Oral side effects are prevalent in individuals experiencing oncology treatment. Compliance with meticulous home care is essential and should be individualized based on risk factors and the current state of health. Oncology therapies result in a host of oral side effects including tooth hypersensitivity, impaired taste, xerostomia, destruction of tooth enamel due to vomiting, and mucositis along with discomfort and pain. The goals in treating mucositis are relieving pain and preventing secondary infections through home oral hygiene and mouth rinses. Chemotherapy can lead to osteonecrosis of the jaw, especially after a tooth extraction or oral surgery. It is important for dental professionals to be familiar with these side effects and discern how to counsel their patients appropriately.

Educational Objectives
During this course the participant will:
1. Discuss the importance of treating and preventing oral complications in the oncology patient.
2. Recognize the signs and symptoms of osteonecrosis associated with bisphosphonate therapy.
4. Describe currently available treatments for oral mucositis.
5. Devise individualized guidelines for the patient receiving oncology treatment to maintain good oral health.

Author Profile
Kris Potts, RDH, BS, FAADH is a hygienist of 38 years, is a member of the American Dental Hygienists’ Association and a fellow with the American Academy of Dental Hygiene. She is the past president of the Texas Dental Hygienists’ Association and a member of the American Academy for Oral Systemic Health. Her passion for lifelong learning has directed her to additional certifications in caries management and oncology care. She has been interviewed frequently for her expertise. She is owner/CEO of Oral Health Promotion Strategies.

Author Disclosure
Kris Potts, RDH, BS, FAADH has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

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Known Benefits and Limitations of the Data: The information presented in this educational activity is derived from the data and information contained in reference section. The research data is extensive and provides direct benefit to the patient and improvements in oral health.

Registration: The cost of this CE course is $59.00 for 3 CE credits.
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Introduction
Cancer is an ever present fact in society today and the second leading cause of death in the United States, surpassed only by heart disease.1 According to the American Cancer Society, as of June 1, 2016, it was estimated that there were 15.5 million people in the United States who were living with some type of invasive cancer.2 With so many people living with cancer, the dental community should be knowledgeable of the many drugs used to treat cancer and the side effects affecting oral health. Of the 67% who were diagnosed more than five years ago, 61% are age 65 or older, with increased comorbidities. In 2017, 1.6 million new cases are expected, and by 2026, the number of survivors is expected to reach 20.3 million with 89% over the age of 65.3

Unfortunately, many oncology patients have suboptimal oral health prior to the diagnosis and, therefore, are at increased risk for potentially life-threatening odontogenic infections during cytotoxic therapy. The knowledge and expertise of dental professionals regarding the prevention and treatment of complications in these patients are vital. Integration of oral care with the oncology team requires effective communication between the two, ideally beginning at diagnosis and prior to beginning treatment.

The pretreatment dental assessment is critical, and in some cases, the only opportunity to identify preexisting dental conditions that may lead to significant and difficult-to-manage complications that occur during cancer treatment. This assessment allows the dentist to determine the status of the oral cavity before treatment begins and to initiate necessary interventions that may reduce oral complications during and after therapy. Optimally, the examination should be performed at least one month before the start of treatment to permit adequate healing from any required invasive oral procedures. An individualized program of oral hygiene should be initiated, with emphasis on maximizing patient compliance with feasible oral health recommendations. In many instances, if treatment has already begun, referral to a dental home is too late.

While no cure for cancer is currently known, incorrect statement there are a number of medications that eliminate cancer cells and can result in a cancer-free state. Unfortunately, these treatments are not without complications (Table 1).4 Dental providers are the most recognized source in providing the patient and caregivers education about the oral implications of these drugs and providing appropriate tools for treatment. Often, it may be possible for the dental professional to diminish these side effects through treatment recommendations in collaboration with the oncology team.

