practice or if further rollout to additional areas is warranted.

The final two steps in the Iowa Model are integrating and sustaining the practice change. These ensure that the change is built into the system and the desired outcomes are maintained, and that results are disseminated both within and outside the organization.

For more information about the Iowa Model, see <https://uihc.org/iowa-model-revised-evidence-based-practice-promote-excellence-health-care>.

PREVENTION AND TREATMENT OF ORAL MUCOSITIS

Oral health is essential for wellness and starts with appropriate oral hygiene. This is especially important in patients treated for cancer. Oral mucositis was once thought to be an inevitable consequence of treatment.⁹ Although natural interventions remain elusive,¹⁵ preemptive identification of at-risk patients and professional dental care are now known to help prevent and reduce the severity of this side effect.^{12,16} Nurses play an important role in improving oral care in patients who have head and neck cancer.

Research demonstrates that oral care can reduce oral mucositis severity.^{17,18} Likewise, education on the importance of routine oral care prior to cancer

treatment may reduce oral mucositis pain and severity.¹⁹ Clinical practice guidelines and systematic reviews consistently support oral care but include insufficient evidence for specific oral care protocols or effective oral rinses,^{14,20,21} except for advising against the use of chlorhexidine and misoprostol^{14,22} and products containing alcohol.¹² In addition, as a participating organization in the American Board of Internal Medicine Foundation's Choosing Wisely campaign, the American Academy of Nursing recommends against the use of "magic mouthwash"—a mixed medication formulation that typically includes anticholinergic medications, an anesthetic, and an antacid or mucosal coating agent—which has been traditionally prescribed as a treatment intervention but is not effective.²³

Management of oral mucositis thus requires assessment and interventions to reduce the severity of this condition and control any pain the patient may be experiencing. Well-developed and disseminated clinical practice guidelines are readily available,^{12,14,24} yet their adoption has been inconsistent. The application and evaluation of clinical practice guidelines addressing oral mucositis is a key challenge affecting patient care.⁹

THE INTERVENTION

In the development of this evidence-based practice oral care project, the interprofessional team followed the Iowa Model, first identifying the need for the practice change, then designing and piloting the intervention, and, finally, integrating and sustaining the practice change.¹ The facility's institutional review board determined that this project did not require its approval.

Participants. The project's participants included adults with head and neck cancer receiving outpatient radiation therapy with or without concurrent chemotherapy. Patients were included in either the usual care or the intervention group. The timeline was sequential as follows: first, a date was set to start recruiting the next 20 patients seen consecutively in the radiation oncology center (the usual care group). The collection of data, which took the form of patient feedback in response to questionnaires on oral care practices, occurred at the following times during the usual care group's treatment course: pretreatment, during week 4 to 5, and one month after treatment ended. Next, a date was chosen for the beginning of the evidence-based practice change, at which time the next 85 consecutive patients were enrolled in the intervention group. Their feedback was obtained in the same way as that of the usual care group and at the same time points. Feedback was also obtained from clinicians (nurses, physicians, and radiation therapists) before the usual care group began treatment and again after the intervention's "go live" phase.

Usual care. All patients treated at the radiation oncology center, including the head and neck cancer patients enrolled in the project, received extensive oral care preparation prior to radiation treatment. This included a visit with an oncologic dentist for a professional dental evaluation, fluoride treatments, the provision of oral care supplies, and tooth extraction if needed. Radiation treatment was then provided daily, Monday through Friday, until the treatment course was completed. The nurse care coordinator routinely saw these patients throughout their six-to-eight-week treatment course and had a lead role in this project.

The nurse care coordinator assessed and monitored the usual care patients, providing education on oral care to patients and/or their family members; coordinated with the interprofessional team on the management of pain, dysphagia, and other health care

needs; and completed nursing documentation. Education included a brochure, video, and supplemental information provided if patients had questions and when indicated by the nursing assessment, which was conducted in conjunction with the patient's weekly appointments with the radiation oncologist. The dentist provided samples of oral hygiene products. Patients with thick secretions received a prescription for a home suction machine. Patients were also given verbal and written information about nutrition and ways to manage other common symptoms.

