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The Oral Health of Rest Home Residents with Dementia

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A research report submitted in partial fulfillment of the requirements for the degree of Master of Dental Surgery in Hospital Dentistry
University of Otago, Dunedin, New Zealand

August, 1999

Supervisors:
Dr. W. M. Thomson, University of Otago
Dr. P. Wood, Auckland University
O heavens! is 't possible a young maid's wits
Should be as mortal as an old man's life?

Laertes, in Hamlet by William Shakespeare: Act IV, Scene V.
Abstract

There are increasing numbers of dentate older people in New Zealand and a proportion of them have dementia. To date, there are no data describing the oral health of older people with dementia in a New Zealand setting, partly because of the substantial challenges in performing an intra-oral examination and providing dental treatment for an older person with dementia. In this study, the World Health Organisation criteria for carrying out oral health surveys were used to examine a convenience sample of 60 dentate older Auckland people with dementia. The oral health of these individuals was characterised by a widespread need for simple periodontal treatment and a moderate need for restorative dental care. The presence of decayed-retained roots has not been previously reported for such a group, and a number of individuals required their extraction. The provision of dental extractions and restorative dental care for these individuals has substantial resource allocation and service provision implications. Managing some people with dementia requires a general anaesthetic; this can be complicated by medical comorbidities and thus requires treatment within a hospital setting. The data from this study can now be used to formulate a long-term service plan for this group of older people, whose numbers are expected to increase in the coming years.
My most sincere thanks go to Clive Ross for enticing me into hospital service, allowing me to balance study and work commitments, and allowing my dream of a career in Hospital Dentistry to become reality. Heartfelt thanks go to David Hay, for his professionalism, dedication and organisation in teaching Oral Medicine, and most of all for arranging and coordinating the curriculum. This course would not have been possible without his hard work. Thanks also to David for his encouragement, and his special discussions on banking and religion that should be part of the formal curriculum for house surgeons.

I would like to express my appreciation to my "buddy" Anne Easton, a special Dental Surgery Assistant, for organising my clinics, theatres and domiciliary visits. I am grateful to Anne for her cheerful disposition, for recording the data for this study, for reading the road map to get us to the rest homes, and not resigning when the pressure was on.

I am grateful to the members of the Executive of the New Zealand Hospital Dental Surgeons Association for their support in all aspects of this course. Special mention of Ian O'Loughlin; I remember his incredulous look when I jokingly asked if there was a career in Hospital Dentistry; he relied emphatically, "Of course there is!"

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To my patients: Many of the people in the study would not remember me even five minutes after we met. I owe all of these people a huge debt of gratitude. It is from them I have been able to learn, and move forward into the future. I also acknowledge the help and assistance of the many caregivers and rest home managers in the community. They have helped make this study possible by allowing me to intrude into the day-to-day running of their busy facilities.

I would like to thank Dr. Phil Wood, Senior Lecturer in Geriatric Medicine, Auckland University, for the initial discussions at the planning phase of this project, for his generous advice, and for making me feel part of the team providing health care for older people.

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Grateful acknowledgement is made to the New Zealand Dental Research Foundation for its support of this study.

Finally, thank you to my family, for their love, cheering from the sidelines, enduring my absence, and putting up with me as the school boy that has never finished. I love you. Most of all, to my best friend Sue, who took time to love, help and support me, and who more than tripled her workload just so that I could do half of mine - ‘thanks’, this one’s for you.
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Chapter 1: Introduction

Dementia is a generic term for a group of usually progressive conditions with a variety of causes. Alzheimer's disease, vascular dementia, Parkinson's disease-related dementia and alcohol-related dementia are the most prevalent of these conditions (Wood, 1996). Alzheimer's disease occurs in approximately 10 percent of the population over the age of 65 and has been observed in as many as 25 to 50 percent of people over the age of 85 years. Individuals with Alzheimer's disease may suffer from dementia and be unable to care for themselves. There has been no published information describing the oral health of people with dementia in New Zealand.

The Oral Health Unit of Auckland Hospital receives many referrals each year from rest-homes and hospitals in the Auckland region to see and treat patients who have dementia or Alzheimer’s disease. These people rely on caregivers to assist them with many of the activities of daily living, such as feeding, mobility, and personal care (for example bathing and oral hygiene). Many people with dementia are residents of special-care rest homes. The aim of this study is to provide a baseline of the oral health of these patients and determine their oral health requirements.

It is hoped that the information from this survey can be used to help establish a dental service that caters for this group of patients who have special needs. Such a service would aim to meet some of their needs for dental care. No such service currently exists in Auckland, and the requirements for restorative dental care are largely unmet, with the only treatment being provided the extraction of unsavable teeth on an ad hoc basis.

At present, one in 20 New Zealanders over the age of 65 years is affected by dementia. The proportion of dementia sufferers is expected to rise to one in five among people over 80 years of age (Sainsbury, 1997). Census data from Statistics New Zealand (1999) indicate that the proportion of older people in the population is increasing. Thus, as the population ages, a substantial number of people will be at risk from dementia. There will be a growth in demand for dental care in the future, because more older adults have retained their teeth and have an associated increased need to utilise dental services (Henry and Wekstein, 1997). A proportion of these older people will have dementia, so it is important that a service for providing oral health care is established to cope with the demands of the future.
The New Zealand government regularly prepares a range of projections for the New Zealand population. These projections take into account changes in fertility, mortality, migration overseas, and past historical trends. Current predictions are that the age structure of the New Zealand population will change significantly for the projection period from 1998 to 2051 (Statistics New Zealand, 1998). There will be an increasing number of older people. Half of all New Zealanders will be over 46 years of age in the year 2051, compared with the median age of 33 years in 1996.

The number of New Zealanders aged 65 years and over is expected to increase over the next 55 years, from 0.43 million in 1996 to about 1.15 million in 2051 (Table 1). This is a rise of 167 percent and reflects a combination of improved life expectancy and the movement of the “baby-boom” generation into retirement ages. By the year 2051, older people are expected to make up 26 percent of all New Zealanders, compared with 12 percent in 1996. In 1996, there were nearly twice as many children in the population as persons aged over 65 years. In 2051, these older people are expected to outnumber children by 65 percent. Of these older people, one in five will be aged 85 or over in 2051. Thus, the absolute number of older people with dementia is likely to increase.

Table 1: Projected New Zealand Resident Population and Median Age 1996 - 2051

<table>
<thead>
<tr>
<th>Year at 30 June</th>
<th>Population aged 65+</th>
<th>Total Population</th>
<th>Median Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>0.43 million</td>
<td>3.714 million</td>
<td>33.0 years</td>
</tr>
<tr>
<td>2001</td>
<td>0.456 million</td>
<td>3.901 million</td>
<td>34.6 years</td>
</tr>
<tr>
<td>2011</td>
<td>0.552 million</td>
<td>4.154 million</td>
<td>38.0 years</td>
</tr>
<tr>
<td>2021</td>
<td>0.750 million</td>
<td>4.352 million</td>
<td>40.5 years</td>
</tr>
<tr>
<td>2031</td>
<td>0.981 million</td>
<td>4.495 million</td>
<td>42.4 years</td>
</tr>
<tr>
<td>2041</td>
<td>1.123 million</td>
<td>4.530 million</td>
<td>44.6 years</td>
</tr>
<tr>
<td>2051</td>
<td>1.145 million</td>
<td>4.486 million</td>
<td>45.8 years</td>
</tr>
</tbody>
</table>

A recent report from Statistics New Zealand, based on the 1996 Census, focused on people 65 years of age and over (Statistics New Zealand, 1997). This is the age of current eligibility for New Zealand Superannuation, and an internationally accepted point of transition into old age. The report further defines the 65-plus group into the young-old (65-74 years), medium-old (75-84 years) and the old-old (85 years and over).
It notes that, in 1996, most people in New Zealand aged 65 years and over were living independently in private dwellings. Fewer than five percent were living in residential homes for the elderly, and only one percent lives in public or private hospitals. The probability of living in a residential home does, however, rise with increasing age. While only one percent of people in 1996 aged 65 to 74 years were living in residential homes for older people, 24 percent of those aged 85 years and over were doing so.

As with the general population, most older people live in the North Island. However, older people account for a larger proportion of the population in the South Island, where 90 percent of older people lived in urban areas in 1996, compared to 85 percent of the total population. People in the oldest age groups are the least likely to live in rural areas, with only six percent of those aged 85 and over living there in 1996.

In 1996, the Auckland region was home to 26 percent of all older people, the Canterbury region 15 percent and the Wellington region 11 percent. The West Coast region had the smallest proportion of New Zealand’s older population, with less than one percent of the total. The Kapiti Coast and Thames-Coromandel districts were the two territorial authority areas with the highest concentrations of older people in 1996. In Kapiti Coast, older people made up 21 percent of the population while they comprised 19 percent of the Thames-Coromandel district population. The territorial authorities with the smallest proportion of older people included cities such as Wellington, Porirua, Waitakere and Manukau. These had above-average numbers of new migrants and Maori and Polynesian residents, which are groups with generally younger age structures. Other areas such as the Chatham Islands and the Mackenzie districts, also had few older residents at that time. There is also considerable mobility among the older population. At the time of the 1996 Census, the Bay of Plenty was the most popular destination for older migrants, gaining more than two older people for every older person it lost. Most of the older migrants came from the Auckland, Waikato, Manawatu-Wanganui and Wellington regions. The Northland and Canterbury regions experienced the next highest net gain of older people.

Advances in public health are extending human longevity. Dental care and technology are improving and there have been changes in societal as well as professional expectations, helping to produce an aging population who have experienced fewer dental extractions than in the past (Barmes, 1994; Henry and Ceridan, 1994; Kalk et al, 1992; Thomson, 1997).
This growing life expectancy has created several challenges for the dental profession. One particular challenge is the increasing number of people, especially those over 80 years old, who are frail and functionally impaired. These people have difficulty living independently and participating in the community. Very frail older people may be homebound or unable to leave the home without assistance. They may be institutionalized and live in a nursing home (Henry and Ceridan, 1994). Contrasts in sociodemographic characteristics, and medical and dental health, are highlighted when a comparison is made between nursing home residents and those who are the same age but live independently in the community (Miyazaki et al, 1992; Dolan and Atchison, 1993). Affluent independent older people, have better medical and dental health than their less affluent, dependent peers.

