HEAD & NECK CANCER:

THE PATIENT JOURNEY, MULTIDISCIPLINARY TEAM AND MANAGING CHRONIC SIDE EFFECTS

2026 DENT5311 DMD3

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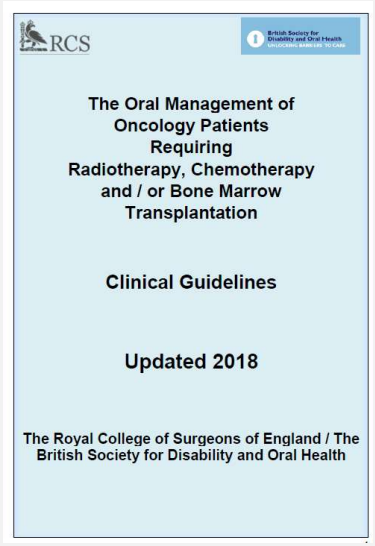




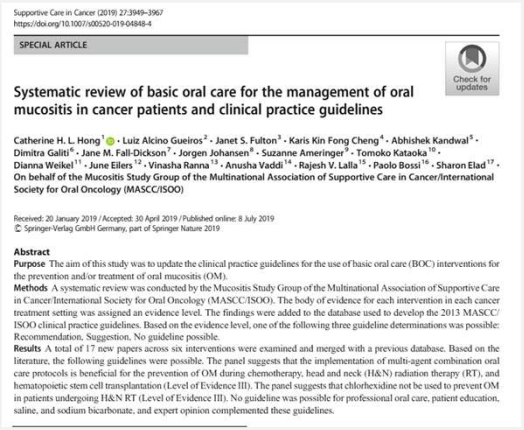
LECTURE OUTCOMES

- 1. Outline cancer therapies and the interprofessional multidisciplinary team involved in providing management
- 2. Appreciate some of the surgical considerations for head and neck cancer resection and reconstruction
- 3. Describe the oral complications of head and neck cancer therapies and their management
- 4. Explain the importance of oral care for head and neck radiotherapy patients
- 5. Discuss the factors to be considered when performing a dental assessment for patients prior to commencing head and neck radiotherapy
- 6. Understand how treatment approaches may differ for palliative patients

GUIDELINES






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SPECIAL ARTICLE

Systematic review of basic oral care for the management of oral mucositis in cancer patients and clinical practice guidelines

Catherine H. L. Hong[1] · Luiz Alcino Gueiros[2] · Janet S. Fulton[3] · Karis Kin Fong Cheng[4] · Abhishek Kandwal[5] · Dimitra Galiti[6] · Jane M. Fall-Dickson[7] · Jorgen Johansen[8] · Suzanne Ameringer[9] · Tomoko Kataoka[10] · Dianna Weikel[11] · June Eilers[12] · Vinasha Ranna[13] · Anusha Vaddi[14] · Rajesh V. Lalla[15] · Paolo Bossi[16] · Sharon Elad[17] · On behalf of the Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology (MASCC/ISOO)

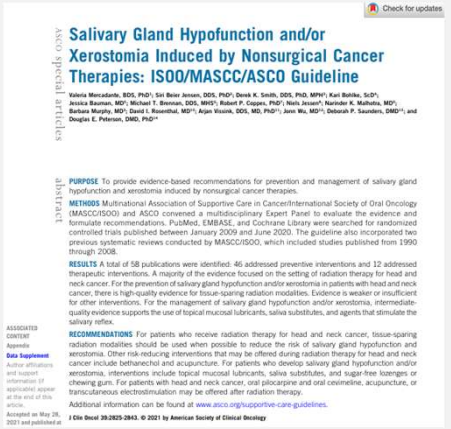
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Abstract

Purpose The aim of this study was to update the clinical practice guidelines for the use of basic oral care (BOC) interventions for the prevention and/or treatment of oral mucositis (OM).

Methods A systematic review was conducted by the Mucositis Study Group of the Multinational Association of Supportive Care in Cancer/International Society for Oral Oncology (MASCC/ISOO). The body of evidence for each intervention in each cancer treatment setting was assigned an evidence level. The findings were added to the database used to develop the 2013 MASCC/ISOO clinical practice guidelines. Based on the evidence level, one of the following three guideline determinations was possible: Recommendation, Suggestion, No guideline possible.

Results A total of 17 new papers across six interventions were examined and merged with a previous database. Based on the literature, the following guidelines were possible. The panel suggests that the implementation of multi-agent combination oral care protocols is beneficial for the prevention of OM during chemotherapy, head and neck (H&N) radiation therapy (RT), and hematopoietic stem cell transplantation (Level of Evidence III). The panel suggests that chlorhexidine not be used to prevent OM in patients undergoing H&N RT (Level of Evidence III). No guideline was possible for professional oral care, patient education, saline, and sodium bicarbonate, and expert opinion complemented these guidelines.


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ASCO special articles

Salivary Gland Hypofunction and/or Xerostomia Induced by Nonsurgical Cancer Therapies: ISOO/MASCC/ASCO Guideline

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PURPOSE To provide evidence-based recommendations for prevention and management of salivary gland hypofunction and xerostomia induced by nonsurgical cancer therapies.

METHODS Multinational Association of Supportive Care in Cancer/International Society of Oral Oncology (MASCC/ISOO) and ASCO convened a multidisciplinary Expert Panel to evaluate the evidence and formulate recommendations. PubMed, EMBASE, and Cochrane Library were searched for randomized controlled trials published between January 2009 and June 2020. The guideline also incorporated two previous systematic reviews conducted by MASCC/ISOO, which included studies published from 1990 through 2008.

RESULTS A total of 58 publications were identified: 46 addressed preventive interventions and 12 addressed therapeutic interventions. A majority of the evidence focused on the setting of radiation therapy for head and neck cancer. For the prevention of salivary gland hypofunction and/or xerostomia in patients with head and neck cancer, there is high-quality evidence for tissue-sparing radiation modalities. Evidence is weaker or insufficient for other interventions. For the management of salivary gland hypofunction and/or xerostomia, intermediate-quality evidence supports the use of topical mucosal lubricants, saliva substitutes, and agents that stimulate the salivary reflex.

RECOMMENDATIONS For patients who receive radiation therapy for head and neck cancer, tissue-sparing radiation modalities should be used when possible to reduce the risk of salivary gland hypofunction and xerostomia. Other risk-reducing interventions that may be offered during radiation therapy for head and neck cancer include bethanechol and acupuncture. For patients who develop salivary gland hypofunction and/or xerostomia, interventions include topical mucosal lubricants, saliva substitutes, and sugar-free lozenges or chewing gum. For patients with head and neck cancer, oral pilocarpine and oral cevimeline, acupuncture, or transcutaneous electrostimulation may be offered after radiation therapy.

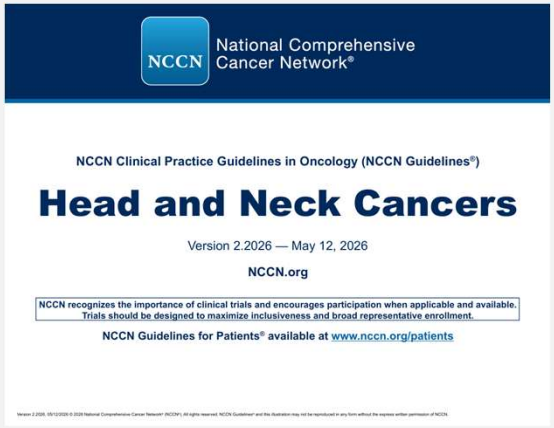
Additional information can be found at www.asco.org/supportive-care-guidelines.

ASSOCIATED CONTENT
Appendix
Data Supplement
Author affiliations and support information (if applicable) appear at the end of this article.
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ISOO INTERNATIONAL SOCIETY of ORAL ONCOLOGY

MASCC MULTINATIONAL ASSOCIATION OF SUPPORTIVE CARE IN CANCER

ASCO AMERICAN SOCIETY OF CLINICAL ONCOLOGY KNOWLEDGE CONQUERS CANCER


NCCN National Comprehensive Cancer Network®

NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®)

Head and Neck Cancers

Version 2.2026 — May 12, 2026

NCCN.org

NCCN recognizes the importance of clinical trials and encourages participation when applicable and available. Trials should be designed to maximize inclusiveness and broad representative enrollment.

NCCN Guidelines for Patients® available at www.nccn.org/patients

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ASCO Special Articles

Prevention and Management of Osteoradionecrosis in Patients With Head and Neck Cancer Treated With Radiation Therapy: ISOO-MASCC-ASCO Guideline

Douglas E. Peterson, DMD, PhD, FDS RCSEd, FASCO[1]; Shlomo A. Koyfman, MD[2]; Noam Yarom, DMD, MPH[3,4]; Charlotte Duch Lynggaard, MD, PhD[5]; Nofisat Ismaila, MD, MSc[6]; Lone E. Forner, DDS, PhD[7]; Clifton David Fuller, MD, PhD[8]; Yvonne M. Mowery, MD, PhD[11]; Barbara A. Murphy, MD[12]; Erin Watson, DMD, MHSc[13]; David H. Yang, DDS, FRCD(C)[14]; Ivan Alajbeg, DMD, MSc, PhD[15]; Paolo Bossi, MD[16,17]; Michael Fritz, MD[18]; Neal D. Futran, MD, DMD[19]; Daphna Y. Gelbium, MD[20]; Edward King, JD[21]; Salvatore Ruggiero, DMD, MD, FACS[22]; Derek K. Smith, DDS, PhD, MPH[23]; Alessandro Villa, DDS, MPH, PhD[24]; Jonn S. Wu, BMSc, MD, FRCPC[25]; and Deborah Saunders, DMD[26]

DOI: https://doi.org/10.1200/JCO.23.02150

ABSTRACT

ASCO Guidelines provide recommendations with comprehensive review and analyses of the relevant literature for each recommendation, following the guideline development process as outlined in the ASCO Guidelines Methodology Manual. ASCO Guidelines follow the ASCO Conflict of Interest Policy for Clinical Practice Guidelines.

Clinical Practice Guidelines and other guidance ("Guidance") provided by ASCO is not a comprehensive or definitive guide to treatment options. It is intended for voluntary use by providers and should be used in conjunction with independent professional judgment. Guidance may not be applicable to all patients, interventions, diseases, or stages of diseases. Guidance is based on review and analysis of relevant literature and is not intended as a statement of the standard of care. ASCO does not endorse third-party drugs, devices, services, or therapies and assumes no responsibility for any harm arising from or related to the use of this information. See complete disclaimer in Appendix 1 and Appendix 2 (online only) for more.

PURPOSE To provide evidence-based recommendations for prevention and management of osteoradionecrosis (ORN) of the jaw secondary to head and neck radiation therapy in patients with cancer.

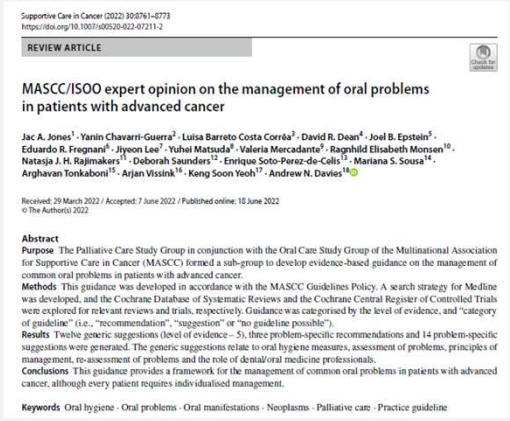
METHODS The International Society of Oral Oncology–Multinational Association for Supportive Care in Cancer (ISOO–MASCC) and ASCO convened a multidisciplinary Expert Panel to evaluate the evidence and formulate recommendations. PubMed, EMBASE, and Cochrane Library databases were searched for randomized controlled trials and observational studies, published between January 1, 2009, and December 1, 2023. The guideline also incorporated systematic reviews conducted by ISOO–MASCC, which included studies published from January 1, 1990, through December 31, 2008.

ACCOMPANYING CONTENT
Listen to the podcast by Dr Petersen at https://ascopubs.org/journal/jco/asco-guidelines-podcast
Appendix
Data Supplement

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Evidence Based Medicine Committee approval December 15, 2023
ISOO-MASCC approval November 9, 2023
J Clin Oncol 42:1975-1996
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View Online Article

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REVIEW ARTICLE

MASCC/ISOO expert opinion on the management of oral problems in patients with advanced cancer

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Abstract

Purpose The Palliative Care Study Group in conjunction with the Oral Care Study Group of the Multinational Association for Supportive Care in Cancer (MASCC) formed a sub-group to develop evidence-based guidance on the management of common oral problems in patients with advanced cancer.

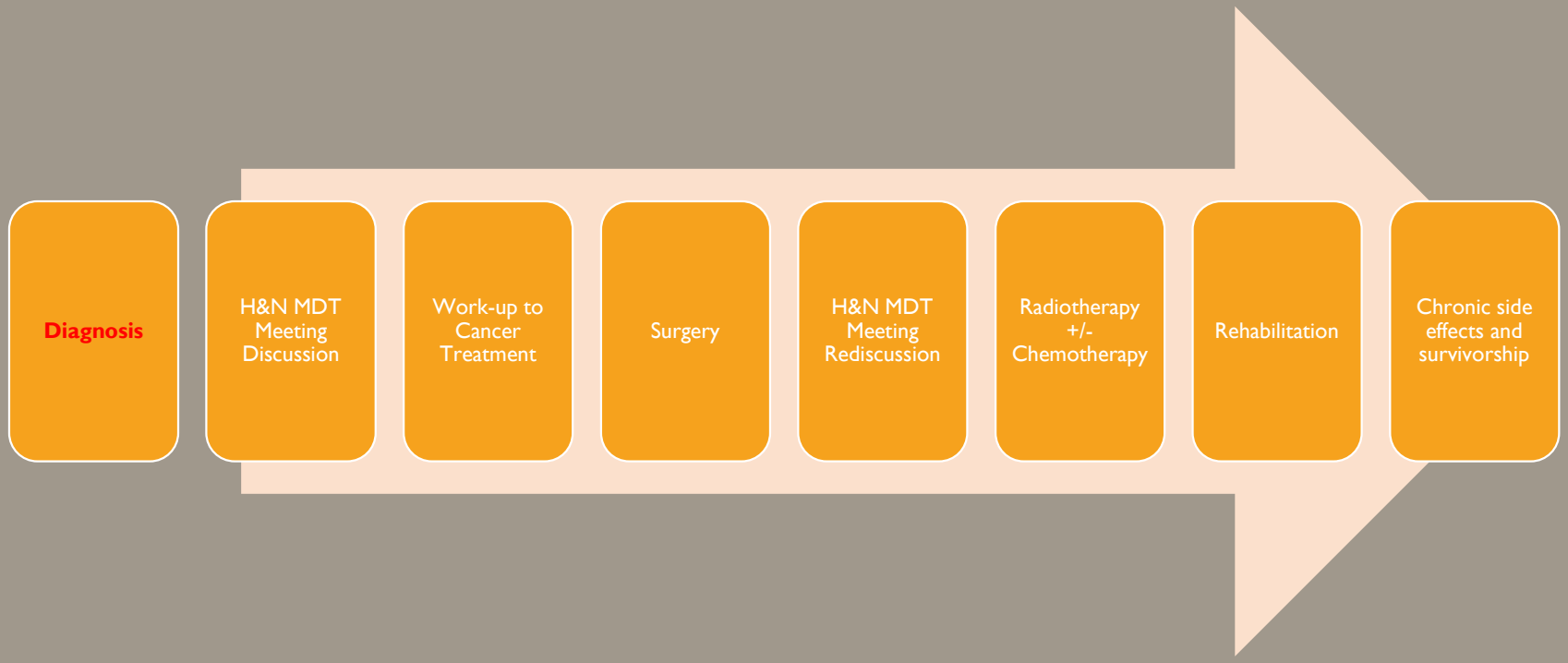
Methods This guidance was developed in accordance with the MASCC Guidelines Policy. A search strategy for Medline was developed, and the Cochrane Database of Systematic Reviews and the Cochrane Central Register of Controlled Trials were explored for relevant reviews and trials, respectively. Guidance was categorised by the level of evidence, and "category of guideline" (i.e., "recommendation", "suggestion" or "no guideline possible").

Results Twelve generic suggestions (level of evidence – 5), three problem-specific recommendations and 14 problem-specific suggestions were generated. The generic suggestions relate to oral hygiene measures, assessment of problems, principles of management, re-assessment of problems and the role of dental/oral medicine professionals.

Conclusions This guidance provides a framework for the management of common oral problems in patients with advanced cancer, although every patient requires individualised management.

Keywords Oral hygiene · Oral problems · Oral manifestations · Neoplasms · Palliative care · Practice guideline

THE HEAD AND NECK CANCER PATIENT JOURNEY

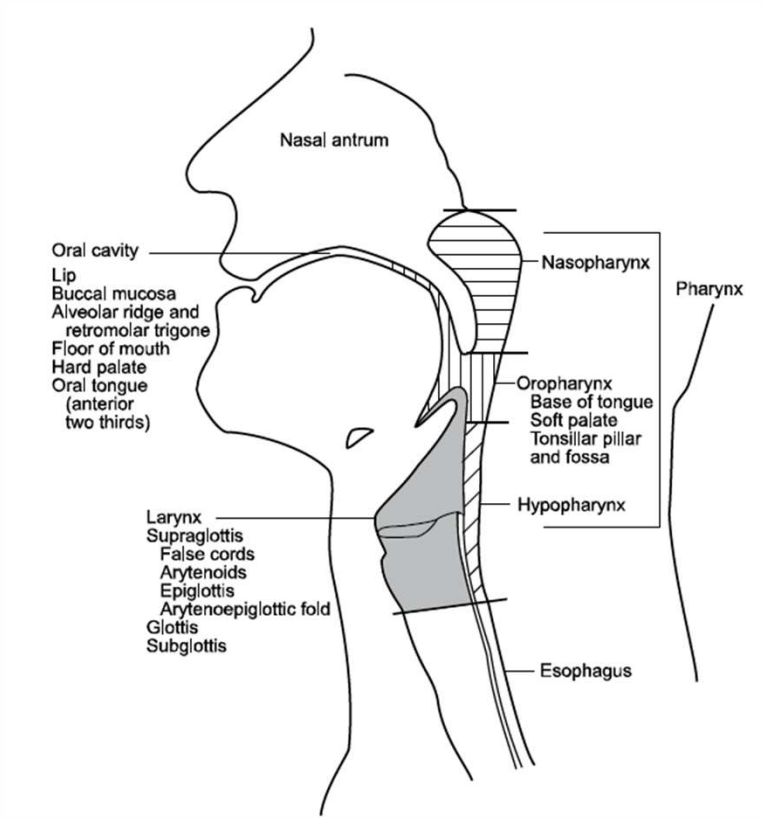


WHAT ARE THE SIGNS & SYMPTOMS THAT ARE SUSPICIOUS FOR H&N CANCER?

