

# The impact of pre-radiotherapy dental extractions on head and neck cancer patients: a qualitative study

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## Key points

Explores the clinical reasons and evidence base behind pre-radiotherapy (RT) dental extractions.

Provides an insight into the impact of pre-RT extractions on head and neck oncology patients in the context of their overall oncology care.

Highlights the need to review the position of the dental speciality in the care of this complex patient group.

**Background** Head and neck cancer patients (HNCs) are recommended to have dental extractions if teeth have a poor prognosis, they are non-functional, interfere with the surgical site or there is a risk of post-radiotherapy (RT) trismus that could prevent access for future care. There is little research available to determine the impact of this approach on patients.

**Method** A qualitative study based on semi-structured interviews conducted with 18 HNCs who experienced pre-RT extractions. Transcripts were analysed by thematic analysis. **Results** Pre-RT extractions represented the first significantly invasive stage of care in the cancer pathway. For most participants the experience was made worse by the fact that teeth were often healthy, asymptomatic and were not the actual site of cancer. Tooth extractions had a significantly negative impact on quality of life. **Conclusion** HNCs encountered the dental speciality at a stressful point in the cancer pathway.

They felt that their information needs about pre-RT extraction were not addressed and choices were limited. Extractions had a profound negative impact. Given the lack of robust evidence and the advent of new technologies, less radical approaches to pre-RT dental treatment planning should be considered.

## Background

Annually Guy's and St. Thomas' NHS Foundation Trust cares for approximately 570 new head and neck cancer patients (HNCs), of which up to 180 will receive radiotherapy (RT) as part of their oncology treatment plan. Prior to starting RT, patients attend for oral health assessment in the Department of Sedation and Special Care Dentistry to mitigate the possible side-effects associated with this treatment modality, as outlined in Table 1.<sup>1,2</sup>

HNCs often have significant untreated oral disease.<sup>3,4</sup> In line with best practice guidance<sup>1,5</sup> patients are offered tailored preventative advice and usually prescribed a high fluoride regime

comprising 0.05% sodium fluoride mouth rinse and 1.1% sodium fluoride toothpaste. They are also given an information leaflet which describes RT and the potential oral health complications. Following assessment, teeth are typically recommended for extraction if they have a poor prognosis such as extensive dental caries, advanced periodontal disease or if they are heavily restored. The latter may require extraction in the future and are therefore considered sites where osteoradionecrosis (ORN) could develop. In addition, healthy teeth are also recommended for extraction if they are non-functional, interfere with the surgical site or post-RT trismus could prevent access for future assessment, maintenance and treatment.<sup>4</sup>

The time between the diagnosis of a tumour and the start of RT is recommended to be kept as short as possible in order to have the highest possibility of a cure.<sup>5</sup> It is standard practice in the United Kingdom for extractions to be undertaken up to three weeks before commencement of RT, with 10 days considered a minimum period.<sup>1</sup> For this reason, pre-RT extractions may be undertaken at the same visit as assessment, unless the patient is planned for oncology-related care under GA,

such that dental extractions may be performed at the same time as surgery. There is variation between services in this respect.

Although the potential oral sequelae of treatments for head and neck cancer are well documented,<sup>1,2,6</sup> there is a lack of evidence to support or refute the extraction or non-extraction of healthy or diseased teeth before radiotherapy in order to reduce the risk of complications.<sup>7</sup> In particular there is little description of this approach from the patient's perspective. To address this gap, a qualitative study was designed to explore the direct impact of pre-RT dental extractions on patient experience, expectations and their understanding of both oral health and function.

## Method

A qualitative method was adopted for this study as it allowed flexibility for exploration of participant experience and perspectives by offering space to expand answers and feelings relating to the head and neck cancer care pathway. Semi-structured interviews were conducted, with some questions drawn from the known literature. The format allowed participants to

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Refereed Paper.

Accepted 1 February 2018

Published online 22 June 2018

DOI: 10.1038/sj.bdj.2018.442

introduce new themes based on their experience of the care pathway.

Potential participants were identified by the dental team from lists of patients who had undergone pre-RT extractions and were due for a recall appointment five months after completion of RT. They were approached by a letter of invitation and participant information sheet, which were included with the recall appointment letter. Participants were introduced to the researcher who ensured informed consent to proceed. The researcher did not have access to clinical records. The length of interview was determined by the participant's level of involvement, with an opportunity to withdraw at any point. In order to be eligible, participants had to be over 18 years of age, have capacity to consent, English-speaking to a sufficient standard to take part in the interview and have received pre-RT extractions.

