

## Review Article

# Developing a Clinical Auditing Tool for the Post-Operative Dental Care for Oral Cancer

Al Shamrany M\*

Department of Surgery, Dental &amp; Maxillofacial Section, King Fahad Specialist Hospital-Dammam, Saudi Arabia

\*Corresponding author: Al Shamrany M, Department of Surgery, Dental & Maxillofacial Section, King Fahad Specialist Hospital-Dammam, P.O. Box 15215, MBC 031, 31444 Dammam, Saudi Arabia

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**Abstract**

Oral cancer incidence is on the rise. Dentistry is a part of the multidisciplinary service provided to patients with oral cancer before, during and after cancer treatment. Clinical audit is a great tool to improve dental care to patients with oral cancer. The aim of this review is to develop a clinical audit tool to evaluate the post-surgery and radiotherapy dental management for oral cancer based on available evidence.

**Keywords:** Clinical Audit; Oral Cancer; Dental Care

**Introduction**

In the United States, it is estimated that approximately 37,000 new cases are diagnosed every year [1]. Oral cancer incidence in the UK has risen by more than 30% since the early 1990s [2]. Dentistry is a part of the multidisciplinary service provided to patients with oral cancer before, during and after cancer treatment. Clinical audit is a great tool that have been used to improve dental care of cancer in general. No clinical audit specific to oral cancer have been published.

The aim of this review is to develop a clinical audit tool to evaluate the post-surgery and radiotherapy dental management for oral cancer based on available evidence.

**Methodology**

Audit standards were drawn from available evidence sources using PubMed database and Cochrane reviews as well as existing standards, guidelines and policies, and consensus until July 2019.

Next, evidence was reviewed and classified based on the level of strength outlined in table1 and subsequently, each standard was given

a grade of recommendation [3]. In some standards, the same standard was given different grades of rating due to the varying strength of evidence.

The Audit Standards:

The audit standards, Table 1,2, were grouped based on the following objectives:

- To assess the pathway of care (immediate follow-up, discharge and long term care).
- To assess preventive care.
- To assess the management of complications.

Table 3 displays a proposed questionnaire to collect audit data.

**Discussion**

Overall, evidence related to fluoride therapy and re-mineralizing agents was the strongest. Pilocarpine and Cevimeline also were supported with evidence of a higher level of strength for the management of xerostomia.

**Table 1:** Hierarchy of evidence and recommendations grading schem.

Level	Type of evidence	Grade	Evidence
1++	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias	A	At least one meta-analysis, systematic review of RCTs, or RCT rated as 1++ and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population and demonstrating overall consistency of results
1+	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias		
1-	Meta-analyses, systematic reviews of RCTs or RCTs with a high risk of bias		
2++	High quality systematic reviews of case control or cohort studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal	B	A body of evidence including studies rated as 2++, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
2+	Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal	C	A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal	D	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+
3	Non-analytic studies, e.g. case reports, case series		
4	Expert opinion	GPP*	Recommended best-practice based on the clinical experience of the guideline development group

GPP: Good Practice Point.