Oral health data are routinely collected for children in New Zealand, but there is a paucity of recent data for the adult population (Edward et al, 1999). A mid-1980s survey of Dunedin people over the age of 65 years (Brown et al, 1987), found that 24 percent were dentate; this is very similar to the 21.5 percent of people in the 1976 Survey of Adult Oral Health (Cutress et al, 1979). There was a higher proportion of edentulous women than men, but, among the dentate group, women had more teeth than men. Over half the sample had 10 or fewer teeth. Seventeen percent (considered high) of people had no periodontal treatment needs and no calculus. Deep periodontal pockets were not a feature; no individuals required complex periodontal treatment, but there were substantial requirements for prophylaxis. The treatment needs for crown and root caries were modest: 36 percent had treatment requirements, but only 26 teeth were considered to require care and four teeth required cusp restorations. A higher prevalence of root surface caries was found in women, who also had a higher proportion of affected surfaces restored.

Cautley et al (1992) reported on the oral health of a sample of dentate Mosgiel residents. Approximately 16 percent of individuals were dentate. Cautley noted that the demographic profile of the population (aged over 70 years) from which he drew his sample was similar to the demographic profile of the New Zealand population aged over 70 as determined by the 1986 census. Of particular note was that 51 percent of the study participants were male, but in the community from which the study sample was selected, only 35 percent of the population over 70 years were male. Cautley found that a disproportionate number of males in that study population had kept their own teeth and that most of the older dentate people
required some form of dental treatment with simple restorative and periodontal treatment needs predominant.

Thomson *et al* (1991) reported on the oral health and treatment needs of a population of institutionalised older New Zealanders and found only 19.5 percent to be dentate. The average number of teeth present was 13.3, similar to the 13 reported by Brown in 1987. Many of the dentate study participants had mandibular teeth but wore a full upper denture. The dental caries experience of that population was high, with many having untreated carious lesions. Although the older individuals had fewer teeth, they were likely to have frank dental caries of the crown or root. Thomson *et al* found that conservative or exodontic treatment for coronal caries was required for 69 percent of dentate individuals. Coronal restorative needs were mainly for multi-surface restorations, two-thirds of which involved two or three surfaces. There was less variation in the need for restorative care than there was for extractions, and there was a very low requirement for complex restorative dental care. There were substantial extraction needs; most extractions were required by men aged 85 or over, and their whole-tooth treatment needs were correspondingly greater. Thomson used the Community Periodontal Index of Treatment Needs and found that every participant required at least scaling. The periodontal health of institutionalised older people is claimed to be worse than their non-institutionalised counterparts, but advanced periodontal disease was not found to be widespread in the population under study (Thomson *et al*, 1991).

In general, nursing home residents tend to be predominantly female, and have more physical and mental disabilities than their community-dwelling counterparts. While both groups have experienced fewer dental extractions than in the past, they show differences in their oral health. Dentists and other health professionals need to be aware of these differences (Kiyak *et al*, 1993). A summary of different findings in New Zealand studies is given in Tables 2 and 3.

<table>
<thead>
<tr>
<th>Study</th>
<th>Periodontal Needs</th>
<th>Need for extractions</th>
<th>Need for restorative care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown <em>et al</em> 1987</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Thomson <em>et al</em> 1991</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Cautley <em>et al</em> 1992</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
**Table 3:** A comparison of three different New Zealand studies describing the treatment needs of older people

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Community dwelling</td>
<td>• Institutionalised</td>
<td>• Community dwelling</td>
</tr>
<tr>
<td>• N = 272</td>
<td>• N = 359</td>
<td>• N = 815</td>
</tr>
<tr>
<td>• Dentate proportion = 24.3%</td>
<td>• Dentate proportion = 19.5%</td>
<td>• Dentate proportion = 16.1%</td>
</tr>
<tr>
<td>• Periodontal need: High</td>
<td>• Periodontal need: High</td>
<td>• Periodontal need: High</td>
</tr>
<tr>
<td>Main need is for improved oral hygiene and oral prophylaxis (83%)</td>
<td>Almost every subject required scaling and oral prophylaxis (92%)</td>
<td>There was a need for simple scaling and root planing (90%).</td>
</tr>
<tr>
<td>• Restorative need: Low</td>
<td>• Restorative need: High</td>
<td>• Restorative need: High</td>
</tr>
<tr>
<td>Only 3% of teeth in the dentate proportion required restorative care</td>
<td>Restorative treatment was required for 47% of dentate individuals.</td>
<td>There was a need for simple restorative care (89%).</td>
</tr>
<tr>
<td>• Need for dental extractions: Low (&lt;1%)</td>
<td>• Need for dental extractions: High (69%)</td>
<td>• Need for dental extractions: Low (9%)</td>
</tr>
</tbody>
</table>
There are several problems that make providing dental care more difficult for these patients: not only are residents of nursing home facilities increasingly frail and long-lived, they are afflicted with complex medical, functional, and dental disabilities. Limitations in the awareness of, and attitudes of caregivers to the problems of oral health may also limit care (Tennstedt et al, 1994). The many studies which have reported on the dental status of older people demonstrate consistent differences between normative and perceived needs, as well as varying levels of awareness of dental health among carers (Kalk et al, 1992; Vigild et al, 1993; Soh, 1992; Persson et al, 1994; MacEntee, 1994). Proper dental management requires recognition of the likelihood of compromised self-care and the development of strategies to address dependence in oral care (Doherty et al, 1994; Felder, James et al, 1994; Felder, Reveal et al, 1994; Kambhu and Levy 1993).

Investigations of the oral health of the older people leave little doubt that disease and dysfunction are highly prevalent, although there is some debate on how the epidemiological observations translate into clinical treatment needs (Vigild et al, 1993; Soh 1992; MacInnis et al, 1993; Cautley et al, 1992; Lo et al, 1994). The problems appear to be greatest among disabled and institutionalised people, and dentists generally show little enthusiasm for offering their services outside the confines of the conventional dental practice (MacEntee et al, 1992). Consequently, the oral health concerns of frail older populations remain substantially unanswered. People with Alzheimer’s disease and dementia form a subgroup of individuals who present with special needs and management challenges for the dentist, and are therefore less likely to have their dental needs met.

US estimates are that one in 10 persons over the age of 65 - and as many as half the population aged 85 and over - has Alzheimer's disease (Jones et al, 1993). Review of the literature reveals substantial decrements in oral health in persons with dementia as measured by denture hygiene, coronal decayed, missing and filled teeth, filled teeth (cervical), caries prevalence and of sites with plaque, gingival bleeding and calculus (Sigal & Levine, 1993; Boccia, 1992). Demented individuals seem to be particularly at risk from dental disease for several reasons: they may be unaware of the need for oral care; they may not be able to express the need for dental treatment; and they may be completely dependent on caregivers to help them with daily self-care activities, such as tooth brushing.

The oral health of older people with dementia compares poorly with that of the general older population (Vincent, 1994; Horn et al, 1994). The dentist can play a key role in the
comprehensive care and management of patients with dementia. As part of a geriatric assessment team, the dentist can contribute to a strategy addressing often complex health issues (Kay & Licari, 1993; Goodman et al, 1993).

Dental health is an important aspect of quality of life. Oral treatment goals for severely demented people and the benefits of that oral treatment are complex issues. Severely demented people can neither express their wishes nor make rational decisions about oral care. Acting “in the best interests” of a demented person who refuses or does not understand the purpose of treatment depends on the perspective and treatment priorities of the advocate. For the oral care of a demented person, the advocate may be a relative, a member of the ward staff, a hospital dentist or any combination of these (Nordenram et al, 1994). While all advocates agree that an individual should be free from pain, each of these different advocates places emphasis on a different part of dental care. Nursing personnel give priority to aspects of care, such as being able to chew and enjoy eating. Relatives are concerned with social behaviour and communication, although factors such as fresh breath, normal speech, and normal appearance are also important. While dentists may be primarily concerned with function, Nordenram et al (1994) also reported that hospital dentists perceived less need for dental prostheses than other patient advocates. This finding was possibly a reflection of professional awareness of the limitations of treatment success due to the individual’s cognitive impairment.

Bearing in mind that the priorities for oral health differ among patients, caregivers, and medical and dental professionals (Atchison et al, 1993; Gilbert et al, 1994), and people with dementia may not be able to care for themselves or make decisions about their care, there is the need for a sound rationale on which to base oral health care that takes these competing considerations into account (Berkey et al, 1996). In order to allow construction of such a paradigm for the dental care older people with dementia in New Zealand, adequate information on the oral health status of this special group is required. That is the rationale for this study. There is no literature at present that examines the oral health status of people with dementia in New Zealand. Until recently, there was no dental service within the hospital system in Auckland, for providing dental treatment for this group of patients with special needs. This study aims to obtain data on the oral health of people suffering from dementia in Auckland. This information will be used to improve oral health services to older people suffering from dementia in the Auckland region.
Chapter 2: Materials and Methods

2.1 Selection of Participants

The data from this study were obtained from a survey of older rest-home residents who had a diagnosis of dementia in their medical history. The survey involved a dental examination of the resident and a review of his/her rest-home records. These people had been referred to the Oral Health Unit at Green Lane Hospital for a dental review.

The referring source in all cases was the resident's general medical practitioner. The common problem in all the referrals was that there was some aspect of the resident's oral health that was thought to have contributed to a worsening of his/her behavior. The rest homes were those in the greater Auckland region. This is the geographical area served by Auckland Healthcare Services Limited, which provides hospital and community-based health care under the governance and funding of the Northern Regional Health Authority.

2.2 Ethical Approval

The Ethics Committee of the Northern Regional Health Authority gave approval for the study. The confidentiality of patient information and considerations regarding informed consent were the committee's main concerns. Consent was obtained directly from the resident, from the next-of-kin or from a person with Power of Attorney for the resident. If a study participant refused to participate, then he/she was excluded from the study. This refusal to participate was accepted at face value and in no way penalised the resident. The Ethics Committee approval documentation for the study is presented in Appendix 1.

The over-riding consideration in terms of the consent procedure was the acceptance of the participant in allowing a dental examination (assent). Participants were excluded from the study if they refused to participate, even though their next-of-kin had given consent; that is, if assent was not operative, they were excluded from the study.
Unique identifiers in the data set preserved the confidentiality of the participants. A master list of identification numbers, names and addresses was kept securely and separate from the clinical information, which was coded and entered onto a database for analysis. Password access to the computer ensured the security of the data at all times. The information collected about the participants was coded so data analysts could not identify individuals, rest homes or hospitals. The data capture form is shown in Appendix 2.

One thorough dental examination was carried out for each participant, at his or her place of residence. No follow-up examinations were undertaken to check the test-retest reliability of the data because of (a) the difficulty in examining a person with dementia, (b) the need to minimise disruption to the routine of the rest homes or hospitals, and (c) it was considered less intrusive for the participants. The only follow-up conducted was for those participants who had “suspicious” oral ulceration. The management strategy for these individuals is described in Section 2.6.

