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The Interprofessional Management Of Geriatric Patients Undergoing Head And Neck Cancer Treatment In U.S. Nursing Homes

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The Interprofessional Management of Geriatric Patients Undergoing Head and Neck Cancer Treatment in U.S. Nursing Homes

Literature Review

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ABSTRACT

Head and neck malignancies can be difficult to treat, especially in the geriatric population. A dental approach toward interprofessional management, treatment planning and rehabilitation of diagnosed individuals undergoing cancer therapies is essential. This literature review focuses primarily on: presurgery oral hygiene instructions; pre-radiotherapy/chemotherapy dental clearance; complications and management during radiotherapy/chemotherapy; post-radiotherapy/chemotherapy oral healthcare; and adjunctive measures. Each section aims to affirm that thorough evaluation is vital to understanding the assessment and safe management of patients undergoing oncology treatment. Furthermore, this project will help establish guidelines for interprofessional nursing home teams in regards to oral healthcare.

Head and neck cancer (HNC) constitutes less than 5% of all cancers, but it can have devastating outcomes in the lives of affected patients.¹⁻² In 2001, there were approximately 30,000 HNC-related deaths in the United States.¹ It has been linked to several causes, including tobacco use and/or alcohol consumption.

Eighty percent to ninety percent of head and neck cancers are due to tobacco and alcohol use. Traditionally, men over the age of 40 who smoke have the highest risk of developing HNC, squamous cell carcinoma (SCC). A recent study showed that development of oral cancer in smokers increases with age. Men who stopped smoking at 30 years of age had a 1.2% risk of developing SCC, while men 75 years of age and older who continued smoking had a 6.3% risk of developing cancer of the upper digestive tract.¹

The incidence of human papilloma virus (HPV)-related squamous cell carcinoma has increased in the last 20 to 30 years. This disease usually occurs in the region of the oropharynx in patients who are 45 years or younger, so it is not usually a risk factor in the geriatric population. HPV-related SCC is discovered at a later stage, but it responds better to radiation treatment compared to non-HPV-related squamous cell carcinoma. Deficiencies of vitamin A and iron, occupational exposure to toxic chemicals and genetic abnormalities have also been linked to the development of cancer in the head and neck.² Immunosenescence, which is defined as the changes that occur in the immune system due to increased age, may cause an increase in the risk of cancer.³

It has been postulated that by the year 2030, 20% of the overall population will be composed of individuals 65 years and older.⁴ The elderly, in particular, are at risk of developing cancer throughout the body, including the head and neck region. According to the American Cancer Society, people ages 55 and above represent 78% of all cancer diagnoses.⁵ Treatment modalities for

cancer, such as surgery, radiation and/or chemotherapy, can take a physical, psychological and financial toll on the affected individuals.⁶ Support from family, friends and nursing home staff can help these patients learn how to cope with their illness.

Nursing homes are facilities that provide long-term residential accommodations and/or healthcare for patients who do not require hospitalization but do require 24-hour assistance.⁶⁻¹¹ According to the Centers for Disease Control and Prevention, in 2013, the United States had 15,700 nursing homes, with 1.4 million beds out of a possible 1.7 million being occupied. While nursing homes provide healthcare to ensure a better quality of life, oral care has been found to be a low priority.⁶ Nurses form an integral part of the interdisciplinary team caring for patients before, during and after treatment.⁶ Dental professionals can assist nurses with patients living in these facilities.

For this study, the journals reviewed were published in English between 1975 and 2015 and contained information about the various types of cancers that occur in the head and neck region, along with treatment modalities and complications. Literature regarding dental care in nursing homes was also included. Abstracts and continuing education course materials were excluded. Relevant websites and textbooks with informa-

tion related to the incidence of cancer and the care of affected patients were also used. This review will discuss pre-surgery oral hygiene instructions, pre-radiology/chemotherapy dental clearance, during-radiology/chemotherapy dental complications and management, post-radiology/chemotherapy oral healthcare and adjunctive healthcare. The aim of this review is to explore guidelines for nursing home healthcare teams in regards to oral health and interprofessional collaboration.