Oral Side Effects
Chemotherapeutic/cytotoxic medications are the most commonly used treatment of cancer therapies (Table 1). There are many types of chemotherapeutic drugs, so it is always prudent to look up the specific medication that the patient is taking in order to be familiar with any unique side effects. Oral side effects occur often, in up to 40% of oncology patients, and include generalized hypersensitivity due to discomfort and pain, ulcerated gingival tissues, and impaired taste.5 Additionally, chemotherapy can cause vomiting leading to tooth enamel erosion, which in turn leads to tooth sensitivity. Patients should be advised to not brush immediately after vomiting due to removal of outer layers of enamel, which have been softened by the acidic discharge. An alternative is the use of buffering agents, including rinsing the mouth with lukewarm water mixed with either baking soda or salt. Lastly, cytotoxic medications can cause xerostomia, which leads to caries, and it is important to be mindful of the increasing use of cannabinoids for neuropathic pain.6,7

The oncology team should be able to educate patients on salivary substitutes, stimulants, and remineralization products as well as recommending the patient have a dental consultation for evaluation and instruction on preventive measures.8,9

Mucositis and Xerostomia
One of the most common and painful oral side effects of oncologic treatment is mucositis, the ulceration of the mucosal lining anywhere along the digestive tract, including the oral cavity. This condition can affect up to 40% of patients undergoing chemotherapy.10 Oral and gastrointestinal mucositis may occur in up to 100% of patients undergoing high-dose chemotherapy with hematopoietic stem cell transplantation (HSCT).11 Patients feel it is the most debilitating side effect of HSCT.12

Oral mucositis symptoms vary greatly and range from pain and discomfort to the complete inability to tolerate food or drink. It may become so severe that the patient can no longer tolerate cytotoxic or radiation therapy. In these cases, treatment will be interrupted, potentially limiting its effectiveness. Patients with inflamed mucosa and reduced immunity due to their therapy regimen are at high risk for any developing opportunistic infections that may be potentially fatal. Hospital stays may need to be extended for patients with severe mucositis and can adversely affect the patient’s gums and teeth.13,14

Many options are available to treat this condition. Until recently, the primary methods of treating mucositis were strictly palliative. They now include oral care protocols, pain control, oral rinses, interventions to reduce the mucositis, and the palliation of dry mouth.15,16 Since the primary symptom of mucositis is pain, it can adversely affect nutritional intake, oral health care, and quality of life. Although they do not provide long-term relief, saline mouth rinses, ice chips, and topical alcohol-free mouth rinses with an anesthetic can provide short-term relief.17,18,19 Often, 2% viscous lidocaine is used in a compounded rinse called Magic Mouthwash. There are several recipes for this rinse that combine equal parts of lidocaine and corticosteroids with a compounded rinse called Magic Mouthwash. There are several recipes for this rinse that combine equal parts of lidocaine and corticosteroids, with a few examples being a compound of lidocaine and oxymetazoline, or a compounded rinse called Magic Mouthwash. There are several recipes for this rinse that combine equal parts of lidocaine and corticosteroids.

