A Service Evaluation of Dental Assessments Prior to Treatment for Head and Neck Cancer in NHS Grampian

Keywords

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ABSTRACT

To minimise the risk of Osteoradionecrosis (ORN) following radiotherapy, dental assessments are carried out by Restorative Consultants to determine teeth of poor prognosis requiring extraction before the commencement of radiotherapy for oncological treatment. Social deprivation is a high-risk factor for poor oral health and head and neck cancer (HANC), consequently highlighting the importance of the prehabilitation pathway, including dental assessment. Aim: To retrospectively assess the demographics of the HAN oncology patient cohort, treatment modality, prehabilitation pathway and timeframe within NHS Grampian and highlight the role of the Restorative Dental Consultant. Materials and Methods: Retrospective assessment of 120 HANC patients' clinical records from May 2018 to December 2019. The patients were selected as a continuous cohort from Restorative Consultant dental assessment clinics. Results: Radiotherapy was the most common treatment modality, with 91% of patients receiving treatment; the mean time between completing dental extractions and commencing radiotherapy for oncological treatment was 17.98 days. Conclusion: The HANC prehabilitation pathway should be conducted in a timeframe that allows patients to have sufficient time for healing between extractions and oncological treatment commencing to reduce ORN risk. The study also demonstrates an increased incidence of HANC in areas of higher social deprivation.

INTRODUCTION

Head and neck cancer is the 8th most common cancer diagnosis in the UK, accounting for 3% of all new diagnoses in 2017. This equates to approximately 34 new cases per day.[1]

Radiotherapy is a common treatment modality utilised in the management of such tumours,[2] with up to 85% of patients with head and neck cancer being treated with radiotherapy.[3] It can be used as a single mode of treatment or in combination with surgery and/or chemotherapy. Unfortunately, radiotherapy has a number of complications which have a direct impact on healthy tissues such as mucositis, trismus, xerostomia, and osteoradionecrosis (ORN). [4-6] In addition, dental caries,[7,8] and periodontal disease[9] commonly occur in patients who have received radiotherapy resulting in the need for dental extractions.[10]

ORN is a condition which may occur following dental extractions in patients who have been treated with radiotherapy and is characterised by the exposure of non-healing, devitalised bone and can be associated with

severe orofacial pain with a significant negative impact on a patient's quality of life (QoL).[11,12] ORN of the jaws is defined as exposed irradiated bone that fails to heal over a period of 3 months without any evidence of persisting or recurrent tumour, its reported prevalence varies greatly with some studies suggesting it ranges from less than 1% to over 50%.[13]

To reduce the need for invasive dental procedures in the future for such patients, it is important that every patient should be offered the opportunity to undergo a full dental assessment prior to their cancer treatment, mitigating the risks of possible side effects including ORN. It is nationally agreed that patients should be assessed by a Consultant in Restorative Dentistry as a core member of the Head and Neck MDT.[14]

This dental prehabilitation assessment serves a number of functions;

- To avoid unscheduled interruptions to primary treatment as a result of dental problems.
- To ensure the patient understands the nature and implications of the short- and long-term oral complications.
- To carry out appropriate dental treatment informed by assessment of individual risk of development of post treatment oral complications and taking into account the overall prognosis.
- To plan post-treatment prosthetic oral rehabilitation.

An important aspect of this dental assessment phase involves rendering patients dentally fit and providing preventative advice and management. Often however decisions will have to be made regarding extraction of any teeth of dubious prognosis.[15-17] There is no consensus when deciding which teeth should be extracted. Decisions are based on a clinician's expert opinion, considering the clinical presentation, strategic value of the tooth, the evidence available on tooth survival and patients' wishes after weighing up the risks and benefits to dental extractions.[7,18] The delivery of this service requires good and efficient communication to ensure cancer treatment is not delayed as it is recommended any dental extractions should be completed at least 10 days prior to commencing radiotherapy.[19,20]

The aim of this study was to assess the demographics of the head and neck oncology cohort and analyse the prehabilitation pathway and timeframe of these patients in NHS Grampian, whilst highlighting the importance of the Restorative Consultant in the head and neck cancer multidisciplinary team.

All patients within the cohort were seen within the NHS Grampian health board responsible for half a million people and covering a range of communities within the 3,000 square miles such as city, town, village and rural.[21] This allows for a diverse socioeconomic status as recorded by the Scottish Index of Multiple Deprivation (SIMD).