Duration for longer than 2-3 weeks:

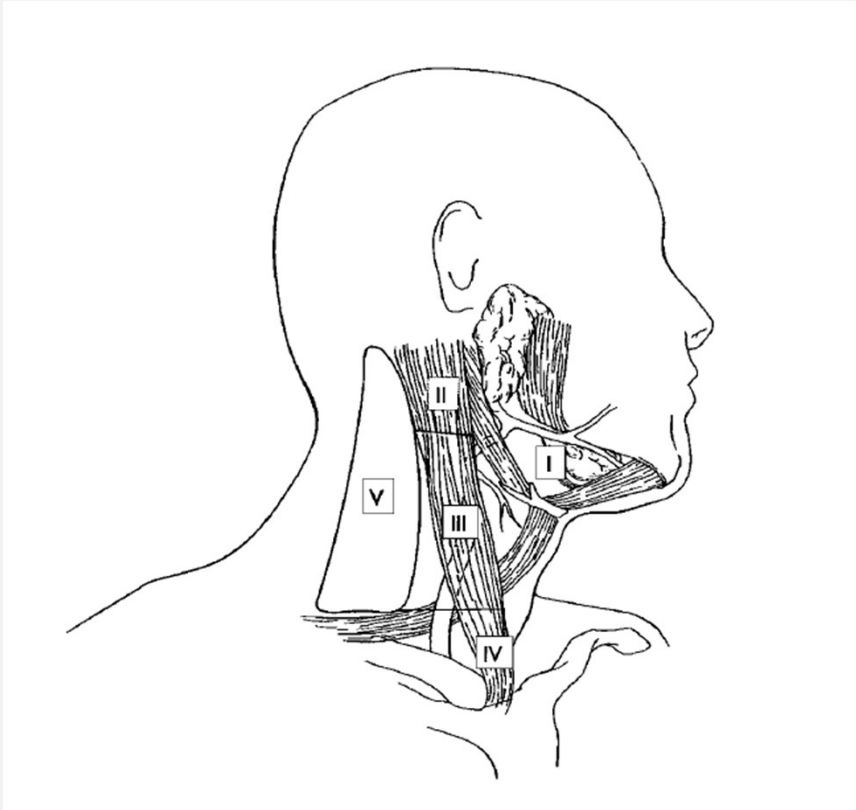
- Persistent sore throat
- Foul breath unexplained by hygiene
- Hoarseness and changes in voice
- Swelling in throat
- Persistent ear ache and constant pain
- Lump, bump or mass in the neck without pain
- White or red patch in the mouth
- Persistent nasal obstruction or congestion
- Blocked nose on one side or bloody discharge from nose
- Difficulty swallowing (dysphagia)
- Trouble breathing
- Unexplained facial palsy, weakness or severe facial pain/numbness

ANATOMIC SITES AND SUBSITES



NCCN version 2.2026 – National Comprehensive Cancer Network

LEVEL DESIGNATION FOR CERVICAL LYMPHATICS

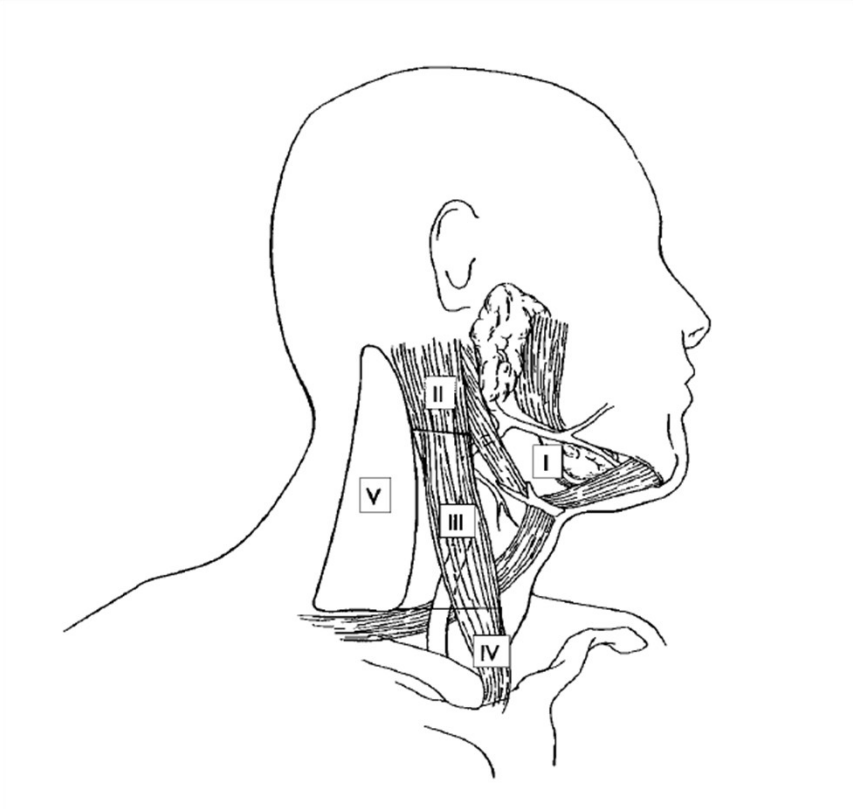


Level	Location	Anatomic borders	Common primary tumor sites to metastasize to this level
I	Submandibular	Mandible, anterior and posterior digastric bellies	Oral cavity, lower lip, nasal cavity, maxilla
	Submental	Anterior bellies of digastric muscles and hyoid bone	
II	Superior jugular chain	Skull base, the carotid bifurcation, and the anterior and posterior borders of the sternocleido-mastoid muscle	Oral cavity, oropharynx, nasal cavity, nasopharynx, larynx, hypopharynx, and parotid gland
III	Mid-jugular chain	Carotid bifurcation, the omohyoid muscle, and the anterior and posterior borders of the sternocleidomastoid muscle	Oral cavity, oropharynx, nasopharynx, larynx, and hypopharynx
IV	Lower jugular chain	Omohyoid muscle, clavicle, and the anterior and posterior borders of the sternocleido-mastoid muscle	Larynx, hypopharynx, cervical esophagus
V	Posterior triangle of the neck	Sternocleidomastoid muscle posterior border, trapezius muscle, and the clavicle	Nasopharynx and oropharynx
VI	Central compartment	Hyoid bone to the sternal notch, and between the two carotid arteries	Tumors of the thyroid gland, larynx, hypopharynx, and cervical esophagus

NCCN version 2.2026 – National Comprehensive Cancer Network

- use 1 to 2 kg of pressure when palpating

LEVEL DESIGNATION FOR CERVICAL LYMPHATICS



- Fixation
- Enlargement
- Unilateral
- Tenderness

NCCN version 2.2026 – National Comprehensive Cancer Network

TNM STAGING

Union for International Cancer Control (UICC)
American Joint Committee on Cancer (AJCC)

Primary tumour size (T)	
Tx	No available information
T0	No evidence of primary tumour
T1	<2cm
T2	2-4cm
T3	>4cm
T4	Invades adjacent structures

Regional lymph node involvement (N)	
Nx	Nodes cannot be / were not assessed
N0	No regional nodes involved
N1	Ipsilateral single node <3cm diameter
N2a	Ipsilateral single node 3-6cm
N2b	Ipsilateral multiple nodes <6cm
N2c	Bilateral or contralateral nodes <6cm
N3	Any node >6cm

Involvement by distant metastases (M)	
Mx	Distant metastasis not assessed
M0	No evidence of distant metastasis
M1	Distant metastasis is present

TNM STAGING

Classification

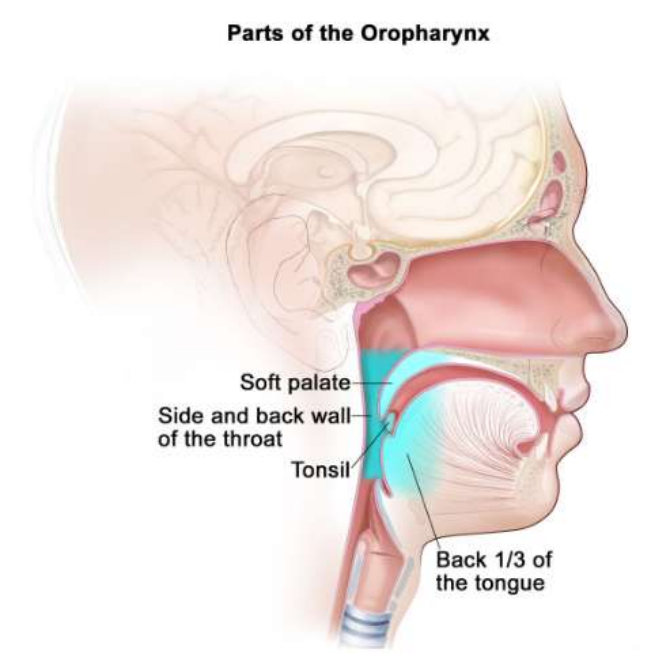
- **Clinical** = cTNM
- **Pathological** = pTNM

Staging

- **Stage 0** – carcinoma in situ
- **Stage I and II** – tumours localised to organ of origin
- **Stage III** – locally extensive spread, particularly to regional lymph nodes
- **Stage IV** – distant metastasis

HPV +VE OROPHARYNGEAL CANCER

- Rising incidence of oropharyngeal cancer due to increasing prevalence of Human papillomavirus (HPV)-induced cancers
  - Incidence of HPV-associated tonsil and BOT cancers increasing 5% increase per year since 1990.
- Younger, healthier individuals with little or no tobacco exposure
- Viral aetiological factor: types 16 and 18
  - Type 16 most prevalent subtype in 95% of cases
- Preventable with vaccines
  - Gardasil 9: HPV types 6, 11, 16, 18, 31, 33, 45, 52, 58
- Highly responsive to treatment and has excellent prognosis
- Immunohistochemistry: **P16 biomarker** significantly correlated with HPV status



EVALUATION

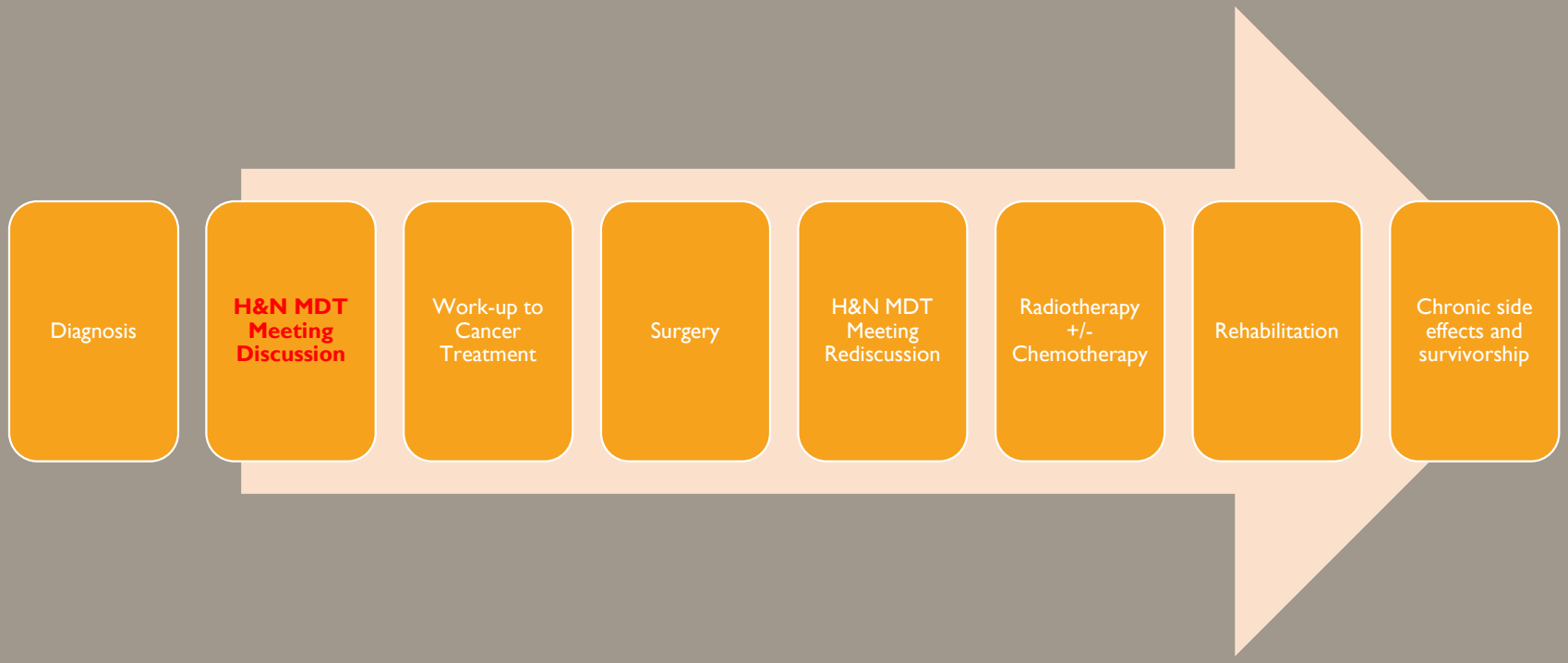
Head and neck examination
Fiber-optic nasopharyngolaryngoscopy
EUA to assess tumour extent and obtain biopsy

Imaging:

- CT scan
- MRI
- PET/CT (if no obvious primary on imaging)
- FNA biopsy of metastatic or equivocal nodes (US or CT guided needle biopsy)
- OPG (mandibultomy, mandibulectomy, radiotherapy)

Advantages of CT	Advantages of MRI
Superior assessment of bone erosion / destruction or periosteal invasion	Better soft tissue delineation
Ease of availability	Better perineural invasion delineation
Less time-consuming	No radiation exposure
Less costly	No contrast iodine required
	Dental artifacts do not affect image quality

THE HEAD AND NECK CANCER PATIENT JOURNEY



COMPREHENSIVE CANCER CARE

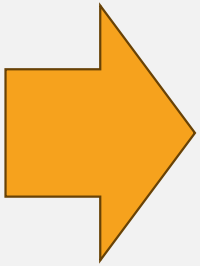
Cancer treatment	Smoking and alcohol cessation
General medical care	Audiology
Pain and symptom management	Tracheostomy care
Nutritional support (enteral feeding, oral nutrition)	Wound management
Dental care	Depression and anxiety management
Speech and swallowing therapy	Social work and case management
	Supportive care (palliative care)
	Physical therapy (lymphoedema)

H&N Multidisciplinary Team Members	
Otolaryngologist (Ear Nose Throat) surgeon	Speech-language therapist
Plastic and reconstructive surgeon	Dietitian
Oral and maxillofacial surgeon	Social worker
Radiation Oncologist	
Medical Oncologist	**Adjunctive services:**
Dental: Special Needs Dentistry, Oral Medicine,	Pain specialist
Maxillofacial prosthodontist	Palliative care specialist
Radiologist	Neurosurgeon
Pathologist	Ophthalmologist
Anaesthetist	Psychologist/Psychiatrist
High risk assessment physician	Occupational therapist
Head and neck cancer coordinator	Addiction services
Clinical nurse specialist	Audiologist

FACTORS INFLUENCING RECOMMENDED TREATMENT

Table 1–11. Factors Influencing Recommended Treatment for an Individual Patient With Head and Neck Cancer

Tumor Factors	Patient Factors	Physician Factors
Site	Medical condition and comorbidities	Expertise
Size	The impact of treatment on the quality of life of the patient	Availability of a comprehensive team: nursing, dental, speech therapy, dietitian, rehabilitation, and social support services
Depth of invasion	Performance status	Personal preferences of members of the team
Degree of spread	Treatment cost	Preferences of the institution
Location and proximity to critical structures	Patient compliance	
Previous treatment	Previous treatment	
Need for reconstructive surgery	Patient preference	



Curative Intent

Palliative Intent

O'Sullivan B, Brierley J, D'Cruz A, et al. UICC Manual of Clinical Oncology. Chicester: John Wiley & Sons, Incorporated, 2015

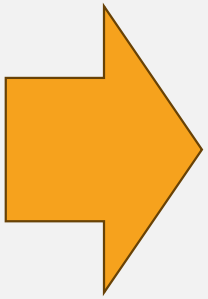
STANDARD CARE TREATMENTS

Neo-Adjuvant = shrink tumour first

Surgery

Radiotherapy

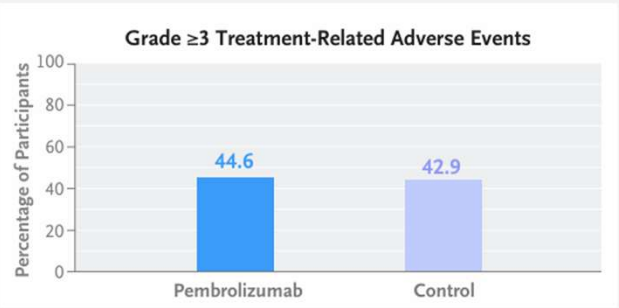
Chemotherapy



- **Surgery, unimodality**
- **Neo-adjuvant radiotherapy**
- **Primary radiotherapy, unimodality**
- **Surgery + Adjuvant radiotherapy +/- chemotherapy**
- **Primary chemoradiotherapy**
- **Palliative radiotherapy / systemic therapy**

NEOADJUVANT IMMUNOTHERAPY

- Standard of care in Australia in past 4 months
- Locally advanced HNSCC (stage III and IV)
- Enhances anti-tumour immunity
  - Primes T-cells to target cancer cells via PDL-1 pathway
- 3 weekly injections
  - 2 cycles pre-op (surgery after 1 week)
  - 15 cycles post-treatment (surgery + RT +/- CT)
- 12% increase in disease-free survival at 36 months
- Similar incidence of adverse events to control group



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Neoadjuvant and Adjuvant Pembrolizumab in Locally Advanced Head and Neck Cancer

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ABSTRACT

BACKGROUND

The benefit of the addition of perioperative pembrolizumab to standard care with surgery and adjuvant therapy for patients with locally advanced head and neck squamous-cell carcinoma (HNSCC) is unclear.

METHODS

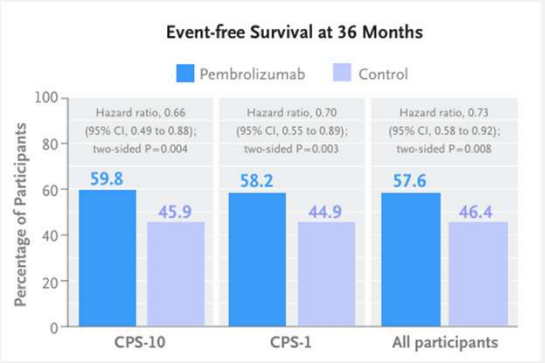
In this phase 3, open-label trial, we randomly assigned participants with locally advanced HNSCC in a 1:1 ratio to receive 2 cycles of neoadjuvant pembrolizumab and 15 cycles of adjuvant pembrolizumab (both at a dose of 200 mg every 3 weeks) in addition to standard care (pembrolizumab group) or standard care alone (control group). Standard care was surgery and adjuvant radiotherapy with or without concomitant cisplatin. The primary end point was event-free survival, sequentially assessed in participants whose tumors expressed programmed death ligand 1 (PD-L1) with a combined positive score (CPS) of 10 or more (CPS-10 population), participants whose tumors expressed PD-L1 with a CPS of 1 or more (CPS-1 population), and all the participants. A higher CPS indicates a higher proportion of cells that express PD-L1.

