Oral health care for individuals with tetraplegia due to spinal cord injury. A pilot study

Sarah Bronte

Abstract

Aim: To establish an overview of the oral health practices and expectations of tetraplegics in New Zealand, and whether a need for an information resource existed.

Design: A telephone questionnaire.

Subjects: Twenty tetraplegic individuals.

Method: The individuals were asked about their injury, medical history, oral health attitudes and expectations, home care practices, professional oral care and problems with oral health or health care. The questionnaire was analysed using SPSS.

Results: While most tetraplegics were happy with their oral health care, differences in the cleaning techniques and habits of caregivers existed. Problems such as decreased access to professional care and dry mouth as a side effect of medications commonly taken by tetraplegics also existed.

Conclusions: In response to the findings, an information pamphlet was developed. Included in the pamphlet is information about oral health care specific to tetraplegics, and a list of contact details for dental practices and dental departments with wheelchair access.

Key words: Tetraplegia, spinal cord injury, oral health

Introduction

Encouraging good oral hygiene is often frustrating for oral health workers, since it is the many capable people who do a poor job of keeping their mouths clean that fill dental waiting rooms. So what of those who are not capable of keeping their own mouths clean? This study aimed to examine some of the differences in oral care received by dependent tetraplegics.

Those who are dependent on others for oral care represent a large proportion of our population, many of these are mentally and physically disabled people. Included in this group are those with spinal cord injuries—particularly tetraplegics. Tetraplegia (quadriplegia) is defined as paralysis of all four limbs. (Dorland, 1994). Strictly speaking, it is a spinal cord injury that affects all four limbs. The extent of paralysis is dependent on the nature of the injury, which may occur at birth (for example cerebral palsy), or due to external injury. Spinal cord injuries can occur at any level of the spinal cord. The higher up the cord, the more disabling the injury is. Injuries at the levels of C6 vertebrae and higher, result in tetraplegia of varying severity. For example, a person with C5 injury may have some, limited use of their arms, but no fine hand movement, while a person with an injury at C1 level has no upper body movement, and is dependent on a ventilator, as they cannot breathe for themselves.

Individuals with higher spinal cord injuries sometimes have reduced cough and gag reflexes, and difficulty in controlling oral fluids. (Allen and Burtner, 2000). Tetraplegics may also have an imbalance between their sympathetic and parasympathetic nerve damage that can result in differing responses to stress, hypotension, and bradycardia.

These factors can make treatment and maintenance of the mouth complicated. Many tetraplegics have limited dexterity, making it difficult to thoroughly clean their own teeth. Those with no use of their arms have to rely on a caregiver to provide daily oral care for them, and this introduces variations and different attitudes to the care regimen. Many tetraplegics use their teeth for functions other than eating, speaking and swallowing, such as opening bottles and picking up objects. In a tetraplegic, pain in the oral cavity can be 80 per cent of total body sensation, therefore optimum oral health is both important and desirable. (Quart, 1982).

Spinal cord injury (SCI) patients are almost always on comprehensive drug regimes. Many drugs commonly prescribed to SCI patients have oral manifestations, for example phenytoin, which is prescribed for muscle spasm and epilepsy, can induce gingival hyperplasia, and Baclofen, which is also for muscle spasm, can lead to xerostomia-like symptoms. (Gage and Pickett, 1997).

Despite the obvious importance of oral health for these
patients, few SCI subjects brush daily or floss. (Nowak, 1984; Beck, 1985). Dependency on others for daily care may be an important determinant of oral health in people with spinal cord injuries. Subjects in one study with tetraplegia and who were dependent on caregivers for daily oral care tended to have poorer oral hygiene and more severe gingival and periodontal disease than a control group (Stiefel et al., 1993).

Most dependent tetraplegics have a group of caregivers who work in shifts to provide care throughout the day. When several different people are caring for a person with tetraplegia, there can be differences in the way care is provided. Caregivers differ in their attitudes towards dental health (Wardh et al., 1997). These attitudes are often indirectly transferred to the people for whom they are caring. A person who spends little time caring for their own mouth is more likely to spend less time on caring for someone else's dental health. Stiefel et al. (1993) commented that 'the tendency for subjects dependent on caregivers to have higher levels of plaque and the prevalence of gingivitis than subjects who can perform daily oral hygiene indicates the inadequacy with which oral care is frequently provided by caregivers'.

