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The Dental Treatment Needs and Oral Side Effects of Patients Undergoing Outpatient Cancer Chemotherapy

Jeffrey Wilson* and Jeremy S Rees†

Abstract - *An increasing number of patients receive cancer chemotherapy on an out-patient basis. Dentists therefore need to be aware of the consequences of cancer chemotherapy. Two hundred and eighteen patients attending a specialist oncology centre were examined and the oral side effects recorded. The patients also completed a structured interview to examine the advice they had been given by health care professionals prior to starting chemotherapy. Clinical examination revealed a significant dental treatment need with 16% of patients requiring restorations and 66% requiring professional periodontal care. The commonest oral side effects were altered taste sensation (52%), xerostomia (35%) and mucositis (22%). All these side effects are unpleasant and may have a significant effect on a patient's quality of life.*

KEY WORDS: Chemotherapy; Oral examination; Oral symptoms

INTRODUCTION

In the United Kingdom there are approximately one-quarter of a million new cases of cancer in adults each year[1]. An ever increasing proportion of these patients are being treated using chemotherapy on an out patient basis[2], so it is likely that these patients will be seen by the general dental practitioner either while undergoing active therapy or when in remission.

Cancer chemotherapy works by interfering with the cell cycle, thus preventing cell replication[3,4]. As a result, the cells which divide most rapidly are more likely to be affected by chemotherapy, resulting in unpleasant side effects. Most chemotherapeutic agents will cause alopecia, bone marrow suppression leading to potential problems with bleeding, anaemia and infection and gastrointestinal disturbances, particularly malabsorption and diarrhoea. It can also induce cardiac and pulmonary dysfunction[3,5].

As periodontal and oral epithelial cells are amongst the most rapidly dividing in the body[6], the oral tissues are particularly susceptible to chemotherapeutic agents (*Table 1*). Other oral side effects include a decreased salivary flow, reduction in salivary amylase and IgA and an increased carriage of opportunistic pathogens such as Candida species, coliforms and *Staphylococcus aureus*[7].

In many patients oral side effects will have a large negative impact on their quality of life and also prevent a satisfactory nutritional intake and communication with relatives and others[8–11]. The prevalence of oral symptoms has been reported to vary from 10–40%[12,13] and there is some evidence to suggest that the prevalence of oral side effects is diminishing, which may reflect a general improvement in overall patient care. The commonest oral side effects seem to be ulceration and mucositis which occurs in around one third of patients[12,13] and these were rated as one of the greatest physical stressors by patients during active therapy[14].

Table 1. *Oral complications of chemotherapy.*

• Mucositis
• Ulceration
• Taste alteration
• Secondary infections eg Candida
• Xerostomia
• Bleeding
• Hypersenstitive teeth

The Calman report on cancer care[15] emphasised the need to focus treatment on both longevity and quality of life. As oral side effects are common, the patient's oral status and function is an important contributor to post treatment social adaptation and quality of life.

It has also been shown that patients with good oral health experience fewer oral complications during cancer chemotherapy[2,16–20]. However, patients are still rarely advised to visit a dentist before starting chemotherapy and dental care tends to be carried out on an emergency basis when problems arise during treatment[21]. To this end the Royal College of Surgeons of England have introduced clinical guidelines for the oral management of oncology patients requiring radiotherapy or chemotherapy[22]. These guidelines emphasise the need for a pre-treatment assessment by a dental professional and for continuity of care during cancer therapy and beyond.

The aim of this study was to assess the oral health status and experience of patients undergoing outpatient chemotherapy for non-head and neck malignancies at one specialist oncology centre in the UK.