Practice change. Those in the intervention group received the same care as those in the usual care group plus targeted education, a comprehensive oral care kit, and information on how to use the kit. The targeted education included a brochure from the U.S. Department of Health and Human Services, *Head and Neck*

Oral Care Brochure Insert

Additional Oral Care Recommendations

- Use a non-abrasive toothpaste (Biotene®)
- Only use a pea-size amount (or smaller) of Biotene® toothpaste
- Brush for 2 minutes using a gentle rotation/circular motion while holding the toothbrush at a 45 degree angle to the tooth surface
- Floss daily with waxed floss
- Apply Lanolin (Lansinoh®) to lips to prevent dryness (or any other lanolin-based product)
- Lansinoh® is found over-the-counter in the baby care section
- Lansinoh® must be removed before radiation treatments

Recomendaciones Adicionales Sobre El Cuidado Oral

- Use una pasta dental no abrasiva (Biotene®)
- Solo use una pequeña porción de la pasta dental Biotene®
- Cepílese por dos minutos en forma suave y circular, con el cepillo dental, en un ángulo de 45 grados cubriendo todos los dientes
- Use seda (encerada) dental todos los días
- Aplique Lanolin (Lansinoh®) en los labios para prevenir sequedad
- Lansinoh® se puede comprar en cualquier farmacia
- Lansinoh® se tiene que remover antes de cualquier tratamiento de radiación

Implementation Strategies Used in the Oral Mucositis and Oral Care Evidence-Based Practice Project

	Create Awareness and Interest	Build Knowledge and Commitment	Promote Action and Adoption	Pursue Integration and Sustained Use
Connecting with Clinicians, Organizational Leaders, and Key Stakeholders	<ul style="list-style-type: none"> • Highlight advantages* or anticipated impact* • Slogans and logos • Staff meetings • Unit in-services • Distribute key evidence • Announcements and broadcasts 	<ul style="list-style-type: none"> • Education (eg, live, virtual, or computer based)* • Pocket guides • Change agents (eg, change champion,* core group,* opinion leader,* thought leader, etc.) • Disseminate credible evidence with clear implications for practice* • Clinician input* • Local adaptation* and simplify* • Match practice change with resources and equipment • Resource manual or materials (ie, electronic or hard copy) 	<ul style="list-style-type: none"> • Reminders or practice prompts* • Resource materials • Give evaluation results to colleagues* • Incentives* • Try the practice change* • Multidisciplinary discussion and troubleshooting • Data collection by clinicians • Report progress and updates • Change agents (eg, change champion,* opinion leader*) • Role model* • Troubleshooting at the point of care 	<ul style="list-style-type: none"> • Public recognition* • Personalize the messages to staff • Share with clinicians protocol revisions based on feedback from clinicians, patients, or family • Peer influence
Building Organizational System Support	<ul style="list-style-type: none"> • Senior executives' announcements • Publicize new equipment 	<ul style="list-style-type: none"> • Teamwork* • Benchmark data* • Inform organizational leaders* • Report within organizational infrastructure* • Report to senior leaders 	<ul style="list-style-type: none"> • Audit key indicators* • Actionable data feedback* • Nonpunitive discussion of results* • Documentation* • Patient decision aids* • Report into quality improvement program* • Link to patient/family needs • Unit orientation 	<ul style="list-style-type: none"> • Report into quality improvement program* • Revise policy, procedure, or protocol* • Present in educational programs

* This implementation strategy is supported by at least some empirical evidence.

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Radiation Treatment and Your Mouth,²⁵ and a one-page insert, which was developed by the team, translated into Spanish for use as needed, and placed inside the brochure (see *Oral Care Brochure Insert*).

Each oral care kit included the following products, which were either approved by the American Dental Association or did not contain irritating ingredients (such as phosphates) known to negatively affect the oral squamous epithelium:

- Soft and more effective toothbrushes^{12, 21, 26, 27}
- Biotene toothpaste²⁸⁻³¹
- Lanolin lip care products³²
- Waxed floss^{20, 33}
- Prepackaged salt and baking soda packets^{12, 21, 27, 34, 35}
- A timer, to encourage thorough brushing

The salt and baking soda packets made it easy for patients to prepare a nonirritating oral rinse when they were away from home. Patients staying at the local American Cancer Society Hope Lodge or a nearby hotel received a larger quantity of prepackaged mixtures to ensure they had oral rinses available throughout their stay.

at the radiation oncology center. The implementation plan included effective, interactive strategies to ensure that the practice change would be sustainable, which required changing both clinician and patient behavior. Previously published “Implementation Strategies for Evidence-Based Practice” provided the implementation framework.³⁶ An overview of the phased implementation approach is described below.

Project leaders worked with the radiation oncology leadership team—which included the nurse manager and medical director—in designing and piloting this practice change. The lead radiation therapist also played a key role. Raising awareness of the practice change among radiation therapists, for instance, led these clinicians to quickly recognize they could identify when patients’ symptoms of oral mucositis required a nursing consultation. Including various clinicians on the leadership team helped to publicize the project and garner support throughout the center. To create awareness and interest among the nursing staff, the new oral care process was discussed at regular staff meetings, where the kits were also showcased.