Being in a wheelchair also introduces various barriers to professional care; low priority, fear, lack of adequate access, and financial restrictions are ranked highly as reasons why wheelchair-bound subjects were reluctant to go to the dentist (Durnan and Thaler, 1973; Salley, 1980; Chohayeb, 1985; Stiefel et al., 1993). The barriers faced by disabled people were compared with those of their caregivers in one study; the caregivers cited financial factors as the predominant barrier to care. (Stiefel et al., 1993). This emphasises possible differences in attitudes to oral care between tetraplegics and their caregivers.

The primary aim of this study was to investigate oral home care practices of tetraplegics in New Zealand and obtain a broad picture of their attitudes to oral health care. The objective would then be to develop an information resource for tetraplegics and their caregivers, promoting the importance and benefits of good oral health. Part of this resource would be a standardised care regimen that would expedite the transition of caregivers and tetraplegics in oral care practice, and the attitudes of the subject to professional oral care were the focus of the questionnaire. A telephone questionnaire also reduced the dependence on others for filling in a paper-based form. Contact details were supplied by outpatient co-ordinators at the Otara Spinal Unit, Auckland, and the Spinal Unit at Burwood Hospital in Christchurch. Tetraplegic patients were contacted and invited to participate. If they declined, they took no further part in the study.

Qualitative analysis only was undertaken because constraints on sample size excluded valid quantitative statistical analysis. The questionnaire, shown as Appendix 1, includes a brief medical history, attitudes to daily home care, actual daily home care practises, and attitudes to professional oral care. Participants were invited to make any comments they felt were relevant to the topics discussed. Demographic information was also collected.

‘Other’ categories were included for use if data collected did not fall into any of the specified categories. Twenty participants were interviewed and the data recorded on a computerised spreadsheet. Each participant's drug history was categorised and recorded using a medication data capture system (MedCap) (Thomson, 1997). The system assigns a single code to each medication, allowing categorisation and ease of analysis. The data were analysed using the Statistical Package for the Social Sciences (SPSS) for Windows.

A pamphlet was designed (Appendix 2) based on the feedback received from the interviewees. The pamphlet was divided into sections: an introduction, and background information about the importance of oral health to tetraplegics. Background information about plaque and the pathogenesis of dental disease were included. A diagram accompanied a toothbrushing technique specific to tetraplegics and their caregivers. Information on toothpastes, interproximal cleaning, and mouthwashes was also included. Another section was devoted to the possibility of having dry mouth from some medications. The consequences of consumption of high acid-high sugar drinks at regular intervals in the event of a dry mouth preceded dietary advice on alternatives to the drink habits.

A short paragraph on the use of maths sticks and the importance of their correct construction followed this. A short list of problems that required the immediate attention of a dentist was included. These were: broken or sore teeth, loose teeth, bleeding or sore gums, bad breath, lumps, red or white patches anywhere in the mouth. Advice on regular dental checkups/cleans was then included.

The Dental Departments of hospitals in each region (New Zealand was divided into ten geographic regions; Northland, Auckland, Waikato, Bay of Plenty, Manawatu, Hawkes' Bay, Wellington, Canterbury, Otago and Southland) were approached and asked if they would allow their contact details to be included on the back page of the pamphlet. A number of private dentists in each major

Methods

This study was a pilot study undertaken for a final-year elective project. To be more meaningful, it needs to be extended, not only by making the sample size larger, but also by including those with tetraplegia due to cerebral palsy and other congenital conditions. The dependence on others for oral care is not unique to those with spinal cord injuries, but due to time and resource restraints, a more in depth study could not be carried out.

A telephone questionnaire was developed as the main research tool, since the tetraplegic population of New Zealand has a wide geographic spread. Aspects of home
region were also approached to see if they would allow their contact details to be included, on the basis that their advertisements in the Yellow Pages stated that they either had a ground floor, or wheelchair accessible practice.

**Results**

Twenty participants were interviewed, 16 (80 per cent) male and 4 (20 per cent) female. The mean age of interviewees was 37.4 years. Nine people were injured due to a motor vehicle accident, eight due to sports injuries and the remaining four came under the ‘Other’ category, with injuries from accidents such as in the household, for example, painting a roof. Five people also suffered from asthma, with two of these also suffering from hayfever. Three people had a heart condition. Twelve (60 per cent) people could not put their own jersey on, and 7 (35 per cent) could not brush their own teeth.