A figure of 20 participants was estimated as the number at which saturation of the data might occur, based on previous qualitative research in dentistry.<sup>8</sup> Recruitment took place over 6 months, from 11 December 2015 – 27 May 2016.

Data derived from interviews were collected through MP3 audio recordings with respondent validation at the time of the interview before being transcribed verbatim. Transcripts were analysed using thematic analysis. This technique involved working systematically through the transcripts in order to become familiar with the data, allowing the generation of summary words known as sub-themes for each element that had been discussed. Following this, the sub-themes were refined by grouping together to generate themes.<sup>9</sup> In order to reduce the risk of bias, validation of the analyses was undertaken whereby two alternative members of the research team reviewed the transcripts independently and held a meeting to establish consensus.

## Results

Eighteen participants were recruited, which took data collection to saturation. This comprised four women and 14 men aged from 37 to 75 years. Of the 60 patients that were invited to participate, two had died, one declined due to mental health status and three more as they did not feel well enough, eight cancelled their recall appointment and the remaining 28 failed to attend for review.

Overall 16 participants communicated verbally, and two participants communicated non-verbally with pen and paper. Interview

length ranged from five minutes 10 seconds to 42 minutes and five seconds. All interviews were conducted by the same researcher.

A summary of the thematic analysis is found in Table 2, key findings are discussed thereafter. Each quote is followed by participant demographic information relating to gender, summarised as M (male) or F (female) followed by their age in years.

It was apparent that the experiences, expectations and understanding of pre-RT dental extractions were similar across all demographics.

The period immediately after receiving the diagnosis was a frightening time for many of the

participants. It is within this stressful context that they came into contact with the dental team.

*'...all hell let loose, letters, bombardments and obviously the diagnosis, which was obviously a big shock to the system...'* (Interview 13, M:54. Lines 31–32)

A wide range of factors influenced their experience; however, the provision of information in relation to dental assessment and treatment was a recurrent focus within the interviews. The majority of participants did not feel adequately prepared for the likelihood of pre-RT extractions. This was frequently due to a lack of information or misinformation from the oncology team:

**Table 1 Side-effects associated with radiotherapy to the head and neck<sup>1,2</sup>**

Acute	Chronic
Mucositis	Xerostomia
Dysguesia	Trismus
Dysphagia	Osteoradionecrosis
	Radiation caries
	Periodontal disease

**Table 2 Summary of thematic analysis**

Theme	Sub-themes
Demographics	Age Gender Employment status
Impact of cancer diagnosis	Reaction Outlook
Perceptions of oral healthcare	Care environment Dental team Organisation Resources Integration of dental care into cancer care pathway Information Urgency of care
Decision making	Impact of clinical recommendations Provision and understanding of information Influence of the dentist-patient relationship Impact of clinical time frame Patient choice
Outcome of extractions	Tooth loss Aesthetics Eating Speaking Adaptation Anxiety Physical toll Regret
Continuity of care	Management of complications Support Discharge Tooth replacement
Oral health status	Perception pre-diagnosis Perception post-treatment

'I thought I was coming up for something like a check-up and to see how things were, but they were more or less saying we're taking seven out this evening like you know. I was a bit shocked about that...' Interview 17, M:59. Lines 111–114

Many felt that due to the pressure of starting cancer treatment, they did not have the capacity to receive and process any more information:

'...everything happened too quickly, I didn't really have time to think about it, which I know they were doing it for the good, so I don't get complications after, yeah but erm yeah, it all took it... (pause) it's all sank in now [sic] I've had time to heal but at that time I found everything really overwhelming, the visits up here, seeing so many different people, and the fact that I was going to lose five teeth.' (Interview 3, F:38. Lines 77–80)

It was also suggested that individual needs differed and their emotional status clearly affected the retention and understanding of information provided:

'I'd imagine that everybody reacts differently. I thinks [sic] that's personal, everybody's response is different... I don't think that was anything lacking on your part, I think it was sort of my mental frame of mind really, quite scared, it was quite a frightening time...' Interview 16, F:53. Lines 193–194, 198–199)

The majority of participants expressed apprehension and shock at extraction recommendations, particularly those who had no prior oral disease:

'I think it was such a shock to me because all I was told before I started radiotherapy was that I had to go have my teeth x-rayed to see (emphasis) if there was any decay because if there was, then they were going to remove the teeth beforehand, not the fact that there is absolutely nothing wrong with your teeth but we're going to take them out anyway. That came as a shock.' (Interview 1, F:44. Lines 101–108)

A small number of participants expressed no worries about the extractions in view of their overarching concerns for their general health at that point in time:

'Didn't bother me. As long as the cancer is alright, that's the only thing that bothered me.' (Interview 5, M:62. Lines 67–68)

Many participants were able to recall some of the clinical reasons offered for the recommendation of dental extractions, but understood that this was a precautionary recommendation:

'...they decided to extract the eight teeth at the back because they could foresee that it was going

to be problematic at a later date.' (Interview 16, F: 53. Lines 49–50)

Most of the participants had some understanding that there was a risk of ORN following dental extractions post-RT, but seemed to think that this would be a definite outcome should any future dental extraction ever be required.