It was important that the nurse care coordinator have an oral care kit available to use for demonstration during patient education. Showing the patient each item as she explained its use—rather than just saying ‘toothpaste,’ for example—helped to reinforce the importance of these specific items.

The oral care products were included in a branded kit—a plastic bag labeled with the names of both the University of Iowa Hospitals and Clinics and the DAISY Foundation, as an acknowledgment of the latter’s funding support. The first oral care kit was distributed by the oncologic dentist and nurse care coordinator before radiation therapy began, ensuring that patients had the correct supplies and appropriate educational materials before treatment. The nurse care coordinator replenished the contents of the oral care kits, when needed, throughout treatment. A second oral care kit that included all the supplies was provided by the nurse care coordinator following data collection at the week 4 to 5 treatment visit.

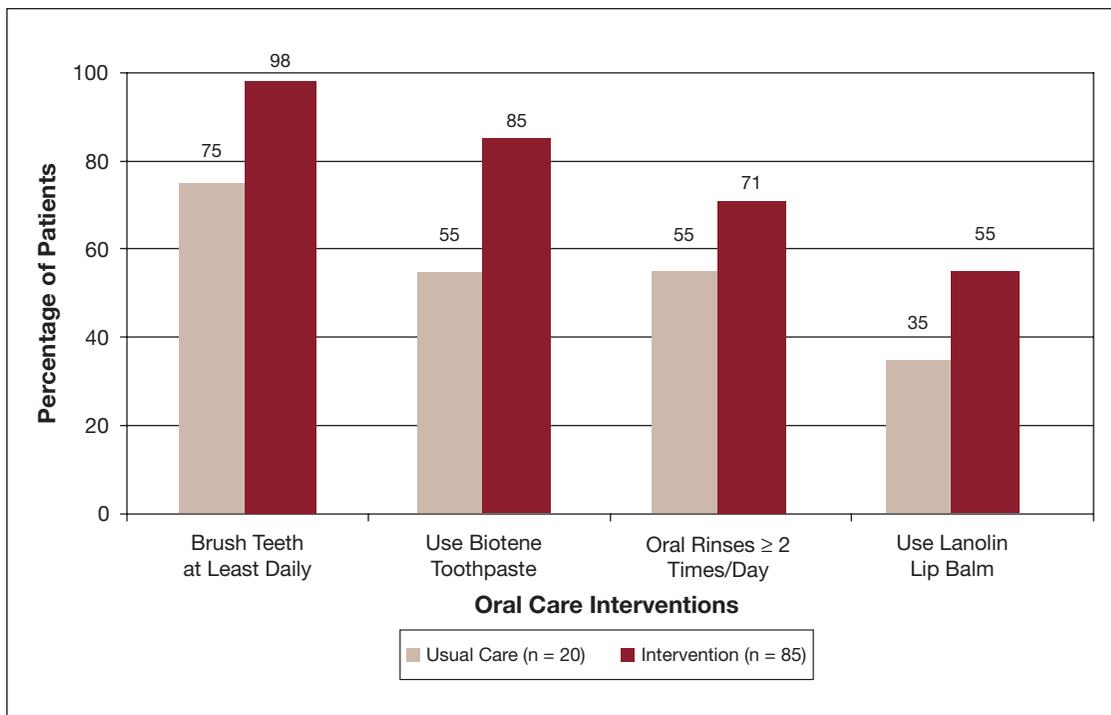
IMPLEMENTATION

An implementation plan promoted awareness, knowledge, adoption, and integration of this practice change, creating a sustained improvement for patients seen

The focus then shifted to building knowledge and commitment. Key strategies included using existing resources to support the practice change. Input was obtained from the nursing staff regarding who should put the oral care kits together and the best place to store them in the clinic. This ensured that the oral care kits and written patient educational materials were readily available for team members to distribute.

Communication and collaboration among members of the interprofessional team were essential for the project’s success. Team members included nurses who primarily cared for adults with head and neck cancer, as well as nurses who cared for other patients receiving radiation treatment; medical or nursing assistants; physicians; radiation therapists; dentists; and speech-language pathologists. All team members helped to screen and monitor patients for early indications of oral mucositis development in addition to providing and reinforcing patient education on evidence-based oral care practices.