If an acute condition such as an infection was discovered during the examination of the participant, then the procedure listed in section 2.6.1 was followed.

2.3 The Study Participants

All patients referred to the Oral Health Unit and who met the entry criteria were selected for the study. The entry criteria are listed in Table 4:

<table>
<thead>
<tr>
<th>Table 4: Entry criteria for recruitment to the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A written referral from a registered medical practitioner requesting a dental review</td>
</tr>
<tr>
<td>2. A diagnosis of dementia listed as a medical problem</td>
</tr>
<tr>
<td>3. Residence in a Stage 2 rest home or a long-term hospital in Auckland</td>
</tr>
<tr>
<td>4. Dentate status (one or more teeth)</td>
</tr>
</tbody>
</table>

In all cases, the participant’s general medical practitioner wrote a letter of referral requesting that a dental review be carried out for the resident. In many cases, the medical practitioner felt that the person’s dementia would preclude him/her from obtaining care from a private dental practitioner.
The medical notes of the resident were examined and social data collection was carried out. This involved confirming the patient's age, gender and ethnicity from the notes, and identifying the dependency level from the medical notes. Mini-mental status (MMSE) or mental status questionnaire (MSQ) scores were obtained from the medical records. If there was no record of ethnicity in the notes, then the participant's determination of their own ethnicity was used, or next of kin were consulted. In this latter case, ethnicity was determined using the criteria of Statistics New Zealand and the conventions used in the New Zealand Official Yearbook 1998 (Statistics New Zealand, 1998) were followed. This resulted in the following coding classifications for ethnicity (Table 5):

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Coding Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>European</td>
<td>1</td>
</tr>
<tr>
<td>Maori</td>
<td>2</td>
</tr>
<tr>
<td>Polynesian</td>
<td>3</td>
</tr>
<tr>
<td>Asian</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
</tbody>
</table>

2.4 The Determination of Cognitive Status

MMSE or MSQ scores were obtained from the person's rest-home notes if they were available. No attempt was made to administer the MMSE or the MSQ if no score was present. This was in acknowledgement that the person had already been diagnosed with dementia and minimised the study's intrusion. It was also considered that determining the extent of any cognitive deficit was beyond the scope of the current study.

2.5 The Dental Examination

The author carried out all examinations of participants and a dental assistant recorded the data. Dr. W. Murray Thomson calibrated the examiner at a rest home before data collection began. Data collection was based on the methods and criteria prescribed by the World Health Organization (WHO, Oral Health Surveys: Basic Methods 4th Edition, 1997).
The examination was carried out using a halogen headlight, autoclavable size four plane mouth mirror, sickle explorer, WHO standard Community Periodontal Index of Treatment Needs (CPITN) probe. The participants were seated in a high-backed chair that supported the head or they reclined on a bed. Examinations were normally conducted in the participant’s rest home room or their hospital room. A dental assistant and a caregiver were present during the examinations. The dental assistant recorded the data.

The examination of the participant was carried out in the following order:

1. Extra-oral examination of the face;
2. Condition of the oral mucosa;
3. Community periodontal index of treatment needs (CPITN);
4. Loss of periodontal attachment;
5. Dentition status and treatment need;
6. Prosthetic status and treatment need

The mouth was examined systematically to ensure that no tooth or quadrant was omitted or recorded more than once. Teeth were recorded as present if any part of them could be visualized and probed with the explorer; this included retained roots. The Federation Dentaire Internationale coding system was used to identify each of the teeth and the categorical coding system set out in the WHO guidelines for oral health surveys was adopted to record data about the teeth and the soft tissues. The codes for the recording of the data are presented in the tables that follow.

No radiographs were taken due to the difficulty of transporting x-ray equipment to rest homes. This minimised the intrusion of the study on the participants and did not introduce factors into the dental examination that could frighten the individual, or unduly challenge their cooperation.
2.5.1 The extra-oral examination

The extra-oral examination commenced from the moment that the examiner met the participant. It consisted of a careful visual examination of the participant’s head and neck for any obvious lesions of the skin and peri-oral region. A systematic visual survey was carried out to screen for asymmetry due to pathological swelling. If extra-oral lesions were noted, they were examined more closely and, if necessary, swellings and lymph nodes were palpated. This visual survey was conducted while introductory conversation was made with the participant in order to minimise the intrusion and also to efficiently utilise time since individuals with dementia often have a limited concentration span and reduced cooperation.

The codes used to record data about the extra-oral appearance of the participants are presented in Table 6:

<table>
<thead>
<tr>
<th>Code</th>
<th>Finding at time of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal extra-oral appearance</td>
</tr>
<tr>
<td>1</td>
<td>Ulceration, sores, erosions, fissures to head neck or limbs</td>
</tr>
<tr>
<td>2</td>
<td>Ulceration, sores, erosions, fissures to nose cheeks or chin</td>
</tr>
<tr>
<td>3</td>
<td>Ulceration, sores, erosions, fissures to the commissures</td>
</tr>
<tr>
<td>4</td>
<td>Ulceration, sores, erosions, fissures to the vermilion border</td>
</tr>
<tr>
<td>5</td>
<td>Cancrum oris</td>
</tr>
<tr>
<td>6</td>
<td>Abnormalities of the upper and lower lips</td>
</tr>
<tr>
<td>7</td>
<td>Enlarged lymph nodes of the head and neck</td>
</tr>
<tr>
<td>8</td>
<td>Other swellings of the face and jaws</td>
</tr>
<tr>
<td>9</td>
<td>Not recorded</td>
</tr>
</tbody>
</table>

Diagnosis of and coding for the description of the individual’s extra-oral appearance was based on the following criteria. The individual was described as having a normal extra-oral appearance if there were no visible signs of ulceration, sores or fissures to the skin and an absence of swellings of the face, jaws and lymph nodes. Any ulceration, sores, erosions or fissuring were recorded as the corresponding code in Table 6 depending on their location. Abnormalities of the upper and lower lips were defined as scars for the repair of cleft lip,
other surgical or traumatic scarring, or other physical deformity. Ordinary facial creases and folds, racial pigmentation, freckles, varicosities and non-ulcerated moles were classified as normal. There was no recording of ocular abnormalities such as corneal ulceration, conjunctivitis or cataracts.

2.5.2 Condition of the oral mucosa

Where possible, the WHO publication *Oral Health Surveys: Basic Methods (4th Edition, 1997)* was used to identify and define lesions of the oral mucosa. If further clarification was required to classify a lesion, the text *Oral Pathology* by Soames and Southam (1998) was consulted. The location of each condition was recorded on the data sheet. Thus, a two digit numeric code was generated that described the type and location of lesions of the oral mucosa (Table 7).

**Table 7:** Categories and codes used to record condition and location of lesions on the oral mucosa

<table>
<thead>
<tr>
<th>Code</th>
<th>Condition</th>
<th>Code</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No abnormal condition</td>
<td>0</td>
<td>Vermilion border</td>
</tr>
<tr>
<td>1</td>
<td>Malignant tumour (oral cancer)</td>
<td>1</td>
<td>Commissures</td>
</tr>
<tr>
<td>2</td>
<td>Leukoplakia</td>
<td>2</td>
<td>Lips</td>
</tr>
<tr>
<td>3</td>
<td>Lichen planus</td>
<td>3</td>
<td>Sulci</td>
</tr>
<tr>
<td>4</td>
<td>Ulceration (apthous, herpetic, traumatic)</td>
<td>4</td>
<td>Buccal mucosa</td>
</tr>
<tr>
<td>5</td>
<td>Acute necrotizing gingivitis</td>
<td>5</td>
<td>Floor of mouth</td>
</tr>
<tr>
<td>6</td>
<td>Candidosis</td>
<td>6</td>
<td>Tongue</td>
</tr>
<tr>
<td>7</td>
<td>Abscess</td>
<td>7</td>
<td>Hard and/or soft palate</td>
</tr>
<tr>
<td>8</td>
<td>Other condition (specify if possible)</td>
<td>8</td>
<td>Alveolar ridges/gingiva</td>
</tr>
<tr>
<td>9</td>
<td>Not recorded</td>
<td>9</td>
<td>Not recorded</td>
</tr>
</tbody>
</table>

2.5.2.1 Malignant tumour (oral cancer)

It was not possible to determine if a lesion was malignant simply by visual examination. A biopsy and histological examination is required to make this diagnosis. To biopsy all ulcers
in this group of people was considered too invasive, as well as unwarranted. Ulceration that had the characteristics of apthous, herpetic or traumatic ulceration was recorded as such, and the patient was placed under weekly review to ensure that the ulcers healed. Advice on mouth care was given to the caregivers. If the ulcers did not heal in the three weeks after initial discovery, the participant was managed using the protocol for a “life-threatening condition” (Section 2.6).

2.5.2.2 Leukoplakia

If a white patch was unable to be categorised as any other pathology, it was coded as leukoplakia on the data sheet.

2.5.2.3 Lichen planus

This dermatological lesion was recorded when the oral mucosa displayed white papules that could not be scraped from the mucosa, and the papules coalesced into reticular, annular or plaque-like patterns or demonstrated Wickham’s striae.

2.5.2.4 Ulceration (apthous, traumatic)

Apthous ulcers were recorded when there were small, painful, inflamed and irregularly shaped lesions covered in a fibrinous grey slough. Traumatic ulcers were recorded when the ulceration was found adjacent to sharp teeth or below an ill-fitting denture and there was a history of trauma.

2.5.2.5 Acute necrotizing gingivitis

Halitosis and a punched-out grey, ulcerated gingival margin with spontaneous bleeding and pain were the criteria used to define acute necrotizing gingivitis. Individuals with this diagnosis were treated with metronidazole and a peroxide mouthwash. The Charge Nurse of the rest home or hospital was informed and the person’s general medical practitioner was advised so that appropriate monitoring and follow-up could be arranged.
2.5.2.6 Candidosis

Three conditions were recorded as candidosis: Atrophic candidosis was recorded where there were red patches on the oral mucosa (commonly the tongue or the palate). These areas of erythema may have been localised “pin-point” lesions or generalised areas of erythema. A prominent feature was that there was an absence of a pseudomembrane. In contrast, Pseudomembranous candidosis was recorded when there was the presence of a thick white coating on the affected area. This white plaque could be wiped away to reveal a red, bleeding, painful base. Candida-associated angular cheilitis was recorded when there was soreness, erythema and fissuring at the corners of the mouth.

2.5.2.7 Abscess

A dento-alveolar abscess was recorded if there was a well-defined, rounded, discrete swelling associated with a carious, fractured, or periodontally involved tooth. The swelling may have been painful or tender to palpation, and pus may have been evident below the mucosal surface. Abscessing teeth were managed as described in Section 2.6.