Three people were taking no medication at the time of the interview. Of the 17 that were taking medication, the mean number of drugs was 2.35 (range 1–5). Antispasmodics and anticonvulsants were the most common kind of medication. Baclofen was the most common individual medication 13 (65 per cent) while other anticonvulsants/ antispasmodics taken were diazepam (25 per cent), oxybutinin (25 per cent) orphenadrine (10 per cent), tegretol (5 per cent) gabapentin (5 per cent) and nortriyl (5 per cent). Four people (20 per cent) were taking anti-hypertensives and 3 (15 per cent) were taking anti-asthma drugs. Three subjects were also taking vitamin supplements, two were taking vitamin C, and one was taking zinc. One person was taking a laxative. Four people (20 per cent) thought that the drugs that they were taking might have some effects on their mouth.

The number of caregivers varied from one to six, the most common being 4 (35 per cent), followed by 2 (25 per cent) and 6 (15 per cent). Ten percent of interviewees had one or three caregivers and one person had five.

**Attitudes and expectations**

Nine (45 per cent) interviewees said they would like their teeth to be cleaned twice daily. Seven (35 per cent) specified once daily, and 3 (15 per cent) said that they would like their teeth to be cleaned more than twice daily. One person said they would not like to have their teeth cleaned at all.

Nine people (45 per cent) specified that they preferred an electric toothbrush, while 11 (55 per cent) preferred a manual toothbrush. Two people (10 per cent) said they would like floss to be used, and one person specified that they would like a mouthwash to be used when cleaning their teeth. All interviewees specified they would like toothpaste to be used.

Fifteen (75 per cent) said that there was nothing bothering them about their oral health at the time of interviewing. One person had sore teeth, and four fell into the ‘Other’ category; two were worried about their wisdom teeth, one was concerned that they had not been to the dentist since their accident, and another said they would like to be able to use floss more.

**Oral care at home**

Thirteen (65 per cent) people cleaned their own teeth, while 7 (35 per cent) relied upon caregivers to do it for them. Two of the people that cleaned their own teeth had partial dentures that they could not clean themselves, and the caregiver did this for them.

Twelve people (60 per cent) cleaned their teeth once a day, while 7 (35 per cent) cleaned them twice daily. One person had their teeth cleaned every two days. Nine (45 per cent) used an electric toothbrush, while 11 (55 per cent) used a manual toothbrush. All people used toothpaste, and one used dental floss. Of the nine people whose caregivers did all or part of their oral health care, 7 (78 per cent) specified that there were variations between caregivers. Five (71 per cent) of these people said that the variation was due to different techniques, and two (29 per cent) said that the variation was in the thoroughness of cleaning. Eighteen people (90 per cent) were happy with the way their teeth were being cleaned at the time of interview, and 2 (10 per cent) were unhappy. Fifteen (75 per cent) interviewees consulted a general dental practitioner for their oral problems, one consulted a general medical practitioner, while four fell into the ‘other persons’ category.

**Professional oral care**

Seventeen (85 per cent) people attend a dentist, 9 (45 per cent) of whom went for regular checkups. Of all people interviewed, 50 per cent only go to the dentist when there is a problem. Of the nine who go for regular checkups, three go yearly, four go every six months, and two had different time schedules. One of these people went yearly to a hygienist, and every eighteen months to a dentist.

Twelve (60 per cent) said they had no problems going to the dentist. Two people said that access was a problem. Transfer in and out of the dental chair was a problem for four people. One person said that access and transfer were problems for them, and one specified cost as a barrier to dental care.

**Discussion**

The male to female ratio was similar to that from the statistics for tetraplegics in New Zealand. The methods of injury were also found to be similar to those previously published. (ACC Statistics, 2000) 80 per cent of tetraplegics in New Zealand are male, and motor vehicle accidents make up the highest percentage cause of injury.

Sixty-five percent of the interviewees were taking Baclofen, a drug that is known to cause dry mouth as one of its side effects. (Gage and Pickett, 1997). Despite this, and the high frequency of other xerostomia-causing drugs (for example: anti-hypertensive and anti-asthma medication)
only 20 per cent of interviewees thought that the drugs had any effects on their mouth. This could be because dry mouth was a relatively uncommon side effect of Baclofen, or that dry mouth was perceived as normal or not drug related.

Dependence on caregivers for oral health care was not as high as was expected. Despite limited mobility, over half the people interviewed cleaned their own teeth. Two people relied on caregivers to clean their dentures for them. Of the people who were caregiver-dependent, 78 per cent said there were cleaning differences between caregivers, which is what was expected. Despite technique differences being the most common, it was not specified as a major problem.