Presurgery Oral Hygiene

The healthcare team at a nursing home comprises family, physicians, nursing staff, social workers, rehabilitation staff, physical therapists, occupational therapists, speech therapists and other non-medical personnel.^{6,12}

As the population ages, physician visits increase, while dental visits decrease for reasons ranging from the individual's lack of awareness, changes in oral hygiene habits and inability to afford dental care.⁷ The nursing home staff may require more encouragement in recognizing the importance of oral care in older populations. According to a study by Coleman and Watson, five nursing homes in New York State did not meet oral hygiene standards for their residents, such as brushing their teeth for at least two minutes, flossing, performing an oral assessment, rinsing with mouthwash and wearing gloves during the performance of oral care.¹³ The elderly are particularly at risk for the development of oral diseases that are gateways to other systemic disease, such as cardiovascular disease, stroke and respiratory infection.¹⁴ Thus, it is extremely important for the team at the nursing home to administer a rigorous oral care protocol. One of the most effective ways to ensure change is to include interdisciplinary collaboration between nurses and dental professionals.

The risk of squamous cell carcinoma increases after age 65, so it is important that all staff be aware of the clinical manifestations. These include red and white mucosal lesions that cannot be wiped away and which should undergo biopsy if present for more than two weeks.³ Non-healing ulcers present for more than two weeks should also be biopsied.² HNC may present as ominous-appearing nodular growths, palpable swellings, constant sore throat and otitis media that do not respond to antibiotics, as well as non-trauma-induced and uncontrolled bleeding of the mucosa.²

Once a patient has been diagnosed with cancer, it is important to increase oral hygiene measures. Cancer therapy can cause the oral cavity to undergo many changes, so it is best to establish a good regimen. Patients should be encouraged to cease all high-risk behaviors, such as smoking and excessive alcohol consumption.

Dental Clearance prior to Radiation and Chemotherapy

A comprehensive oral evaluation, prior to HNC treatment, is necessary to identify and eliminate active or potential oral sources

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TABLE 1.
Oral and Dental Care Prior to Cancer Therapy

Dental Care Considerations	Guidelines and Action
Surgical Considerations	<p>Vital and viable teeth should be retained for function, aesthetics, and quality of life.⁷⁰ Nonetheless, it is significant to eliminate possible sources of infection.²⁸</p> <p>Due to the increased risk of osteoradionecrosis in irradiated bone with dental extractions or untreated infection, it is generally advised to extract teeth with poor long-term prognosis prior to radiotherapy.⁷¹ Ideally, extractions should be undertaken up to two weeks before commencement of radiotherapy.^{28,72} Teeth that should be considered for extraction include, but are not limited to:⁷⁰</p> <ul style="list-style-type: none"> ● Extensive carious lesions with questionable pulpal status or involvement ● Extensive peri-apical lesions ● Moderate or advanced periodontal disease, with extensive attachment loss, bone loss and mobility or furcation involvement ● Residual root tip that is radiolucent or if not fully covered by alveolar bone ● Impacted or incompletely erupted teeth (third molars)^{71, 73, 74}
Periodontal Considerations	<p>Scaling and prophylaxis with establishment and reinforcement of good oral hygiene and dietary advice. With emphasis on adequate hydration.⁷⁵</p> <p>Deep scaling and root planing (PD < 6 mm) should occur 14 days prior to radiotherapy for sufficient healing time.²⁸</p> <ul style="list-style-type: none"> ● Recommended mouthrinse with aqueous alcohol-free chlorhexidine gluconate mouthwash for short-term use.
Restorative Treatment	<p>Caries removal and restorations.</p> <p>Smoothing of irregular teeth and sharp areas on restoration. Removal and replacement of defective restorations.⁷⁴</p>
Prosthetic Considerations	<p>Removable prostheses should be removed if any signs of ulceration.</p> <p>Ill-fitting dentures should be relined, repaired, or replaced to avoid irritation and tissue trauma.²³</p>
Orthodontic Appliances	<p>Treatment should be discontinued.⁷⁶</p>

of infection. In cancer patients, the most frequently documented source of sepsis is the oral cavity.¹⁵⁻²⁰ Therefore, it is essential to evaluate and address dental needs for geriatric patients receiving oncology treatment. An early assessment of oral status and a means for providing care are critical in reducing potential complications associated with cancer therapy.¹⁷