SIMD allows for identification of deprivation and low socioeconomic status by assessing 7 domains: income, employment, education, health, access to services, crime, and housing. However as stated on the SIMD website 'SIMD is less helpful at identifying the smaller pockets of deprivation found in more rural areas, compared to the larger pockets found in urban areas.[22,23]

METHODS

Advice was sought from NHS Grampian Clinical Effectiveness team and data was collected in line with Caldicott principles and guidance. Approval was granted prior to conducting a retrospective study within NHS Grampian over a 19-month period between May 2018 to December 2019. Patients were selected as a continuous cohort from the Head and Neck oncology dental assessment clinics carried out by a Restorative Consultant.

A total of 120 (M = 87, F= 33) patient records were extracted from digital patient records which fulfilled the following inclusion criteria:

1. Patients who required a dental assessment prior to oncology treatment.[14]
2. All patients with a confirmed histopathological diagnosis of Head and Neck cancer regardless of site, tumour stage or treatment modality.[24]

The following data was extrapolated from the initial and subsequent proformas made:

- TNM diagnosis
- Tumour type (eg Squamous Cell Carcinoma)
- Anatomical location
- Initial referral date
- Dental assessment date
- Treatment plan and date carried out, including if this was over one or two visits and with either Local anaesthetic or General Anaesthetic
- Oncological treatment modality and the date of radiotherapy
- Whether the patient was deceased
- HPV status
- Postcode

This was then transferred to Excel for data analysis by two authors.

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RESULTS

DIAGNOSTIC INFORMATION

Ninety-four percent (113/120) of patients presented with a squamous cell carcinoma (SCC). The tumour sites are shown in Figures 1 and 2. These are dominated by oropharyngeal (tonsillar tongue base) site of origin (44%), with the next most common being Laryngeal (10%). The location impacts the type of oncological treatment offered to the patient. Surgery and radiotherapy are the most common treatment modalities used for oral cancer, however radiotherapy or chemoradiotherapy are the more preferred management for oropharyngeal cancers which are typically HPV positive.[25]

The T stage of the tumours is shown in Figure 3. Seventy-five out of 120 patients (62.5%) presented with positive neck pathology, which has a negative effect on prognosis and 5-year survival rates[26] *(Figure 4)*.

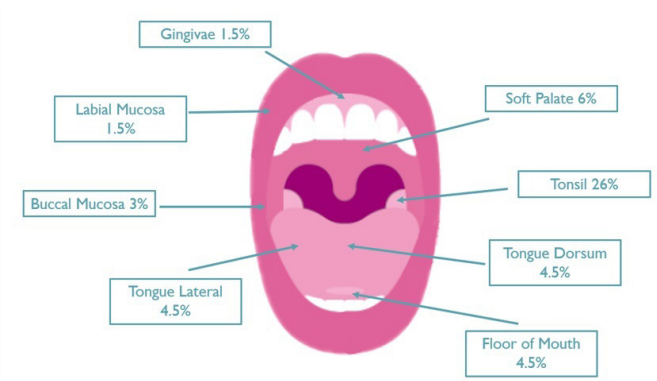

Figure 1: Anatomical distribution of primary sites of diagnosis for Head and neck cancer with oral cancer making up 22% of all head and neck cancers (Images adapted from cancerresearchuk.org).

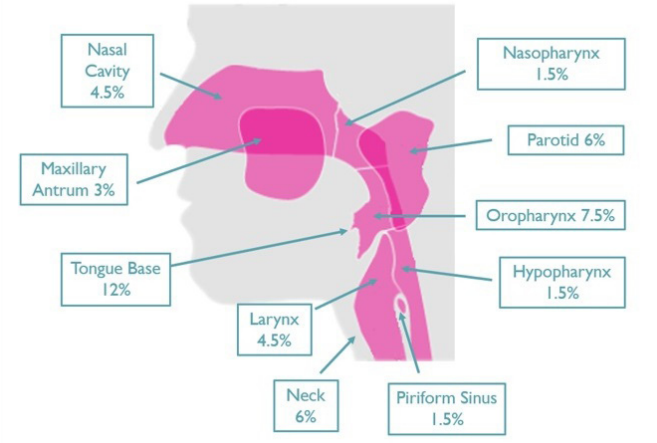

Figure 2: Regional anatomic distribution of primary sites of presentation for head and neck cancer in NHS Grampian (Images adapted from cancerresearchuk.org).

GEOGRAPHICAL SPREAD

The geographical spread of cases per postcode is denoted in Figure 5 (Aberdeen City) and Figure 6 (Aberdeenshire). Due to obvious population differences between regions, the risk of head and neck cancer incidence was calculated as cases per 10,000 of the population, over the specified time period. Those regions at highest risk (4 or more cases per 10,000 population) are indicated by the darkest shade. Those regions appearing to be at high risk include inner city locations as well as remote and rural.