Figure 1. Percentage of Patients Reporting Oral Care Practices During Week 4–5 of Radiation Treatment



Implementation strategies used during the “go live” phase—when patients in the intervention group were first given the oral care kit and educational materials—focused on promoting action and adoption of the practice change. The nurse care coordinator acted as a role model, answering questions, providing guidance, and encouraging other members of the interprofessional team. Documentation of the new practice was updated in the electronic health record to support the new screening, assessment, and patient education standards.

The final phase of implementation focused on pursuing integration and sustained use of the practice change. In this phase, the patient and clinician evaluations were used to assess the intervention and are described below.

For a list of the strategies used in this practice change, see *Implementation Strategies Used in the Oral Mucositis and Oral Care Evidence-Based Practice Project*. A more complete description of how to use these strategies is available elsewhere.^{1,36,37}

EVALUATION

A descriptive evaluation used evidence-based practice methods to capture feedback from patients and clinicians.^{38,39}

Clinicians. Clinician feedback was obtained before the usual care group began treatment and after the

intervention’s “go live” phase. Process indicators included the clinician’s (nurses, physicians, and radiation therapists) knowledge of oral care and correct use of oral care products, perceptions and attitudes about oral care, and behaviors and practices related to the documentation of patients’ oral health and education. Clinician questionnaires had two sections: a 27-item knowledge assessment (in multiple choice and true/false format) based on a National Comprehensive Cancer Network report on the prevention and management of oral mucositis,⁴⁰ and a section capturing clinician perceptions (using a 4-point Likert scale, ranging from 1 = strongly disagree to 4 = strongly agree) adapted from an evidence-based practice guidebook.⁴¹ Psychometric evaluation of the questionnaire was not performed, as the intent was to evaluate for local use following evidence-based practice, not research, methods. Clinician perceptions were sought to guide implementation planning.

Clinical outcomes (such as the severity of symptoms associated with oral mucositis and xerostomia) were evaluated to demonstrate a clinically meaningful impact of the practice change, to guide revisions in the implementation plan, and to determine if roll-out to other clinics and inpatient units caring for oncology patients was appropriate.

Patients. Patient feedback, obtained before radiation treatment, during week 4 to 5 of treatment, and

one month after treatment, was also collected using questionnaires. The results of process evaluation of patients' knowledge, attitudes and priorities, and health behaviors related to oral hygiene practices were used in planning the rollout of the practice change, ensuring that it reflected patient preferences and values and improved patient experience. Patient questionnaires had three sections: patients' oral care practices (the frequency of care and products used, for example); patients' perceptions about oral care (feeling well prepared and the helpfulness of oral rinses, for example) rated on a 4-point Likert scale (ranging from 1 = strongly disagree to 4 = strongly agree); and oral mucositis symptoms rated on an 11-point Likert scale (ranging from 0 = none to 10 = worst possible). As with the clinician questionnaire, no psychometric evaluation was performed for this local practice change.

RESULTS

The data collected from clinician and patient questionnaires were analyzed to determine any clinically important effects of the practice change on oral mucositis severity and to guide further implementation of the practice change.

Clinicians. A total of 23 of 28 clinicians responded to the questionnaire given before the usual care group

began treatment (preimplementation), for a response rate of 82%; after the intervention's "go live" phase (postimplementation), the response rate was 69% (n = 20/29). The percentage of clinicians with correct responses to knowledge assessment items improved from 71% preimplementation to 80% postimplementation.

The clinicians' mean scores on questions capturing their perceptions were higher postimplementation than preimplementation, reflecting more favorable perceptions of the following: oral care being important (3.8 versus 3.5); oral health influencing general health (3.7 versus 3); patient education helping to reduce oral mucositis severity (3.7 versus 3.5); patient education being important for oral mucositis prevention (3.9 versus 3.7); feeling knowledgeable about oral mucositis prevention (3.1 versus 2.7); being able to identify which patients needed oral mucositis prevention (3.2 versus 3); and patients receiving oral care at least twice per day (2.5 versus 2.1).

Patients. Feedback provided by patients during radiation treatment week 4 to 5 demonstrated improvement in oral hygiene behaviors. More patients in the intervention group reported brushing at least daily, using Biotene toothpaste, performing oral rinses at least twice a day, and using lanolin lip balm, compared with

Figure 2. Patient-Reported Perceptions of Oral Care During Week 4–5 of Radiation Treatment