'Something to do with the bone. The bone is dead, so take them out or something like that.' (Interview 5, M:62. Lines 61–62)

A number of participants had faith in the advice offered by professionals and did not want to contest this:

'...I just trust in professionals to do their job properly. I'm not quizing them in their ability to look after me... they tell me what they're doing, they do it and I say fine, thank you very much.' (Interview 14, M:75. Lines 77, 80–81)

However, one participant would have valued a second opinion to assist their decision making:

'I think at that point I really wanted a second opinion but it was like we have no time, it was literally two days before the operation I think, because I mean it is a major thing, four teeth is quite a lot because now I'm only chewing on one side and it makes me concerned.' (Interview 6, M:52. Lines 114–121)

Although this was not highlighted by other participants, this may indicate that they were unaware of the option of having a second opinion or involvement of their own dentist.

A large number of participants felt that they had no choice in whether or not to go ahead with the recommended treatment:

'There was no decision to make like. I, I didn't make that decision... the dentist made the decision, and said that seven had to come out for it to be successful for later on, but I don't think I was given that option of leaving them in.' (Interview 17, M:59. Lines 128–131)

Many felt that this lack of choice was due to the higher priority of cancer treatment:

'I had no choice. You know, it's either that or the cancer.' (Interview 4, M:62. Line 74)

In addition, some participants admitted being passive in the decision making process as they felt overwhelmed:

'...at that point I didn't really want to argue because I had too much stuff, so I said OK do it, do whatever.' (Interview 6, M:52. Lines 93–94)

For the majority, it appeared that an 'all or nothing' approach had been taken. However, two participants negotiated to reduce the number of teeth that were planned for extraction:

'They did want eight, and (laughs)... [the dentists] at the time said you know we think you'll be alright with just us taking four.' (Interview 1, F:44. Lines 82–83)

Having explored the decision-making process through which participants underwent extractions, the consequences of the extractions themselves were explored. Overall the dental extractions had a profound negative impact, with many expressing a sense of grief:

'Out of everything so far, of all the treatment, chemo and radiotherapy, it's not having those teeth there that really pisses me off the most. Unbelievable you know.' (Interview 7, M:55 lines 93–95)

'...it was the eight at the back... which I still have in a box (laughs) ..., I think I definitely had a little sense of loss (laughs) which is why I kept them.' (Interview 16, F:53. Lines 95, 113).

Many participants had concerns about their appearance after the teeth had been extracted:

'I do worry because I am aware that teeth give you your facial features and they sort of hold everything together, and I worry that as I get older, is it going to affect how I look because I like to look nice... you notice when people haven't got teeth their face sinks in somehow ... I don't want to look old and saggy and you know...' (Interview 13, M:54. Lines 137–143, 145–148)

'...I thought am I going to have to be careful how I smile here, or is it going to look particularly ugly because I had a bit of a lop-sided grin...' (Interview 9, M:64. Lines 207–209)

In addition, a wide range of functional issues were raised. Most participants felt that they had difficulties eating to some extent:

'... it's affected my eating tremendously. You know, everything has to be mushy and slushy, like Weetabix and things like that. I can't chew meat. I can't even chew a biscuit. Nothing.' (Interview 2, M:52. Lines 75–77)

'I felt like I must look like a rabbit because I was having to chew just on my front teeth and was quite self-conscious.' (Interview 9, M:64. Lines 200–205).

Some reported concerns in relation to changes in speech due to missing teeth:

'...sometimes with no teeth it makes you dribble a little bit, it affects how you talk.... It sort of, because of that gap there, you've got a lot more phlegm and you have to sort of watch how you speak. So it affects your pronunciation.' (Interview 7, M:55. Lines 116–119)

Some participants reported general discomfort due to altered soft tissue control in the edentulous spaces:

‘...I also feel that the face has caved in and you end up sometimes like sucking your cheek and biting your tongue.’ (Interview 7, M:55. Lines 191–193)

For many, the dental extractions left them feeling incapacitated:

‘...if only I could have hung onto my teeth, I was totally really devastated that they had to come out, you know. Absolutely. Absolutely, drained you know.’ (Interview 10, M:68. Lines 127–129)