**Table 2:** Audit standards for the dental management of patients who had surgery and radiotherapy oral cancer.

Standards (Rating)	Target	Exception	Definitions/ instructions	questions on data collection sheet
<b>Pathway of care</b>				
1. Patients with stable oral health are seen at least biannually during the period of monitoring by the oncology team; and those with unstable oral health require more frequent monitoring. <b>(GPP)</b> [3-5].	100%	None	Period of monitoring by the oncology team: Within the first three years post-treatment.	1a,1b
2. Designated specialist/consultant restorative dentist is responsible to coordinate care including extractions after discharge to the primary dentist. <b>(GPP)</b> [3-7].	100% of discharged patients.	None		2
3. Patients with implant-supported or complex conventional prostheses have long-term follow-up by prosthodontics/ restorative specialist/consultant. <b>(GPP)</b> [5,6].	100% of complex cases.	None	Complex case: implant-supported or complex conventional prostheses	3
<b>Preventive care</b>				
4. Fluoride and/or re-mineralizing agents are available to all dentate patients. <b>(A)</b> [4,8]; <b>(B)</b> [9-11].	100% of dentate patients.	None	Daily topical fluoride application (5000 ppm fluoride) in custom-made trays or brush-on.	4
5. Oral hygiene and caries prevention are re-introduced as mucositis subsides. <b>(GPP)</b> [5].	100%	None		5
6. Oral care for patients fed <i>via</i> gastrostomy tube is to be maintained throughout the pathway. <b>(GPP)</b> [5].	100 % of patients who had gastrostomy tube			6
<b>Management of complications</b>				
7. Trismus prevention measures are implemented and patients with established trismus are managed appropriately.	100%	None	Trismus: tonic contraction of the masticatory muscles; and results in a limited mouth opening.	7
Exercises with a specific device. <b>(B)</b> [10,12]; <b>(C)</b> [5,13,14].				
Stacking and taping together tongue spatulas. <b>(B)</b> [4,12]				
Trigger point injections, analgesics, and muscle relaxants. <b>(B)</b> [4,15].				
Pentoxifylline. <b>(C)</b> [12]				
8. Xerostomia is managed appropriately.	100%	None	Salivary gland hypo-function: a decrease in salivary secretion, with pathological low saliva secretion as $\leq 0.1$ ml/min for unstimulated whole salivary flow and $\leq 0.5$ ml/min for stimulated whole salivary flow. Xerostomia: the subjective complaint of dry mouth.	8
Pilocarpine in patients with evidence of some intact salivary function, providing there are no medical contraindications. <b>(A)</b> [3,5,6,16]; <b>(B)</b> [4,10,12,14,17,19]				
Cevimeline. <b>(A)</b> [16,19]; <b>(B)</b> [12]				
Sipping water and sugarless fluids frequently. <b>(C)</b> [4]				
Chewing sugarless gum or lozenges. <b>(B)</b> [4,12,17,19]				
Saliva substitute (mouthwash or gel). <b>(B)</b> [10,19]; <b>(C)</b> [4,5,11,12]				
9. Dental extractions and implants placement should be carried out by specialists with a working knowledge of principles of radiotherapy and surgery, e.g. oral and maxillofacial surgeon and periodontist, under appropriate precautions. <b>(C)</b> [3], <b>(D)</b> [6].	100%	None		9
Atraumatic approach. <b>(B)</b> [4,20]; <b>(D)</b> [6]				
Pre-extraction antibiotic prophylaxis (Co amoxiclav/ amoxicillin (metronidazole in those allergic to penicillins) are generally the drugs of choice. <b>(B)</b> [4]				
Hyperbaric Oxygen (HBO) before and after tooth removal or implant placement. <b>(B)</b> [4,5]; <b>(C)</b> [21,22]				
A minimum of 24 months between the end of radiotherapy and implant insertion. <b>(D)</b> [8]				
10. Provision of dentures should be delayed for 12 months or more after completion of radiation to minimize the risk of Osteoradionecrosis (ORN) of the jaws. <b>(C)</b> [22-26].	100% of patients receiving dentures.	None		10

One Cochrane review reported insufficient evidence supporting the HBO role in ORN prevention during implant placement [27], however other reviews supported it even with moderate strength of evidence. Another Cochrane review reported insufficient evidence on the benefit of acupuncture and electrostimulation devices for

xerostomia [28], therefore they were not included in the standards.

Timing of the placement of the denture after completion of radiotherapy is controversial. The recommended period ranged from 4-6 weeks [29,30], to no longer than 6 months [7,31], to 1 year or

**Table 3:** Data Collection Sheet.

	<b>Questions:</b>
	Answers
Pathway of care	<b>1a. Patient with stable oral health: Was he/she seen at least biannually during the period of monitoring by the oncology team?</b>
	(Yes, No, NA, Exception)
	<b>1b. Patient with unstable oral health: Did he/she receive more frequent monitoring?</b>
	(Yes, No, NA, Exception)
Pathway of care	<b>2. Was there a designated specialist/consultant restorative dentist responsible for coordinating care including extractions after discharge to the primary dentist?</b>
	(Yes, No, NA, Exception)
	<b>3. Did the patient with implant-supported or complex conventional prostheses have long-term follow-up by prosthodontics/restorative specialist/consultant?</b>
	(Yes, No, NA, Exception)
PREVENTIVE CARE	<b>4. Was fluoride and/or re-mineralizing agents available to the dentate patient?</b>
	(Yes, No, NA, Exception)
	<b>5. Were oral hygiene and caries prevention re-introduced as mucositis subsided?</b>
	(Yes, No, NA, Exception)
	<b>6. Was oral care for patients fed via gastrostomy tube maintained throughout the pathway?</b>
	(Yes, No, NA, Exception)
MANAGEMENT OF COMPLICATIONS	<b>7. Was the patient with established trismus managed appropriately?</b>
	(Exercises with tongue depressors, Exercises with a specific device, Trigger point injections, Pentoxifylline, None, NA, Exception)
	<b>8. Was the patient with Xerostomia managed appropriately?</b>
	(Pilocarpine, Cevimeline, Sipping water and sugarless fluids, Chewing gum, Saliva substitute, None, NA, Exception)
	<b>9. Was dental extraction and/or implant placement carried out under appropriate precautions?</b>
	(Atraumatic approach, Antibiotic, HBO, No HBO facility, None, NA, Exception)
	<b>10. Was denture provision delayed 1 year or more after completion of radiation?</b>
	(Yes, No, NA, Exception)