While half of people said they would like their teeth to be brushed twice or more times daily, only 35 per cent cleaned twice or more daily. No specific reasons were given for this. All people were happy with the tools used for cleaning, with all using the toothbrush of preference (manual or electric). Manual toothbrushes were used by 55 per cent, which was an unexpected finding. It was thought that the increased availability of electric toothbrushes in recent years would make them more commonly used or desired.

Specific oral problems were more common than dissatisfaction with home care. Twenty-five percent of people had aspects of their oral health that bothered them. One person had recently had extensive restorative treatment to crown all his anterior teeth. These teeth had been abraded excessively because he used pens with his mouth. It was anticipated that this would have been a more common problem.

Half of people interviewed only went to the dentist when they had a problem, and eight people specified problems about going to the dentist, the most common being transferring in and out of the dental chair, and access to the dental surgery. One man stated that transferring in and out of the dental chair increased the risk of getting pressure sores from limbs scraping on chair arms, and wheels of wheelchairs. One woman’s dentist moves to a surgery downstairs from his normal practice when he sees her. In New Zealand, many dentists have their practices upstairs. Of these, a significant number do not have lifts to allow wheelchair access. Many do not specify in their advertisements whether or not they are wheelchair accessible. In some of the larger areas, the hospital departments are the most appropriate first point of contact, as they can refer to private dentists in the area, should the patient wish to be treated privately.

Conclusions

These findings suggested that while most of this small group of tetraplegics are happy with their oral care, differences between caregivers do exist. In addition, an information resource, including contact details of wheelchair-accessible practices, would be valuable. More in-depth research is needed to add power to this study.

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References


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Appendix 1. The Questionnaire

**AGE:**  
**SEX:**

<table>
<thead>
<tr>
<th>YOUR SCI</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 How did your SCI occur?</td>
<td>Sport</td>
<td>Motor</td>
<td>Cong</td>
<td>Other</td>
</tr>
<tr>
<td>1.2 a) Can you put your own jersey on?</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Can you brush your own teeth?</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3 Medical History</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>a) Drugs taken</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) Do you think that any of these drugs affect your mouth</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) What other medical conditions do you have?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1.4 How many caregivers do you have?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**ATTITUDES AND EXPECTATIONS**

| 1 | 2 | 3 | 4 | 5 | 6 |
| 2.1 How often would you like your teeth to be cleaned? | >2xday | 2xday | daily | ev.2days | <ev.2days | other |

<table>
<thead>
<tr>
<th>2.2 What would you like to be used?</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>elec TB</td>
<td>man TB</td>
<td>Tpaste</td>
<td>Tpicks</td>
<td>Floss</td>
<td>MW</td>
<td>other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.3 Is there anything about your oral health bothering you?</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bbreath</td>
<td>cavs</td>
<td>Bl/gums</td>
<td>sore teeth</td>
<td>ulcers</td>
<td>other</td>
<td>none</td>
</tr>
</tbody>
</table>

**ORAL CARE AT HOME**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who cleans your teeth?</td>
<td>self</td>
<td>C/G</td>
</tr>
</tbody>
</table>

| 2.2 | 2.3 | 2.4 | 2.5 |
|--------------------------|---|---|---|---|
| How often? | >2xday | 2xday | daily | ev.2days | <ev.2days | other |
| What do they use? | 1 | 2 | 3 | 4 | 5 | 6 |
| elec TB | man TB | Tpaste | Tpicks | Floss | MW | other |

| 3.4 | 3.5 |
|--------------------------|---|---|
| Are there any variations between caregivers? | YES | NO |
| Are you happy with the way your teeth are being cleaned? | YES | NO |

**COMMENTS:**

| 3.6 | 3.7 |
|--------------------------|---|---|
| Who do you consult for oral problems? | 1 | 2 | 3 | 4 | 5 |
| C/G | G/P | G/D | dist nurse | other |

**PROFESSIONAL ORAL CARE**

| 4.1 | 4.2 |
|--------------------------|---|---|
| Do you go to the dentist? | YES | NO |
| a) When do you go? | 1 | 2 |
| reg checkups | only when a problem |
| b) if (1) how often? | 1 | 2 | 3 | 4 |
| 1xyr | 6mths | 3mths | other |

| 4.2 | 4.3 |
|--------------------------|---|---|---|---|
| Are there any other problems going to the dentist? | 1 | 2 | 3 | 4 | 5 |
| access | transfer | money | other | none |

**COMMENTS:**
Appendix 2. The Leaflet

You may have realised that it is important to preserve your teeth, especially if you are using them for a range of different functions.