2.5.3 Community Periodontal Index of Treatment Needs

The Community Periodontal Index of Treatment Needs (CPITN) was considered an appropriate instrument to assess the periodontal treatment needs of the participants. The CPITN is simple and easy to apply. It assesses treatment need without unnecessary application of a complex periodontal status evaluation for the individual. A WHO periodontal probe was used for the examination and gentle probing pressure was applied to determine pocket depth using the technique described by Ainamo et al (1983).
Table 8: Categories and codes used to record the Community Periodontal Index of Treatment Needs

<table>
<thead>
<tr>
<th>Code</th>
<th>Clinical Observation</th>
<th>Grid for recording CPITN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Healthy</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Bleeding</td>
<td>17/16 11 26/27</td>
</tr>
<tr>
<td>2</td>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pocket 4-5mm (black band on probe partly visible)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pocket 6mm or more (black band on probe not visible)</td>
<td>47/46 31 36/37</td>
</tr>
<tr>
<td>8</td>
<td>Excluded sextant</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Not recorded</td>
<td></td>
</tr>
</tbody>
</table>

The mouth was divided into sextants, and a sextant was included for data capture if it contained two or more teeth. The sextant divisions contained the teeth as follows:

- Tooth 17 to tooth 14
- Tooth 13 to tooth 23
- Tooth 44 to tooth 47
- Tooth 43 to tooth 33
- Tooth 24 to tooth 27
- Tooth 34 to tooth 37

Functional (occluding) third molars were included in the charting. Non-functional third molars were excluded from the charting. Recordings from each sextant were based on specific "index" teeth. These teeth are listed on the grid diagram for recording the CPITN (Table 8). In total, ten teeth were examined resulting in six recordings, one from each sextant. The worst finding from the index tooth was recorded, or, if the index tooth was missing then the worst recording from the remaining teeth in the sextant was taken. If the sextant had no remaining teeth, it was categorised as “excluded” from the CPITN. Bleeding for each recorded site was assessed within five seconds of probing.

2.5.4 Loss of attachment

Loss of attachment (LOA) around the teeth was measured with the WHO periodontal probe (Section 2.5.3). Specific index teeth were examined and the site of maximal gingival recession identified and probed to calculate a loss of attachment score. For this study, LOA was defined as the sum of the gingival recession and probing depth at that site on the index tooth. The corresponding code was selected and entered in the data grid.
## Table 9: Codes used to record Loss of Attachment (LOA) around teeth

<table>
<thead>
<tr>
<th>Code</th>
<th>Degree of LOA</th>
<th>Grid for recording LOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0-3mm</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4-5mm (cementoenamel junction (CEJ) within black band)</td>
<td>17/16 11 26/27</td>
</tr>
<tr>
<td>2</td>
<td>6-8mm (CEJ between upper limit of black band and 8.5mm ring)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9-12mm (CEJ between 8.5mm and 11.5mm rings)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>12mm or more (CEJ beyond 11.5mm ring)</td>
<td>47/46 31 36/37</td>
</tr>
<tr>
<td>8</td>
<td>Excluded sextant</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Not recorded</td>
<td></td>
</tr>
</tbody>
</table>

In order to examine and record the extent of loss of attachment around participants’ teeth, the mouth was divided into sextants. The sextant was included for data capture if it had two or more teeth. The sextant divisions contained the teeth as follows:

Tooth 17 to tooth 14  
Tooth 13 to tooth 23  
Tooth 24 to tooth 27  
Tooth 44 to tooth 47  
Tooth 43 to tooth 33  
Tooth 34 to tooth 37

Functional third molars were included in the charting. Non-functional third molars were excluded from the charting. Recordings from each sextant were based on specific “index” teeth. These teeth are listed on the grid diagram for recording the loss of attachment (Table 9). In total, 10 teeth were examined resulting in six recordings, one recording from each sextant. The worst finding from the index tooth was recorded, or, if the index tooth was missing, the worst recording from the remaining teeth in the sextant was taken. If the sextant had no remaining teeth, it was excluded from the LOA examination.
2.5.5 Dentition status and treatment need

The codes for recording the status of the tooth crown and root are presented in Table 10.

Table 10: Categories and codes used to record dentition status and treatment need

<table>
<thead>
<tr>
<th>Crown Code</th>
<th>Root Code</th>
<th>Status</th>
<th>Treatment Code</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Sound</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>Decayed</td>
<td>1</td>
<td>One surface filling</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Filled, with decay</td>
<td>2</td>
<td>Two or more surface fillings</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Filled, no decay</td>
<td>3</td>
<td>Crown for any reason</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>Missing as a result of caries</td>
<td>4</td>
<td>Veneer or laminate</td>
</tr>
<tr>
<td>5</td>
<td>-</td>
<td>Missing, any other reason</td>
<td>5</td>
<td>Pulp care and restoration</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>Fissure sealant</td>
<td>6</td>
<td>Extraction</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Bridge abutment, special crown or veneer/implant</td>
<td>7</td>
<td>Need for other care</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Unerupted tooth, (crown)/unexposed root</td>
<td>8</td>
<td>Preventive caries-arresting care</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>Not recorded</td>
<td>9</td>
<td>Not recorded</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>Trauma (fracture)</td>
<td>10</td>
<td>Fissure sealant</td>
</tr>
</tbody>
</table>

The coding sheet in Appendix 2 was used to record data items describing the participant's dental status and treatment need. A systematic examination of the participant's teeth was carried out and the teeth that were present were charted and coded according to the protocol of the World Health Organization.
2.5.5.1 Coding for the Status of the Crown or Root

A tooth or root surface was coded as *sound* if it had no evidence of caries and had not undergone restoration. Hypoplastic teeth, those that were discoloured, had white spots, stains, evidence of fluorosis, or which had pits or fissures that were *not* softened were all recorded as sound.

A tooth or root surface was recorded as *decayed* if it had a softened surface, cavity or pit, or there was undermining of part of the tooth due to caries. Interproximal surfaces were recorded as decayed if there was definite softening and cavitation that could be detected by probing. In cases where there was very obvious visual cavitation, no probing was attempted. If there was any doubt then the tooth was recorded as sound.

A tooth was classified as *filled, with decay* if it had been restored in any way with either a temporary or a permanent material and it had one or more areas of decay. The carious lesions may have been associated with the restoration or they may have been separate from them. There was no attempt to classify the caries as being primary or recurrent.

The classification of *filled, no decay*, was used to describe teeth that had been restored by any means (excluding acid etch fissure sealants, for which there was a separate category of recording) and where there was no evidence of decay in the tooth.

For the group of people under study, it was impossible to determine whether a tooth had been lost due to caries or for another reason such as trauma. If a carious root stump was present, the crown was coded as *missing due to caries* – the assumption was that caries had caused loss of the crown. For all other missing teeth, the crown and the root were coded as “5” *missing for another reason* – no assumptions were made as to the reason for the loss.

If a *fissure sealant* was detected in the occlusal surface of the tooth, the code for fissure sealant was recorded on the data sheet. Preventive restorative resin applications (where the occlusal fissures had been enlarged with a bur and a composite resin placed) were classified as “filled, no decay” if the tooth was sound, or “filled, with decay” if caries was present.

The coding *bridge abutment or special crown* was used for teeth that formed part of a bridge, or for individual teeth that were restored with crowns. It was not possible to say if these crowns were placed due to caries, so no attempt was made to discern the reason for the crown
placement. Missing teeth that had been replaced by bridge or partial denture pontics were coded as "missing for another reason."

The code *unerupted tooth (crown)/unexposed root*, was used only for third molar teeth that were partly erupted and the crowns were detectable without displacing the mucosa. Partly erupted lower third molars fell into this category where the tooth was visible through a gap in the operculum, or upper third molars, where the tooth had erupted under a denture base. One drawback with using this classification is that no distinction could be made between missing teeth and unerupted ones. No radiographs were taken and it was felt that it was impossible to distinguish whether a tooth was unerupted or missing due to congenital absence or previous extraction. Even so, it was felt that the number of teeth likely to be counted as missing, when in fact they were unerupted, was very small.

The category *not recorded* was used for any tooth that could not be examined.

The coding *trauma/fracture* was used to describe teeth that were either sound and unrestored, or sound and previously restored but which had fractures of the enamel or cusps. If there was evidence of decay in these teeth, they were classified as being "decayed" if unrestored, or "filled, with decay," whichever was appropriate.

2.5.5.2 Treatment Needs of the Crown or the Root

No treatment was required for teeth that had sound coronal and/or root surfaces, or teeth that had been previously restored but showed no signs of decay.

The code for *one-surface filling* was used when the tooth had caries in any surface, and it was determined that the procedure to restore the tooth would only require the preparation of one surface. Where single-surface restorations with secondary caries were present, these were coded as requiring a one-surface filling.

If two or more surfaces required restoration, the crown or root was classified as needing *two-or-more-surface fillings*. This classification was also applied to crowns and roots that had been previously restored with multi-surface restorations but had evidence of recurrent decay.
The treatment need categories of a crown for any reason, pulp care and restoration, and veneer or laminate were not used, but are included here for completeness, as they are listed in the WHO protocol for treatment needs. The placement of such restorations in this group of individuals with dementia is problematic. The decision to place a complex restoration on a tooth is dependent on factors such as an individual's perceived need, social desirability, and the person's ability to maintain good oral care. Consideration of the position of the tooth in the arch and its relationship to the occlusion or the requirement for the tooth (or teeth) requiring crowns to be abutments for other prostheses may be required. The cost of the procedure and the person's ability to cooperate are also factors, as is the ability of the dental team to provide the service.

Extraction was listed as the treatment need for teeth that were grossly carious. Carious root stumps, abscessing teeth and periodontally involved teeth that were symptomatic were also classified as requiring extraction.

If the individual required the management of a soft tissue lesion (for example, biopsy of a suspicious ulcer), the treatment need was recorded as need for other care. Periodontal treatment needs and prosthetic treatment needs are charted under the criteria in Sections 2.5.3 and 2.5.4.

The category preventive caries arresting care was not used in this study.

There was no attempt in this study to differentiate between the various presentations of enamel hypoplasia and the different manifestations of dental caries. The definition of caries in this study was that the lesion (whatever its colour), had to present surface softening that would catch a probe if gently explored. A tooth surface was thus classified as carious or not, and the requirement for treatment was recorded elsewhere. In this way, caries was recorded as a dichotomous variable (present/absent), and no attempt was made to record early lesions or to grade lesions by severity. There was no use of the coding “preventive caries arresting care” for treatment needs classification, but it is included here for completeness since it is part of the WHO protocol.