‘...the overall scenario of having all of those teeth out, I feel like my mouth’s disabled.’ (Interview 13, M:54. Lines 195–196)

A number of participants expressed regret:

‘I may have said I’d like to keep a couple even if they’re a bit rotten, or do something, fill them the best you can. I don’t know but if it comes to it, take them out if they do go really bad after radiotherapy. But sort of being given the choice a bit more really I think.’ (Interview 2, M:52. Lines 130–133, 140–141)

‘I think I would sooner have had the cancer and finish my days eating properly because I cannot eat properly now, I have to eat mush and all sorts of soft stuff, you know, I long to eat a decent meal again...’ (Interview 10, M:68. Lines 68–70)

Participants were divided in their perceived need for tooth replacement post-RT. Some had accepted the ensuing changes in view of the greater need for cancer treatment:

‘...you expect to be inconvenienced and things not to always be normal, but as long as we get rid of the cancer, that’s the main thing’ (Interview 1, F:44. Lines 118–120)

Others felt that they had not received information explaining that extracted teeth may never be replaced and remained uncertain about their future prosthodontic options:

‘I didn’t realise at that point that I would never be able to put anything instead of them. In fact I always thought that I would be able to replace them when I have money and as far as I understand now, I won’t be able to do it. So yeah, if I knew this then, it would have been a major issue.’ (Interview 6, M:52. Lines 105–108)

‘...if I could have a couple of teeth over this side and this side, I could chew on something but I’ve not been told and the lady in there just said that I’d have to be referred to somewhere else for specialist treatment for that, but wasn’t really told any of this beforehand. So it’s a bit of a shock, you know.’ (Interview 2, M:52. Lines 106–111)

Participants described different preferences for information provision and more time to enable them to assimilate their thoughts:

‘...having some dedicated literature even if you know it’s not a brochure it’s something printed out, and for me personally I’d prefer to have several days to read it and re-read it, maybe do some research online basically for questions, to make sure I have enough questions for the consultant’ (Interview 6, M:52. Lines 206–209)

‘Verbally for me anyhow, I like the personal touch really rather than more and more information...’ (Interview 17, M:59. Lines 175–176)

The final theme that was explored was oral health status. Participants were asked about their perceptions of oral health before and after their cancer treatment. Many felt that they had adequate oral health by attributing this simply to a lack of symptoms yet reported limited awareness of oral care routines:

‘It was alright, no problems. Just brush it, once or twice.’ (Interview 5, M:62. Lines 31, 38)

Among this sub-group, poor dental attendance was a frequent finding:

‘Not at all if no toothache’ (Interview 18, M:60. Line 48)

Dental anxiety was cited as a reason for irregular attendance:

‘I hated it because I am terrified of dentists. Face me with someone with a gun or a knife and I’ll know what to do, but dentists...’ (Interview 9, M:64. Lines 77–78)

Overall, 15 participants reported improved awareness of positive oral health-related behaviours post-RT:

‘Well brushing my teeth is the major thing I guess. I do need to sign up with a dentist, as I said I’ve never had one, so yeah that’s on my to-do list. One more thing I guess is that I have significantly reduced my sugar intake, so I try to only do fruits and nuts rather than chocolates.’ (Interview 6, M:52. Lines 63–66)

The majority described oral care routines as expected in line with professional guidance for HNCPS. One participant was less motivated towards oral healthcare:

‘Erm, I tend to be lazy now. Yeah, because of the radiotherapy it’s easier for me to say I’ll do it later than it is for me to get up and do it.’ (Interview 8, M:62. Lines 54–55)

This is not surprising as several participants acknowledged that oral hygiene was more difficult post-RT:

‘...it’s certainly more difficult, it’s more of a challenge, I don’t have the extension of erm you know, my jaw isn’t opening, so it’s much harder to clean...’ (Interview 16, F53. Lines 75–76)

## Discussion

The dental encounter is brief, but brings significant short- and long-term consequences for HNCPS. If recommended, extractions are carried out very soon after diagnosis. From the participants’ perspectives, their memory of this clinical encounter was one of shock, with a variable level of understanding of the nature of the dental visit, the reasons for pre-RT extraction recommendations and options for tooth replacement after treatment. They felt that there was insufficient information or empowerment to ask about alternative options. When considered against some of the other consequences of cancer treatment, the impact of tooth loss was often the most profound and deeply felt. This is likely due to the complexities of information consistency and delivery between multi-disciplinary specialities in addition to participant emotional status at that particular point in time.