You may use your teeth to hold things such as pens, as well as eat and speak.

You may have a dry feeling in your mouth, which could be caused by some of your medications.

Up to 80% of a tetraplegic's total body sensation is in his/her mouth, so it is important to keep it healthy.

If someone else is caring for you, they need to know how to care for YOUR mouth properly, because what is OK for them may not necessarily be right for you.

**WHAT IS PLAQUE?**

Plaque is the fuzzy white film that accumulates on your teeth between brushings. It can cause tooth decay. Gum disease can develop, which can lead to more sensitive teeth and eventual tooth loss.

**BRUSHING** is the best way of removing plaque.

A hand-held toothbrush can be modified so people with limited hand movement can hold it.

Electric toothbrushes are excellent for people with limited hand movement.

Whatever you use, make sure ALL tooth surfaces are cleaned.

**BRUSHING TECHNIQUES**

If your caregiver brushes your teeth, the best way for them to do it is to stand behind you, as if they were brushing their own teeth.

All teeth need to be cleaned, front and back, using gentle circular movements.

Floss and toothpicks can get fiddly, but your caregiver can still clean in between your teeth with them if a dentist shows them the proper technique.

**TOOTHPASTES:**

Fluoride strengthens teeth, so it is important to use a fluoride-containing toothpaste. Most toothpastes at the supermarket have fluoride in them.

**MOUTHWASHES:**

A fluoride mouthwash can help strengthen teeth. You can get a prescription from your dentist. Savacol can help reduce plaque levels, especially if you have limited brushing movements. It is important to realise that mouthwashes are not a substitute for brushing well.

**DRY MOUTH**

You may have noticed a dry feeling in your mouth.

Antispasmodic, anticonvulsant and antidepressant drugs (such as Baclofen) can all cause a dry mouth by decreasing your saliva production. However, not everyone who takes these drugs will experience a dry mouth.

Saliva is your natural defense against plaque. If you do have a dry mouth **DON’T** sip sweet drinks!

Sweet drinks such as fruit juice, cordial and fizzy will increase your risk of tooth decay, and weaken your front teeth.

Instead, try water, milk, or sugar free cordials.

Rinsing with mouthwashes often won’t help, as they may contain alcohol, which can dry your mouth out even more.

A teaspoon of salt in warm water, with or without a teaspoon of baking soda, can help relieve a dry mouth.

Chewing sugar-free gum is an excellent way to stimulate saliva, and also helps to decrease plaque.

**MATHS STICKS**

You may also use a maths stick to perform functions such as dialing numbers on the phone, or turning pages.

These can damage your teeth if they are not made properly, or if you misuse them. They may cause your teeth to move, or wear down. Check with your dentist if your stick has any damage potential and if it is right for your mouth.

Sticks can be custom-made to fit your teeth, and to perform specific functions.
WHEN TO VISIT YOUR DENTIST

See your dentist immediately if you have

- Broken or sore teeth
- Loose teeth
- Bleeding or sore gums
- Bad breath
- Lumps, red or white patches anywhere in your mouth.

SEE YOUR DENTIST EVERY SIX MONTHS

- For a check-up
- For professional cleaning.

SOME WEBSITES OF INTEREST

www.eparent.com/resources/asktheexperts/askthedoctor/
http://www2.umdnj.edu/forumweb/dental.htm
www.dental.ufl.edu/Disabilities/

WHERE TO GO

NORTHLAND
David Stallworthy
19 Maunu Rd
Whangarei
09 438 4400

AUCKLAND
Greenlane Hospital
Oral Health Unit
Building 9
Greenlane West Auckland
09 623 6494
(for private dentists, contact the hospital department.)

WAIKATO
Dental Department
Waikato Hospital
Pembroke St
Hamilton
07 839 8805
(for private dentists, contact the hospital department.)

BAY OF PLENTY
John Twaddle
Whakatane Medical Centre
9 Simpkin St
Whakatane
07 3085279

PNTH/WANGANUI
Dental Department
Palmerston Nth Hospital
Heretaunga St
Palmerston North
06 350 8629

CANTERBURY
Paul Morris
188 Grey Street
Palmerston North

For further information, please contact your local branch of the New Zealand Dental Association or your yellow pages.