Pre-treatment Comprehensive Oral Evaluation

Ideally, the oral evaluation should occur several weeks prior to commencement of cancer treatment, to allow for adequate healing time.^{18,21,22} Medical consultation and thorough review of the patient's dental history are needed to develop an appropriate treatment plan. The medical consultation should encompass information concerning the disease/condition and associated treatment protocol, immunosuppression status, medications, allergies and contact information for the patient's oncologist.^{17,23}

Dental health history must contain information regarding the patient's previous dental care, symptomatic teeth, trauma, habits, fluoride exposure, caries risk assessment and oral hygiene.¹⁶ The assessment includes extraoral and intraoral clinical examinations, identification of existing infections and other compromised hard or soft issues, and an evaluation of relevant radiographs.^{16,24}

Dental and Systemic Care prior to Oncology Therapy

Upon completion of the oral examination, it is critical that the dentist communicate the findings and associated treatment plan

to the oncologist. If the radiation oncologist determines that a delay in cancer treatment will affect the potential success of disease control and patient survivability, pre-cancer dental care may not be advisable.^{25,26} The main focus should be on existing infections, extractions, periodontal care and sources of tissue irritation (Table 1).^{16,24,27,28} The team should educate the patient on proper oral hygiene, maintenance, nutrition and diet.²⁴ Oral and maxillofacial surgeons (OMS) play an important role in diagnosing HNC and patient management. The OMS is involved with cancer screenings and patient education, and surgical therapy.^{29,30} The team approach will aid in reducing or eliminating complications, such as radiation mucositis, xerostomia and osteoradionecrosis.^{31,32}

In addition to a complete oral examination, a comprehensive geriatric assessment (CGA) should be completed.³³ Geriatric patients often present with comorbidities, such as narrow arteries and decreased organ function, which may cause complications during surgery, radiation and chemotherapy. Chemotherapy-related toxicity is more common in elderly patients. This is caused by decreased liver and renal function, which allows abnormally high levels of chemotherapeutics to build up in the bloodstream.^{29,30,33} CGA is a multidisciplinary evaluation of the patient's nutritional status, co-morbid medical conditions, cognition, psychological state and functional status. This assessment will help determine what type of treatment the patient will be able to withstand.³³ Systemic health benefits and oral care are critical to the quality of life for geriatric patients undergoing oncology treatment.³⁴

Dental Complications and Management during Radiation/Chemotherapy Treatment

Oral or oropharyngeal mucositis (OM), an inflammatory disease of the oral and oropharyngeal mucosa, is commonly induced by ionizing radiation during radiation therapy (RT). Within three weeks, mucosal ulcerations manifest and become confluent.³⁵ These ulcerations may persist for up to six weeks after completion of RT and impair the patient's ability to eat, speak and function properly. These lesions leave patients vulnerable to microbial invasion of the bloodstream, increasing their risk of acquiring local or systemic infections.^{36,37}

Therapeutic treatments, including soft laser and cryotherapy, show increasing evidence of effectiveness in preventing and managing OM. Lack of significant evidence, however, has limited their approval or utilization.

OM treatment is associated with symptom management.³⁸ As pain is typically present, treatment begins with topical analgesics or anesthetics, such as viscous lidocaine to help with OM.¹⁵ Some clinicians will prescribe "magic mouthwash" to alleviate the pain associated with OM. There are many different formulas used to make magic mouthwash. Palifermin is the only FDA-approved growth factor or cytokine-approved medication to treat oral mucositis.³⁹⁻⁴¹ Alternating non-opioid oral analgesics, such as ibuprofen and Tylenol, is recommended if topical application is insufficient. If pain persists, opioids may be added, starting with the lowest effective dose and increasing as needed.^{38,42}

Low-level laser therapy (LLLT) is a new modality, which may be used to reduce the effects of mucositis in patients treated with RT.^{15,33,43} In a recent study by Gautam et al., LLLT treatment of the oral cavity prior to RT showed decreased OM, oral pain, weight loss and the need for analgesic in elderly patients with HNC.^{15,43}