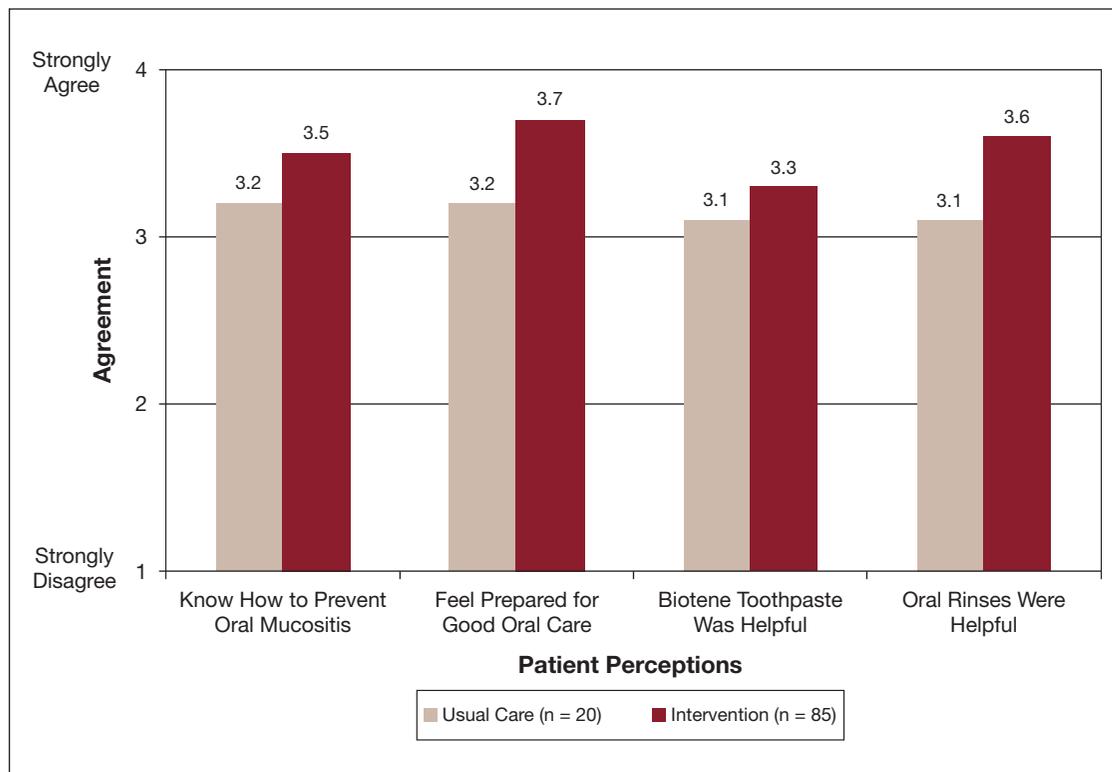
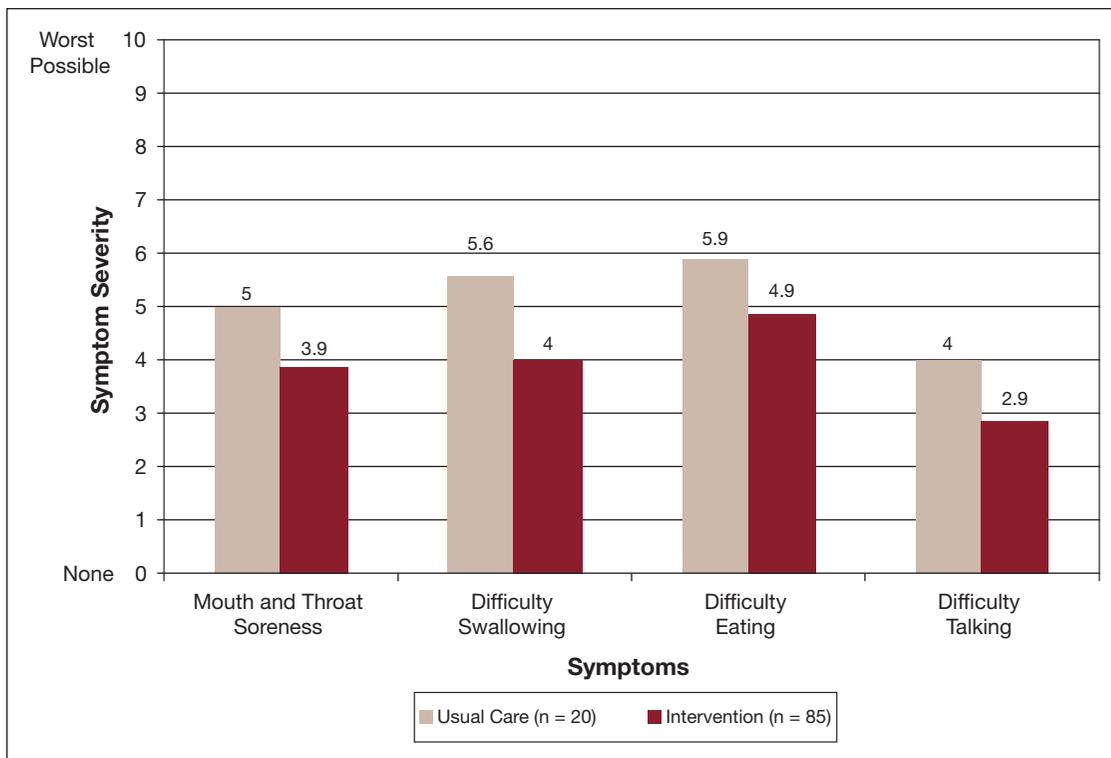