Note: Statistical analysis guide: a therapy will be stratified as "Yes, met standard".

more being the majority [22,26]. It has been suggested that patients who never had dentures before radiation or had been dentulous prior to therapy and had either intra- or postradiation extractions seem to be at a higher risk of developing ORN [24,31,32]. Oral cancer places the entire mouth at a radiation dose greater than 5000 cGy, which was reported as a risk factor for ORN in denture users [32]. Therefore, it is best that the provision of dentures should only commence after 1 year following radiotherapy based on weighing risk and benefit.

### Conclusion

Clinical audit is a proven quality improvement method that must be part of the practice organizationally to learn and improve performance. Comparing care delivery to standards drawn from high-quality evidence is the core of any clinical audit. There is a lack of strong evidence that supports audit standards related to post-surgery and radiotherapy dental management for oral cancer or head a neck cancer in general. However, audit standards can be developed currently from the highest level of evidence available until stronger evidence emerges.

### References

1. National Institutes of Health Updated October 2010. FACT SHEET - Oral Cancer.
2. National Cancer Intelligence Network. National Cancer Registration and Analysis Service, Public Health England 2010.

3. Scottish Intercollegiate Guidelines Network 2006. Diagnosis and Management of Head and Neck Cancer: A National Clinical Guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network, (90), 96.
4. The Royal College of Surgeons of England, the British Society for Disability and Oral Health 2012. The Oral Management of Oncology Patients Requiring Radiotherapy, Chemotherapy and/or Bone Marrow Transplantation.
5. Restorative Dentistry-UK 2016. Predicting and Managing Oral and Dental Complications of Surgical and Non-Surgical Treatment for Head and Neck Cancer. A Clinical Guideline.
6. National Institute for Health and Care Excellence 2004. Improving Outcomes in Head and Neck Cancers. London (United Kingdom): National Institute for Health and Care Excellence.
7. Mc Caul LK. Oral and dental management for head and neck cancer patients treated by chemotherapy and radiotherapy. Dent Update. 2012; 39: 135-138, 140.
8. Buglione M, Cavagnini R, Di Rosario F, Sottocornola L, Maddalo M, Vassalli L, et al. Oral toxicity management in head and neck cancer patients treated with chemotherapy and radiation: Dental pathologies and osteoradionecrosis (Part 1) literature review and consensus statement. Crit Rev Oncol Hematol. 2016; 97: 131-142.
9. Chai, WL, Ngeow, WC, Ramli, R, Rahman RA. Managing complications of radiation therapy in head and neck cancer patients: Part II. Management of radiation-induced caries. Singapore Dent J. 2006; 28: 4-6.
10. Multinational Association of Supportive Care in Cancer /International Society of Oral Oncology 2010. A summary of the prevalence of the oral complications reviewed as well as the management recommendations.