Xerostomia

Salivary glands are sensitive to RT. Xerostomia may manifest due to inflammation, fibrosis or degeneration of salivary glands. Decreased flow is continuous throughout RT and may persist post-treatment, increasing the risk of infections and the development of dental caries.³⁶ Current treatments for xerostomia hope to increase the existing salivary flow or replace lost secretions, maintain proper oral hygiene, control dental caries that may be present and treat any arising infections. The presence or absence of residual oral cavity secretions determines appropriate treatment.⁴²

Xerostomia treatments include muscarinic acetylcholine agonists, salivary substitutes or stimulants, acupuncture and hyperbaric oxygen therapy (HBOT). Some examples of muscarinic acetylcholine agonists are pilocarpine and cevimeline. The continued administration of topical pilocarpine lozenges has been found to be superior to other treatments for improving unstimulated and stimulated salivary flow rates.⁴⁴

Alternative treatments include mechanical, gustatory or electrical salivary stimulants. If salivary secretion stimulation fails, mouthwash or saliva substitutes that mimic natural saliva may be prescribed. Because of the increased risk for dental caries and infections, patients require frequent dental visits. Patients must be active in managing xerostomia by performing daily self-examinations for the presence of any white, red or dark-pigmented lesions, ulcerations or tooth decay.^{42,44}

Infections

Radiation-induced xerostomia and mucosal ulcerations increase the risk of viral, bacterial or fungal infections. Common bacterial infections involve species of *Staphylococci* and *Streptococci*, *Klebsiella pneumonia*, *Pseudomonas aeruginosa* and *Escherichia coli*.⁴⁵ The most common infection is oral candidiasis (OC), an opportunistic fungal infection primarily associated with *Candida albicans*. The two types of acute OC found in this population are pseudomembranous and erythematous. Patients suffering from pseudomembranous OC may present with wipeable, white, patchy lesions, while erythematous OC manifests in the oral cavity as red diffused lesions on the oral mucosa. Frequently coexisting during RT, OC is often mistaken as oropharyngeal mucositis. Common symptoms are generalized burning sensations and pain.^{35,46}

The treatment for OC is topical antifungal medication. Systemic antifungals are administered for more invasive infections. Antifungal agents that are fully absorbed from the GI tract, such as fluconazole, ketoconazole and itraconazole, appear to be more effective in preventing OC.^{44,47}

Trismus and Fibrosis

Radiation-induced fibrosis and ischemia may lead to trismus during or post-RT. Unmanaged trismus may cause difficulty in swallowing. The main treatment for increasing mouth-opening is a constant exercise regimen.³⁷ Nursing home patients experiencing difficulty with exercising independently may manage exercise routines with the help of staff. Modified, custom-made mouth-opening devices could be an alternative treatment.⁴⁸

Post-radiation/chemotherapy Complications and Management

Long-term complications of radiotherapy and chemotherapy include xerostomia, osteoradionecrosis, rampant caries and radiation-induced sarcomas. Severe cases of xerostomia can cause difficulty in speech and swallowing, making everyday tasks troublesome.⁴⁹

Residents in nursing homes might experience extreme discomfort with removable prostheses because saliva promotes bonding between the interface of prosthesis and the oral/gingival tissue.^{50,51} Xerostomia treatment includes salivary stimulants, mouth moisteners and parasympathomimetic drugs. Side effects might be sweating, headache, rhinitis, dizziness and urinary fre-

quency.⁵²⁻⁵⁶ Persistent xerostomia can lead to rampant caries. Effective preventive therapies include maintenance of good oral hygiene, the use of fluoride and chlorhexidine rinse.⁵² Conventional glass ionomers are the restorative material of choice because of their bond strength and fluoride release.²⁵

Most cases of osteoradionecrosis occur as the result of traumatic incidents, such as tooth extraction, biopsies, periodontal disease, subgingival scaling or ill-fitting prostheses.²⁰ After radiotherapy, edentulous patients should not wear dentures for at least one year. Dental implants can be placed successfully in irradiated bone 12 to 18 months after completion of radiotherapy.⁵⁸ Although rare, treatment with radiation can cause post-radiation sarcomas.⁵⁷ Therefore, any suspicious lesion should be sent for biopsy. If the lesion is found to be malignant, surgical resection is often the main treatment of choice.⁵¹ The oral and maxillofacial surgeon can aid in post-radiation/chemotherapy therapy by helping patients through the rehabilitation process.^{29,30}