The authors' full names, academic degrees, and affiliations are listed at the end of the article. Dr. Uppaluri can be contacted at ravindra_uppaluri@dfci.harvard.edu or at Brigham and Women's Hospital, 75 Francis St., Boston, MA 02115.

*A complete list of the principal investigators in the KEYNOTE-689 trial is provided in the Supplementary Appendix, available at NEJM.org.

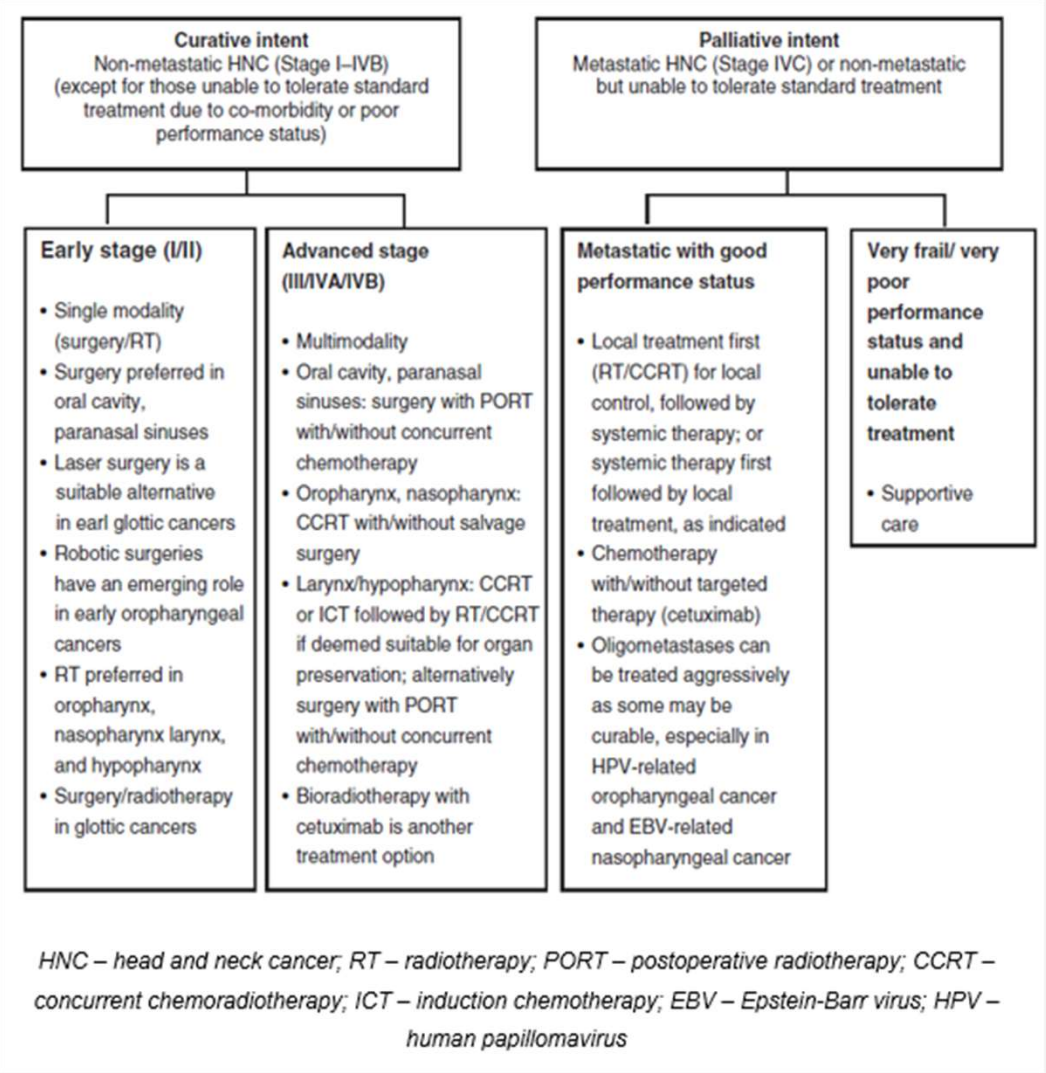
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MANAGEMENT OF H&N CANCER

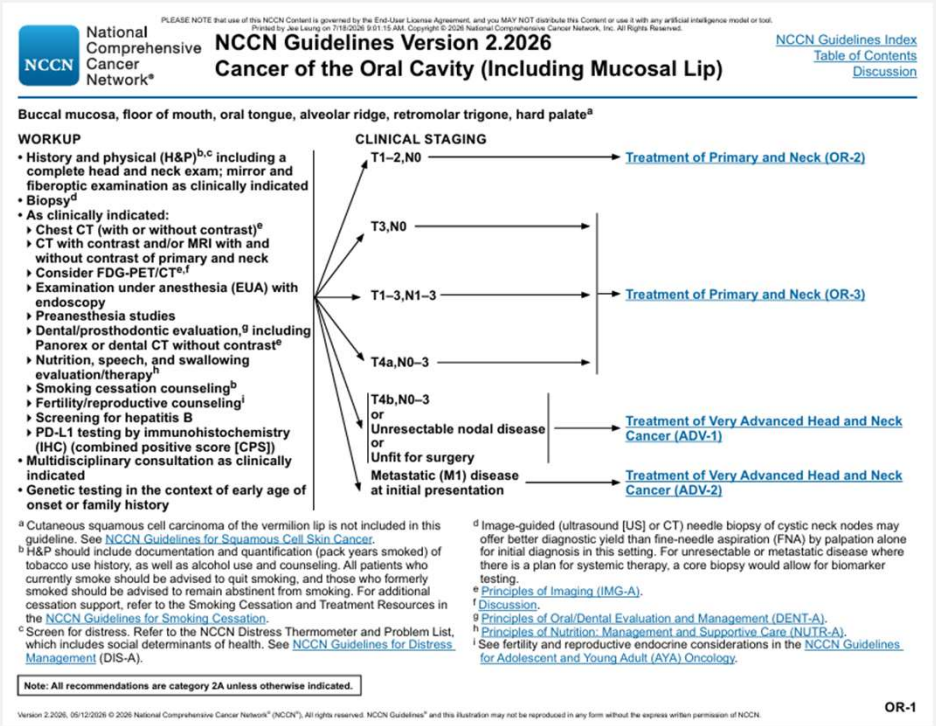
UICC 2015



HNC – head and neck cancer; RT – radiotherapy; PORT – postoperative radiotherapy; CCRT – concurrent chemoradiotherapy; ICT – induction chemotherapy; EBV – Epstein-Barr virus; HPV – human papillomavirus

DON'T HAVE TO KNOW

ORAL CAVITY MANAGEMENT



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National Comprehensive Cancer Network®

NCCN Guidelines Version 2.2026
Cancer of the Oral Cavity (Including Mucosal Lip)

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Discussion

Buccal mucosa, floor of mouth, oral tongue, alveolar ridge, retromolar trigone, hard palate[a]

WORKUP

- **History and physical (H&P)[b,c] including a complete head and neck exam; mirror and fiberoptic examination as clinically indicated**
- **Biopsy[d]**
- **As clinically indicated:**
  - **Chest CT (with or without contrast)[e]**
  - **CT with contrast and/or MRI with and without contrast of primary and neck**
  - **Consider FDG-PET/CT[e,f]**
  - **Examination under anesthesia (EUA) with endoscopy**
  - **Preanesthesia studies**
  - **Dental/prosthodontic evaluation,[g] including Panorex or dental CT without contrast[e]**
  - **Nutrition, speech, and swallowing evaluation/therapy[h]**
  - **Smoking cessation counseling[b]**
  - **Fertility/reproductive counseling[i]**
  - **Screening for hepatitis B**
  - **PD-L1 testing by immunohistochemistry (IHC) (combined positive score [CPS])**
- **Multidisciplinary consultation as clinically indicated**
- **Genetic testing in the context of early age of onset or family history**

CLINICAL STAGING

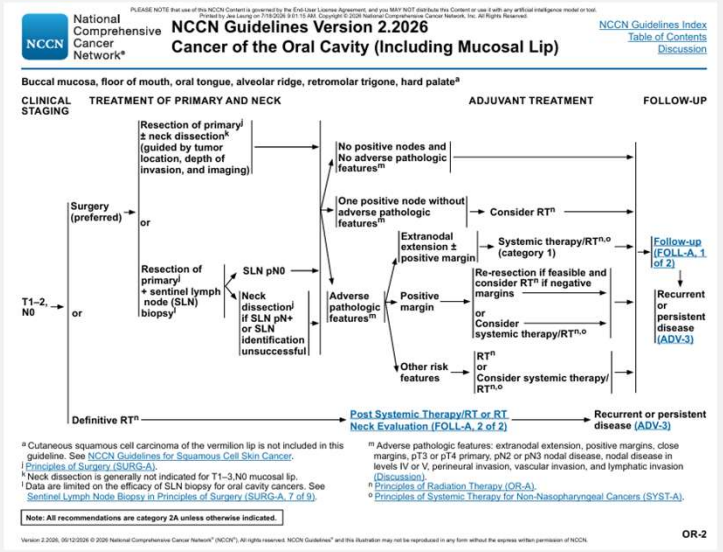
- **T1–2,N0** → Treatment of Primary and Neck (OR-2)
- **T3,N0**, **T1–3,N1–3**, **T4a,N0–3** → Treatment of Primary and Neck (OR-3)
- **T4b,N0–3 or Unresectable nodal disease or Unfit for surgery** → Treatment of Very Advanced Head and Neck Cancer (ADV-1)
- **Metastatic (M1) disease at initial presentation** → Treatment of Very Advanced Head and Neck Cancer (ADV-2)

[a] Cutaneous squamous cell carcinoma of the vermilion lip is not included in this guideline. See NCCN Guidelines for Squamous Cell Skin Cancer.
[b] H&P should include documentation and quantification (pack years smoked) of tobacco use history, as well as alcohol use and counseling. All patients who currently smoke should be advised to quit smoking, and those who formerly smoked should be advised to remain abstinent from smoking. For additional cessation support, refer to the Smoking Cessation and Treatment Resources in the NCCN Guidelines for Smoking Cessation.
[c] Screen for distress. Refer to the NCCN Distress Thermometer and Problem List, which includes social determinants of health. See NCCN Guidelines for Distress Management (DIS-A).
[d] Image-guided (ultrasound [US] or CT) needle biopsy of cystic neck nodes may offer better diagnostic yield than fine-needle aspiration (FNA) by palpation alone for initial diagnosis in this setting. For unresectable or metastatic disease where there is a plan for systemic therapy, a core biopsy would allow for biomarker testing.
[e] Principles of Imaging (IMG-A).
[f] Discussion.
[g] Principles of Oral/Dental Evaluation and Management (DENT-A).
[h] Principles of Nutrition: Management and Supportive Care (NUTR-A).
[i] See fertility and reproductive endocrine considerations in the NCCN Guidelines for Adolescent and Young Adult (AYA) Oncology.

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OR-1



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Buccal mucosa, floor of mouth, oral tongue, alveolar ridge, retromolar trigone, hard palate[a]

CLINICAL STAGING | **TREATMENT OF PRIMARY AND NECK** | **ADJUVANT TREATMENT** | **FOLLOW-UP**

- **T1–2, N0** → **Surgery (preferred)**
  - Resection of primary[j] ± neck dissection[k] (guided by tumor location, depth of invasion, and imaging)
    - No positive nodes and No adverse pathologic features[m] → Follow-up (FOLL-A, 1 of 2)
    - One positive node without adverse pathologic features[m] → Consider RT[n] → Follow-up (FOLL-A, 1 of 2)
    - Adverse pathologic features[m]
      - Extranodal extension ± positive margin → Systemic therapy/RT[n,o] (category 1) → Follow-up (FOLL-A, 1 of 2)
      - Positive margin → Re-resection if feasible and consider RT[n] if negative margins, or Consider systemic therapy/RT[n,o] → Follow-up (FOLL-A, 1 of 2)
      - Other risk features → RT[n] or Consider systemic therapy/RT[n,o] → Follow-up (FOLL-A, 1 of 2)
  - or Resection of primary[j] + sentinel lymph node (SLN) biopsy[l]
    - SLN pN0 → Follow-up (FOLL-A, 1 of 2)
    - Neck dissection[j] if SLN pN+ or SLN identification unsuccessful → Adverse pathologic features[m] (see above)
- **or** Definitive RT[n] → Post Systemic Therapy/RT or RT Neck Evaluation (FOLL-A, 2 of 2) → Recurrent or persistent disease (ADV-3)

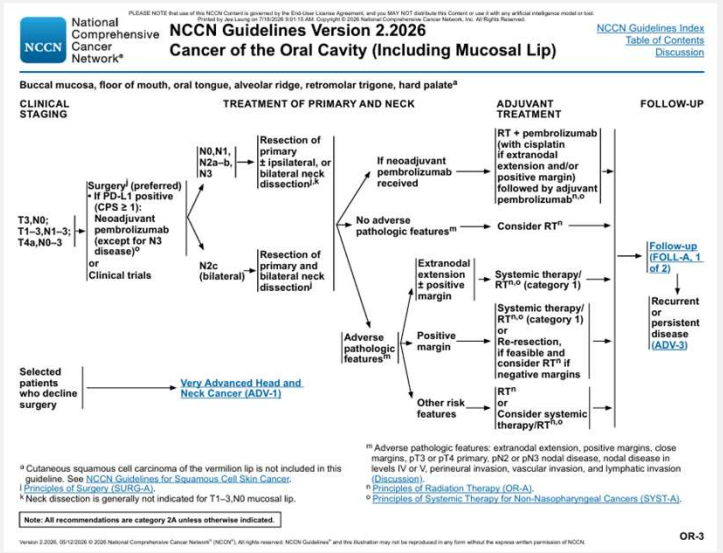
Recurrent or persistent disease (ADV-3)

[a] Cutaneous squamous cell carcinoma of the vermilion lip is not included in this guideline. See NCCN Guidelines for Squamous Cell Skin Cancer.
[j] Principles of Surgery (SURG-A).
[k] Neck dissection is generally not indicated for T1–3,N0 mucosal lip.
[l] Data are limited on the efficacy of SLN biopsy for oral cavity cancers. See Sentinel Lymph Node Biopsy in Principles of Surgery (SURG-A, 7 of 9).
[m] Adverse pathologic features: extranodal extension, positive margins, close margins, pT3 or pT4 primary, pN2 or pN3 nodal disease, nodal disease in levels IV or V, perineural invasion, vascular invasion, and lymphatic invasion (Discussion).
[n] Principles of Radiation Therapy (OR-A).
[o] Principles of Systemic Therapy for Non-Nasopharyngeal Cancers (SYST-A).

Note: All recommendations are category 2A unless otherwise indicated.

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OR-2



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NCCN Guidelines Version 2.2026
Cancer of the Oral Cavity (Including Mucosal Lip)

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Buccal mucosa, floor of mouth, oral tongue, alveolar ridge, retromolar trigone, hard palate[a]

CLINICAL STAGING | **TREATMENT OF PRIMARY AND NECK** | **ADJUVANT TREATMENT** | **FOLLOW-UP**

- **T3,N0; T1–3,N1–3; T4a,N0–3** → **Surgery[j] (preferred)** • If PD-L1 positive (CPS ≥ 1): Neoadjuvant pembrolizumab (except for N3 disease)[o] or Clinical trials
  - N0,N1, N2a–b, N3 → Resection of primary ± ipsilateral, or bilateral neck dissection[j,k]
    - If neoadjuvant pembrolizumab received → RT + pembrolizumab (with cisplatin if extranodal extension and/or positive margin) followed by adjuvant pembrolizumab[n,o] → Follow-up (FOLL-A, 1 of 2)
    - No adverse pathologic features[m] → Consider RT[n] → Follow-up (FOLL-A, 1 of 2)
    - Adverse pathologic features[m]
      - Extranodal extension ± positive margin → Systemic therapy/RT[n,o] (category 1) → Follow-up (FOLL-A, 1 of 2)
      - Positive margin → Systemic therapy/RT[n,o] (category 1) or Re-resection, if feasible and consider RT[n] if negative margins → Follow-up (FOLL-A, 1 of 2)
      - Other risk features → RT[n] or Consider systemic therapy/RT[n,o] → Follow-up (FOLL-A, 1 of 2)
  - N2c (bilateral) → Resection of primary and bilateral neck dissection[j] → Adverse pathologic features[m] (see above)
- **Selected patients who decline surgery** → Very Advanced Head and Neck Cancer (ADV-1)

Recurrent or persistent disease (ADV-3)

[a] Cutaneous squamous cell carcinoma of the vermilion lip is not included in this guideline. See NCCN Guidelines for Squamous Cell Skin Cancer.
[j] Principles of Surgery (SURG-A).
[k] Neck dissection is generally not indicated for T1–3,N0 mucosal lip.
[m] Adverse pathologic features: extranodal extension, positive margins, close margins, pT3 or pT4 primary, pN2 or pN3 nodal disease, nodal disease in levels IV or V, perineural invasion, vascular invasion, and lymphatic invasion (Discussion).
[n] Principles of Radiation Therapy (OR-A).
[o] Principles of Systemic Therapy for Non-Nasopharyngeal Cancers (SYST-A).