Figure 3. Patient-Reported Oral Mucositis Symptoms During Week 4–5 of Radiation Treatment



those in the usual care group (see Figure 1). Patients in the intervention group also felt more strongly than those in the usual care group that they knew how to prevent oral mucositis, felt prepared for good oral care, and were aware that Biotene toothpaste and oral rinses were helpful (see Figure 2).

Although Biotene toothpaste and lanolin lip care products were only given to patients in the intervention group, the questionnaires asked both groups of patients for their perceptions of Biotene and lanolin. This was for several reasons. First, identical questionnaires were used in both groups to increase the team's ability to understand patients' feedback. Second, both Biotene and lanolin are available without a prescription and are advertised directly to consumers. In addition, oncology patients and families at our center get to know each other in the waiting rooms and often share information about interventions for symptom management. It was therefore reasonable to expect that some patients in the usual care group might be using these products.

Based on the feedback of patients in the intervention group, compliance with the targeted education and oral care kit intervention led to a reduction in their symptoms at week 4 to 5 of radiation treatment, when symptoms are expected to peak (see Figure 3). The intervention patients reported less severity than

the usual care patients regarding the following symptoms: mouth and throat soreness (3.9 versus 5), difficulty swallowing (4 versus 5.6), difficulty eating (4.9 versus 5.9), and difficulty talking (2.9 versus 4). A noteworthy finding was that patients in the intervention group reported less difficulty with xerostomia than those in the usual care group (3.1 versus 4.1) one month following the completion of treatment, when xerostomia is expected to persist. This finding is important because patients who have undergone radiation therapy traditionally report long-lasting issues with xerostomia.

INTEGRATION OF THE PRACTICE CHANGE

After the successful piloting of the practice change, the interprofessional team shifted to planning for its integration into practice. Findings of the project were used to address sustainability as a primary concern. Implementation strategies thus changed from promoting adoption of the practice change to integrating and sustaining it. This included reporting the project results through the institution's quality improvement program. In addition, after the project's funding ended, additional funding sources were sought to continue creating and supplying the oral care kits to patients and families. The project's positive results prompted administrators in the

radiation oncology center to fund the continued provision of oral care supplies using the department's budget.

Several keys to the project's success needed to continue. For instance, patients reported greater compliance with oral care after they received the initial supplies during their dental clinic visit. Likewise, it was important that the nurse care coordinator have an oral care kit available to use for demonstration during patient education. Showing the patient each item as she explained its use—rather than just saying “toothpaste,” for example—helped to reinforce the importance of these specific items and of asking for additional supplies when needed. The nurse care coordinator also played a key role in sustainability by regularly meeting with patients to discuss prevention and treatment of oral mucositis, starting during the first week of radiation treatment. The educational session also covers self-care practices patients can use throughout the course of radiation treatment. This dialogue between the patient and nurse care coordinator occurs throughout treatment on a weekly or more frequent basis.

After the initial intervention, some aspects of the practice change were altered to ensure that our approach would be sustainable. Oral care supplies continued to be replenished as needed throughout treatment. Patients now receive a soft bristle toothbrush, Biotene toothpaste, lanolin lip balm, waxed dental floss, prepackaged salt and baking soda packets, and a denture cup and other small cups (for mixing and using the oral rinse when away from home). These items are placed in a bag that also contains the printed educational materials. Instead of using a timer, patients are now instructed to silently sing “Happy Birthday” four times, which takes about two minutes to complete and is the correct amount of time for adequate toothbrushing.

DISCUSSION

This project followed a well-established evidence-based practice process to improve care. The practice change was designed for use in one radiation oncology center and, as such, the results are not necessarily generalizable to other settings.