Prostheses are essential to help patients regain normal function and improve facial aesthetics. Prostheses include dentures, as well as treatments for other portions of the face and neck. Because tissues actively heal and change after surgery, a close follow-up of the fit of the prostheses and assessment of functional jaw improvement is recommended.⁵⁹ Patients, with the help of the nursing staff, should perform frequent oral examinations to identify any abnormal changes occurring in the oral cavity.¹⁵ The dentist can help by performing monthly oral examinations for residents for the first six months after completion of their treatment(s) and semiannually thereafter.⁵⁹ An oral medicine specialist should be notified whenever oral pathology is suspected.¹⁵

Adjunctive Treatment

Innovative cancer treatments are keeping patients alive longer, resulting in complex disabilities, including fibrosis of irradiated tissue, trismus, dermatitis, and severe, acute mucositis and oropharyngeal.^{53,56} Radiation-induced tissue damage occurs from injury to the endothelial cells lining small blood vessels, resulting in inflammation, ischemia and interstitial edema.⁶⁰ Edema in the head and neck causes facial disfigurement; in severe cases, swelling of eyelids and lips can lead to difficulties in eating, as well as impaired vision.⁵⁵ Traditional nursing measures, such as compression garments, ambulation and elevation, contribute to a reduction in lymphedema. Radiation dermatitis symptoms may be alleviated by skin care instructions, the use of aloe vera gels and water-based lotions, avoiding chemical irritants, and limiting sun and wind exposure. Massage and position changes can alleviate the pressure sores of bedridden patients.⁶⁰

Patients should be aware of support services, such as physical, manual and occupational therapy, to reduce deconditioning and muscle atrophy. Manual therapy includes passive/active stretching and joint manipulation to increase range of motion (ROM)

and reduce inflammation, hypoxia and contractile tensions.⁶¹ A novel technique is trigger-point dry-needling, which decreases pain and increases cervical ROM and blood flow to the site in patients having upper myofascial pain.⁶² Various jaw ROM exercises and mechanical assistance devices, such as Therabite (*Atos Medical, Sweden*), can help increase ROM.⁶³ Fibrosis can result in impaired movement of the muscles of mastication, tongue, pharyngeal constrictors and larynx, resulting in swallowing dysfunction and risk for aspiration.⁶³⁻⁶⁵ Tongue-stretching, as an adjunct to the supraglottic swallowing maneuver, helps with coordination of chewing and swallowing.⁶³

Prevention counseling in oral hygiene, nutrition, alcohol and smoking should be offered. Smoking after a cancer diagnosis decreases the effectiveness of radiotherapy, shortens survival time and increase the risks of recurrence, second primary malignancies and treatment complication.⁶⁵ Cryotherapy (e.g., sucking on ice chips) can also lower the incidence of mucositis during infusions of chemotherapeutic agents by causing local vasoconstriction, thus reducing exposure of cells to the drug.^{39,63} Pain associated with mucositis can be alleviated by using mouthrinses (Table 2) and gargling several times a day with warm salt water or a baking soda solution.⁶⁶

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TABLE 2.
Natural Adjunctive Mouthrinse Recommendations for Mucositis
Secondary to Chemotherapy and/or Radiation for Cancer Treatment