PATHWAY

Timescales involving the patients restorative prehabilitation journey are summarised in the schematic diagram below *(Figure 7)*. The speed with which patients are seen following referral for dental assessment is a mean of 3.75 days. Following this the mean time from dental assessment to completion of recommended extractions is 6.64 days. The time between completion of extractions and initiation of oncological treatment (including radiotherapy) is a mean of 17.98 days, thus the entire timeframe from the initial referral for Restorative Consultant led dental assessment to initiation of cancer treatment is approximately 28.3 days. Three patients breeched the desired timeframe, none of which went on to develop ORN, however one patient is deceased despite treatment having curative intent.

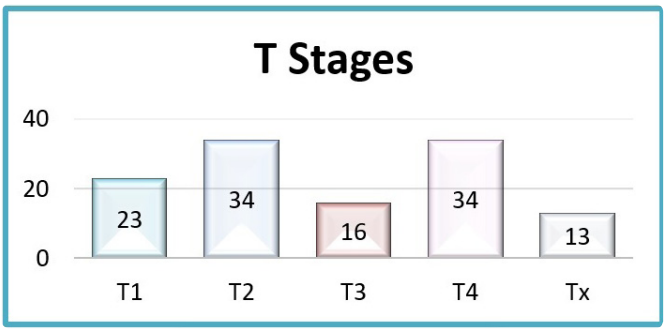

Figure 3: T-stages of Tumours.

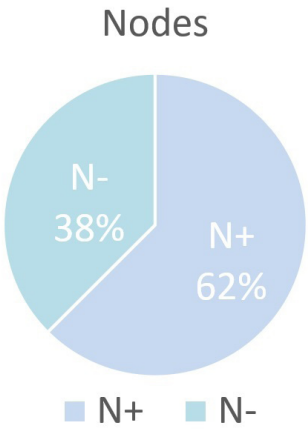

Figure 4: Nodal involvement

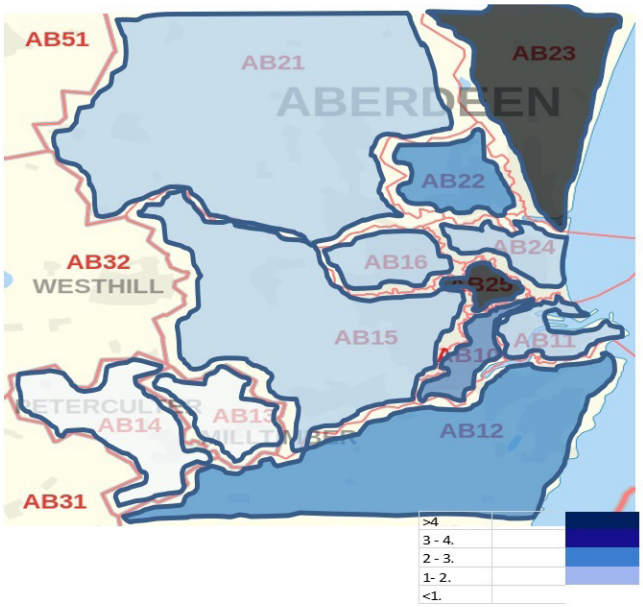

Figure 5: Representation of the Aberdeen city postcode region and incidence of head and neck cancer. The scale represents number of cancer diagnoses per 10000 of population. AB25 and AB23 show the highest risk with more than 4 cases per 10000 people.

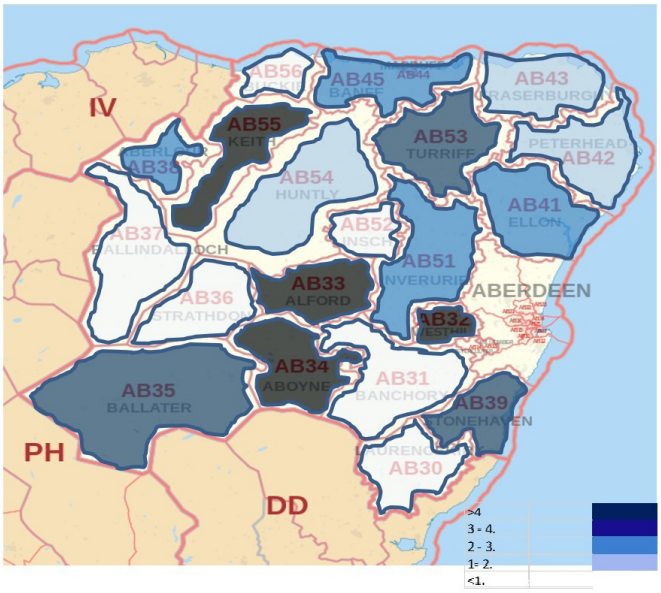

Figure 6: Representation of Aberdeenshire postcode regions and the incidence of head and neck cancer diagnoses, ranging from less than 1 case per 10000 population (white shade) up to over 4 per 10000 (darkest shade). Some rural areas show the highest incidence with Keith Alford and Aboyne all showing more than 4 cases per 10000 people.