*BDS, MSc, DDPH, FDSRCS
†BDS, MScD, FDSRCS, PhD

Table 2. *Cancer type.*

Cancer type	*%*	*Management*
Breast	36%	Cyclophosphamide + methotrexate + 5-fluorouracil OR Methotrexate + mitomycin + mitozantrone
Bowel	21%	5-flurouracil + folinic acid
Ovary	12%	Carboplatin
Lymphoma	11%	Cyclophosphamide + adriamycin + vincristine
Lung	3%	Adriamycin + Cyclophosphamide
Bladder	2%	Carboplatin + Methotrexate + Vinblastine
Other	15%	Various

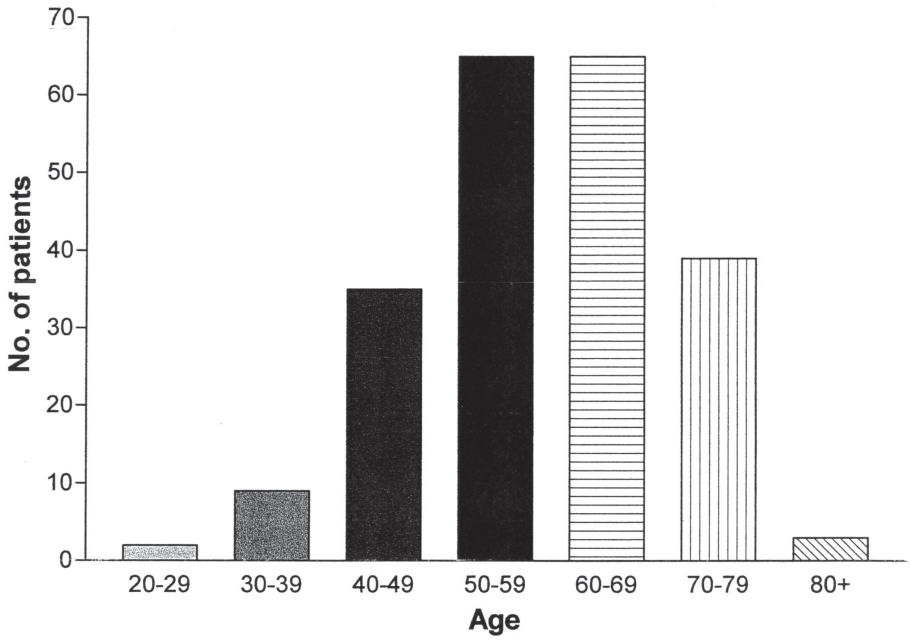

Figure 1. *Age profile of sample*

MATERIALS AND METHODS

Subjects

This study was carried out at the Mid-Kent Oncology Centre following ethical approval from the Local Research Ethics Committee. A series of 335 consecutive patients attending the Oncology Centre were asked to participate in the study over a period of 12 months. Those attending for head and neck cancers were excluded, as any radiotherapy used for these patients was likely to have a direct effect on the oral tissues[13]. A total of 201 (60%) patients agreed to participate in the study. Various types of tumours were being treated and an overview of the types of tumours and their clinical management is shown in *Table 2*. Seventy males (32%) and 148 females (68%) participated in the study with a mean age of 58.6 years (SD=11.2 range = 28-85 years). The age distribution of the sample is shown in *Figure 1*. One hundred and forty two of the patients were dentate, 42 were completely edentulous and 17 wore either a complete upper or complete lower denture. Ninety one (57.3%) of the patients were smokers and 68 (42.7%) were non-smokers.

Interview

A semi structured interview format was used, based on a guide containing a 10–item questionnaire, including open ended questions covering the following areas of patient's experiences:-

- Advice about the potential side effects of chemotherapy
- Grade of hospital staff giving advice
- Specific advice about dental problems and visiting a dentist prior to the start of chemotherapy
- Oral side effects experienced since starting chemotherapy

Clinical examination

All clinical examinations were carried out by one of the authors (JW) assisted by a trained dental nurse. The oral cavity was examined with regard to the state of the oral mucosa, dental caries, the presence of failing restorations and mucositis. The presence of mouth ulcers was noted but these were not graded for severity. For dentate patients the periodontal status of each patient was assessed using the Basic Periodontal Examination using a CPITN (E) probe and the results were recorded onto a conventional sextant based grid[23] for each patient.