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OR-3

OROPHARYNGEAL MANAGEMENT

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NCCN Guidelines Version 2.2026
Cancer of the Oropharynx

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Base of Tongue/Tonsil/Posterior Pharyngeal Wall/Soft Palate

WORKUP

- Tumor human papillomavirus (HPV) testing by p16 IHC required[a]
- H&P[b,c] including a complete head and neck exam; mirror and fiberoptic examination as clinically indicated
- Biopsy of primary site or fine-needle aspiration (FNA) of the neck[d]
- CT with contrast and/or MRI with and without contrast of primary and neck[e]
- As clinically indicated:
  - EUA with endoscopy[f]
  - Preanesthesia studies
  - FDG-PET/CT[e]
  - Chest CT[e] (with or without contrast)
  - Dental evaluation[g] including Panorex
  - Nutrition, speech, and swallowing evaluation/therapy, and audiogram[h]
  - Smoking cessation counseling[b]
  - Fertility/reproductive counseling[i]
  - Screening for hepatitis B
  - PD-L1 testing by IHC (CPS)
- Multidisciplinary consultation as clinically indicated

	CLINICAL STAGING[j]	TREATMENT
p16-negative	T1–2,N0–1	ORPH-2
	T3–4a,N0–1	ORPH-3
	T1–4a,N2–3	ORPH-4
	T4b,N0–3	Treatment of Very Advanced Head and Neck Cancer (ADV-1)
	Unresectable or unfit for surgery or Metastatic (M1) disease initial presentation	Treatment of Very Advanced Head and Neck Cancer (ADV-2)
p16 (HPV)-positive	T1–2,N0	ORPHPV-1
	T0–2,N1 (single node ≤3 cm)	ORPHPV-2
	T0–2,N1 (single node >3 cm, or 2 or more ipsilateral nodes ≤6 cm), or T1–2,N2 or T3,N0–2	ORPHPV-3
	T0–3,N3 or T4,N0–3	ORPHPV-4

[a] Principles of p16 Testing for HPV-Mediated Oropharyngeal Cancer (ORPH-B).
[b] H&P should include documentation and quantification (pack years smoked) of tobacco use history, as well as alcohol use and counseling. All patients who currently smoke should be advised to quit smoking, and those who formerly smoked should be advised to remain abstinent from smoking. For additional cessation support, refer to the Smoking Cessation and Treatment Resources in the NCCN Guidelines for Smoking Cessation.
[c] Screen for distress. Refer to the NCCN Distress Thermometer and Problem List, which includes social determinants of health. See NCCN Guidelines for Distress Management (DIS-A).
[d] Image-guided (US or CT) needle biopsy of cystic neck nodes may offer better diagnostic yield than FNA by palpation alone for initial diagnosis in this setting. For unresectable or metastatic disease where there is a plan for systemic therapy, a core biopsy would allow for biomarker testing.
[e] Principles of Imaging (IMG-A).
[f] Prior to treatment, EUA with biopsy confirmation of the oropharyngeal primary site is recommended for patients presenting with a p16+ cervical lymph node. See Principles of Surgical Management (SURG-A).
[g] Principles of Oral/Dental Evaluation and Management (DENT-A).
[h] Principles of Nutrition: Management and Supportive Care (NUTR-A).
[i] See fertility and reproductive endocrine considerations in the NCCN Guidelines for Adolescent and Young Adult (AYA) Oncology.
[j] The clinical staging definitions are based on the AJCC 8th edition for oropharynx cancer (see ST-4 for p16-, and see ST-7 for p16+). Definitions for nodal staging criteria previously used in clinical trials (AJCC 7th edition) on the management of oropharynx cancer are included.

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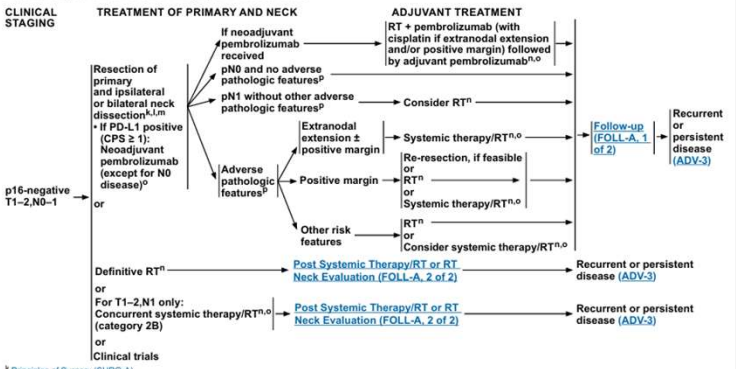
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NCCN Guidelines Version 2.2026
Cancer of the Oropharynx (p16-negative)

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Base of Tongue/Tonsil/Posterior Pharyngeal Wall/Soft Palate



[k] Principles of Surgery (SURG-A).
[l] Tumors in the base of tongue, posterior pharyngeal wall, and soft palate require consideration of bilateral neck treatment as do tumors of the tonsil invading the tongue base.
[m] For pN0–N1 and no poor pathologic risk features, single-modality treatment should be considered whenever possible. For T1–T2 primary tumors near midline and resected to adequate margins and with no adverse pathologic features, a staged contralateral neck dissection can be performed in order to avoid RT. Lateral tumors pN0–N1 resected with favorable pathologic features can be observed.
[n] Principles of Radiation Therapy (ORPH-A).
[o] Principles of Systemic Therapy for Non-Nasopharyngeal Cancers (SYST-A).
[p] Adverse pathologic features: extranodal extension, positive margins, close margins, pT3 or pT4 primary, pN2 or pN3 nodal disease, nodal disease in levels IV or V, perineural invasion, vascular invasion, and lymphatic invasion (Discussion).

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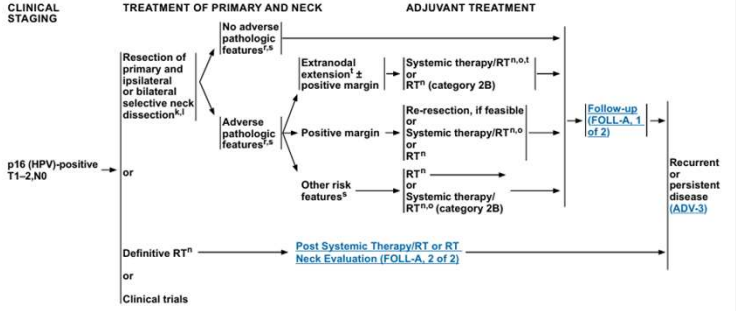
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NCCN Guidelines Version 2.2026
Cancer of the Oropharynx (p16 [HPV]-positive)

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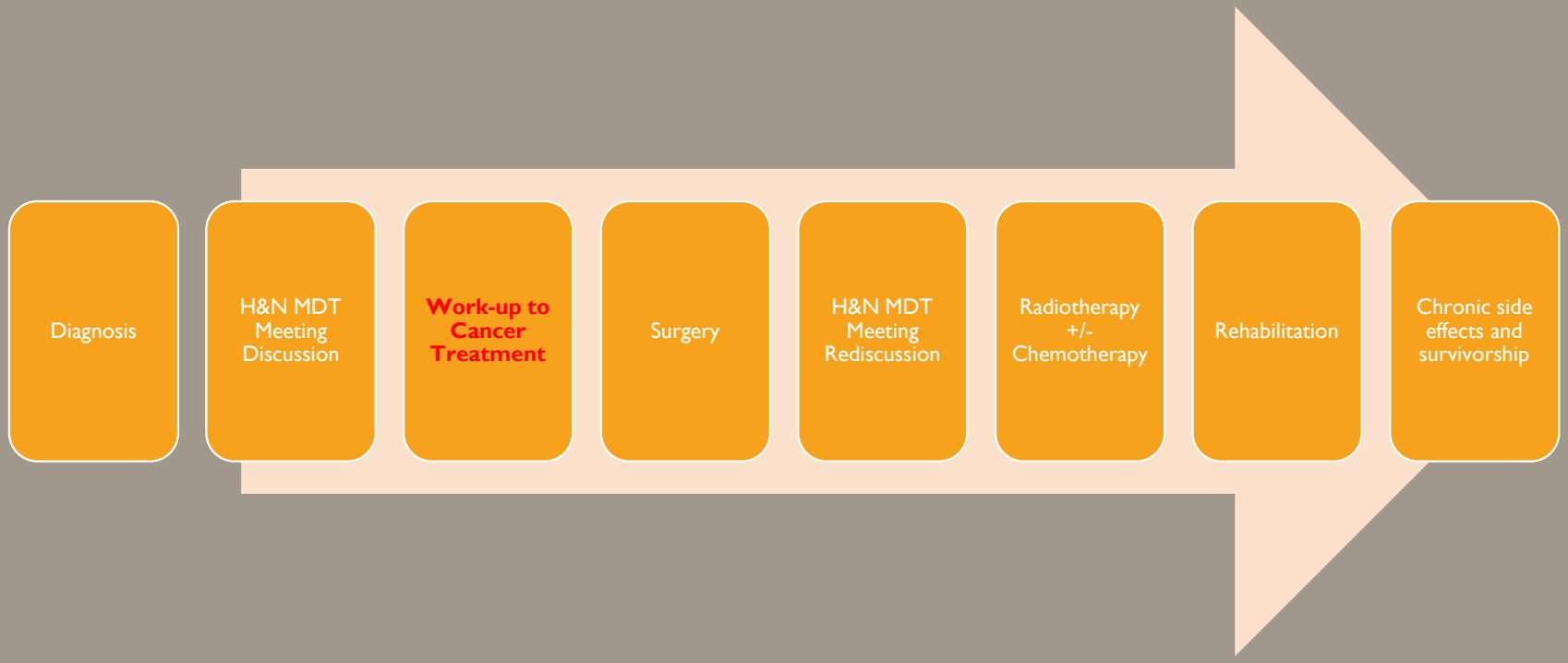


[k] Principles of Surgery (SURG-A).
[l] Tumors in the base of tongue, posterior pharyngeal wall, and soft palate require consideration of bilateral neck treatment as do tumors of the tonsil invading the tongue base.
[n] Principles of Radiation Therapy (ORPH-A).
[o] Principles of Systemic Therapy for Non-Nasopharyngeal Cancers (SYST-A).
[r] Pathologic staging criteria differ from clinical staging criteria in HPV-mediated oropharyngeal cancer. For pathologic stage following resection, see AJCC 8th edition for appropriate staging criteria (ST-7).
[s] Adverse pathologic features: extranodal extension, positive margins, close margins (<3 mm), pT3 or pT4 primary, one positive node >3 cm or multiple positive nodes, nodal disease in levels IV or V, perineural invasion, vascular invasion, and lymphatic invasion (Discussion). The definition of an adverse pathologic feature in the context of HPV+ disease is an area of active research. This includes the presence and extent of extranodal extension, and the number of involved nodes.
[t] The recommendations for patients at high risk with extranodal extension + positive margins are based on randomized studies involving patients for whom the HPV status of their tumors was not specified.

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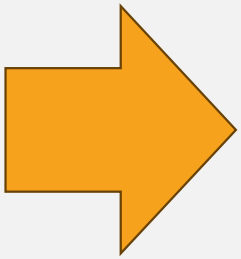
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THE HEAD AND NECK CANCER PATIENT JOURNEY



MANY APPOINTMENTS!

- Anaesthetic assessment
- Dental assessment
- Nutrition assessment
- Speech and swallow evaluation
- Radiation oncology and medical oncology consults
- Audiogram
- Smoking cessation counselling
- Psychological counselling
- Any further investigations (e.g. incidental findings on imaging)



Cancer Nurse Coordinator

Cancer Network WA

Other support services

Cancer Council
13 11 20 for information and support
(Monday to Friday, general office hours)

Cancer Nurse Coordination Service
(08) 6457 0855
(Monday to Friday, 8.30am–4.30pm)

Crisis Care
(08) 9223 1111
1800 199 008 (freecall STD)

Lifeline
13 11 14

Mental Health Emergency Response Line

Perth Metro	1300 555 788
Peel Region	1800 676 822
RuralLink WA	1800 552 002

The service is administered by the Cancer Network WA.

We are proud to be a smoke-free site.
Thank you for not smoking or vaping.

Ask a staff member about free nicotine therapy to help your cravings during your hospital stay.

Cancer Network WA

Queen Elizabeth II Medical Centre.
Locked Bag 2012. Nedlands WA 6009
(08) 6457 0855
cnwa@health.wa.gov.au

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CNWA4578_0523

Government of Western Australia
North Metropolitan Health Service
WA Psycho-Oncology Service



WA Psycho-Oncology Service

Clinical psychology care for adults affected by cancer

ORAL SIDE-EFFECTS OF H&N CANCER RADIOTHERAPY

SHORT TERM

- Oral mucositis
- Altered taste

LONG TERM

- Altered saliva quality and quantity
- Oral thrush
- Dysphagia
- Trismus
- Periodontal susceptibility
- Radiation Caries
- *Osteoradionecrosis









ROLE OF DENTAL PRACTITIONER PRE-RADIOTHERAPY

- Identify existing oral disease & potential risk of oral disease
- Remove dental infections and teeth with poor long term prognosis prior to commencing cancer therapy
- Avoid unscheduled interruption to primary treatment due to dental issues
- Prepare the patient for expected side effects of cancer therapy
- Develop a plan for preventive care and follow up to meet the increasing challenges during cancer therapy
- Establish multidisciplinary collaboration within the cancer team

MULTIDISCIPLINARY WORK UP

- **Surgical teams** = altered anatomy affecting function and rehabilitation, teeth removed as part of resection, extractions due to impingement on healing flap, extractions to monitor cancer margins, extractions during time of cancer surgery
- **Radiation Oncology** = urgency to commence radiotherapy, anticipated radiation fields, risks vs benefits of extractions
- **Medical Oncology** = neo-adjuvant therapy affecting timings, patient factors
- **Speech therapy and dietetics** = dysphagia, tube feeding, nutritional supplementation

FSH H&N Cancer MDT - Provisional Radiotherapy Fields

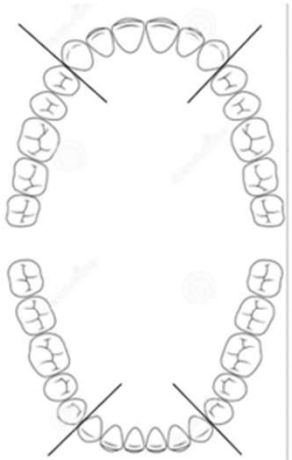
Anticipated RT dose/#:

_____

Ant max
- ☐ high >60Gy
- ☐ mod <45-60Gy
- ☐ low <45Gy

R post max
- ☐ high >60Gy
- ☐ mod 45-60Gy
- ☐ low <45Gy

L post max
- ☐ high >60Gy
- ☐ mod 45-60Gy
- ☐ low <45Gy



R post mand
- ☐ high >60Gy
- ☐ mod 45-60Gy
- ☐ low <45Gy

L post mand
- ☐ high >60Gy
- ☐ mod 45-60Gy
- ☐ low <45Gy

Ant mand
- ☐ high >60Gy
- ☐ mod 45-60Gy
- ☐ low <45Gy

H&N MDT Date: _____

Patient Name: _____

UR Number: _____

Cancer site / TNM: _____

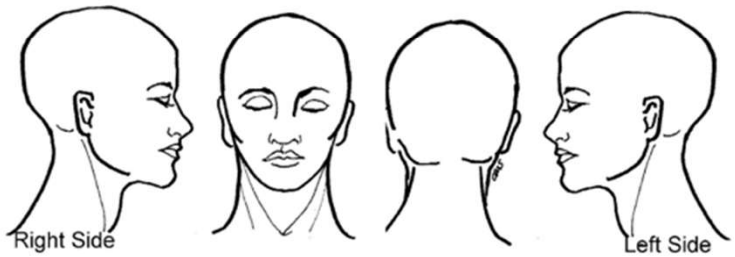
New Path Review Known recurrence

Proposed treatment: _____

Rad Onc Consultant: _____

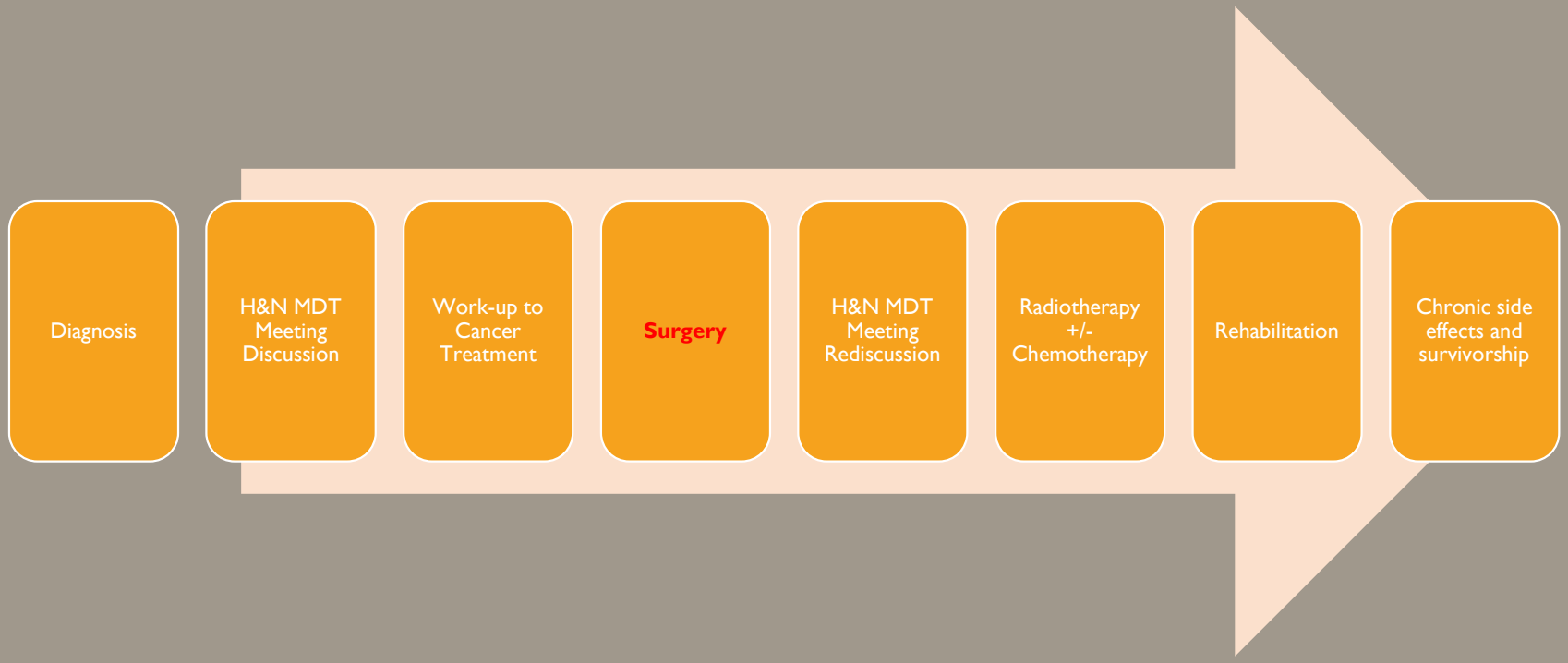
Comments: _____

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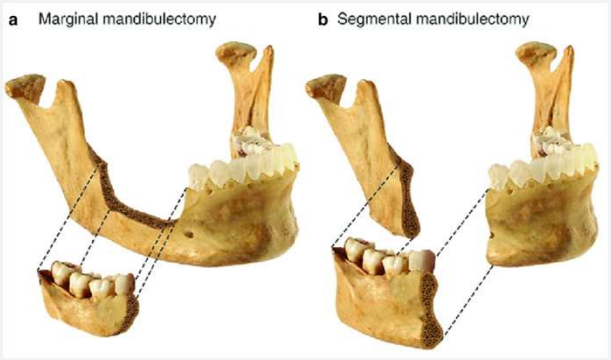
Government of Western Australia
South Metropolitan Health Service
Fiona Stanley Fremantle Hospitals Group