Figure 7: Schematic Diagram of the Head and Neck cancer patient journey from initial referral for Restorative Dentistry pre-assessment to final start date of Oncological treatment

TREATMENT INFORMATION

Ninety one percent of patients (110/120) were planned to have radiotherapy as part of their oncology treatment. Twenty- eight (23%) patients were planned for radiotherapy alone, 67 (56%) were planned for chemoradiotherapy, 15 patients (13%) were planned for surgery and adjunctive chemo/radiotherapy and 11 patients (9%) were planned for surgery alone.

DISCUSSION

This study has demonstrated the significant input dentistry has in delivery of a comprehensive head and neck oncology treatment plan. Within NHS Grampian, clear communication between members of the MDT ensures patients receive a dental assessment prior to embarking on their cancer therapy which prevents treatment from being delayed and allows adequate time for any treatment to be carried out. Rendering patients dentally fit prior to oncological treatment commencing helps mitigate potential oral and dental complications. The Restorative consultant attends a joint patient clinic with the Maxillofacial consultant and Oncology consultant to aid in treatment planning, taking into consideration patient wishes as well as the surgical and oncological treatment required. The patient clinics take place within the Maxillofacial department which is in the same health campus as the Dental Hospital, this allows the consultant to have easy access to the clinic during these sessions.

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Often this group of patients present with complex medical histories and complex dentitions, with extensive restorations and implant restorations becoming increasingly common. When treatment planning such cases, it has been demonstrated there is a vast amount of clinical experience required across all restorative dentistry disciplines to ensure the most appropriate patient-centred treatment plan is enacted.

CONCLUSION

This study has confirmed a link between areas of social deprivation and an increase incidence rate of head and neck cancer as has been previously demonstrated in the literature.[27,28] Multiple oral hygiene, periodontal, restorative and exodontia appointments should be considered within the prehabilitation timeframe for this cohort of patients, due to poor dentition and neglect. This study withing NHS Grampian demonstrated a sufficient interval between dental extractions and commencing radiotherapy therefore minimising the risk of ORN as a possible oral complication of oncological treatment. Future treatment planning should utilise each member of the MDT to optimise patient-centred care, pre, peri and post oncological treatment.