Table 1: Common Cancer Drugs and Their Side Effects

<table>
<thead>
<tr>
<th>COMMONLY USED CHEMOTHERAPEUTIC AGENTS</th>
<th>USED TO TREAT</th>
<th>ORAL AND GI SIDE EFFECTS</th>
<th>OTHER SIGNIFICANT EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bevacizumab</td>
<td>Breast, colorectal, lung, kidney, ovarian, cervical, glioblastoma</td>
<td>Loss of appetite, heartburn, altered taste, dry mouth, mucositis, coughing/gagging</td>
<td>Leukopenia</td>
</tr>
<tr>
<td>Lenvatinib</td>
<td>Multiple myeloma</td>
<td>Diarrhea, loss of appetite, altered taste, burning tongue</td>
<td>Swollen glands in neck</td>
</tr>
<tr>
<td>Imatinib</td>
<td>Myeloid leukemia, GI tract tumors</td>
<td>Diarrhea, nausea, vomiting, altered taste, mucositis, loss of appetite, dry mouth</td>
<td>Leukopenia</td>
</tr>
<tr>
<td>Pembrolizumab</td>
<td>Non-small-cell lung cancers</td>
<td>Nausea, vomiting, loss of appetite, diarrhea, mucositis</td>
<td>Leukopenia, sleep disturbances</td>
</tr>
<tr>
<td>Celecoxib</td>
<td>Colorectal, head and neck</td>
<td>Mucositis, dry mouth, sore throat, vomiting, altered taste, loss of appetite, diarrhea, heartburn</td>
<td>Confusion, bone and joint pain</td>
</tr>
<tr>
<td>Capetitabine</td>
<td>Breast, colorectal</td>
<td>Mucositis, dry mouth, vomiting, altered taste, loss of appetite, diarrhea, nausea</td>
<td>Leukopenia, sleep disturbances</td>
</tr>
<tr>
<td>Erlotinib</td>
<td>Non-small-cell lung, pancreatic</td>
<td>Mucositis, vomiting, loss of appetite, diarrhea, nausea, heartburn</td>
<td>Numbness, burning, tingling of hands and feet, anxiety, depression</td>
</tr>
<tr>
<td>Erlotinib</td>
<td>Breast, pancreatic</td>
<td>Dry mouth, altered taste, diarrhea</td>
<td>Agitation and other behavioral changes, joint pain, sleep disturbances</td>
</tr>
<tr>
<td>Sorafenib</td>
<td>Renal, GI tract tumors</td>
<td>Mucositis, dry mouth, sore throat, vomiting, altered taste, loss of appetite, diarrhea, heartburn, nausea, burning tongue, bleeding gums, loosening of teeth, difficulty swallowing</td>
<td>Leukopenia, sleep disturbances</td>
</tr>
<tr>
<td>Geosmin</td>
<td>Renal, liver</td>
<td>Mucositis, dry mouth, vomiting, loss of appetite, diarrhea, nausea</td>
<td>Jaundice, seizures, confusion, sudden severe headache, shortness of breath</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>Breast, head and neck, lung, Lymphomas, osteosarcoma, leukemia (ALL)</td>
<td>Swollen gums, vomiting</td>
<td>Difficulty breathing or swallowing, sleep disturbances, uncontrolled emotions</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>Leukemia (ALL, AML, CML, CML, MLL), breast, ovarian, myeloma, neuroblastoma</td>
<td>Mucositis, vomiting, loss of appetite, diarrhea, nausea, slow healing</td>
<td>Leukopenia, difficulty breathing or swallowing, seizures, cardio toxicity</td>
</tr>
<tr>
<td>Doxorubicin</td>
<td>Leukemia (AML), breast, gastric, lymphoma, neuroblastoma, ovarian, non-small-cell lung, thyroid, soft tissue and bone sarcomas</td>
<td>Mucositis, vomiting, loss of appetite, diarrhea, nausea</td>
<td>Leukopenia, joint pain, mood changes, depression, sleep disturbances, interactions with other meds</td>
</tr>
<tr>
<td>Anastrozole</td>
<td>Breast</td>
<td>Dry mouth, vomiting, loss of appetite, diarrhea, heartburn, nausea</td>
<td>Leukopenia, joint pain, mood changes, depression, sleep disturbances, interactions with other med</td>
</tr>
<tr>
<td>Letrozol</td>
<td>Breast</td>
<td>Dry mouth, vomiting, loss of appetite, diarrhea, heartburn, nausea</td>
<td>Leukopenia, joint pain, mood changes, depression, sleep disturbances, interactions with other med</td>
</tr>
<tr>
<td>Trastuzumab</td>
<td>HER2+ breast, adenocarcinoma</td>
<td>DIarrhea, heartburn, loss of appetite, depression, sleep disturbances, leukopenia</td>
<td>Leukopenia, joint pain, mood changes, depression, sleep disturbances, interactions with other med</td>
</tr>
</tbody>
</table>
Patients can also rinse with a solution of baking soda and salt in a cup of warm water several times a day to alleviate symptoms. Rinsing with this solution will also clean and lubricate the oral tissue, elevate oral pH, and provide a protective barrier for the oral mucosa. The chewing of tart, sugarless gum (preferably 100% xylitol sweetened) to stimulate salivary flow and saliva substitutes can be utilized as necessary.14