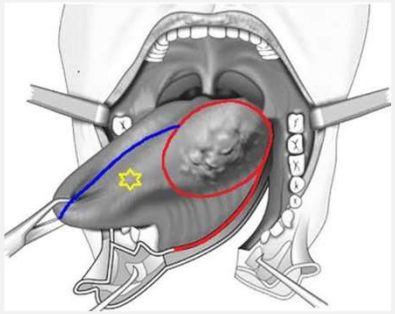
THE HEAD AND NECK CANCER PATIENT JOURNEY



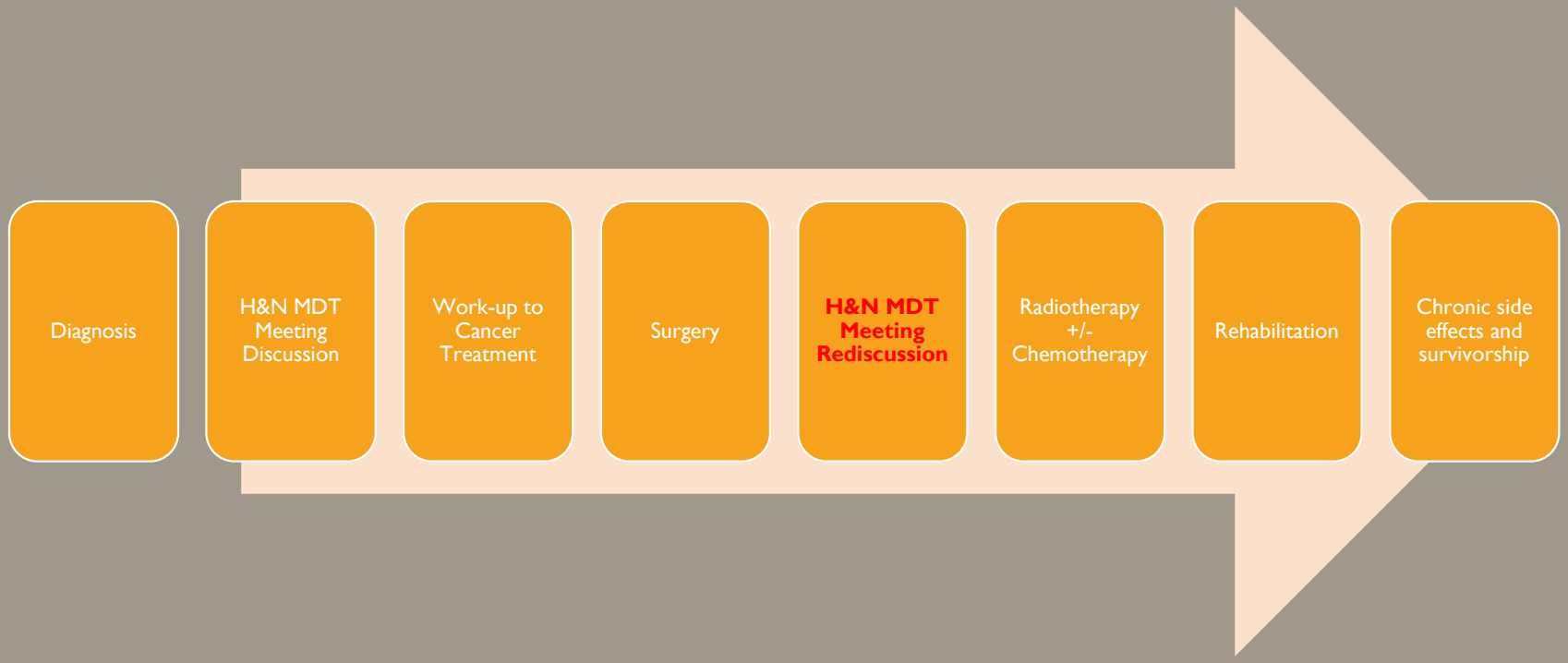
ANATOMICAL CHANGES OF RELEVANCE TO DENTISTRY





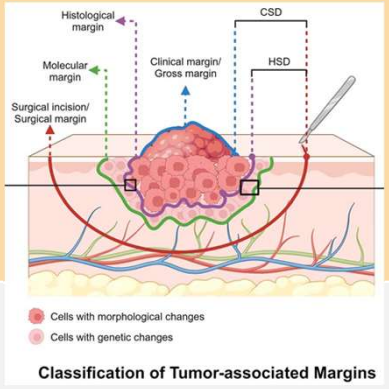


THE HEAD AND NECK CANCER PATIENT JOURNEY



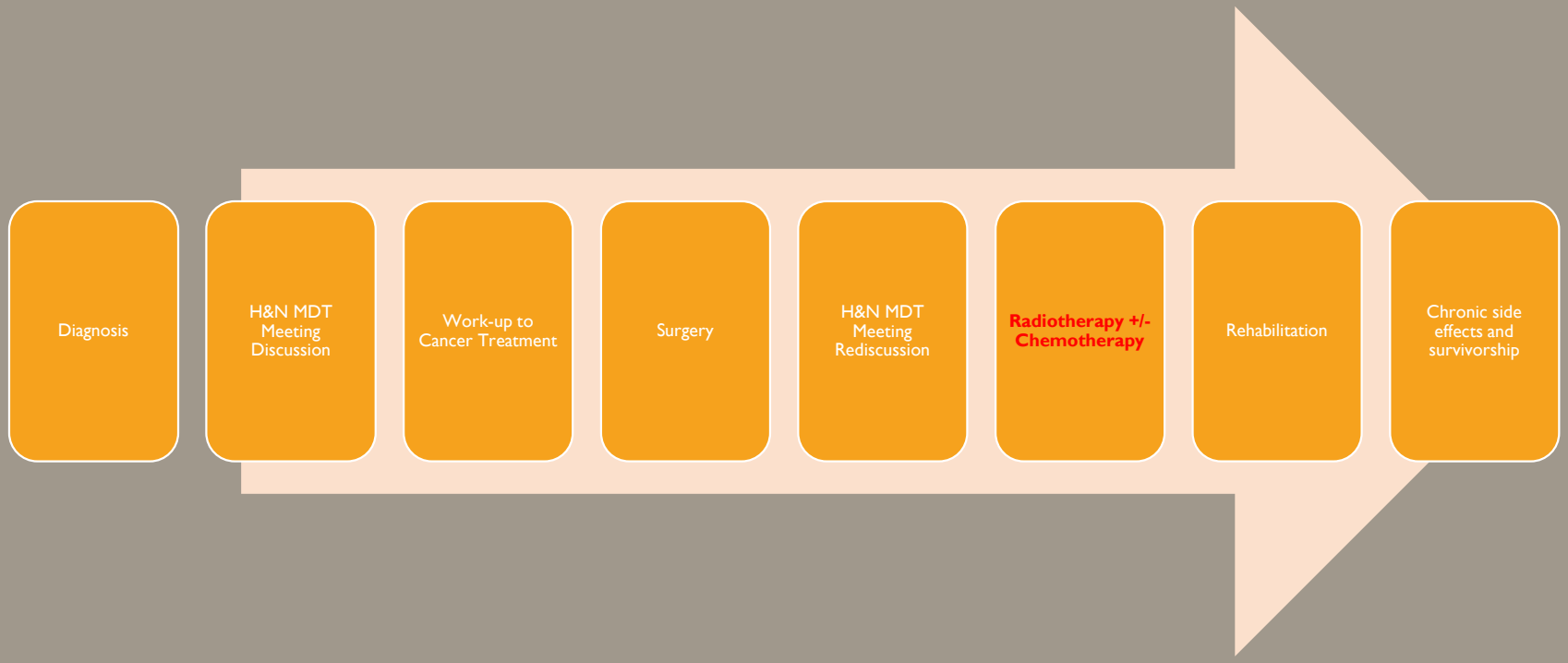
ADJUVANT RADIOTHERAPY REQUIRED? ORAL CANCERS

Definitive Factors for Adjuvant Radiotherapy	Definitive Factors for Adjuvant Chemoradiotherapy	Other Factors that may influence receipt of Adjuvant Radiotherapy
• pT3/T4 • pN2/N3 • Close margins <5mm • Depth of invasion >10mm	• Lymph node extracapsular spread (ECS) • Positive margin <1mm	• Perineural invasion (PNI) • Lymphovascular invasion (LVI) • Grade • Single node positive >3cm or multiple positive nodes • Worst pattern of invasion



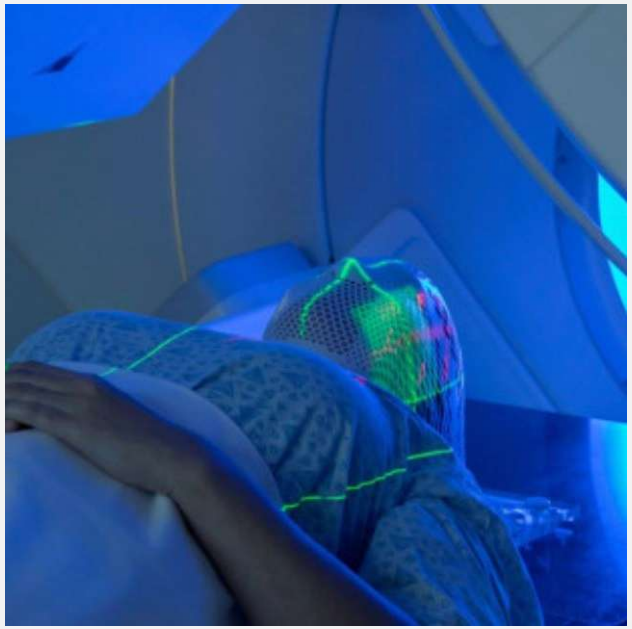
D'Cruz A, Vaish R, Dhar H. Oral cancers: current status. Oral Oncol. 2018;87:64-9
Chen et al. Surgical margins in head and neck squamous cell carcinoma: A narrative review. Int J Surg. 2024; 110: 3680-3700

THE HEAD AND NECK CANCER PATIENT JOURNEY



RADIOTHERAPY

- Used to treat approximately 50-60% of patients with HNC
- Aims: destroy cancer cells, reduce size of tumours
- Unit of measurement: Gray (Gy) = absorption of 1 joule of energy per kilogram of matter
- Delivered in *fractions* (# = treatment sessions)
- Gold standard = commence within 6 weeks of MDT discussion or surgery



RADIATION SCHEDULE

Curative Radiotherapy (complete eradication)

- Definitive Radiotherapy: 60-72 Gy in 25-40 fractions over 6-7 weeks
- Adjuvant Radiotherapy:
  - Primary and involved nodes: 56-60Gy in 28-30 fractions (2Gy) over 6 weeks
  - High risk sites (e.g. ECS, residual disease, positive tumour margins): 4-10 Gy dose augmentation (up to 66-70Gy)

Palliative Radiotherapy (symptom control)

- 30-50Gy, in 5-20 fractions

Prophylactic Radiotherapy (prevent growth in high-risk sites)

Why is treatment planning before H&N Radiotherapy so challenging?

Most medical procedures have a modest effect on oral health risk factors.

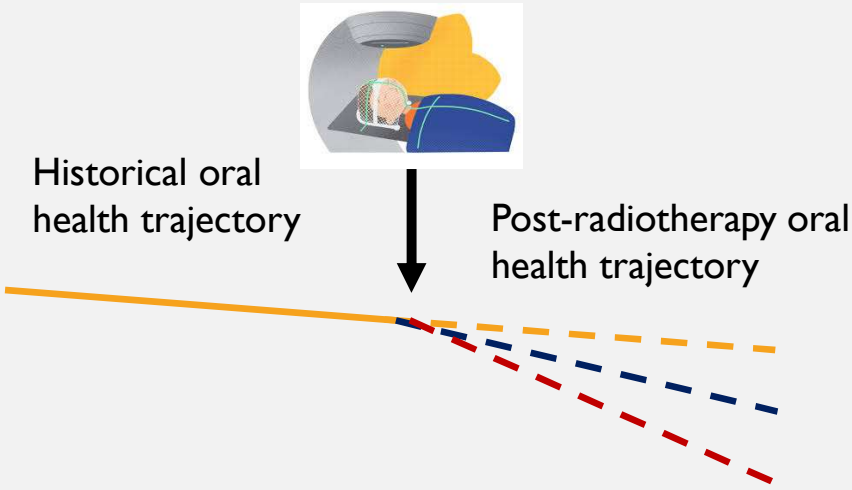
Predicting the patient's future oral health trajectory is often fairly straightforward: we examine their past trajectory.

But here's where it gets tricky…

For Head & Neck radiotherapy patients, their risk of dental disease almost always increases after treatment… but the extent can vary from mild to catastrophic.

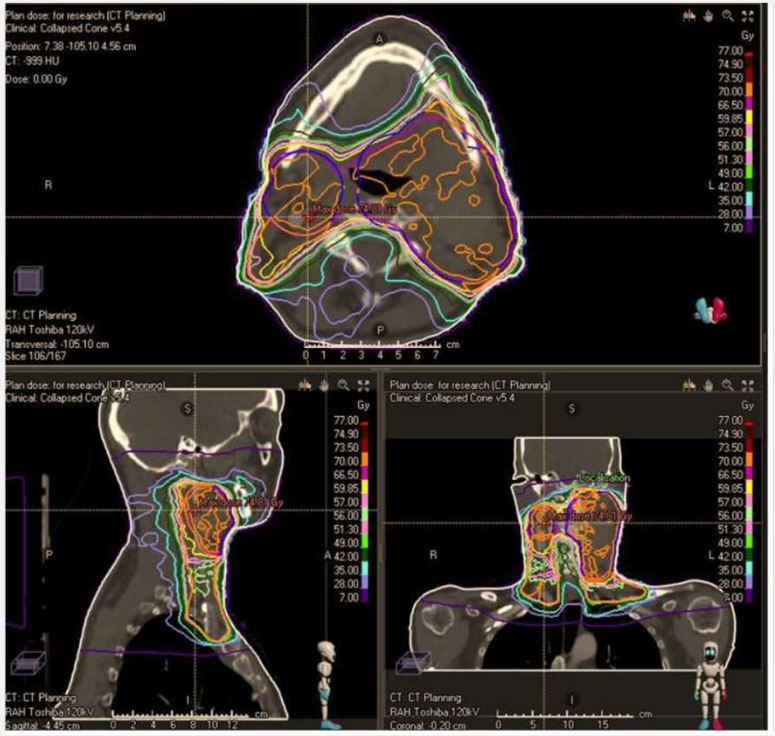
Predicting their future oral health trajectory is more complex because there are many more variables.





RADIATION FIELDS PLANS



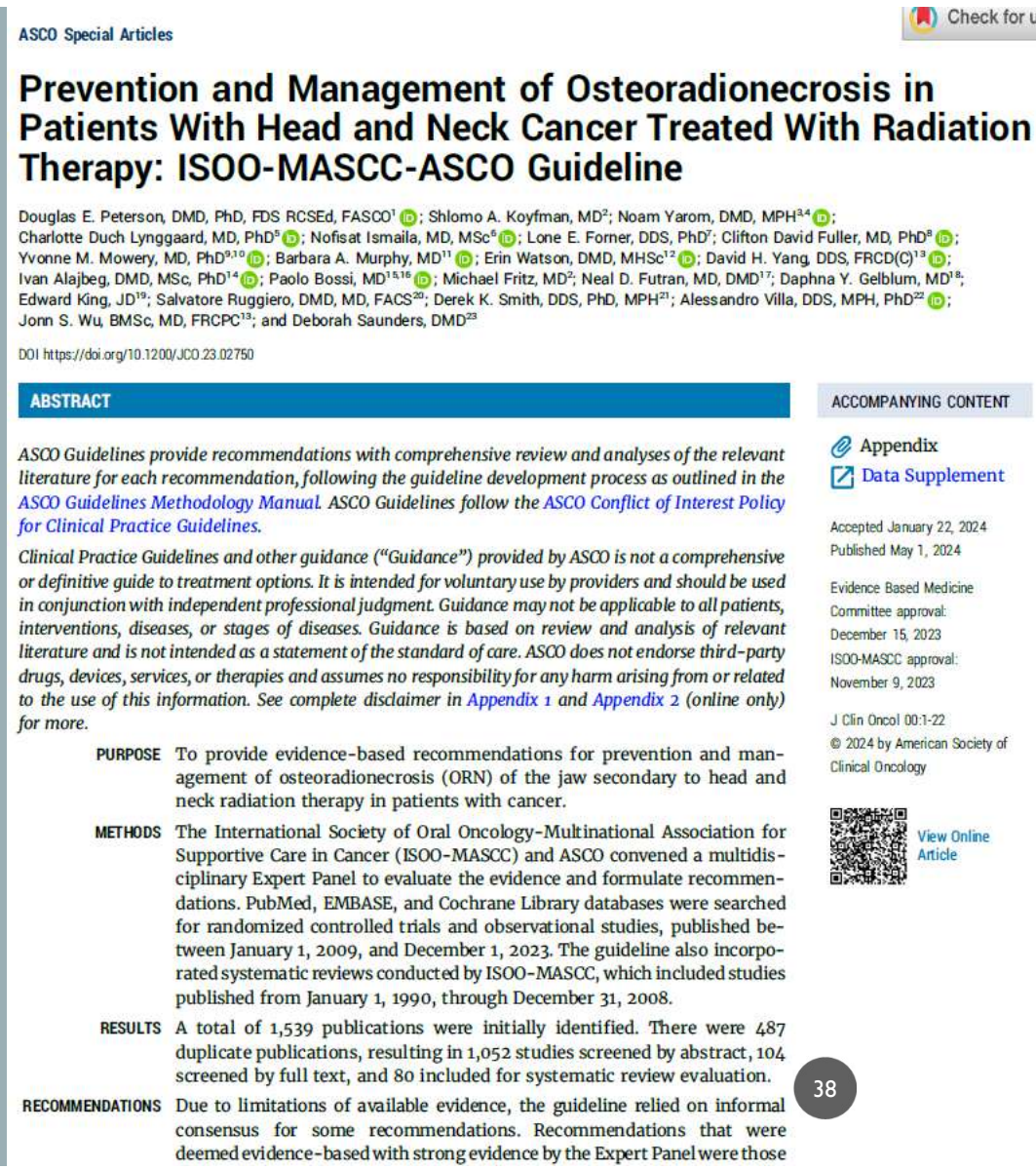


PREVENTION AND MANAGEMENT OF ORN GUIDELINES 2024

International Society of Oral Oncology

Multinational Association for Supportive Care in Cancer

American Society of Clinical Oncology



ASCO Special Articles

Check for u

Prevention and Management of Osteoradionecrosis in Patients With Head and Neck Cancer Treated With Radiation Therapy: ISOO-MASCC-ASCO Guideline

Douglas E. Peterson, DMD, PhD, FDS RCSEd, FASCO[1]; Shlomo A. Koyfman, MD[2]; Noam Yarom, DMD, MPH[3,4]; Charlotte Duch Lynggaard, MD, PhD[5]; Nofisat Ismaila, MD, MSc[6]; Lone E. Forner, DDS, PhD[7]; Clifton David Fuller, MD, PhD[8]; Yvonne M. Mowery, MD, PhD[9,10]; Barbara A. Murphy, MD[11]; Erin Watson, DMD, MHSc[12]; David H. Yang, DDS, FRCD(C)[13]; Ivan Alajbeg, DMD, MSc, PhD[14]; Paolo Bossi, MD[15,16]; Michael Fritz, MD[2]; Neal D. Futran, MD, DMD[17]; Daphna Y. Gelblum, MD[18]; Edward King, JD[19]; Salvatore Ruggiero, DMD, MD, FACS[20]; Derek K. Smith, DDS, PhD, MPH[21]; Alessandro Villa, DDS, MPH, PhD[22]; Jonn S. Wu, BMSc, MD, FRCPC[13]; and Deborah Saunders, DMD[23]

DOI https://doi.org/10.1200/JCO.23.02750

ABSTRACT

ASCO Guidelines provide recommendations with comprehensive review and analyses of the relevant literature for each recommendation, following the guideline development process as outlined in the ASCO Guidelines Methodology Manual. ASCO Guidelines follow the ASCO Conflict of Interest Policy for Clinical Practice Guidelines.