11. Ray-Chaudhuri A, Shah K, Porter RJ. The oral management of patients who have received radiotherapy to the head and neck region. *Br Dent J.* 2013; 214: 387-393.
12. Buglione M, Cavagnini R, Di Rosario F, Maddalo M, Vassalli L, Gersanti S, et al. Oral toxicity management in head and neck cancer patients treated with chemotherapy and radiation: Xerostomia and trismus (Part 2). Literature review and consensus statement. *Crit Rev Oncol Hematol.* 2016;102: 47-54.
13. Bensadoun RJ, Riesenbeck D, Lockhart PB, Elting LS, Spijkervet FK, Brennan MT. Trismus Section, Oral Care Study Group, Multinational Association for Supportive Care in Cancer (MASCC)/International Society of Oral Oncology (ISOO). A systematic review of trismus induced by cancer therapies in head and neck cancer patients. *Support Care Cancer.* 2010; 18: 1033-1038.
14. Butterworth C, McCaul L, Barclay C. Restorative dentistry and oral rehabilitation: United Kingdom National Multidisciplinary Guidelines. *J Laryngol Otol.* 2016; 130: S41-S44.
15. Hancock PJ, Epstein JB, Sadler GR. Oral and dental management related to radiation therapy for head and neck cancer. *J Can Dent Assoc.* 2003; 69: 585-590.
16. Mercadante V, Al Hamad A, Lodi G, Porter S, Fedele S. Interventions for the management of radiotherapy-induced xerostomia and hyposalivation: A systematic review and meta-analysis. *Oral Oncol.* 2017; 66: 64-74.
17. Ngeow WC, Chai WL, Rahman RA, Ramli R. Managing complications of radiation therapy in head and neck cancer patients: Part I. Management of xerostomia. *Singapore Dent J.* 2006; 28: 1-3.
18. Jensen SB, Pedersen AM, Vissink A, Andersen E, Brown CG, Davies AN, et al. Salivary Gland Hypofunction/Xerostomia Section; Oral Care Study Group; Multinational Association of Supportive Care in Cancer (MASCC)/International Society of Oral Oncology (ISOO). A systematic review of salivary gland hypofunction and xerostomia induced by cancer therapies: management strategies and economic impact. *Support Care Cancer.* 2010; 18: 1061-1079.
19. Gupta N, Pal M, Rawat S, Grewal MS, Garg H, Chauhan D et al. Radiation-induced dental caries, prevention and treatment - A systematic review. *Natl J Maxillofac Surg.* 2015; 6: 160-166.
20. Koga DH, Salvajoli JV, Alves FA. Dental extractions and radiotherapy in head and neck oncology: review of the literature. *Oral Dis.* 2008; 14: 40-44.
21. Bennett MH, Feldmeier J, Hampson NB, Smee R, Milross C. et al. Hyperbaric oxygen therapy for late radiation tissue injury. *Cochrane Database Syst Rev.* 2016; 4: CD005005.
22. Rahman RA, Ngeow WC, Chai WL, Ramli R. Managing complications of radiation therapy in head and neck cancer patients: Part III. Provision of dentures. *Singapore Dent J.* 2006; 28: 7-10.
23. Riley C. Maxillofacial prosthetic rehabilitation of post-operative cancer patients. *J Prosthet Dent.* 1968; 20: 353-360.
24. Rahn AO, Matalon V, Drane JB. Prosthetic evaluation of patients who have received irradiation to the head and neck region. *J Prosthet Dent.* 1968; 19: 174-178.
25. Krajcicek DD. Oral radiation in prosthodontics. *J Am Dent Assoc.* 1969; 78: 320-322.
26. Beech N, Robinson S, Porceddu S, Batstone M. Dental management of patients irradiated for head and neck cancer. *Aust Dent J.* 2014; 59: 20-28.
27. Esposito M, Grusovin MG, Patel S, Worthington HV, Coulthard P. Interventions for replacing missing teeth: hyperbaric oxygen therapy for irradiated patients who require dental implants. *Cochrane Database Syst Rev.* 2008; CD003603.
28. Furness S, Bryan G, McMillan R, Worthington HV. Interventions for the management of dry mouth: non-pharmacological interventions. *Cochrane Database Syst Rev.* 2013; CD009603.
29. Carl W, Ikner C. Dental extractions after radiation therapy in the head and neck area and Hard Tissue Replacement (HTR) therapy: a preliminary study. *J Prosthet Dent.* 1998; 79: 317-322.
30. Tolentino Ede S, Centurion BS, Ferreira LH, Souza AP, Damante JH, Rubira-Bullen IR. Oral adverse effects of head and neck radiotherapy: literature review and suggestion of a clinical oral care guideline for irradiated patients. *J Appl Oral Sci.* 2011; 19: 448-454.
31. Eposito SJ, Matheis MJ. Sequelae and dental management of the head and neck radiation patient. *Ohio Dent J.* 1987; 61: 17-19, 21-24.
32. Gerngross PJ, Martin CD, Ball JD, Engelmeier RL, Gilbert HD, Powers JM, et al. Period between completion of radiation therapy and prosthetic rehabilitation in edentulous patients: a retrospective study. *J Prosthodont.* 2005; 14: 110-121.