Missing teeth were classified as not recorded with respect to their need for treatment. If there was the requirement for prosthetic replacement of these teeth, it was recorded as a treatment need in the prosthetic section of the data record (Section 2.5.6).
Fissure sealant was not selected as a treatment need for the individuals in this study. The dental history and treatment experiences of this group of older people were expected to preclude the use of fissure sealant as a preventive measure. It was considered unlikely that any of the participants would have teeth suitable for fissure sealing.

2.5.6 Prosthetic status and treatment need

Table 11 lists the categories and codes used to record prosthetic status and prosthetic need. Prosthetic status and need was recorded separately for the upper and lower dental arches.

Table 11: Categories and codes used to record prosthetic status and prosthetic need

<table>
<thead>
<tr>
<th>Code</th>
<th>Prosthetic Status</th>
<th>Code</th>
<th>Prosthetic Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No prosthesis</td>
<td>0</td>
<td>No prosthesis needed</td>
</tr>
<tr>
<td>1</td>
<td>Bridge</td>
<td>1</td>
<td>Need for one-unit prosthesis</td>
</tr>
<tr>
<td>2</td>
<td>More than one bridge</td>
<td>2</td>
<td>Need for multi-unit prosthesis</td>
</tr>
<tr>
<td>3</td>
<td>Partial Denture</td>
<td>3</td>
<td>Need for combination of one- and/or multi-unit prosthesis</td>
</tr>
<tr>
<td>4</td>
<td>Both bridge(s) and partial denture(s)</td>
<td>7</td>
<td>Need for full prosthesis (replacement of all teeth)</td>
</tr>
<tr>
<td>5</td>
<td>Full removable denture</td>
<td>9</td>
<td>Not recorded</td>
</tr>
<tr>
<td>9</td>
<td>Not recorded</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.5.6.1 Prosthetic Status

The prosthetic status was recorded as follows: if the participant had no fixed or removable prostheses, the Code 0 was recorded on the data sheet; single or multiple fixed bridges were recorded as Code 1 or Code 2 respectively; a partial denture was recorded as Code 3; and a combination of fixed bridgework and removable dentures was allocated Code 4. If the participant had an edentulous arch and a full removable denture (whether they wore it or not), a prosthetic status of Code 5 was recorded for that arch.
2.5.6.2 Prosthetic Treatment Need

The WHO categories for prosthetic treatment need are listed in Table 11. Individuals with adequate upper, lower or partial dentures, or who had an adequate anterior occlusion comprising between 16 and 20 teeth, were allocated Code 0. Participants with discontinuous upper or lower arches requiring a one (or multi-unit) prosthesis to restore the arch had the appropriate code (1, 2, or 3) assigned. The aim of this process was to provide the person with an occlusion of at least 20 teeth in the upper and lower anterior segments. The upper arch was evaluated using the principle that at least 8 anterior teeth were present to provide some aesthetics.

Individuals with poor prosthesis that could not be improved by a simple reline or adjustment were classified as having a prosthetic treatment need, and this was allocated according to the number of units in their existing prosthesis. Edentulous individuals or participants whose dentition was unrestorable were coded as requiring complete prostheses.

2.6 Need for Referral

2.6.1 Acute ("life-threatening") conditions

If a participant was found to have an acute medical or dental condition, then the rest home Manager or Charge Nurse was informed and the individual was referred to their medical or dental practitioner as required. Follow-up was undertaken to ensure that the appropriate practitioner had reviewed the participant, and to determine what treatment had been provided.

2.6.2 Suspicious oral lesions

In the event that a suspicious lesion was discovered on the oral mucosa, infection and local factors such as trauma from a sharp tooth or a denture, were eliminated. The individual was reviewed for three weeks to ensure healing of the lesion. If there was inadequate healing of the lesion in this time, then the participant’s medical practitioner and the Charge Nurse of the facility were informed. The participant was then referred a specialist in the Oral Health Unit of the Hospital for appropriate management.
2.7 Method of Analysis

The statistical computer package SPSS (version 6.1 for Apple Macintosh®, and version 9.01 for Windows®) was used to analyse the data. Univariate statistics were computed, including distribution curves and other graphical information. In the bivariate analysis, categorical dependent variables were tested for significance using the Chi-square test, while continuous variables were tested using ANOVA or t-tests where appropriate (Cary, 1989; Kirkwood, 1988).
Chapter 3: Results

3.1 Overview

There are several difficulties in carrying out dental examinations for older rest home residents with dementia. The timing of a rest home visit can be a problem: too early in the morning, and the visit clashes with bathing, dressing and breakfast. Mid-morning, of course, has the all-important time of morning tea, while later in the morning, the resident has concerns that “lunch-time is soon...” Afternoon visits offer a similar problem, with the added complication that some residents like to “nap” after lunch. Some rest homes provide activities for their residents, such as day-trips to places of interest, so it requires some coordination with the Charge Nurse or the Manager of the facility for a domiciliary visit to be a success.

In addition to coordinating a visit with the routine of the rest home or hospital, the cognitive status of the individual needs to be considered. Some individuals are more alert and cooperative in the mornings and others more so in the afternoons. Support people may be required to assist in placing the participant at ease. Occasionally, the examination was less full than described in the protocol, for, while the participant remained cooperative, their attention span was short enough to make the intra-oral inspection a challenge. It is unfortunate that many participants probably could not remember the experience an hour or two later, let alone the next day.

3.2 Socio-demographic Characteristics

3.2.1 Age

Sixty rest-home residents diagnosed with dementia were examined. Their mean age was 80.8 years (sd, 11.4; range 46 to 97 years), while the median age was 84 years. The age distribution was skewed (Figure 1). Of the 38 participants who had ages greater than the mean, 26 were women.
Figure 1: Histogram showing the sample’s age distribution.

3.2.2 Gender

There were 25 (41.7 percent) males and 35 (58.3 percent) females. The male participants had a mean age of 76.6 years (sd, 10.4; range 54 to 91 years), while the female participants had a mean age of 83.8 years (sd, 11.2; range 46 to 97 years; p < 0.05).

3.2.3 Ethnicity

The majority of the participants were European (88.4 percent), with a small number of Polynesian and Asian participants (8.3 and 3.3 percent respectively). There were no Maori in the sample. It was felt that there were insufficient numbers within the Polynesian and Asian groups to be able to meaningfully compare their characteristics with those of the Europeans. For this reason, no bivariate analyses by ethnicity were conducted.
3.3 Cognitive Status

The figures in Table 12 show the range of values recorded for the participants' MMSE and MSQ scores. Seventeen participants had MMSE scores in the range 0 to 22, while eight participants had MSQ scores ranging from 0 to 4. The remaining participants had been medically diagnosed with dementia but there had been no scoring of their cognitive state.

Table 12: Measures of cognitive status

<table>
<thead>
<tr>
<th>Test of Cognitive Status</th>
<th>Score</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-Mental State Examination</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>(Scored out of 30 points)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>Mental Status Questionnaire</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>(Scored out of 10 points)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Dementia recorded as a medical diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

The mean MMSE was 11.9 (sd, 7.3) and the mean MSQ score was 2.4 (sd, 1.8). Males and females did not differ in their mean scores for either MMSE (p > 0.05) or MSQ (p > 0.05).
3.4 Oral Health

The following sections describe the oral health of the study group. Their dental status, dental caries, periodontal disease, mucosal disease and prosthetic status will be described.

3.4.1 Dental status

The mean number of teeth was 12.7 (sd, 6.2; range 2 to 28). One participant's entire dentition consisted of 9 decayed, retained lower anterior roots. The mean number of decayed teeth (including those teeth with recurrent decay) was 2.5 (sd, 2.8). There was no significant difference in the number of decayed teeth between males and females, or between those that had a measured score of cognitive impairment, and those participants with a medical diagnosis of dementia. Seventeen participants (28.3%) were edentulous in the maxilla, while the remaining 43 participants (71.7%) had teeth distributed in both arches.

Table 13 presents summary data for DMF teeth. There was no significant difference in any of the parameters by sex or cognitive state (p > 0.05). Decayed retained roots have been presented separately from decayed teeth, and a combined estimate of all decayed teeth (including those which were decayed retained roots) gives a mean of 6.3 decayed teeth per participant (sd, 5.3). There was a mean of 16.7 (sd, 6.53) missing teeth, a mean of 7.9 teeth (sd, 5.9) that had previously been restored.
**Table 13:** Decayed, Missing and Filled (DMF) teeth

<table>
<thead>
<tr>
<th></th>
<th>Decayed Teeth (including recurrent decay)</th>
<th>Decayed Retained Roots</th>
<th>All Decayed Teeth and Roots</th>
<th>Missing Teeth (any reason)</th>
<th>Filled Teeth (including recurrent decay)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>sd</td>
<td>Mean</td>
<td>sd</td>
<td>Mean</td>
</tr>
<tr>
<td>All Participants</td>
<td>2.50</td>
<td>2.78</td>
<td>3.82</td>
<td>4.13</td>
<td>6.32</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2.48</td>
<td>2.24</td>
<td>3.08</td>
<td>3.10</td>
<td>5.44</td>
</tr>
<tr>
<td>Female</td>
<td>2.51</td>
<td>3.15</td>
<td>4.43</td>
<td>4.75</td>
<td>6.94</td>
</tr>
<tr>
<td>MMSE</td>
<td>2.58</td>
<td>2.43</td>
<td>3.71</td>
<td>3.62</td>
<td>6.29</td>
</tr>
<tr>
<td>MSQ</td>
<td>1.00</td>
<td>1.20</td>
<td>3.50</td>
<td>4.28</td>
<td>4.50</td>
</tr>
<tr>
<td>&quot;Dementia&quot; in notes</td>
<td>2.80</td>
<td>3.12</td>
<td>4.03</td>
<td>4.48</td>
<td>6.74</td>
</tr>
</tbody>
</table>
3.4.1.1 Missing Teeth

The mean number of missing teeth in the participant group was 16.70 (sd, 6.53). The distribution of missing teeth is presented in Figure 2. There was no apparent skewing of the data. There were no sex or cognitive score differences in the number of missing teeth ($p > 0.05$).

Figure 2: Frequency histogram showing the distribution of missing teeth (for any reason) in the study participants
3.4.1.2 Filled Teeth

This distribution is presented in Figure 3. It was slightly skewed, with smaller numbers of participants having large numbers of filled teeth.