Clinical Practice Guidelines and other guidance ("Guidance") provided by ASCO is not a comprehensive or definitive guide to treatment options. It is intended for voluntary use by providers and should be used in conjunction with independent professional judgment. Guidance may not be applicable to all patients, interventions, diseases, or stages of diseases. Guidance is based on review and analysis of relevant literature and is not intended as a statement of the standard of care. ASCO does not endorse third-party drugs, devices, services, or therapies and assumes no responsibility for any harm arising from or related to the use of this information. See complete disclaimer in Appendix 1 and Appendix 2 (online only) for more.

PURPOSE To provide evidence-based recommendations for prevention and management of osteoradionecrosis (ORN) of the jaw secondary to head and neck radiation therapy in patients with cancer.

METHODS The International Society of Oral Oncology-Multinational Association for Supportive Care in Cancer (ISOO-MASCC) and ASCO convened a multidisciplinary Expert Panel to evaluate the evidence and formulate recommendations. PubMed, EMBASE, and Cochrane Library databases were searched for randomized controlled trials and observational studies, published between January 1, 2009, and December 1, 2023. The guideline also incorporated systematic reviews conducted by ISOO-MASCC, which included studies published from January 1, 1990, through December 31, 2008.

RESULTS A total of 1,539 publications were initially identified. There were 487 duplicate publications, resulting in 1,052 studies screened by abstract, 104 screened by full text, and 80 included for systematic review evaluation.

RECOMMENDATIONS Due to limitations of available evidence, the guideline relied on informal consensus for some recommendations. Recommendations that were deemed evidence-based with strong evidence by the Expert Panel were those

ACCOMPANYING CONTENT

Appendix

Data Supplement

Accepted January 22, 2024
Published May 1, 2024

Evidence Based Medicine Committee approval: December 15, 2023
ISOO-MASCC approval: November 9, 2023

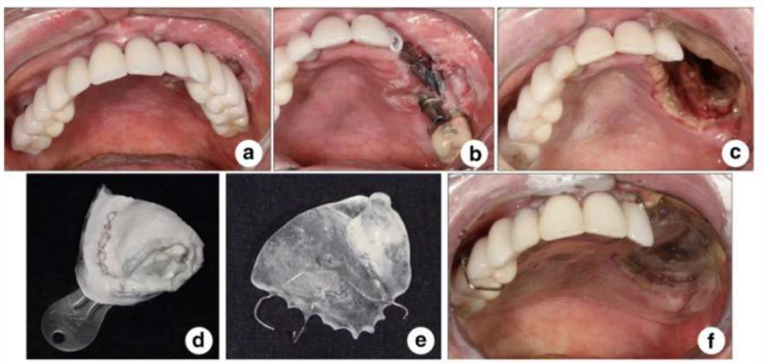
J Clin Oncol 00:1-22

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View Online Article

PRE-THERAPY DENTAL MANAGEMENT

- **Extract teeth** with doubtful long-term prognosis (especially mandibular teeth planned for >60Gy) at least 10-14 days prior to RT
  - Balance against the risks of delaying RT (e.g. OAC, co-morbidities that may contribute to delayed healing, MRONJ)
- **Recontour/restore sharp teeth**, failing restorations, carious cavities with potential to traumatise soft tissues or flap
- **Assess dentures** = modify ill-fitting dentures if possible
- Joint planning with **surgical team** if surgery will alter oral cavity (e.g. maxillectomy requiring obturator construction, dental extractions as part of resection or cancer margin monitoring)



From: Brandão, T.B., Migliorati, C.A., Vechiato-Filho, A.J. et al. Strategic use of obturator prostheses for the rehabilitation of oral cancer patients during the COVID-19 pandemic. Support Care Cancer ***29****, 11–15 (2021).*

KEY FACTORS TO DETERMINE TREATMENT APPROACH

Cancer-related factors

- Cancer prognosis
- Urgency to commence radiotherapy
- Irradiation dose >50Gy (risk ↑ 11x if >66Gy)
- Site
  - Posterior > anterior
  - Mandible > maxilla 24:1
- Tooth extraction timing (<21 days pre-RT)
- Cancer-related trismus

Patient-related factors

- Other co-morbidities
  - Physiological tolerance / risks of dental tx
  - Patient prognosis
- Patient function (e.g. morbidity of surgery, dysphagia, QOL, wishes)
- Patient motivation and psychology
- Maintenance (motivation, access, ability)
- Risks of extraction (OAC, IAN, MRONJ)

- Periodontal health and oral hygiene
- Alcohol/tobacco use
- Nutritional status
- Dentate > edentate
- Poor prosthetic adjustment

Peterson DE, et al. Prevention and Management of Osteoradionecrosis in Patients with Head and Neck Cancer Treated with Radiation Therapy: ISOO-MASCC-ASOC Guideline. *J Clin Oncol.* 2024;42(16):1975-1996
Nabil S, Samman N. Risk factors for osteoradionecrosis after head and neck radiation: a systematic review. Oral Surg Oral Med Oral Path Oral Radiol. 2012;113(1):54-69.
Frankart AJ, et al. Osteoradionecrosis: Exposing the evidence not the bone. Int J Radiat Oncol Biol Phys. 2021;109(5):1206-18.
Beadle B, et al. Evaluating the impact of patient, tumor, and treatment characteristics on the development of jaw complications in patients treated for oral cancers: A SEER–Medicare analysis. Head Neck. 2012;35:1599-605
Raguse J-D, et al. Patient and treatment-related risk factors for osteoradionecrosis of the jaw in patients with head and neck cancer. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016;121(3):215-21

PRE-RT EXTRACTIONS

- Teeth with doubtful prognosis should be extracted as early as possible in the patient journey before RT.
  - Ideally allow 3 weeks healing before RT, minimum 10-14 days

- Pre-RT extractions still pose a risk of developing ORN
  - Irradiation of healing bone
  - 2017 Moon et al: pre-RT tooth extractions independent risk factor for ORN (hazard ratio 4.52)
  - 2013 Cochrane review: no evidence from RCTs to support or refute extraction of healthy or diseased teeth prior to ORN
  - 1986 – 2006: ORN pooled incidence after pre-RT extraction 3.0-3.2%, post-RT extraction 3.1 – 3.5%
  - Prophylactic extractions of healthy/restorable molars within the anticipated RT field → no longer considered appropriate

- Most established guidelines still argue for pre-RT extraction of teeth with poor to hopeless long-term prognoses
  - Majority of studies report higher rate of ORN post-RT extractions
  - Beumer et al: ORN more often requires radical resection with post-RT extraction (45.4%) than pre-RT (11.7%)

Kumar N, et al. The oral management of oncology patients requiring radiotherapy, chemotherapy and/or bone marrow transplantation. London: Royal College of Surgeons and British Society for Disability & Oral Health; 2018. Available from: https://www.rcseng.ac.uk/dentalfaculties/fds/publications-guidelines/clinical-guidelines/

McCaul LK, et al. Predicting and managing oral and dental complications of surgical and non-surgical treatment for head and neck cancer - A clinical guideline. United Kingdom: Restorative Dentistry UK, British Association of Head and Neck Oncology Nurses, British Association of Head and Neck Oncologists, Royal College of Speech & Language Therapists, ENT UK, British Dieticians Association, British Association of Oral and Maxillofacial Surgeons; 2016.

Eliyas S, Al-Khayatt A, Porter RWJ, Briggs P. Dental extractions prior to radiotherapy to the jaws for reducing post-radiotherapy dental complications. The Cochrane database of systematic reviews. 2013;2013(2):CD008857

Moon DH, et al. Incidence of, and risk factors for, mandibular osteoradionecrosis in patients with oral cavity and oropharynx cancers. *Oral Oncol*. 2017;72:98-103.

Beech NM, Porceddu S, Batstone MD. Radiotherapy-associated dental extractions and osteoradionecrosis. *Head Neck*. 2017;39(1):128-32.

Chang DT, et al. Do pre-irradiation dental extractions reduce the risk of osteoradionecrosis of the mandible? *Head Neck*. 2007;29(6):528.

Beumer 3rd J, et al. Osteoradionecrosis: Predisposing factors and outcomes of therapy. *Head Neck Surg*. 1984;64:819-27

DENTAL TREATMENT PROTOCOLS PRIOR TO H&N RT

TABLE A3. Descriptions of Complete, Partial, and Minimal Dental Evaluation Protocols on the Basis of the Type of Dental and/or Periodontal Pathology[81,94]

Dental Pathology	Complete Dental Clearance	Partial Dental Clearance	Limited Dental Clearance
Caries	Restore all teeth	Restore deep caries; mild/moderate caries restored if time permits	Intervention only if symptomatic
Severe caries/pulp involvement/ dental abscess	Extraction	Extraction	Intervention only if symptomatic
Apical periodontitis—previous endodontic treatment	Extraction of symptomatic lesions and lesions ≥5 mm	Extraction of symptomatic lesions and lesions ≥5 mm	Intervention only if symptomatic
	Surveillance of asymptomatic lesions <5 mm	Surveillance of asymptomatic lesions <5 mm	Intervention only if symptomatic
Apical periodontitis—no previous endodontic treatment	Extraction or endodontic therapy for restorable, periodontally sound teeth	Extraction or endodontic therapy of restorable, periodontally sound teeth	Intervention only if symptomatic
Advanced periodontal disease	Extract teeth with	Extract teeth with	Intervention only if symptomatic
	Probing depth ≥5 mm	Probing depth ≥5 mm	
	Furcation II, III; Mobility II, III	Furcation II, III; Mobility II, III	
	Severe inflammation	Severe inflammation	
Partially erupted third molars	Extract	Extraction of symptomatic teeth; consider requesting radiation delay	Intervention only if symptomatic

NOTE. The proper protocol should be selected by the oncologist and dentist according to the patient's medical status. Limited clearance would be indicated for patients treated with noncurative intent. Partial and complete clearance protocols are based on patients being treated with curative-intent radiotherapy and appropriate access to care. In general, patients with at least 2 weeks of healing available before radiation can be treated with complete clearance and those with less than 2 weeks of time can be treated with partial clearance.

[a]Clearance protocols should be applied to teeth that will receive a therapeutic dose of radiation. For teeth that will receive below a therapeutic dose, minimal clearance protocols can be applied.

Peterson DE, et al. Prevention and Management of Osteoradionecrosis in Patients with Head and Neck Cancer Treated with Radiation Therapy: ISOO-MASCC-ASOC Guideline. *J Clin Oncol.* 2024;42(16):1975-1996

- Lalla RV, Hodges JS, Treister NS, et al: Tooth-level predictors of tooth loss and exposed bone after radiation therapy for head and neck cancer. *J Am Dent Assoc. 2023;*154:519-528.e4
- Watson E, Dorna Mojdami Z, Oladega A, et al: Clinical practice guidelines for dental management prior to radiation for head and neck cancer. *Oral Oncol* . 123:105604, 2021

THINKING IT THROUGH… H&N RADIOTHERAPY

Rationale

- Reducing initiating factors for ORN within an irradiated site
- Curative-intent radiotherapy

Medical, Dental and Social Considerations

- Long-term prognosis of tooth
- Ability to tolerate extractions (pain, cancer-induced trismus)
- Risks of extraction (other medical co-morbidities, OAC, IAN, MRONJ)
- Ability for tooth to be maintained post-surgery & RT (restricted mouth opening, surgical flaps/grafts)
- Compliance with ongoing preventive oral care
- Ongoing alcohol and tobacco use
- Concomitant oral disease (periodontal disease, periapical pathology) = infection risk factor for ORN
- Focus on preventive oral hygiene measures
- Education about life-long risks of ORN
- Tooth location

Entire or localised areas of the mouth

- Anticipated radiation fields >50-60Gy
- Maxilla vs mandible
- Anterior vs posterior
- Mucosal trauma during period of mucositis

Optimal Timeframes

- Ideally future-proof for life-long foreseeable future
- Urgency to commence RT vs time available for healing (min 14 days healing, ideally 2-3 wks)
- Prioritise care that reduces mucosal trauma or need for future oral surgery impacting on bone (e.g. poor prognosis tooth extraction, poorly fitting dentures)
- If extractions will alter VDO, perform prior to immobilisation mask fabrication
- Rapidly progressing tumours: defer extractions, do not delay RT initiation

Treatment Approaches

- Curative intent tx: Typically aggressive pre-RT, then conservative post-RT
- Long-term medical prognosis, physiological tolerance
- Resulting QOL (# appts, functionality)

CHEMOTHERAPY

- Not a curative treatment for HNC alone
- Contexts:
  - Induction (neo-adjuvant) chemotherapy
  - Primary chemoradiotherapy
  - Adjuvant chemoradiotherapy
  - Palliation
- Typical chemotherapy drugs: *cisplatin, carboplatin, docetaxel, 5-fluorouracil and hydroxyurea
- Typical schedule: 3 doses, 3 weekly during RT (start, middle, end)

IMMUNOTHERAPY

- **Immunotherapy**: form of biological therapy that stimulates the body's immune system to detect and act against cancer cells
- Examples in H&N cancer context: cetixumab, nivolumab
- Growing field
- Advantages:
  - higher specificity against malignant cells thus fewer side-effects
  - ability to target both microscopic disease and widespread metastases
  - increased efficacy against cancer cells that are slowly dividing or quiescent (do not preferentially attack dividing cells c.f. radiation and chemotherapy)
  - potential to provide long-term control (immune system's ability to develop "memory" cells)

IMPACTS OF CANCER TREATMENT ON THE MOUTH

SHORT-TERM EFFECTS

- Mouth Lining
  - Increased inflammation, damage to cell layering → mucositis
- Tastebuds
  - Altered taste sensation; loss of taste sensation

LONG-TERM EFFECTS

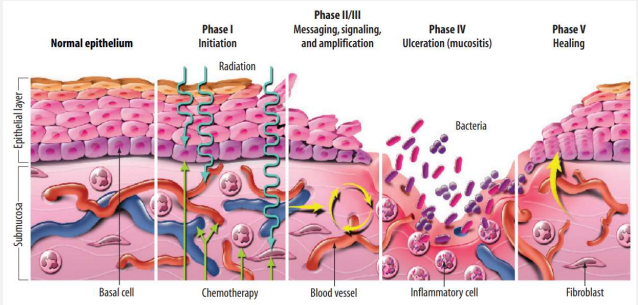
- Salivary Glands
  - Decreased saliva volume; change in quality
- Oral Flora
  - Changed environment → changed organism profile
- Jaw Joints & Facial Musculature
  - Fibrosis → limited mouth opening, tightness on opening
- Bone of the Jaws
  - Decreased blood/oxygen supply → reduced healing capacity

MUCOSITIS

- Radiotherapy and chemotherapy damages cells → inflammation of the mouth lining (mucosa).
- Initially erythema → progress to painful ulcers with white/yellow fibrinous slough
- Onset ~2 weeks into treatment
- Effects generally short term:
  - Usually resolves at 2 to 6 weeks after completion of therapy.



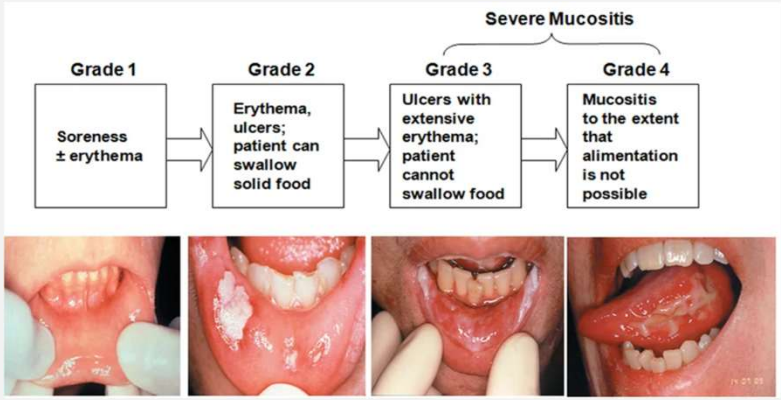




Sonis S. A biological approach to mucositis. J Support Oncol. 2005;2(1):21-36.