Table 2: Common Mucositis Treatment Comparisons

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Effectiveness</th>
<th>Cost</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nystatin</td>
<td>No effect</td>
<td>Low</td>
<td>Daily</td>
</tr>
<tr>
<td>Sucralfate and chlorhexidine and benzydamine rinse</td>
<td>Relieves symptoms</td>
<td>Moderate</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Gentile brushing, interdental cleaning</td>
<td>Prevents adherence of food and bacteria</td>
<td>High</td>
<td>Three times weekly</td>
</tr>
<tr>
<td>Water flosser</td>
<td>Prevents dental plaque and calculus</td>
<td>Moderate</td>
<td>As needed</td>
</tr>
<tr>
<td>Oral rinses</td>
<td>Relieves symptoms</td>
<td>Low</td>
<td>Twice daily</td>
</tr>
</tbody>
</table>

Unfortunately, there is currently no definitive cure for mucositis, so symptomatic and preventive treatments are the options available to oncology patients. Preventive treatments include:

- Use of a mild flavored toothpaste is recommended, as strong flavors can be irritating to the oral mucosa.
- Topical fluoride is often used to prevent caries that are caused by reduced salivary flow. For certain individuals, the provider should advise the patient to avoid fluoride products, as they can increase the aciduric bacteria load in the oral cavity if brushing is not possible.
- Patients should check with an oral surgeon and oncology team to see if it is possible to discontinue IV bisphosphonates prior to oral surgery. Newer drugs are available that potentially allow a “drug holiday” from bisphosphonate therapy allowing for emergency treatment, then resuming the IV bisphosphonate once the surgical site is completely healed. This might give the patient the best chance to avoid developing ONJ. Conclusive evidence that discontinuation of bisphosphonate therapy has an impact on healing ONJ is controversial. Another treatment being investigated is hyperbaric oxygen therapy. As a presurgical intervention, CARISMA has not established accelerated healing by stimulating osteoactivity with hyperbaric oxygen therapy. As another precautionary measure, many oral surgeons recommend a course of antibiotics prior to surgery to fight off any possible infection. It should be noted that more frequent and intense complications can occur spontaneously in about 21% of those affected.9 The signs and symptoms of osteonecrosis include localized pain, soft tissue swelling and inflammation, loosening of previously stable teeth, exudate, and visible exposed bone. However, these symptoms occur at sites of previous tooth extractions or other invasive oral procedures. The provider should advise the patient and the dental team to ensure efficacy. Always check with the oncology team before performing any dental treatment or stop taking any medications. Current findings further reinforce the recommendation for a pre-bisphosphonate dental evaluation as a strategy for prevention of ONJ.11

Guidelines for the Dental Professional

Patient education regarding potential oral side effects as well as necessary prophylactic information are integral parts of the oral and systemic care for oncology patients. As dental providers, there are things to be mindful of in treating oncology patients. Topical fluoride is often used to prevent caries that are caused by reduced salivary flow. For certain individuals, the provider should advise the patient to avoid fluoride products, as they can increase the aciduric bacteria load in the oral cavity if brushing is not possible.

This increase in aciduric bacteria results in an increased risk for caries. This imbalance can result in secondary infections, including but not limited to candidiasis, angular cheilitis, herpetic infections, dental/periodontal abscesses, and aspiration pneumonia.9 Nutritional considerations such as avoidance of sweets and high carbohydrate foods should be communicated. Certain medications will cause cravings for these foods, and nutritional supplements that are routinely given contain an elevated sucrose level detrimental to tooth structure. These foods can also change the bacterial makeup of plaque and increase gingival inflammation.30 Rinses such as chlorhexidine are recommended.31 Patients should be encouraged to gently brush their teeth two times a day. When brushing, the patient should use an ultra soft, postsurgical type toothbrush and rinse it under warm water before use to soften the bristles and avoid damaging any remaining teeth or oral tissues.32 The patient should be encouraged to practice meticulous oral hygiene and keep frequent, daily brushing, as growths and lesions are more likely to cause this even when used for a short duration.9