Both clinical examination and interviews were performed at the end of the second or third chemotherapy cycle. Examinations and interviews took place at the Oncology Clinic and lasted approximately 30 mins. The interviewer wrote down the patient's responses during the interview.

RESULTS

Interview

The results of the advice given to patients prior to starting chemotherapy is given in *Table 3*. This shows that the commonest general symptom discussed was nausea (85%) and the commonest oral side effect discussed was mucositis (62%). Other common oral side effects that patients were warned about included mouth ulcers (43%), altered taste sensation (17%) and xerostomia (7%).

The commonest grade of staff giving this advice (*Table 4*) were nursing staff (88%) and this advice was backed up with a booklet (60%) to reinforce the health care messages.

The oral side effects physically experienced by the patients (*Table 5*) differed from the side effects initially suggested by the nursing staff. Fortunately 20% of patients in our sample suffered no oral side effects. However, the common oral side effects reported were altered taste sensation (52%), xerostomia (35%) and mouth ulcers (12%). These side effects were managed in a variety of ways (*Table 6*), either by using a mouthwash (Corsodyl), a proprietary ointment (Bonjela) or folinic acid.

Clinical examination

The majority of patients had healthy soft tissues (82%), but a significant number of patients had evidence of mouth ulcers (10%) or mucositis (10%). An incidental finding was that two of the patients had small fibroepithelial polyps, but these were not causing any symptoms.

Examination of the periodontium (*Table 7*) found that 44% of the sample had either a healthy periodontium or a chronic marginal gingivitis (CPITN score 0, 1 or 2), whereas 46% of the sample had moderate disease with pocketing of up to 5.5mm (CPITN score 3). A small proportion of the sample (4.4%) had severe periodontal destruction (CPITN score 4) and all subjects within this subset smoked.

Twenty six patients (13%) were found to have either carious teeth or lost/fractured restorations with recurrent caries. However, at the time of the examination all these teeth were asymptomatic.

Table 3. *Advice given about potential chemotherapy side effects.*

Advice	*%*
Nausea	85%
Mucositis	62%
Mouth ulcers	43%
Malaise/Tiredness	28%
Diarrhoea	22%
Hair loss	20%
Altered taste	17%
Dry skin	10%
Dry mouth	7%
Headaches	5%
Constipation	5%
Candida	2%
Red face	1%

Table 4. *Grade of staff giving advice about potential side effects.*

Grade	*%*
Oncologist	28%
Nursing staff	88%
Booklet	60%
Other	10%

Table 5. *Oral side effects experienced since beginning chemotherapy.*

Symptom	*%*
Altered taste	52%
Xerostomia	35%
Mucositis	22%
Mouth ulcers	12%
No symptoms	20%

Table 6. *Clinical management of side effects.*

Clinical management	*%*
None	35%
Mouthwash (Corsodyl)	65%
Topical ointments (Bonjela)	10%
Folinic acid	8%
Suck sweets/frequent fluids	8%

Table 7. *CPITN scores.*

CPITN Score	*Total Pt Nos*	*Smokers*	*Non-smokers*
0/1/2	82 (51.6%)	46 (56.1%)	36 (43.9%)
3	70 (44.0%)	38 (54.3%)	32 (45.7%)
4	7 (4.4%)	7(100%)	0
Total	159	91 (57.3%)	68 (42.7%)

DISCUSSION

This study set out to survey a group of patients who had just begun a course of chemotherapy for cancer that did not involve the head and neck region. It is unfortunate that from the initial sample of 355 patients, only 201 consented to a clinical examination. This represents an inclusion rate of 60% with the potential for bias. However, it is understandable that many patients declined an additional, voluntary examination during a particularly traumatic period of their life.