MUCOSITIS

- **Complications**:
  - Painful to speak, eat, swallow
  - Infection, sepsis
  - Nutritional deficiencies, weight loss
  - Dose-limiting factor, necessitating dose reduction or treatment delay



WHO Mucositis Scale

- **Severity / healing determined by:**
  - Radiotherapy dose
  - Radiation field size
  - Fractionation schedules (hyperfractionated)
  - Saliva volume
  - Combination of chemo and radiotherapy
  - Host immune and genomic factors
  - Hepatic and renal impairment
  - Tobacco smoking

MANAGEMENT OF MUCOSITIS





















MUCOSITIS: DIETARY AND LIFESTYLE ADVICE

Diet that is typically acceptable	Food to Avoid	Lifestyle Habits to Avoid
• Liquids • Purees • Ice • Custards • Non-acidic fruits (banana, mango, melon, peach) • Soft cheese • Eggs	• Rough foods (potato crisps, toast) • Spicy foods • Salt • Acidic fruit (grapefruit, lemon, orange)	• Smoking • Alcohol

LOSS OF TASTE

- Onsets at start of cancer treatment
- Related to dry mouth and direct damage to taste buds
- May start to recover within 2 to 4 months
- Taste often returns with an unpleasant interim period of altered taste
- Typically restored by 6 months
- If radiation dose >60 Gy, loss of taste may be permanent

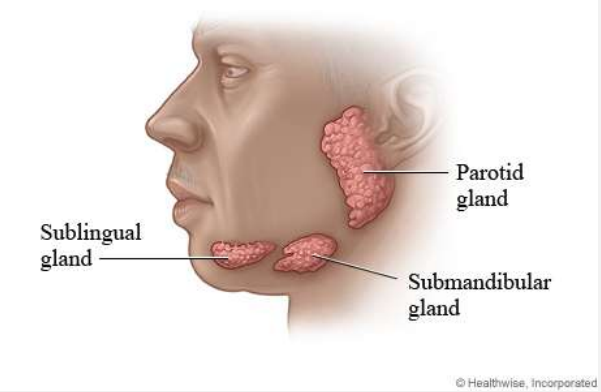


SALIVARY CHANGES AND THE SECONDARY COMPLICATIONS

Viscous, acidic, reduced pH & buffering capacity, reduced quantity

- Difficulty with speech, eating (mastication) and swallowing (dysphagia)
- Mouth soreness
- Difficulty/discomfort wearing dentures
- Taste alteration/loss
- Reduced food clearance
- Changes in oral flora → fungal, viral, bacterial infections (e.g. oral thrush, salivary gland infections, gingival/periodontal disease progression)
- Radiation caries
- Dental erosion
- Increased risk of tooth wear and gingival recession (hyposalivation important contributor) → Tooth sensitivity

- **→ QUALITY OF LIFE**





MANAGING THE SYMPTOMS OF DRY MOUTH





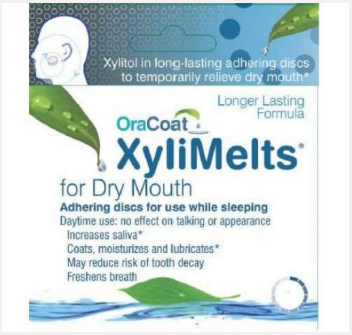












XYLIMELTS



Place the tan adhesive side of disc on the outside of a molar and/or adjoining gums, upper or lower, white side touching cheek. Use your tongue to push the disc to a comfortable spot. Once there, do not touch it with your tongue for 10 seconds, as this movement will disrupt the adhesion.

Before bedtime: Use two (2) discs, placing one on each side of the mouth.

Everyday use: For dry mouth, use more as needed throughout the day.

DIFFICULTIES WITH DENTURES

- Susceptibility to oral thrush
  - Denture hygiene
  - Well-fitting denture
- Ill-fitting dentures
  - Post-surgical change
  - Weight loss
  - Changes in sensation
- Dry mouth









MUCOUS










McKENZIE'S
Bi-Carb
Soda
Baking Soda


CURASEPT
ADS 220
NO ALCOHOL


Confident Care
Oraswab

FUNGAL INFECTIONS (ORAL THRUSH)

- Candida albicans: harmless organism that inhabits the mouths of up to 50% of the population.
- 'Opportunistic' fungal infection
- Symptoms are variable, and not always specific. They may include:
  - White spots on the palate
  - Central red patch on tongue (can be "kissing" a red spot on the palate)
  - Thickly coated tongue
  - Red patch delineated by a denture-breaing area
  - Cracked corners of the mouth
  - Burning sensation in the mouth



Images: Contemporary Oral Medicine 2018 (Farah, Balasubramaniam, McCullough)

MANAGEMENT OF FUNGAL INFECTIONS











WEIGHT MAINTENANCE

- Dietician advice during chemo-radiotherapy
  - High calorie foods and drinks
  - Nutritional supplements (contain sugar)
  - Moisten foods, thickened liquids
  - PEG feeding
  - Soda water (effervescent)





- After chemo-radiotherapy
  - Weight stabilisation may still be a priority
  - Taste alterations (John lost sweet and salty sensations)
  - Taste aversions
  - Risk assessment for dental caries

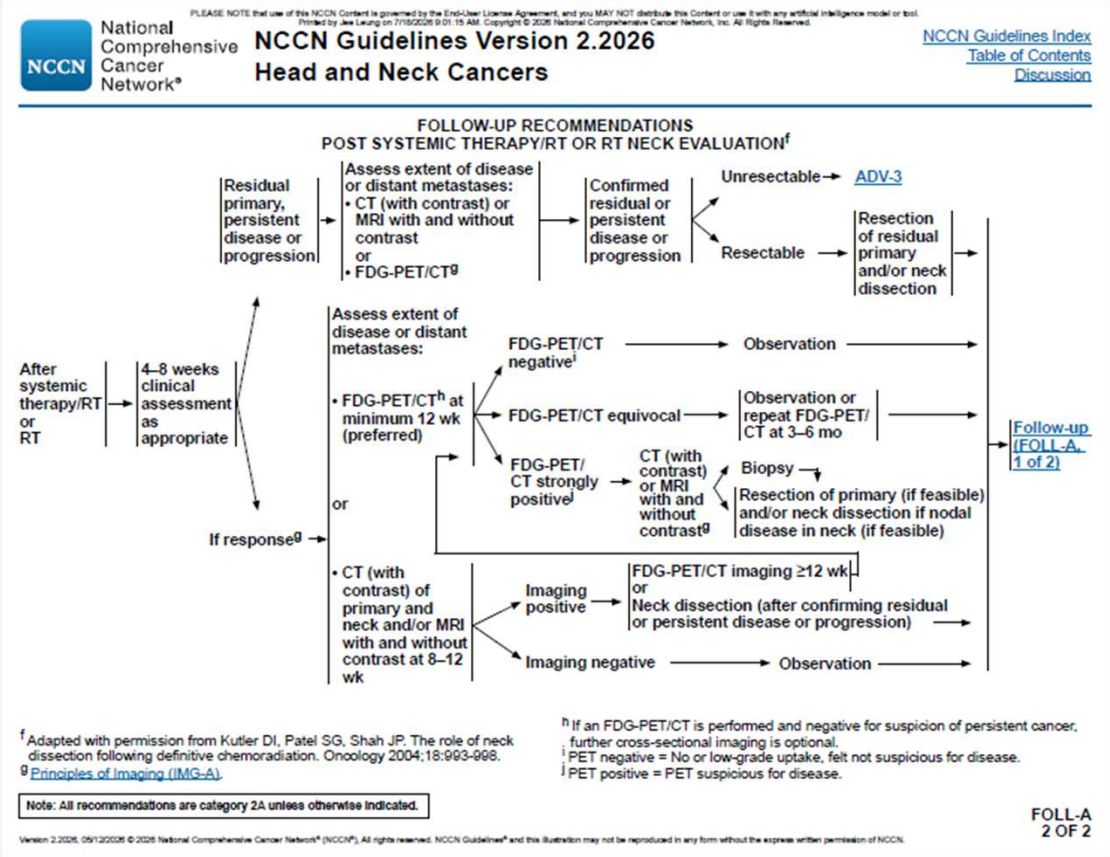


HOW WOULD THIS IMPACT ON THE DIETARY ADVICE YOU WOULD ROUTINELY PROVIDE PATIENTS WITH FOR THE PREVENTION OF DENTAL CARIES?

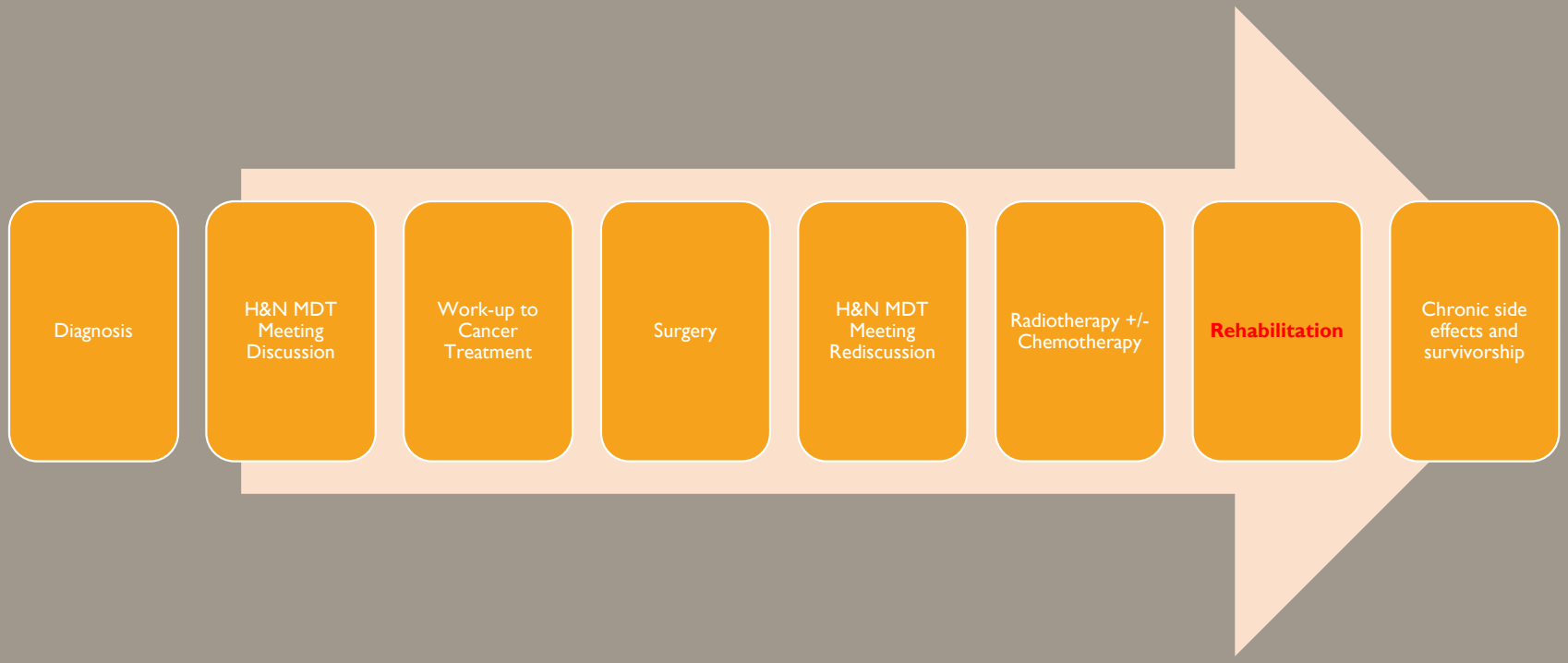
- Liaise with dietician: Ensure our advice does not conflict with theirs!
- Focus on prevention:
  - Sip water or bicarbonate rinses after meals
  - Fluoride / CPP-ACP
  - Oral hygiene
  - Use of straws

FOLLOW-UP

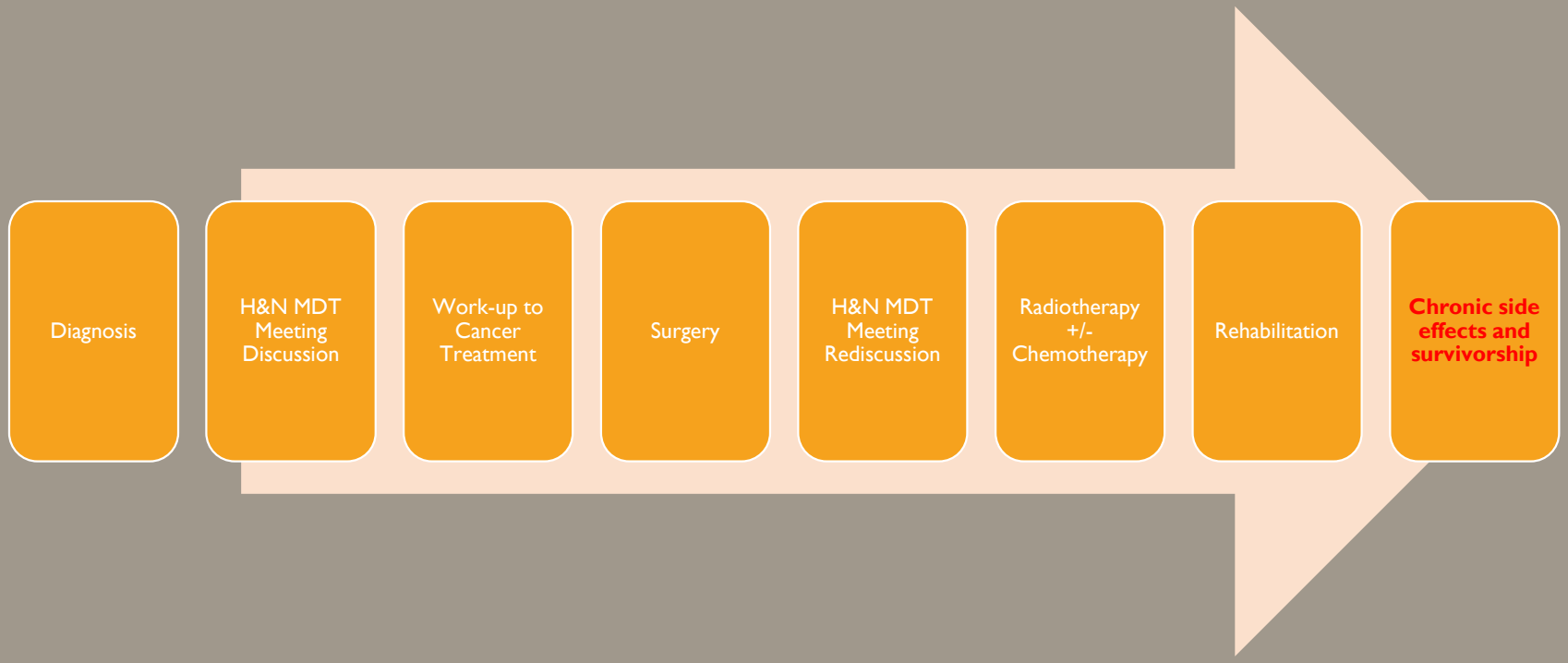
- 4-8 week clinical assessment
- *3 month post-treatment FDG-PET/CT
- (3-4 month post-surgical CT and/or MRI)



THE HEAD AND NECK CANCER PATIENT JOURNEY



THE HEAD AND NECK CANCER PATIENT JOURNEY



ONGOING DENTAL ISSUES POST-RADIOTHERAPY

- Salivary changes and their long-term impacts
- Muscle fibrosis and limited mouth opening (trismus)
- Difficulties with dentures
  - Trismus, surgery, hyposalivation
- Osteoradionecrosis
  - Spontaneous, trauma-induced (extractions, dentures)
- Risk of recurrence
  - Oral surveillance
  - Lymph node assessment
  - Smoking cessation and counselling regarding alcohol intake

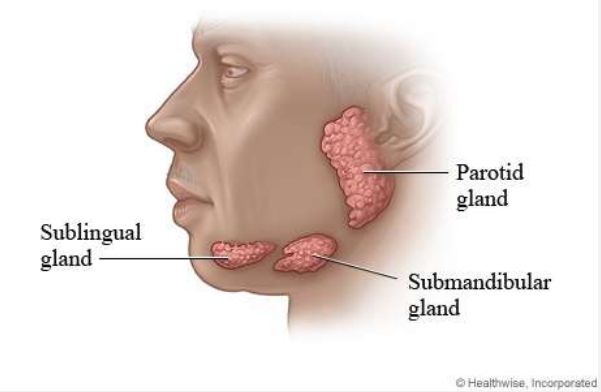
ROLE OF DENTAL PRACTITIONER POST-RADIOTHERAPY

- Management of hyposalivation
- Prevention and minimisation of trismus
- Prevention and management of dental caries, periodontal disease, ORN and oral candidiasis
- Performing dental work deferred during RT
- Consultation with the treating radiation oncologist if extractions or implants are to be considered.
- Continued monitoring for local recurrence, metastatic lesions in the head and neck region, and second cancers

SALIVARY CHANGES AND THE SECONDARY COMPLICATIONS

Viscous, acidic, reduced buffering capacity, reduced quantity

- Difficulty with speech, eating (mastication) and swallowing (dysphagia)
- Mouth soreness
- Difficulty/discomfort wearing dentures
- Taste alteration/loss
- Reduced food clearance
- Changes in oral flora → fungal, viral, bacterial infections (e.g. oral thrush, salivary gland infections, gingival/periodontal disease progression)
- Radiation caries
- Dental erosion
- Increased risk of tooth wear and gingival recession (hyposalivation important contributor) → Tooth sensitivity
- **→ QUALITY OF LIFE**



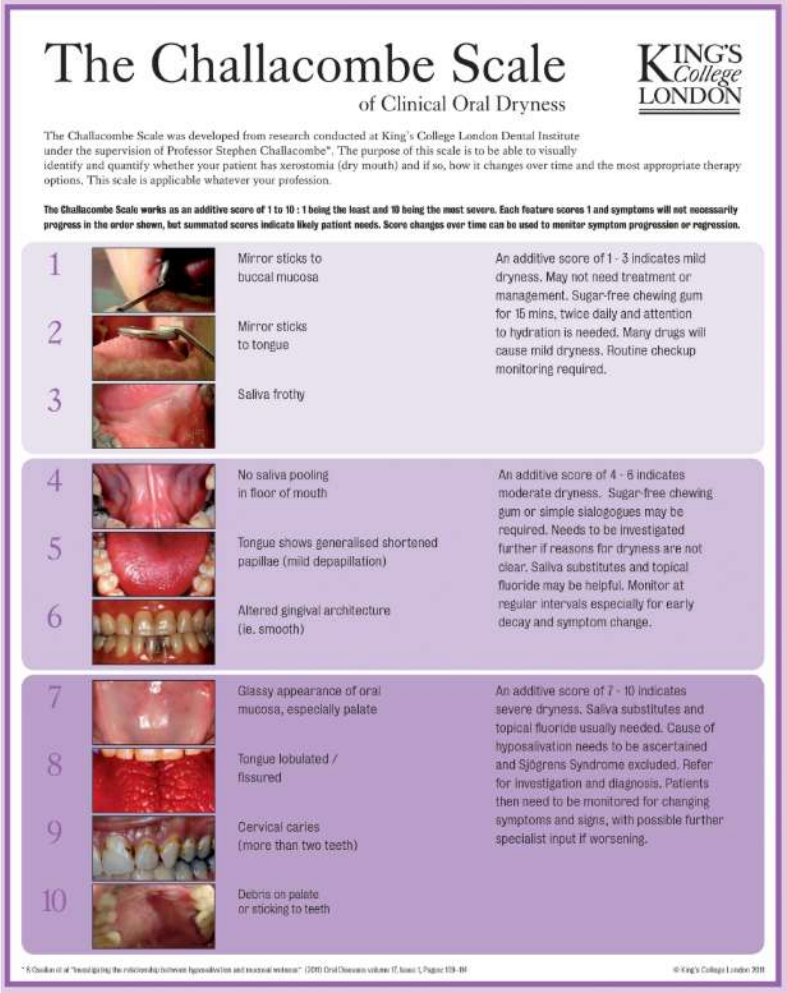


WILL IT RECOVER?