Formative evaluation is an important part of the evidence-based practice process. After the intervention began, for instance, the nurse care coordinator reported that patients were requesting additional oral care supplies more frequently than the team anticipated. This led to a revision in the timing of the oral kit replenishments. The project team learned multiple lessons during this practice change process. First, it was determined that follow-up was needed to ensure the clinicians involved in the pilot project consistently followed the same practices. Nurses, for

instance, sometimes provided two different educational brochures, and physicians sporadically ordered “magic mouthwash.” In addition, the lanolin lip balm inventory and that of some other supplies in the oral care kit were easily depleted and not automatically reordered. These items had to be special ordered by the nurse manager after the nurse care coordinator communicated that the inventory was getting low. It was difficult to predict demand, and sometimes there were unavoidable delays in the availability of these products. Also, as new clinicians were hired, they needed to be familiarized with the oral care intervention and their role in it.

The biggest lesson learned was when the nurse manager, who served as the project opinion leader and was thus influential in promoting adoption of the practice change, left the clinic. Consequently, there was the beginning of a “drift” back to old practice habits, rather than maintenance of the new practice. Clear expectations helped change champions (the staff nurses and nurse care coordinator) provide ongoing training to sustain the practice when staff turnover occurred. The continued commitment to the project by the interprofessional team was essential for the successful transition of responsibility among clinicians throughout the course of this project.

The implementation of this practice change shows that the distribution of standardized oral care kits and related educational materials can offer an effective way to meet patients' needs and reduce oral mucositis severity in adults treated for head and neck cancer. The success of this project also highlights the key role nurses play in cancer symptom management—before radiation therapy begins, throughout the course of treatment, and in the months afterward. ▼

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REFERENCES

1. Iowa Model Collaborative, et al. Iowa Model of evidence-based practice: revisions and validation. *Worldviews Evid Based Nurs* 2017;14(3):175-82.