Interview

The group of patients examined in this study were relatively heterogeneous, with treatment being carried out for various types of cancer including breast, bowel and ovarian cancer (*Table 2*). The advice given to patients about to undergo chemotherapy was generally extensive (*Table 3*) with most patients being told about the commonest side effect, nausea. Sixty-two per cent of patients were also warned about the possibility of mucositis, which previous studies have identified as being one of the commonest oral side effect[12,13,24]. More disappointingly, 43% of patients were told about the possibility of oral ulcers, which can have a severe effect on the quality of a patients' life. One study found that oral ulceration was ranked as the worst side effect of chemotherapy[14].

Similarly, only 17% of patients were warned about the possibility of altered taste sensation and only 7% were warned about the problems of xerostomia. However, the reason why so few patients were warned about xerostomia as a complication is a that this problem is frequently a short term side effect only, particularly in patients undergoing chemotherapy.

It is apparent that the oncology team in this study was heavily reliant on specialist nursing staff to counsel patients (*Table 4*) and this is likely to reflect the general position across the UK. It therefore seems important to target this group of health care professionals to ensure that they are delivering the correct oral health messages. It is possible that some nurses may consider undertaking an oral examination a violation of patient integrity and feel uncomfortable discussing the topic of oral health[26]. Only additional training or the consistent involvement of a dental professional as a part of the oncology team will help break down these barriers[22].

Each patient was provided with an information booklet that included advice about oral complications, particularly the possibility of oral ulceration, altered taste sensation and transient xerostomia. This booklet was used principally to reinforce this important information, as many studies have shown that patients forget in excess of 60% of the information provided during a consultation[26].

The oral side effects endured by the patients differed from the likely side effects that they we warned about prior to therapy (*Table 5*). The commonest side effect was altered taste sensation, which was reported by 52% of patients. In part, this may be due to the well documented neurotoxic side effects of vincristine[27]. Vincristine was used, in combination with other chemotherapeutic drugs, to principally manage lymphomas. However, only 12% of the patients in our sample were taking vincristine and therefore this alone would be unlikely to account for all these cases of altered taste perception. An alternative explanation is that it may be related to mouthwash use. Sixty five per cent of the patients were using a mouthwash, which was principally chlorhexidine. Altered taste sensation is a well known side effect of this mouthwash[28] and this may more readily account for the high numbers of patients with this side effect.

Xerostomia was the next most common side effect with 35% of patients reporting the problem. This is much higher than previous studies which reported only 7–21% of patients having problems with xerostomia[12,13]. In many patients undergoing chemotherapy, xerostomia is a short term problem and may not cause cervical caries *per se*. However, many of these patients resort to sucking sweets to combat the altered taste and this may well contribute to cervical caries.

In previous studies, oral mucositis has been reported as the most debilitating oral side effect[14] affecting 28–36% of patients[12,13,24]. This is due to the direct effect of the chemotherapeutic drugs on the rapidly dividing oral mucosal cells. In this study, a slightly smaller proportion of patients (22%) reported problems from mucositis, which could be due to the use of a folinic acid mouthwash.

The clinical management of the oral side effects was generally good (*Table 6*) and involved the use of mouthwashes. The mouthwash of preference was Corsodyl, but due to its high alcohol content it sometimes exacerbated a mucositis and Listerine was occasionally suggested as alternatives, although paradoxically Listerine also has a high alcohol content. However, on a more worrying note, 8% of patients were advised to suck sweets to manage their dry mouth! As discussed above, this could have disastrous effects in a dentate patient and again highlights the need for a dental professional to be part of the oncology team.

Clinical examination

It was encouraging that the majority of patients had healthy soft tissues (82%) and this is probably a reflection of modern chemotherapy and the use of preventive agents, such as chlorhexidine. However, a small number of patients had evidence of mouth ulcers (10%) or mucositis (10%).