- Usually yes, to some degree
- Timing varies between individuals
- Gains usually start within 4 weeks to 6 months
- Can be last up to 2 years post-radiotherapy, but is often permanent

SALIVA TESTING





The Challacombe Scale

of Clinical Oral Dryness

KING'S College LONDON

The Challacombe Scale was developed from research conducted at King's College London Dental Institute under the supervision of Professor Stephen Challacombe*. The purpose of this scale is to be able to visually identify and quantify whether your patient has xerostomia (dry mouth) and if so, how it changes over time and the most appropriate therapy options. This scale is applicable whatever your profession.

The Challacombe Scale works as an additive score of 1 to 10 : 1 being the least and 10 being the most severe. Each feature scores 1 and symptoms will not necessarily progress in the order shown, but summated scores indicate likely patient needs. Score changes over time can be used to monitor symptom progression or regression.

1	Mirror sticks to buccal mucosa	An additive score of 1 - 3 indicates mild dryness. May not need treatment or management. Sugar-free chewing gum for 15 mins, twice daily and attention to hydration is needed. Many drugs will cause mild dryness. Routine checkup monitoring required.
2	Mirror sticks to tongue	
3	Saliva frothy	
4	No saliva pooling in floor of mouth	An additive score of 4 - 6 indicates moderate dryness. Sugar-free chewing gum or simple sialogogues may be required. Needs to be investigated further if reasons for dryness are not clear. Saliva substitutes and topical fluoride may be helpful. Monitor at regular intervals especially for early decay and symptom change.
5	Tongue shows generalised shortened papillae (mild depapillation)	
6	Altered gingival architecture (ie. smooth)	
7	Glassy appearance of oral mucosa, especially palate	An additive score of 7 - 10 indicates severe dryness. Saliva substitutes and topical fluoride usually needed. Cause of hyposalivation needs to be ascertained and Sjögrens Syndrome excluded. Refer for investigation and diagnosis. Patients then need to be monitored for changing symptoms and signs, with possible further specialist input if worsening.
8	Tongue lobulated / fissured	
9	Cervical caries (more than two teeth)	
10	Debris on palate or sticking to teeth	

* S Challacombe et al "Investigating the relationship between hyposalivation and mucosal wetness" (2019) Oral Diseases volume 17, Issue 1, Pages 113–118

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PREVENTION OF DENTAL DECAY



















DIFFICULTIES WITH DENTURES

- Susceptibility to oral thrush
  - Denture hygiene
  - Well-fitting denture
- Ill-fitting dentures
  - Post-surgical change
  - Weight loss
  - Changes in sensation
- Dry mouth



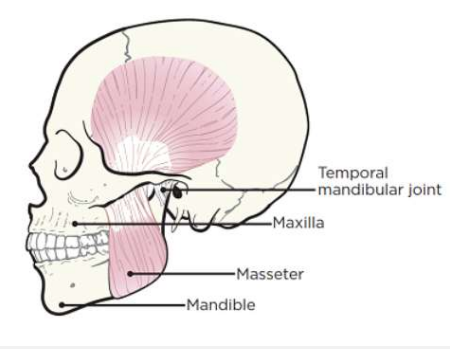






TRISMUS

- Muscle and joint capsule stiffness (trismus)
  - Reduced jaw muscle movement
  - Exercises can help to maintain and improve mouth opening and movement





TRISMUS - ORAL HYGIENE MAINTENANCE













OSTEORADIONECROSIS OF THE JAW (ORN)

- "Radiation-induced bone death"
- Changes in the jaw bone's healing ability following dental extractions and trauma
- Occasionally seen as a spontaneous condition
  - Typically within first 2 years post-RT





DEFINITIONS OF OSTEORADIONECROSIS

Traditional ORN:

- *"Exposed bone through overlying skin or mucosa that presents as a non-healing wound for three months or more, without residual or recurrent tumour, in those who have received radiation"* (Marx 1983)

  - However, this is not strictly correct since:
    - ORN can be shown radiographically without any breach of the oral mucosa or cervicofacial skin, by virtue of its characteristic appearance
    - Pathological fractures due to ORN have been described without evidence of bone exposure

  (He et al 2015, Owosho et al 2015, Lyons et al 2014, Store & Boysen 2000, Van Merkesteyn et al 1994)

Radiographic ORN:

- "*Radiographic evidence of bone necrosis (i.e. bone sequestrum or pathologic bone fracture) within the radiation field, where tumour recurrence has been excluded, and mucosa is still intact*"
- (Owosho et al 2015, Støre & Boysen, 2000, Van Merkesteyn et al 1994)

CLINICAL FEATURES OF ORN

Signs

- Non-healing ulcer or necrosis of oral mucosa
- Exposed necrotic bone
- Oral malodour
- In advanced stages:
  - Ulceration of overlying skin
  - Chronic drainage or orocutaneous fistula
  - Pathologic fractures
- Complications:
  - Repeated episodes of superimposed bacterial infection and osteomyelitis

Symptoms

- Pain
- Paraesthesia / dysaesthesia / anaesthesia
  - When IAN irritated or severed by the process
- Trismus
- Difficulties chewing / speaking / swallowing





RADIOGRAPHIC CHANGES FOLLOWING H&N RT

1. Widened Periodontal Ligament Space (WPLS):
Subclinical, increased width of PDL space >0.5mm along entire length of tooth root without a specific epicentre and adjacent bone destruction

2. Bone sclerosis (BS):
Region of increased bone density resulting from an increased number of bone trabeculae

3. Bone resorption (BR):
Region of decreased bone density resulting from decreased number of bone trabeculae.

4. Periodontal disease-like bone loss (PDBL):
Vertical bone loss in the alveolar process as measured from the level of the CEJ of the adjacent tooth

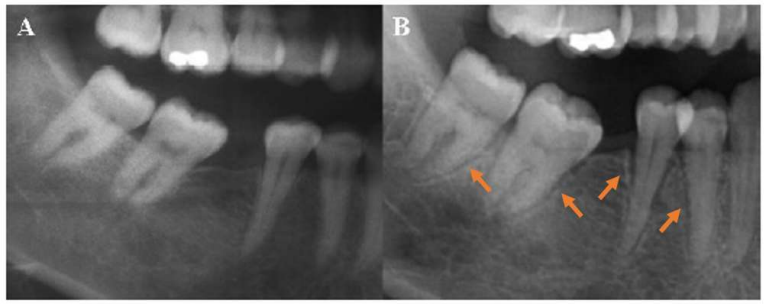


Figure 1: Widened periodontal ligament space (WPLS)

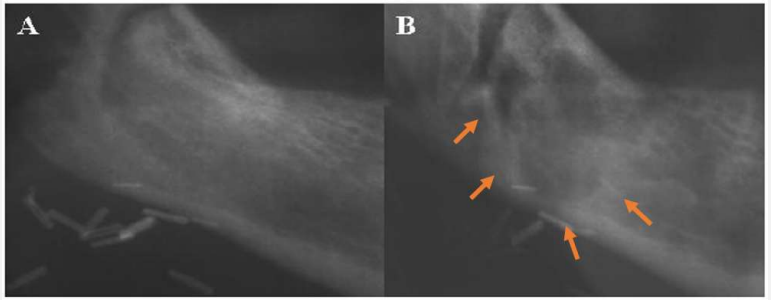


Figure 2: Bone resorption (BR)

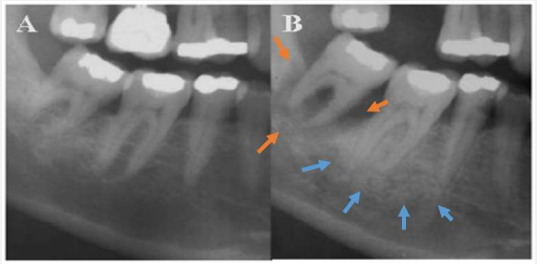


Figure 3: Bone sclerosis (BS - blue), and Periodontal disease-like bone loss (PDBL - orange)

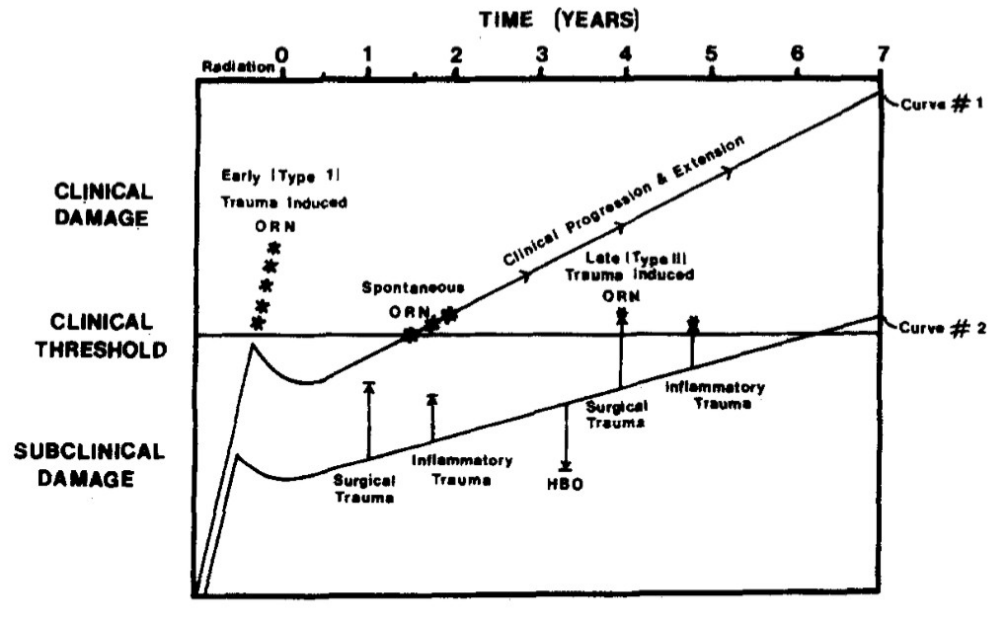
Chan K. Jaw Bone Changes on Panoramic Imaging after Head and Neck Radiotherapy. In: Pharoah M, editor.: ProQuest Dissertations Publishing; 2012.
Chan KC, Perschbacher SE, Lam EWN, Hope AJ, McNiven A, Atenafu EG, et al. Mandibular changes on panoramic imaging after head and neck radiotherapy. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016;121(6):666-72.

THE IMPORTANCE OF REGULAR DENTAL CHECKS

- After radiotherapy in particular, it is important to have regular dental monitoring
- This may be more often than normal
- Allows dental team to work with you to prevent and manage problems before they become severe



POST-RADIOTHERAPY EXTRACTIONS



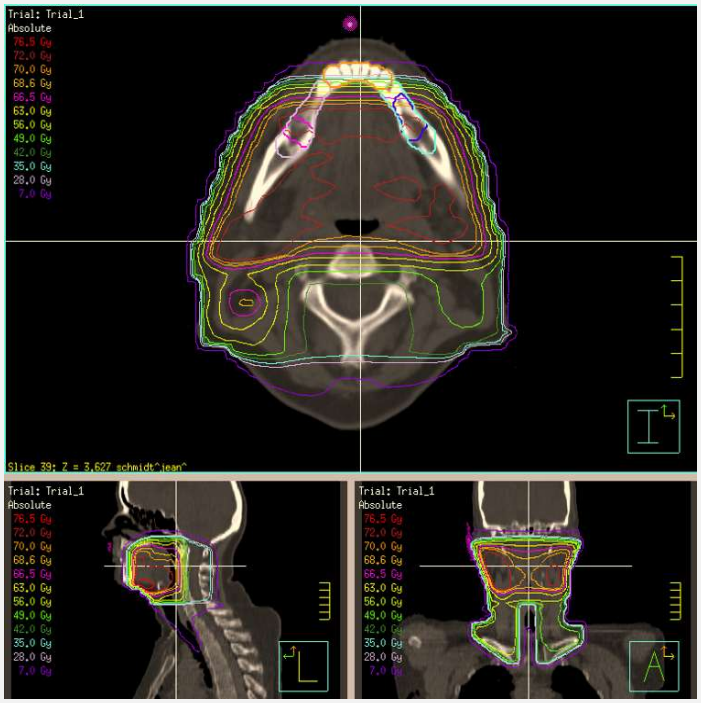
Radiation tissue injury vs time (Marx and Johnson 1987)

Marx RE, Johnson RP. Studies in the radiobiology of osteoradionecrosis and their clinical significance. Oral Surg Oral Med Oral Pathol. 1987;64(4):379-90.

Kanatas A, Rogers S, Martin M. A practical guide for patients undergoing exodontia following radiotherapy to the oral cavity. Dent Update. 2002;29(10):498

Nabil S, Samman N. Incidence and prevention of osteoradionecrosis after dental extraction in irradiated patients: a systematic review. Int J Oral Maxillofac Surg. 2011;40(3):229-43

3D-CRT VS IMRT RADIOTHERAPY



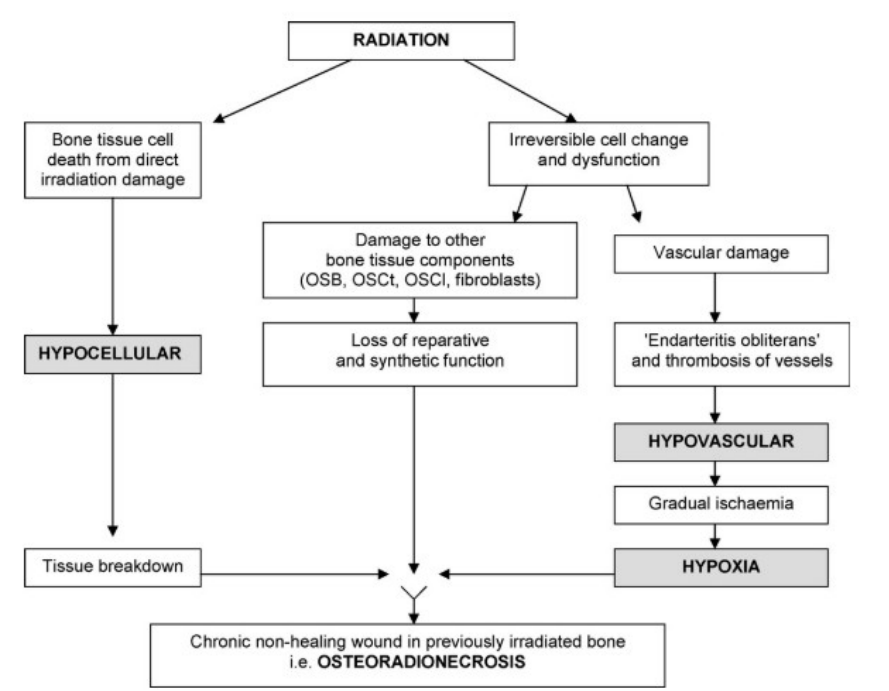


3DCRT vs. IMRT

	3DCRT	IMRT
Target Conformity	Highly conformal
Uniform intensity beams	Intensity-modulated beams
Higher dose to nearby OARs	Better sparing of OARs
Shorter	Longer
Simple to moderate	Complex
Dose dose gradient less sharp	Sharp dose fall-off
Basic	Advanced
Suitable for simple-shaped	Best for irregular tumors

HYPERBARIC OXYGEN THERAPY

- Based on Marx's "3H" theory of ORN: Hypocellularity, Hypovascularity and Hypoxia



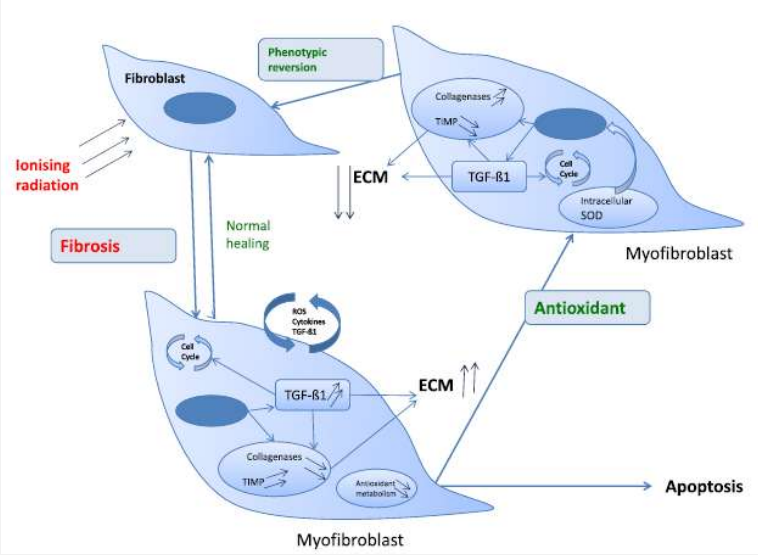






PENTOCLO

- Based on Delanian and Lefaix's radiation-induced fibroatrophic theory of ORN
  - Impaired healing results from endothelial injury, release of cytokines (inflammation) and abnormal fibroblast activity
  - End result is hypocellular bone and reduced bone matrix formation, compensated by fibrosis → bone and tissue necrosis



Pentoxifylline	α-Tocopherol (Vitamin E)	Clodronate
Vasodilator and antifibrotic	Antioxidant	Non-nitrogenous bisphosphonate



CONSERVATIVE ORN MANAGEMENT

- Strict oral hygiene
- Irrigation (saline)
- Chlorhexidine rinses or gel
- Cessation of tobacco and alcohol consumption
- Analgesics
- Antibiotic therapy
- Minimal surgical debridement

CANCER SURVEILLANCE

Follow-up Intervals

- **Year 1**: every 1-2 months
- **Year 2:** every 2-6 months
- **Years 3-5**: every 4-8 months
- **>5 years:** every 12 months.

Regular follow-ups to assess

- Symptoms
- Possible tumour recurrence
- Health behaviours
- Nutrition
- Dental health
- Speech and swallowing function

Increased risk of recurrence

- Buccal cancers
- Ongoing smoking
- Immunosuppressants
- Larger cancers
- Long history of SCCs ("hot mouth" "field cancerisation")

LONG-TERM COMMUNITY SUPPORT

General medical practitioner Clinical nurse specialist (including tracheotomy care and wound management) Speech and swallowing therapist Dietician (enteral feeding and oral nutrition) Dentist/Dental hygienist Physiotherapist Occupational therapist (lymphedema management)	Social worker Psychologist Psychiatrist Counsellor Pain specialist Smoking and alcohol cessation services Audiology

PSYCHOSOCIAL CONSIDERATIONS

- Depression during and post treatment
- Social support/isolation
- Affect on family (children, spouses)
- Quality of life impacts
- Social adaptation
- Occupation
- Survivorship
  - Treatment guiding your life – what next?
  - Fear of recurrence

PROGNOSIS

- 5-year survival
  - Overall survival for oral cancer globally = 50%

Stage I	Stage II	Stage III	Stage IV
85%	66%	41%	9%

- Steady increase in HNC survivors
  - Advances in treatment
  - Decreased smoking rates
  - Improved prognosis of HPV-associated oropharyngeal cancers (80% long term survival)

CURATIVE VS PALLIATIVE TX APPROACH

THANK YOU!

QUESTIONS?



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