The most recent National Cancer Patient Experience Survey<sup>10</sup> report showed that 25.0% of HNCPS do not have complete understanding of their condition or proposed treatment. Similarly this qualitative study has highlighted that from the dental perspective, participants varied significantly in their information needs, with varied memory of and preference for different information formats, including face-to-face conversations and written materials. Such issues have long been acknowledged in cancer care, leading to the development of National Cancer Information pathways and information prescriptions (IP). This initiative aims to make nationally agreed information available in electronic format to healthcare professionals, which can be shared reliably with patients at each stage of their experience.<sup>11</sup> This has not been widely adopted within dentistry and IP may offer an alternative way of addressing patient information needs in relation to pre-RT extractions and oral rehabilitation.

For most participants, pre-RT extractions represented the first significantly invasive stage of care in the cancer pathway and was made worse by the fact that teeth were often healthy, asymptomatic and not the actual site of cancer. In this study we found that pre-RT extractions had a profound, negative impact on quality of life, leaving participants feeling unable to chew food as before and conscious of the fact that they looked or spoke differently. Such findings are discussed in a number of other recent studies.<sup>12–14</sup>

Recent guidance from Restorative Dentistry UK<sup>15</sup> acknowledges that pre-RT extraction recommendations are based on expert opinion in the absence of a robust evidence base. It also highlights that the risk of developing ORN following extraction in irradiated jaws is low at 7.0%. This statistic is taken from a frequently cited systematic review,<sup>16</sup> which also highlights that the risk of ORN remains similar up to 12 months post-radiotherapy at 8.0%, and slightly increases to 12.0% in patients receiving a radiation dose of more than 60 Gy.<sup>16</sup> Although not discussed in this guidance,<sup>1,15</sup> it is important to recognise that pre-RT extractions are not without their own risks, with up to 3.2% of extraction sites reportedly developing ORN.<sup>17</sup> ORN can be devastating in the small proportion of affected patients,<sup>6</sup> therefore research has been conducted to determine methods of reducing the risk. A systematic review of the evidence suggested that the incidence following post-RT extractions performed in conjunction with prophylactic hyperbaric oxygen therapy was 4.0% compared to 6.0% among patients given antibiotic prophylaxis.<sup>16</sup> More recent research has demonstrated resolution of established ORN through combined tocopherol and pentoxifylline regimens.<sup>18,19</sup> This approach has also been used successfully on a prophylactic basis before post-RT extractions, with an ORN incidence in one study as low as 1.2%.<sup>20</sup> Systematic reviews of the side-effects of intensity modulated radiotherapy suggest reduced incidence of xerostomia, ORN and trismus compared to other techniques.<sup>21,22</sup> Taking such advancements in medical technology, treatment of post-RT complications and dental preventive regimes into account, it is clear that the oral risk profile of this group of patients has changed with time. It may be time therefore to adopt a less radical approach to pre-RT extractions, with each case planned and based on individual risk assessment and patient preference.

The incidence of head and neck cancer is increasing and the 5-year survival rate of some head and neck cancers remains low, such as cancer of the oral cavity at 56.1%.<sup>23</sup> Based on the aforementioned literature and findings from this study, it is plausible for patients to have the option of delaying decision making in relation to dental extractions until after the completion of RT, particularly where extractions would not be carried out at the time of cancer surgery. This would not only potentially reduce the pressure on services to coordinate appointments around pre-RT extractions (and

delays caused by subsequent monitoring of the healing), but more importantly it could reduce the physical and psychological burden on HNCs at an incredibly vulnerable point in their lives.

The retention of teeth of poor prognosis itself carries a risk of interruption to radiotherapy; however, there is no evidence of this at present,<sup>24</sup> despite a proportion of patients anecdotally declining pre-RT extractions. It is acknowledged, however, that a number of patients will need chemo-radiation during their cancer treatment. In view of associated pancytopenia and potential complexities brought by managing dental infection mid-chemotherapy, the pre-treatment dental recommendation to remove all teeth with associated risk of infection, both inside and outside the high dose RT field remains clinically practical.<sup>1,15</sup>

## Conclusion

This study has shown that pre-RT extractions had a profound negative impact, leaving many participants devastated. In the absence of robust evidence to support this approach, and the advent of new technologies which appear to be successful in preventing and treating post-RT oral health complications, a more conservative approach to pre-RT dental treatment planning is warranted.

### Acknowledgements

Ethical approval for this study was received from the North West – Haydock Research Ethics Committee, reference number: 15/NW/0848.

Thanks are extended to Dr Damien Reilly, Kim Adams and the Dental Nurses in the Department of Sedation and Special Care Dentistry at Guy's Hospital for their assistance with this research project.

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