2. Titler MG, et al. The Iowa model of evidence-based practice to promote quality care. *Crit Care Nurs Clin North Am* 2001; 13(4):497-509.
3. Centers for Disease Control and Prevention. *Chronic disease indicators. Indicator definitions—cancer*. 2015. <https://www.cdc.gov/cdi/definitions/cancer.html>.
4. National Cancer Institute. Cancer prevalence. Bethesda, MD 2010.
5. National Cancer Institute. Graph by cancer site and phase of care. Bethesda, MD 2010.
6. National Cancer Institute. *Cancer types. Head and neck cancers [fact sheet]*. n.d. <https://www.cancer.gov/types/head-and-neck/head-neck-fact-sheet>.
7. Al-Dasooqi N, et al. Emerging evidence on the pathobiology of mucositis. *Support Care Cancer* 2013;21(7):2075-83.
8. Lalla RV, et al. Chemotherapy or radiation-induced oral mucositis. *Dent Clin North Am* 2014;58(2):341-9.
9. Peterson DE, et al. Oral mucosal injury in oncology patients: perspectives on maturation of a field. *Oral Dis* 2015;21(2): 133-41.
10. Chen SC, et al. Changes and predictors of radiation-induced oral mucositis in patients with oral cavity cancer during active treatment. *Eur J Oncol Nurs* 2015;19(3):214-9.
11. National Cancer Institute. *Oral complications of chemotherapy and head/neck radiation (PDQ)—health professional version*. 2016. <https://www.cancer.gov/about-cancer/treatment/side-effects/mouth-throat/oral-complications-hp-pdq>.
12. De Sanctis V, et al. Mucositis in head and neck cancer patients treated with radiotherapy and systemic therapies: literature review and consensus statements. *Crit Rev Oncol Hematol* 2016; 100:147-66.
13. Barkokebas A, et al. Impact of oral mucositis on oral-health-related quality of life of patients diagnosed with cancer. *J Oral Pathol Med* 2015;44(9):746-51.
14. Lalla RV, et al. MASCC/ISOO clinical practice guidelines for the management of mucositis secondary to cancer therapy. *Cancer* 2014;120(10):1453-61.
15. Yarom N, et al. Systematic review of natural agents for the management of oral mucositis in cancer patients. *Support Care Cancer* 2013;21(11):3209-21.
16. Saito H, et al. Effects of professional oral health care on reducing the risk of chemotherapy-induced oral mucositis. *Support Care Cancer* 2014;22(11):2935-40.
17. Hogan R. Implementation of an oral care protocol and its effects on oral mucositis. *J Pediatr Oncol Nurs* 2009;26(3):125-35.
18. Qutob AF, et al. Implementation of a hospital oral care protocol and recording of oral mucositis in children receiving cancer treatment: a retrospective and a prospective study. *Support Care Cancer* 2013;21(4):1113-20.
19. Yavuz B, Bal Yilmaz H. Investigation of the effects of planned mouth care education on the degree of oral mucositis in pediatric oncology patients. *J Pediatr Oncol Nurs* 2015;32(1): 47-56.
20. Eilers J, Million R. Clinical update: prevention and management of oral mucositis in patients with cancer. *Semin Oncol Nurs* 2011;27(4):e1-e16.
21. McGuire DB, et al. Systematic review of basic oral care for the management of oral mucositis in cancer patients. *Support Care Cancer* 2013;21(11):3165-77.
22. Nicolatou-Galitis O, et al. Systematic review of anti-inflammatory agents for the management of oral mucositis in cancer patients. *Support Care Cancer* 2013;21(11): 3179-89.
23. American Academy of Nursing. *Choosing wisely. Twenty things nurses and patients should question*. n.d. <http://www.aannet.org/initiatives/choosing-wisely>.
24. Peterson DE, et al. Management of oral and gastrointestinal mucositis: ESMO clinical recommendations. *Ann Oncol* 2008;19 Suppl 2:ii122-ii125.
25. National Institute of Dental and Craniofacial Research. *Head and neck radiation treatment and your mouth*. Bethesda, MD: National Institutes of Health; 2013 Apr. NIH Publication No. 13-4362. Oral health, cancer care, and you: fitting the pieces together; <https://www.nidcr.nih.gov/OralHealth/Topics/CancerTreatment/HeadNeckRadiation.htm>.
26. Eilers J, et al. Evidence-based interventions for cancer treatment-related mucositis: putting evidence into practice. *Clin J Oncol Nurs* 2014;18 Suppl:80-96.
27. Harris DJ, et al. Putting evidence into practice: evidence-based interventions for the management of oral mucositis. *Clin J Oncol Nurs* 2008;12(1):141-52.
28. Epstein JB, et al. A double-blind crossover trial of Oral Balance gel and Biotene toothpaste versus placebo in patients with xerostomia following radiation therapy. *Oral Oncol* 1999;35(2):132-7.
29. Jyoti S, et al. Effect of lactoperoxidase system containing toothpaste on cariogenic bacteria in children with early childhood caries. *J Clin Pediatr Dent* 2009;33(4):299-303.
30. Nagy K, et al. Controlled study of lactoperoxidase gel on oral flora and saliva in irradiated patients with oral cancer. *J Craniofac Surg* 2007;18(5):1157-64.
31. Warde P, et al. A phase II study of Biotene in the treatment of postradiation xerostomia in patients with head and neck cancer. *Support Care Cancer* 2000;8(3):203-8.
32. Santos PS, et al. Efficacy of HPA Lanolin in treatment of lip alterations related to chemotherapy. *J Appl Oral Sci* 2013;21(2): 163-6.
33. Bonomi M, Batt K. Supportive management of mucositis and metabolic derangements in head and neck cancer patients. *Cancers (Basel)* 2015;7(3):1743-57.
34. Scarpace SL, et al. Treatment of head and neck cancers: issues for clinical pharmacists. *Pharmacotherapy* 2009;29(5): 578-92.
35. Vokurka S, et al. The comparative effects of povidone-iodine and normal saline mouthwashes on oral mucositis in patients after high-dose chemotherapy and APBSCT—results of a randomized multicentre study. *Support Care Cancer* 2005;13(7): 554-8.
36. Cullen L, Adams SL. Planning for implementation of evidence-based practice. *J Nurs Adm* 2012;42(4):222-30.
37. Cullen L, et al. *Evidence-based practice in action: comprehensive strategies, tools, and tips from the University of Iowa hospitals and clinics*. Indianapolis, IN: Sigma Theta Tau International; 2018.
38. Bick D, Graham ID, editors. *Evaluating the impact of implementing evidence-based practice*. Oxford, UK; Ames, IA: Wiley-Blackwell and Sigma Theta Tau International 2010. Evidence-based nursing series.
39. Parry GJ, et al. Recommendations for evaluation of health care improvement initiatives. *Acad Pediatr* 2013;13(6 Suppl): S23-S30.
40. Bensinger W, et al. NCCN Task Force report. Prevention and management of mucositis in cancer care. *J Natl Compr Canc Netw* 2008;6 Suppl 1:S1-S21.
41. Cullen L, et al. *Evidence-based practice building blocks: comprehensive strategies, tools, and tips*. Iowa City, IA: Nursing Research and Evidence-Based Practice Office, Department of Nursing Services and Patient Care, University of Iowa Hospitals and Clinics; 2012. https://uihc.org/sites/default/files/documents/ebp_building_blocks_-_sample_-_08-31-12.pdf.