REFERENCES

1. Cancer Research UK. Head and neck cancers statistics. Available at: https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/head-and-neck-cancers (Accessed May 2020).
2. GOV.UK. 2016. National Cancer Registration and Analysis Service (NCRAS). Available at:https://www.gov.uk/guidance/national-cancer-registration-and-analysis-service-ncras. (Accessed May 2020).
3. Breslin, M. and Taylor, C. Incidence of new carious lesions and tooth loss in head and neck cancer patients: a retrospective case series from a single unit. *Br Dent J* 2020; **229**:539-543.
4. Colloc, T., Brown, T. and Keys, W. Role of the consultant in restorative dentistry in managing head and neck cancer patients undergoing radiotherapy: a novel intraoral shield appliance design. *Br Dent J* 2020; **229**:655–660.
5. Lalla, R.V., Bowen, J., Barasch, A. Elting, L., Epstein, J., M Keefe, D.M., McGuire, D.B., Migliorati, C., Nicolatou-Galitis, O., Peterson, D.E., Raber-Durlacher, J. E., Sonis, S.T. and Elad, S. MASCC/ISOO clinical practice guidelines for the management of mucositis secondary to cancer therapy. *Cancer* 2014; **120**:1453-1461.
6. Jensen, S.B., Pedersen, A.M.L., Vissink, A., Andersen, E., Brown, C.G., Davies, A. N., Dutilh, J., Fulton, J. S., Jankovic, L., Lopes, N. N. F., Mello, A.L.S., Muniz, L.V., Murdoch-Kinch, C.A., Nair, R.G., Napeñas, J.J., Nogueira-Rodrigues, A., Saunders, D., Stirling, B., von Bültzingslöwen, I., Weikel, D.S., Elting, L.S., Spijkervet, F.K.L. and M.T., Brennan, A systematic review of salivary gland hypofunction and xerostomia induced by cancer therapies: prevalence, severity and impact on quality of life. *Support Care Cancer* 2010; **18**:1039-1060.
7. Kawashita, Y., Soutome, S., Umeda, M. and Saito, T. Oral management strategies for radiotherapy of head and neck cancer. Jpn Dent Sci Rev 2020; **56**:62-67.
8. Hong, C.H.L., Napeñas, J.J., Hodgson, B.D., Stokman, M.A., Mathers-Stauffer, V., Elting, L.S., Spijkervet, F.K.L. and Brennan, M.T. A systematic review of dental disease in patients undergoing cancer therapy. *Support Care Cancer* 2010; **18**:1007–1021.
9. Jawad, H., Hodson, N. and Nixon, P. A review of dental treatment of head and neck cancer patients, before, during and after radiotherapy: part 2. *Br Dent J* 2015; **218**:69–74.
10. Koga, D.H., Salvajoli, J.V. and Alves, F.A. Dental extractions and radiotherapy in head and neck oncology: review of the literature. *Oral Dis* 2008; **14**:40-44.
11. Semple, C.J. and Killough, S.A. Quality of life issues in head and neck cancer. *Dent Update* 2014; **41**: 346-348, 351-353.
12. Anonymous. Study protocol for the World Health Organization project to develop a Quality of Life assessment instrument (WHOQOL). *Qual Life Res* 1993; **2**:153-159.
13. Chronopoulos, A., Zarra, T., Ehrenfeld, M. and Otto, S. Osteoradionecrosis of the jaws: definition, epidemiology, staging and clinical and radiological findings. A concise review. *Int Dent J* 2018; **68**:22-30.
14. RD-UK. Predicting and Managing Oral and Dental Complications of Surgical and Non-Surgical Treatment for Head and Neck Cancer. 2016.
15. Critchlow, S.B., Morgan, C. and Leung, T. The oral health status of pre-treatment head and neck cancer patients. *Br Dent J* 2014; **216**:E1.
16. Beacher, N. and Sweeney, M. The dental management of a mouth cancer patient. *Br Dent J* 2018; **225**:855–864.
17. Butterworth, C., McCaul, L. and Barclay, C. Restorative dentistry and oral rehabilitation: United Kingdom National Multidisciplinary Guidelines. J Laryngol Otol 2016; **130**:S41-S44.
18. Calvert, G., Barclay, S.C., Owens, J.S. and Alani, A. A national survey of restorative consultants' treatment provision for head and neck oncology patients. *Br Dent J* 2014; **217**:E21.
19. Jawad, H., Hodson, N.A. and Nixon, P.J. A review of dental treatment of head and neck cancer patients, before, during and after radiotherapy: part 1. *Br Dent J* 2015; **218**:65-68.
20. Royal College of Surgeons England. The Oral Management of Oncology Patients Requiring Radiotherapy, Chemotherapy and / or Bone Marrow Transplantation. 2018; 9-10.
21. Nhsgrampian.org. 2020.Grampian N. About NHS Grampian. Available at: https://www.nhsgrampian.org/about-us/about-nhs-grampian/ (Accessed February 2021).
22. Gov.scot. 2020. Scottish Index of Multiple Deprivation 2020 - gov.scot. Available at: https://www.gov.scot/collections/scottish-index-of-multiple-deprivation-2020/ (Accessed February 2021).
23. Scottish Index of Multiple Deprivation. 2020. SIMD (Scottish Index of Multiple Deprivation). Available at: https://simd.scot/#/simd2016/BTTTFTT/13/-2.1300/57.1500/ (Accessed February 2021).
24. Barnes, L., Eveson, J., Reichart, P. and Sidransky, D. World Health Organization classification of tumours. Lyon: IARC Publications; 2005.
25. Furness, S., Glenny, A., Worthington, H., Pavitt, S., Oliver, R., Clarkson, J., Macluskey, M., Chan, K.K. and Conway, D.I. Interventions for the treatment of oral cavity and oropharyngeal cancer: chemotherapy. Cochrane Database Syst Rev 2011.
26. Sanderson, R. and Ironside, J. Squamous cell carcinomas of the head and neck. *BMJ* 2002; **325**:822-827.
27. McGrady, M., Ellwood, R., Maguire. A., Goodwin, M., Boothman, N. and Pretty, I. The association between social deprivation and the prevalence and severity of dental caries and fluorosis in populations with and without water fluoridation. *BMC Public Health* 2012; **12**:1122
28. Anderson, W., Ahmed, H. A retrospective analysis of hospitalisation for diseases of the pulp and periapical tissues in NHS Grampian 2011-2015: geographic, socioeconomic and increased primary care availability effects. *Br Dent J* 2019; **226**:951–954.