Management/Therapy	Patient Diagnosis	Results	Type Study/Level Evidence	Author/Year
Rinse containing olive leaf extract (OLE) or benzydamine hydrochloride	Chemotherapy-induced mucositis—25 patients given mouthrinse with OLE, 25 patients given mouthrinse with benzydamine hydrochloride, 25 patients given placebo mouthrinse.	Oral mucositis rates and severity were lower in OLE and Benzydamine groups compared to placebo. Decrease in pro-inflammatory cytokine production.	Double-blind RCT, Level I	Ahmed (2012) ⁶⁴
Calendula officinalis (English marigold) flowers extract mouthwash as oral gel on radiation-induced oropharyngeal mucositis (OM)	38 patients with HNC undergoing radiotherapy (60 Gy) or concurrent chemoradiotherapy were randomly assigned to receive either 2% calendula extract mouthwash or placebo (20 patients in each group).	OMAS scores were significantly lower in calendula group compared to placebo at week 2, 3 and 6 of the study. According to repeated measures ANOVA test, the differences between OMAS of calendula and placebo during the weeks of evaluation were statistically significant ($p < 0.001$).	RCT, Level I	Babaei (2013) ⁷⁷
Korean red ginseng (liquid concentrate) only Radiotherapy only RT+ KRG group	(20 Gy) Radiation-induced oral mucositis.	Rats in RT+ KRG group had less severe mucositis, fewer ulcerative mucosal lesions on the tongue, less hair loss, less rapid decrease in weight than did the RT-only group.	RCT, Level I	Chang (2014) ⁷⁸
Diocahedral smectite (natural absorbent clay of non-systemic specific aluminomagnesium silicate) and iodine glycerin (DSIG) cream vs. topical mouthrinse (composed of saline, gentamicin and Vitamin B	18 y.o. and older with pathological confirmed malignant tumors or malignant hematological diseases, 130 intensive chemotherapy or stem cells transplantation induced OM. 67 patients received topical mouthrinse and 63 patients received DSIG cream treatment.	A favorable, lower oral assessment guideline (OAG) score was observed in DSIG cream treated patients. The iodine glycerin may function as an antifungal/antibacterial and decrease repair time. From day 2-5 topical mouthrinse patients had a higher OAG score than DSIG treated. "The mouthrinse shows a protective function prior to OM appearance."	Prospective RCT, Level I	Lin (2015) ⁷⁹
Curcumin mouthwash	20 adult cancer patients with radio-chemotherapy OM randomly divided into 2 groups.	Curcumin mouthwash was found to be better than chlorhexidine mouthwash in terms of rapid wound healing and better patient compliance.	RCT, Level I	Patil (2015) ⁸⁰
13 received an aloe vera mouthwash , 13 received benzydamine mouthwash.	26 HNC patients (receiving at least 50 Gy) with radiation-induced mucositis.	Aloe vera mouthwash was as beneficial as benzydamine mouthwash in alleviating the severity of radiation-induced mucositis and showed no side effects.	Triple Blind RCT, Level I	Sahebamee (2015) ⁸¹
16 received polaprezinc , 15 received azulene oral rinse (control).	31 HNC patients with radiotherapy or radiochemotherapy OM.	Incidence rate of mucositis, pain, xerostomia and taste disturbance was lower in polaprezinc group than control.	Prospective RCT, Level I	Watanabe (2010) ⁸²

RCT: Randomized Control Trial
 Gy: Grays
 OMAS: Oral Mucositis Assessment Scale
 HNC: Head and Neck Cancer
 OM: Oropharyngeal Mucositis
 KRG: Korean Red Ginseng
 RT: Radiation therapy

HNC patients are at high risk for malnutrition due to taste alterations, xerostomia from medications, parotid atrophy and radiation-induced diarrhea (RID).^{65,66} The diagnosis of diminished swallowing function and odynophagia (painful swallowing) can be made by a speech language pathologist and treated by means of postures to control the bolus and other swallowing maneuvers. Twenty-nine percent to sixty-six percent of patients will experience severe oral mucositis during treatment, which is why alternative ways to provide nutrition need to be found.⁶⁷ Bolus modification by altering foods (mashed, puréed, thickened [fluids]) may make them safer to swallow.⁶⁸ Feeding tubes can also offer additional nutritional support post-treatment, when oral consumption is too painful.

Psychological support and speech rehabilitation can greatly improve the HNC patient's mental health. Frequently used alternatives include selenium, relaxation techniques, prayer, vitamin C, meditation and distraction.⁶⁹ Mild-to-moderate exercise can promote energy and boost quality of life and mood, despite feelings of tiredness.⁷⁰ Care plans should be tailored to meet the needs of each individual.

Conclusion

The objective of this review is to stress the importance of inter-professional collaboration and management for the treatment of patients undergoing various types of cancer therapy. Each health-care provider has the knowledge to guide the geriatric population in nursing homes through the various phases of diagnosis, treatment and health maintenance post-treatment. The dentist and allied dental health professional can assist the nursing home staff with patients' oral hygiene and look for signs of recurrent disease. The goal of the interprofessional team is to increase overall health and quality of life. *✍*

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