**Figure 3:** Frequency histogram showing the distribution of filled teeth in the study participants

![Frequency histogram showing the distribution of filled teeth in the study participants](image)

3.4.1.3 The Need for Referral Due to Pain or Infection

Eight participants (11.7%) were referred for treatment as a result of findings at the time of examination. Three of those referred were men, while the other five were women. They were all referred for the acute exacerbation of a dento-alveolar abscess.

3.4.1.4 Decayed Teeth and Decayed Retained Roots

Summary data on decayed teeth are presented in Table 14 and Figure 4. The data in these summaries includes restored teeth with recurrent decay. There were 21 (35%) participants who had no decay, but the majority of individuals (60 percent) had between one and seven decayed teeth. The frequency distribution of decayed teeth was skewed (Figure 4).
Table 14: Frequency distribution of decayed teeth

<table>
<thead>
<tr>
<th>Number of Decayed Teeth</th>
<th>Number of participants</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>21</td>
<td>35.0</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>11.7</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>15.0</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>11.7</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>8.3</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>5.0</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Total 60 100.0

Figure 4: Frequency histogram showing the number of decayed teeth per participant.

The distribution of decayed retained roots was also skewed (Figure 5). One-third of the participants had no decayed retained roots, while the remainder had between one and 15 decayed retained roots. Overall, the participants had a mean number of 3.8 decayed retained
roots (sd, 4.1). A minority (11.7 percent) had more than ten decayed retained roots. There were no differences by sex or cognitive status ($p > 0.05$).

**Figure 5:** Frequency histogram showing the number of decayed retained roots per participant
3.4.2 Prosthetic treatment need (upper jaw)

Fifteen (25%) of the participants needed a multi-unit prosthesis to restore their upper dental arch, and 25 (41.7%) required a full upper denture. A quarter of the participants did not require any prosthetic rehabilitation to the upper arch, while five (8.3%) needed a one-unit (or a combination of a single- and multi-unit) prosthesis (Table 15).

Table 15: Prosthetic treatment need for the upper jaw

<table>
<thead>
<tr>
<th>Prosthetic Need</th>
<th>Participants with prosthetic need</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No prosthesis needed</td>
<td>15</td>
<td>25.0%</td>
</tr>
<tr>
<td>Need for one unit prosthesis</td>
<td>1</td>
<td>1.7%</td>
</tr>
<tr>
<td>Need for multi-unit prosthesis</td>
<td>15</td>
<td>25.0%</td>
</tr>
<tr>
<td>Need for a combination of one and multi-unit prosthesis</td>
<td>4</td>
<td>6.6%</td>
</tr>
<tr>
<td>Need for full prosthesis</td>
<td>25</td>
<td>41.7%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>60</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

3.4.3 Prosthetic treatment need (lower jaw)

Twenty-seven participants (45%) had no need for prosthetic rehabilitation of the lower jaw; thirteen (21.6%) required a multi-unit prosthesis to restore the arch, and 15 (25.0%) had the need for a full lower denture. Five participants (8.3%) needed either a one-unit prosthesis or a combination of a single- and multi-unit prosthesis (Table 16).

Table 16: Prosthetic treatment need for the lower jaw

<table>
<thead>
<tr>
<th>Prosthetic Need</th>
<th>Participants with prosthetic need</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No prosthesis needed</td>
<td>27</td>
<td>45.0%</td>
</tr>
<tr>
<td>Need for one unit prosthesis</td>
<td>1</td>
<td>1.7%</td>
</tr>
<tr>
<td>Need for multi-unit prosthesis</td>
<td>13</td>
<td>21.6%</td>
</tr>
<tr>
<td>Need for a combination of one and multi-unit prosthesis</td>
<td>4</td>
<td>6.7%</td>
</tr>
<tr>
<td>Need for full prosthesis</td>
<td>15</td>
<td>25.0%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>60</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
3.4.4 The combined need for prostheses (upper and lower jaws)

While all of the participants were dentate at the time of examination, full upper and lower dentures were required by 15 (25.0%) of the study participants, whose dental arches had patterns of tooth loss that were unrestorable with partial dentures. Four participants required the combination of a full upper denture and a partial lower denture, and eight participants (13.4%) required multi-unit prostheses in both jaws. The remainder (54.9%) had treatment needs ranging from no prosthetic requirement to the placement of a one-tooth partial denture in one jaw (Table 17).

Table 17: Prosthetic need in the upper and lower jaws

<table>
<thead>
<tr>
<th>Prosthetic Need</th>
<th>Participants with prosthetic need</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for upper denture occluding against lower teeth +/- partial denture</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Need for multi-unit prosthesis in both jaws</td>
<td>8</td>
<td>13.4</td>
</tr>
<tr>
<td>Need for complete dentures</td>
<td>15</td>
<td>25.0</td>
</tr>
<tr>
<td>Other</td>
<td>33</td>
<td>54.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

3.4.5 Periodontal status and treatment need

Periodontal status and treatment needs data are presented in Tables 18 and 19. These figures represent the numbers and percentages of participants with periodontal findings and attachment loss. These data are combined in Table 20 to summarise the numbers and percentages of participants with a particular treatment need.
Table 18: Community Periodontal Index of Treatment Needs (CPITN)
The numbers and percentages of participants who have as the highest score: no periodontal
disease (score 0); bleeding (score 1); calculus (score 2); pockets 4-5mm (score 3), and pockets
6mm or more (score 4).

<table>
<thead>
<tr>
<th>Score</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>27</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 19: Loss of Attachment (LOA)
The numbers and percentages of participants who have as the highest score: Score 0: 0-3mm
loss of attachment; score 1: 4-5mm loss of attachment, score 2: 6-8mm loss of attachment,
score 3: 9-11mm loss of attachment, and score 4: greater than 12mm loss of attachment.

<table>
<thead>
<tr>
<th>Score</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>46</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 20: Periodontal treatment requirements
The numbers and percentages of participants requiring: no treatment (TN0); improved oral
hygiene (TN1); scaling and prophylaxis (TN2); complex periodontal therapy (TN3).

<table>
<thead>
<tr>
<th>Score</th>
<th>TN0</th>
<th>TN1</th>
<th>TN2</th>
<th>TN3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>0</td>
<td>27</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>Percentage</td>
<td>0</td>
<td>45</td>
<td>50</td>
<td>5</td>
</tr>
</tbody>
</table>
3.4.6 Oral mucosal conditions

An oral mucosal condition was observed in ten participants (17%). One participant had ulceration below an ill-fitting denture, one had lichen planus to the buccal mucosa, and the remainder had candidosis (Table 21).

Table 21: Location and type of condition found on the oral mucosa

<table>
<thead>
<tr>
<th>Condition</th>
<th>Location</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>50</td>
<td>83.0</td>
</tr>
<tr>
<td>Lichen planus</td>
<td>Buccal Mucosa</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Ulceration</td>
<td>Alveolar ridges/gingiva</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Candidosis</td>
<td>Commissures</td>
<td>5</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>Hard and/or soft palate</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Tongue</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

3.4.7 The extra-oral examination

Five participants (8.3%) had extra-oral ulceration. This was due to angular cheilitis and was the only notable extra-oral finding (Table 22).

Table 22: Findings at the extra-oral examination

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>55</td>
<td>91.7</td>
</tr>
<tr>
<td>Ulceration</td>
<td>5</td>
<td>8.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Chapter 4: Discussion

4.1 Overview

The first part of this discussion will examine the socio-demographic characteristics of the study participants, and the second will examine the oral health findings. A discussion of these findings with regard to normative dental need will follow, and implications for the provision of oral health services to older dementia sufferers in the Auckland region will be discussed.

4.2 Socio-demographic Characteristics

4.2.1 Age and gender

The sample’s mean age of 80.8 years is slightly lower than that reported for a representative sample of institutionalised older people in Manawatu-Horowhenua (Thomson, 1991), of whom two-thirds were aged 80 or over, with a mean age of 83 years. Broad et al (1995) reported a mean age of 81.7 years for a group of older people in rest home or private hospital care in Auckland. A study by Warren et al (1997) examined the oral health of a sample of 230 older people with and without dementia, who attended a geriatric clinic in Iowa, USA. The average age of 80.9 years (sd, 6.9) was very similar to the 80.8 years found in the present study. However, 58 percent of the participants in the Iowa study did not suffer from dementia. The mean age of the dementia sufferers alone was 81.5 years (sd, 7.1), slightly higher than the mean age in this study, but this difference is unlikely to have any clinical or statistical significance with respect to comparing the findings of the two studies.

The mean ages of the females and males differed, with the latter being lower. This finding is consistent with data published by Statistics New Zealand (1999), which show that, since 1970, there has been a gain in life expectancy of 5.7 years for men and 5.0 years for women. A major part of this increase in life expectancy has occurred in the population of people over the age of 65 years. New Zealand government statistics confirm that women continue to outlive men. It is reported that, a century ago, women could expect to outlive men by two
years; by 1950, the female-male differential had increased to four years; and by 1990, it was approximately six years. Recently, the differential in longevity appears to have declined to just over five years between the sexes (Statistics New Zealand, 1999).

This study’s ratio of men and women (females outnumbered males) reflects the ongoing trend for the older New Zealand population to contain more females than males. In the 1996 Census, the sex ratio was 76 males per 100 females among the population of people aged 65 years and over. A similar ratio of 71 males per 100 females was found in the present study. At ages below 65 years, women outnumber men by a small margin. Since 1971, Census data show that the number of people aged 65 years and over has increased by more than one-and-a-half times, and the number aged 80 years and over has doubled (Statistics New Zealand, 1999). It seems from these trends that, in the future, there will be an increasing number of older women in the population.

4.2.2 Ethnicity

There were insufficient numbers in this study to permit a comprehensive examination of ethnicity: the study’s sample was fairly homogenous, with only a small minority (approximately 12 percent) of ethnic groups other than Europeans, and no Maori in the sample. In contrast, Thomson and Cautley (1996) reported on the dental status and treatment need of a group of older people in the Wanganui area, with the following ethnic breakdown: 93.3 percent Europeans; 5.0 percent Maori; and 1.7 percent people from other ethnic groups. Broad et al (1995) described a sample of approximately 8000 older people living in long-term care facilities in Auckland. They reported that five percent of people were from an ethnic group that was not European; among whom about two percent were Maori, two percent were of Pacific Island origin, and the remainder was of Asian descent (or other ethnic groups).