It was interesting to note that there were no signs of any Candidal infection. Previous studies have found this to be a problem, due to the effect of chemotherapy on the immune system. Sonis *et al*.[12] found that Candidal infections was seen in 6–7% of patients in his sample. It seems that in our sample the preventive use of a chlorhexidine mouthwash completely stopped the development of these problems, since chlorhexidine is known to possess good anti-fungal properties[28]. However, it is possible that chlorhexidine is also responsible for the high proportion of patients complaining of altered taste perception, as discussed above.

Examination of the teeth and periodontium revealed a significant dental need within our sample with 16% of patients requiring one or more restorations. Periodontally, 52% of the dentate sample had a generally sound periodontium, with nothing more than a chronic marginal gingivitis (CPITN score 0, 1 or 2). However, 44% of the sample had a CPITN score of 3 and 4.4% had a score of 4. These findings are generally similar to the findings of Lockhart and Clark[29], who found that 57% had moderate bone loss, (which is approximately equivalent to a CPITN score of 3) and 9% had more severe bone loss (which is approximately equivalent to a CPITN score of 4).

The findings of this study are remarkably similar to the much larger sample examined in the recent Adult Dental Health Survey[30]. This survey found that 46% of their sample had a CPITN score of 0, 1 or 2; 54% had a CPITN score of 3 and 6% had a CPITN score of 4.

This finding is not entirely surprising, as the periodontal disease present in this cohort of patients would, in most if not all patients, have pre-dated the treatment for cancer and one would therefore expect the prevalence to reflect that of the general population.

However, this still represents a significant dental need within this group of patients. Those patients with a CPITN score of 3 or 4 require some form of professional intervention, and this involves 66% of the patients in our sample. A CPITN score of 3 or more indicates a periodontal probing depth of 5.5mm and it is suggested by some clinicians that teeth with pockets of 6mm or more

should be extracted[5]. This is a fairly aggressive approach to treatment, although it may be argued that in smokers the non-surgical management of pockets ≥6mm is likely to be unsuccessful[31].

Within our sample a great number of patients were smokers (57%), which is much higher than the number of smokers in the population generally, which is around 28%[32]. This was not too surprising a finding as smoking is well established as a risk factor for the development of many cancers, particularly the oral cavity, upper GI tract, lung and bladder[32]. However, as the number of smokers was over twice the national average, one would expect to see more periodontal disease, as around 40% of the variability of periodontal disease can be attributed to smoking[33]. One explanation may be that a relatively small sample size was used in this study. Therefore, the number of patients that are genetically susceptible to periodontal disease was low.

Although this study presents a number of important findings, the data must be interpreted with caution for a number of reasons. Firstly, the sample was relatively heterogeneous looking at a number of different types of cancer, rather than just, say, head and neck cancer. Secondly, from the initial sample of 355 patients, only 201 consented to a clinical examination. This represents an inclusion rate of 60% with the result that the potential for bias increased.

CONCLUSION

- A significant dental treatment need within our sample with 13% of patients requiring a restoration and 66% requiring professional periodontal care
- Oral side effects during cancer chemotherapy were common, particularly altered taste sensation and xerostomia.
- Health care professionals are still providing some advice about oral care that is contrary to accepted good practice
- The amount of dental need in patients about to undergo chemotherapy and the high prevalence of oral side effects strongly suggests that an appropriate dental professional should be part of every oncology team.

MANUFACTURERS' DETAILS

- Bonjela, Reckitt & Colman Products, Dansom Lane, Hull.
- Corsodyl Mouthwash, GlaxoSmithKline, St Georges Avenue, Weybridge, Surrey.
- Listerine, Warner Lambert Consumer Healthcare, Lambert Court, Chestnut Av., Eastleigh, Hampshire.

ADDRESS FOR CORRESPONDENCE

Professor J.S. Rees, Adult Dental Health Department, Dental School, University of Wales College of Medicine, Heath Park, Cardiff, CF4 4XY, UK. E-mail: reesjs1@cf.ac.uk

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