There are numerous oral care guidelines that dental providers can introduce to oncology patients, emphasizing the need for the patient to maintain meticulous oral hygiene (Table 3). Patients should be encouraged to gently brush their teeth two times a day. When brushing, the patient should use an ultra soft, postsurgical type toothbrush and rinse it under warm water before use to soften the bristles and avoid damaging any remaining teeth or oral tissues.32 The patient should be encouraged to practice meticulous oral hygiene and keep frequent, daily brushing, as growths and lesions are more likely to cause this even when used for a short duration.9

Use of a mild flavored toothpaste is recommended, as strong flavors can be irritating to the oral mucosa. Toothpastes designed for whitening can be drying to the oral mucosa and should be avoided.31 The provider should advise the patient to avoid mouthwash that contains alcohol.31 This can cause a strong burning sensation. Baking soda rinses can be palliative and soothing to the oral mucosa.31 Ill-fitting dentures greatly in-
treatment, they are less likely to consider the side effects in their mouths, with their first thoughts being of more commonplace effects such as hair loss or vomiting. The oral ramifications can affect the quality of life. May 2007 or more than 21, 2007. The dental community has a responsibility to supply these patients with the appropriate knowledge and tools to counter these adverse effects, resulting in the best possible care for patients undergoing oncology treatment. A multidisciplinary approach is required, but to date no gold-standard protocol exists that is promisingly better than others. The dental provider can develop a personalized home-care routine for the patient and their specific condition. The knowledge and expertise of the dental community regarding prevention and treatment of oral complications makes them a core part of this care. These capable clinicians may be identified at cancer centers, hospital dental programs, and in the community. With a proactive approach, the dental team can take care of any existing dental problems presented by an individual and provide advice as treatment progresses, reducing the chances of serious complications.

References


Reaching

Mouth rinses

Interdentinal cleaning

Other

Use a ultrasonic, posturgical toothbrush, and rinse it with warm water before brushing to avoid damaging any tissues. Rinsing with a solution of baking soda and saline can help tender tissues to heal.

Interdentinal cleaning at least once daily

Do not wear ill-fitting dentures. These can increase the risk of a disease process called osteonecrosis of the jaw.

Replace your toothbrush every 3 months or after any infection.

Avoid using mouthwash that contains alcohol. It can burn the tissues.

If the gums are bleeding heavily, do not floss these areas. Wait for the tissues to heal.

Be aware of the side effects of any medications you are taking. Knowing what to expect can help you to maintain healthy teeth and gums.

Use an antibacterial mouth rinse to help prevent infections. Ask your dental professional for more information. Many alternatives and new products are now available.

May 21, 2017.

1. According to the American Cancer Society, the number of individuals estimated to be living through invasive cancer is:

A. 15.5 million
B. 15.6 million
C. 6.6 million
D. all of the above

2. Pretreatment dental care for an oncology patient can help to:

A. lower chances of oral complications
B. integrate care with the oncology team
C. customize care recommendations
D. all of the above