There are several possible reasons for the lack of Maori in the sample. First, Maori and other ethnic groups are not as long-lived as Europeans. In New Zealand, current statistics show that life expectancy does vary according to ethnicity. The life expectancy at birth for Maori males has increased from 54.0 years in 1950 to 68.0 years in 1990. Similarly, the life expectancy for females has risen by 17.1 years, from 55.9 years to 73.0 years. New Zealand Census data show that, in 1991, a newborn Pakeha male child could expect to outlive his
Maori counterpart by 5.4 years, while for females, the difference was 6.2 years (Statistics New Zealand, 1999). Second, the age structure of the various ethnic groups could differ. Ethnic groups such as Maori and Polynesians have more youthful populations. Census data show that Maori and Polynesian groups contain twice the proportion of children younger than 15 years of their non-Maori, non-Polynesian counterparts. About seven-tenths of Maori and Pacific Island populations are under 30 years, and their median ages are about 12 years lower than their non-Maori and non-Polynesian peers. For the older age groups, only four percent of Maori and three percent of Polynesians (because of their recent migration to New Zealand) are 60 years or over, compared with 17 percent for the non-Maori, non-Polynesian population. However, Maori are reported to have higher age- and sex-dependent rates in care than Europeans, and, in 1988, many Maori were cared for in psychogeriatric institutions rather than in the community (Broad et al, 1995). This suggests that, if the age structure of the Maori and non-Maori populations were similar, there would be a higher proportion of Maori in samples such as that observed for this study.

Another hypothesis that may explain the ethnic distribution of the study sample is that there may be differences in referral rates to the Oral Health Unit for Maori and Non-Maori. Such differences in ethnic distribution were reported for a group of 255 patients who attended the Hospital service in Auckland for relief of pain. Of those attending: 13 percent were Maori; 47 percent were of Pacific Islanders; 33 percent were European, while the remaining seven percent were from other ethnic groups (Whyman et al, 1996). In the present study, the high proportion of Pacific Island people is reflected in that, apart from the Europeans, they outnumbered the other ethnic groups.

There may also be a lower proportion of dentate older Maori and Maori with dementia in the population of older rest home residents in Auckland. The Survey of Adult Oral Health in New Zealand (Cutress et al, 1979) suggested that at the time of their study in 1976, adult Maori had early rapid tooth loss and became edentulous at a younger age than non-Maori.

A further reason why Maori may be under-represented in this study could be that older Maori may be cared for in alternative ways; for example, by using Kaumatua flats on Marae. Marae-based Maori Health initiatives (e.g. the Waipareira Trust in Auckland) care for their older people in a way that contrasts with the Pakeha system of rest home care by using the four cornerstones of Maori health: wairua (spiritual); whanau (family); hinengaro (mental); and tinana (physical).
The concept of bringing *kaupapa Maori* (Maori thought, ideology and philosophy) into health care, particularly for older institutionalised Maori with mental health problems, was emphasised by Hosford *et al* (1995). They described a process of consultation with Maori, to determine resuscitation policy for an older institutionalised Maori person in the event of an acute medical crisis. Similarly, for the provision of oral health care, Broughton (1993) and Edward (1992) have described issues for Maori in obtaining appropriate, culturally acceptable, and accessible health care. A common theme in these papers is the involvement with *whanau* (family) regarding care; the acknowledgement that privacy and space are important, so that care (or discussions about care) takes place where the *whanau* feel comfortable. It was recommended that a Maori health worker/interpreter be present to *tautoko* (provide support for) the patients, and the care should be delivered by someone the patients could identify with. Finally, a sense of "ownership" of the health delivery system by involving *whanau* and *Kaumatua* in decision-making is important. Broughton (1995) reported on a successful Maori health initiative involving oral health-care delivery at Ratana Pa (Wanganui) using these principles.

### 4.2.3 Testing of cognitive status

Five percent of New Zealanders over the age of 65 years, and 20 percent over the age of 80 years, are estimated to suffer from Alzheimer's Disease and other dementias (Sainsbury, 1997). Dementia has been found to be one of four major clinical disorders contributing to disability and social handicap in a sample of 856 New Zealanders aged 70 years or over. The other diseases were heart failure, osteoarthritis and stroke (Campbell *et al*, 1994).

An important part of psychological assessment for an older person is the quantification of observations of behaviour, cognition and affect. An old but still commonly used method of cognitive evaluation is the Mental Status Questionnaire (MSQ) developed by Khan *et al* (1960). Folstein *et al* (1975) developed the Mini-Mental Status Examination (MMSE) as a screening test for cognitive disability. This test is widely used to describe an older person's orientation to place and time, assess their powers of reasoning, and test their memory and comprehension. It is scored on a scale of zero to 30. An individual who scores less than 23 in a mini-mental status examination is considered as having a cognitive deficit.
The MMSE and MSQ are commonly used because they have been found to have high validity and are simple to apply. Although other methods are available for screening for cognitive disorder, the MMSE and MSQ are said to be less prone to the confounding influences of education and institutional setting (Ritchie, 1997).

It was beyond the scope of this study to perform cognitive testing, since this, coupled with a dental examination, was considered too intrusive and each participant had already been diagnosed with dementia. Instead, the decision was made for the purposes of data analysis, to allocate participants to one of three groups depending on the cognitive status information in their medical records. A shortcoming in this approach is that no formula exists to convert MMSE and MSQ scores to a common scale. In future studies of this type there would be advantages in using only one measure of cognitive status, such as Folstein's Mini-mental Status Questionnaire. This would allow the meaningful comparison of study data based upon a single measure of dementia. While all of the participants in the current study had dementia, it was not possible to group them based upon a common measure of their cognitive deficit, to subsequently compare the severity of oral health problems in those groups. Thus, the study can only report the oral health data for the sample as a whole; not, for example, whether individuals with severe dementia have better or worse oral health than their less-affected peers.

4.3 Oral Health

There are many articles discussing the unique oral health needs of older people. Ettinger (1997) emphasised the need for preventive dental strategies and the need for accurate diagnostic procedures for at-risk older adults. Johnson et al (1997) highlighted the complex nature of dental treatment planning for the older person. Gift et al (1998), Samaranayake et al (1995), Mojon and MacEntee (1994), and Weyant et al (1993) all described the oral health status of populations of older people. There are relatively few publications describing the oral health of older people with dementia. Wyatt and MacEntee (1997) examined the pathophysiology of dental caries in a group of older people they termed "chronically disabled." While this paper discussed diagnosis, prevention and treatment of dental caries in older individuals with physical and mental disabilities, it did not specify the nature of (or quantify caries levels for) any particular disability. Blanco et al (1997) conducted a pilot study of a sample of 21 caregivers of cognitively impaired older people. They attempted to explore the attitudes of the caregivers in providing oral care for community-dwelling, cognitively-
impaired, dependent older people. Unfortunately, they drew no conclusions due to methodological difficulties and their small sample size, but made recommendations for study design for future surveys of this type. A comprehensive paper by Henry and Wekstein (1997) described the provision of oral health care to patients diagnosed with Alzheimer's disease, but the paper contained scant data describing the oral health status of these individuals.

This study has described the oral health of a population of individuals with dementia in New Zealand. It describes both differences and similarities in measures of oral health in the examined sample, to populations of individuals with and without dementia, whose oral health has been previously reported in the literature.

4.3.1 Dental status

Warren et al (1997) reported the mean number of teeth in a sample of older people with and without dementia as 12.5 (sd, 10.6). This estimate included a proportion of individuals who did not have dementia. The number of teeth reported in the group with dementia was approximately 11.5 (sd, 10.3). In the present study, the mean number of teeth per participant was 12.7 (sd, 6.2). The standard deviations that are reported in the study of Warren et al (1997) indicate a wide range for this data. The mean number of missing teeth in this study (16.7; sd, 6.5) is comparable to other studies of this type.

The mean number of teeth present is similar those reported by Thomson in 1991, who found a mean of 13.3 (sd, 6.3) teeth per person in a group of institutionalised older New Zealanders, and a mean of 13.0 teeth per person reported by Brown et al (1987), for an older community-dwelling population.

4.3.2 Dental caries experience: decayed teeth and decayed-retained roots

There is no consistent method in the literature for reporting oral health parameters in individuals with dementia. For example, Jones et al (1993) reported the caries experience of 23 male veterans with dementia, from the state of Massachusetts (USA) as more than twice that of a group of their non-demented peers. The mean age of the participants was 67.4 years,
which is young in comparison to the 60 participants in the present study. There was a mean 17.9 teeth per participant. Caries was reported as 2.29 lesions per 100 surfaces at risk for coronal decay and 2.38 lesions per 100 surfaces at risk for root caries. In comparison, the study of Warren et al (1997) reported a mean of 0.25 decayed coronal surfaces, and a mean of 0.6 carious root surfaces in a group of 67 dentate individuals with dementia. It is difficult to compare the caries prevalence in these two studies because Jones et al (1993) reported caries prevalence per 100 surfaces, while Warren et al (1997) reported a raw figure of mean surfaces, without any denominator to allow rate comparisons.

A comparison of these studies suggests that there is a case for the development of international guidelines for reporting oral health data for people with dementia. In order to make some comparison of the results of this study with the studies above, assumptions need to be made in relation to the number of surfaces at risk from caries. The caries experience of participants in this study was an average of 6.3 filled or decayed teeth per participant. Assuming that at least two carious surfaces were present on each tooth, then approximately 12 surfaces of the six teeth would be involved. If it is considered that each of the 32 teeth has a potential of five surfaces that could be affected by caries, there is potential for 160 surfaces to become decayed. Thus, 7.5 surfaces per 100 surfaces may have been carious in this study, which is 50 percent higher than the figure of approximately five surfaces per 100 surfaces reported by Jones et al (1993).

Radiographs were not taken as part of the examination in the current study. This simplification may have resulted in an underestimate of caries prevalence and possibly reduced detection of other pathology, but this risk was considered acceptable for a group of people with behavioural difficulties. Wenzel et al (1991) showed that the ability to detect caries by visual examination was only four percent lower than the caries detection rate when radiographs were taken, which suggests that the current study's caries levels were not substantially underestimated.

Decayed retained roots were reported as a separate category for this study. There was an average of 3.8 decayed retained roots per participant. This categorisation is usually not described in the literature, although Thomson et al (1991) excluded four participants from their analysis of root caries, on the basis that no anatomical crowns were present. Further to this, they reported substantial extraction needs for their study participants, suggesting either many very badly decayed teeth or a substantial number of decayed retained roots.
Decayed retained roots were reported as a separate category because caregivers often reported the presence of hopelessly decayed teeth (often decayed retained roots) and attributed behavioural changes in people with dementia to these carious fragments. Caregivers do not differentiate between coronal and root caries when requesting dental treatment for people under their care with dementia. Personnel without dental training have no need to understand the different treatment implications of caries in the crowns or roots of the teeth. A common clinical finding, in the absence of a dentoalveolar abscess, is that decayed retained roots are non-vital and symptomless. This clinical observation is not shared by caregivers, who struggle to provide care for people whose day-to-day behaviour may be affected by their dementia. The rest home resident, because of his/her dementia, cannot refute or confirm the presence of dental pain. The caregivers, acting in the best interests of their patients, seek to find reasons behind changes in mood or affect and often blame the teeth. Referrals of these people for "dental pain" impact on the resources required for the provision of dental services, as the provision of restorative care or the removal of teeth often requires a general anaesthetic. This is costly and carries risks for the patient who may have other medical comorbidities, which compound the anaesthetic risk.