3. Risk factors for medically related osteonecrosis of the jaw (ONJ) do not include:

A. corticosteroids
B. in-fitting dentures
C. uncontrolled diabetes
D. all of the above

4. All of these conditions are common in oncology patients except:

A. xerostomia
B. excess biofilm
C. actinic cheilitis
D. dental surgical procedures

5. Oral care guidelines for patients undergoing oncology treatment include all except:

A. mild toothpaste
B. interdental cleaning daily
C. self-postural toothbrush
D. dental surgical procedures

6. Research shows insufficient evidence of finding short-term relief for mucositis using:

A. salvia
B. saline rinses
C. niacinamide CRH compound
D. PCA with morphine

7. The percentage of patients undergoing ICHT who experience mucositis is:

A. 100%
B. 80%
C. 25%
D. 9%

8. Patients with xerostomia are at higher risk of decay and should be using all on a regular basis except:

A. some F2
B. buffering agents
C. moisturizer
D. 100% xylitol

9. When scheduling treatment for a patient undergoing chemotheraphy, this should not be considered:

A. antibiotic prophylaxis
B. cycle of NADIR
C. postoperative care
D. all of the above

10. Presentations of ONJ may include all except:

A. numbness
B. fever in the jaw
C. pain
D. compound fractures

11. Oral side effects of chemotherapy include:

A. hyperemesis
B. altered taste
C. mouth sores
D. all of the above

12. When vomiting occurs, patients should:

A. rinse with warm water and baking soda
B. brush immediately
C. use antiseptic mouth rinse with alcohol
D. eat more

13. ONJ occurs most often in patients with:

A. breast cancer
B. multiple myeloma
C. liver metastasis
D. both A and B

14. After a cancer diagnosis, a dental consultation should occur:

A. one month prior to onset of treatment
B. midway through treatment
C. after treatment has been completed
D. only if there is a problem

15. A major oral side effect of IV biphosphonate use is:

A. gingival hyperplasia
B. mucogingival changes
C. ONJ
D. mucositis

16. Symptomatic treatment for mucositis includes all but:

A. avoiding caffeine, alcohol, and tobacco
B. avoiding spicy foods
C. palliative rinses
D. using firm, intense toothbrush strokes

17. Prior to initiating dental care, blood platelet counts should be:

A. above 75 000 mm$^{-3}$
B. under 75 000 mm$^{-3}$
C. undetected
D. above 100 000 mm$^{-3}$

18. Oral health maintenance visits for an oncology patient should be recommended:

A. every 6 months
B. every year
C. every 1-2 months
D. not at all

19. The number of new cancer cases expected to be diagnosed in 2017 is:

A. 1.6 million
B. 1.7 million
C. 2.5 million
D. 2.6 million

20. This product is not used to treat:

A. xerostomia
B. saliva substitute
C. anticholinergic drugs
D. hydrochloride for prophylaxis of radiation-induced oral mucositis

21. During the dental appointment, all should be considered except:

A. prevent with CHX
B. assess health and OH
C. awareness of cannabis use
D. what the patient had for dinner

22. OHI and education of oncology patients should include:

A. anticancer oral hygiene
B. frequent tooth brushing
C. interdental cleaning
D. all of the above

23. Patients with existing protheses should be evaluated for:

A. fit
B. shade
C. cleanliness
D. all of the above

24. This instruction is not usually related to oncology patients.

A. candidiasis
B. herpetic ulcers
C. dental/periapical abscesses
D. malignancies

25. Dental examinations prior to or early on in oncology treatment allows the dental professional to do all of the following except:

A. establish baseline status
B. initiate palliative care
C. maximize patient compliance
D. maximize prevention

26. The pretreatment dental assessment allows the dentist to:

A. determine the status of the oral cavity before treatment begins
B. initiate necessary interventions
C. maximize oral complications during and after therapy
D. all of the above

27. Rinsing with a solution of baking soda and salt:

A. will alleviate symptoms
B. will elevate oral pH
C. is not considered effective
D. all of the above

28. Proper interdental cleaning:

A. is important to reduce bacterial load in the mouth
B. should only occur under supervision
C. can only be accomplished with string floss
D. reduces the need for adjunctive F2

29. Clinicians who take a proactive approach in advising the oncology team can be found:

A. at dental schools associated with local hospitals
B. at local cancer treatment centers
C. in oncology communities
D. all of the above

30. During a dental appointment, the provider should:

A. not bother with bacterial testing
B. stay away from nutritional counseling
C. avoid eye contact
D. have the patient prerinse with CHX

Notes

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Oral Care for the Oncology Patient

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 3 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp.

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