4.3.2.1 Filled teeth

The mean number of filled teeth per participant in this study is difficult to compare with estimates from other recent studies of older populations with dementia. Warren et al (1997) and Jones et al (1993) reported their data as the number of filled surfaces, with a range from 23 to 35 surfaces per individual, but the current study used teeth as the unit of analysis because of the difficulties of collecting surface-level data. This reported variation highlights the need for a uniform approach to the reporting of such data. People with dementia (and their caregivers) are unconcerned with the technicalities of filling one or more surfaces of a tooth. Their main concern is that their teeth: "have holes in them and need fixing..." and this means they will have to visit the dentist. From the patient's point of view, dental treatment is determined on tooth-based needs (that is, it requires treatment or it doesn't) rather than the number of surfaces affected.
4.3.3 Prosthetic treatment needs

Full upper and lower dentures were required by 15 (25.0 percent) of the study participants, whose dental arches had patterns of tooth loss that were considered to be unrestorable with partial dentures. Four participants required the combination of a full upper denture and a partial lower denture, and eight participants (13.4 percent) required multi-unit prostheses in both jaws.

Nordenram et al (1996) reported on the nutritional status of institutionalised patients with Alzheimer's disease and compared them to cognitively healthy people living in the community. Of the edentulous individuals they examined, one-third wore dentures. There was no association between the oral health of these people and their nutritional status, but there was a strong association between their cognitive status and their ability to eat. These findings supported the earlier work of Horn et al (1994), that carried out a retrospective clinical study to evaluate the role of dentures in weight maintenance for institutionalised people with dementia. They reported that 33 percent of their individuals were edentulous and functioned without dentures, and that only one-quarter actually possessed dentures. They did not report any relationship between weight loss and dental condition but found an association between weight loss and mental acuity.

In their description of the dentures, prosthetic treatment needs, and mucosal health of an institutionalised elderly New Zealand population, Thomson et al (1992) commented that there is no reliable system for evaluating the status of dentures. They noted that subjective influences could make the evaluation of dentures difficult and complicate the determination of prosthetic treatment need. They viewed prosthetic treatment need as that required to ensure that a person's existing denture is adequate. This contrasts with the approach of the World Health Organisation, which is to assess the individual's requirement for dentures (World Health Organisation, 1997).

It is a difficult decision as to whether or not to provide dentures for a person suffering from dementia. For the purposes of this study, the philosophy described by Kayser (1981) was followed in the application of the WHO criteria for determination of prosthetic need. Kayser found, in a survey of 118 individuals, that there was sufficient adaptive change within the human masticatory system, to maintain adequate oral function in the presence of a "shortened dental arch," which is a dentition where the posterior teeth are missing. It was
shown that adequate oral function and maintained aesthetics were provided by an occlusion containing no fewer than the teeth anterior to the second premolars.

The traditional practice of prosthetic dentistry is to replace missing teeth. For individuals with a shortened dental arch, this can only be achieved with free-end saddle partial dentures. To carry out such rehabilitation for an older person with dementia would introduce unfavourable conditions to the remaining teeth and mucosa. Older people have difficulty in adapting to new dentures, and the difficulties would be compounded for an older person with dementia. The behaviour of an individual with dementia may make the construction of dentures impossible, while their cognitive deficit may mean that dentures would seldom be used. Thus, the cost-benefit ratio of the treatment may be unacceptable. There are also implications for increased caregivers’ training and workload in maintaining oral hygiene for individuals with dementia and oral prostheses. Moreover, taking into account studies that have shown dentures make no impact on the nutritional status of an individual, and those showing adequate oral function with a shortened dental arch, the provision of new prostheses for people with dementia is not a high priority from a service-provision point of view.

4.3.4 Periodontal treatment needs

The periodontal treatment needs observed in this study were similar to those reported by Brown et al (1987), Thomson et al (1991), and Cautley et al (1992) for groups of older New Zealanders. With the current study, these confirm the need for extensive oral hygiene care, with simple scaling and prophylaxis being the main treatment requirements of older people. There was a low requirement for complex periodontal therapy, although a high proportion of participants (77 percent) had one or more sites with loss of attachment in the range of four to five millimeters. Such a pattern implies that it is possible to have gingival recession without the presence of gross periodontal pocketing.

One probing site per each of six index teeth was used in the calculation to determine loss of attachment. This contrasts with the method of Warren et al (1997), who measured recession around each tooth in millimeters. The use of index teeth and measuring only one site per index tooth in the current study, raises the possibility of having underestimated the levels of periodontal disease. To obtain a valid estimate of attachment loss around a tooth would
involve adding the maximum recession to the greatest periodontal pocket depth. These measurements could only be determined by a time-consuming procedure involving multiple probing measurements around each tooth. To determine a more accurate estimate of periodontal status, all teeth would need to be measured. In a group of people whose cooperation is limited, such detailed measurements are not feasible. The data obtained from such measurements would not add significantly to the finding that the main treatment need for the participants was that of simple oral hygiene and scaling, rather than complex periodontal surgery.

4.3.5 Oral mucosal conditions and extra-oral pathology

The mucosal pathology that was found in this study was predominantly candidosis. This occurred most frequently at the commissures, and accounted for all of the extra-oral findings. Two of the participants had yeast infections below full upper dentures, and another participant had *Candida* sp. on the tongue. The resident with lingual candidosis was taking a course of antibiotics at the time of examination, and antibiotic therapy is recognised as a predisposing factor to candidosis. Although *Candida* sp. has been associated with denture stomatitis in many older people with diabetes, it is not justified on economic grounds to perform diabetic screens on all individuals with denture-associated infections involving *Candida* sp. Abu-Elteen and Abu-Elteen (1998) reported infection with *Candida* sp. in 78 percent of complete denture wearers. They described the tongue, palate, and cheeks to be the most common and densely colonised oral sites; however, they did not report on the presence of angular cheilitis. *Candida* sp. has been linked with angular cheilitis, while a strong association of *Candida* sp. with iron, folic acid, and vitamin B₁₂ deficiency has been described (Scully and Cawson, 1998). It is likely that many of the participants in the current study were iron-deficient.

One resident in this study was found to have severe ulceration due to trauma from an ill-fitting full lower denture. Modifications were made to the prosthesis and the patient was reviewed regularly to exclude malignant transformation, and ensure adequate healing. There were no complications with healing, and no indication for surgical repair of the traumatised soft tissue.
There was one participant with lichen planus in the buccal mucosa. The lesion was unilateral and about 1.5 centimeters in diameter. No biopsy was performed to confirm the clinical diagnosis, for two reasons. First, the lesion displayed the characteristic clinical appearance of lichen planus, with white striae on a slightly inflamed, non-ulcerated base. Second, this person's dementia created significant practical and logistical difficulties in confirming the diagnosis by biopsy. Silverman and Bahl (1997) have reported malignant transformation of lichen planus in 3.2 percent of individuals with lichen planus who were monitored for a period of 18 months. For this reason, this person has been placed under regular review to ensure that there is no progression to malignant pathology.

The same range of mucosal pathology was found in this group of older people with dementia as that reported by Thomson et al (1992) for a group of institutionalised older New Zealanders. The predominant conditions were candidosis, ulceration and leukoplakia. The comparison of this study to other studies on mucosal health should be done with caution, however, because there are no standard methods for diagnosing and recording mucosal lesions. The current study indicated a need for the management of angular cheilitis; otherwise, the mucosal condition of the study participants was unremarkable.

### 4.4 Ethical Approval and Relationship with Dementia and Cognitive Status

Certain important issues arise in dealing with people with dementia, who may not remember conversations that they have from one minute to the next. The procedure of obtaining informed consent involves potential participants fully understanding the implications of being involved in a study. While this is a major concern of ethics committees, it may not always be possible for people with dementia. This was the reason for obtaining the permission of the next-of-kin for the involvement of individuals with dementia in this study. In legal terms, a person with dementia may not be deemed competent to give consent, but could still refuse to participate; that is, they might refuse to assent to the dental examination. The difficulties of obtaining informed consent for people with developmental disabilities have been well described by Ferguson et al (1996). They acknowledged that informed consent can be given without the need for a written record, and the presence of adequate documentation does not preclude a lack of informed consent. They also noted that complications may arise in obtaining consent for care, due to several parties with an interest in the individual's well-being taking part in the decision-making. There may be conflict
between caregivers and treatment providers regarding the types and outcomes of treatment. Such conflict arises from different knowledge and expectations of the parties involved in care provision.

Nordenram and Norberg (1998) published a study describing the moral and ethical issues perceived by dentists treating people with dementia. Twenty-one dentists with extensive experience in the management of people with severe dementia underwent a structured psychological interview to evaluate the ethical reasoning behind their treatment planning for people with dementia. The study showed that ethical dilemmas can arise as a result of decision-making conflicts experienced by the dentist at the time of treatment planning, or as a result of demands placed on the dentist by relatives, caregivers or medical staff regarding care. The interviews showed that all dentists had difficulty in finding and being happy with the most beneficial treatment levels for their patients.

4.5 Estimated Dental Need

The age structure of the New Zealand population is following similar trends to other developed countries, with increasing numbers of older adults retaining more of their natural dentition. This population of older people no longer expects tooth loss to occur with age, and dental extractions are often not an accepted first treatment option for a dental problem. The presence of multiple chronic medical conditions, their associated medications, and possible dependence on others for care places these older adults at increased risk from dental disease. Individuals who have spent considerable time, money and effort preventing and treating oral health problems in the past can suddenly be confronted with a need for dental treatment that is complicated by their medical problems. Because they are resident in a rest home or hospital, this care may not be easily carried out. In particular, older people with dementia have difficulties with oral health, because poor cognitive function, behavioural problems, and the need for residence in special care facilities make the provision (and receipt) of dental services difficult. Such difficulties can be compounded by the attitudes of caregivers to oral health issues, where oral health problems may be unrecognised, and the importance of simple oral hygiene procedures is overlooked.

There is no consensus among rest homes, caregivers, medical or dental professionals on the provision of oral health care to older institutionalised people with dementia in Auckland.
The introduction of accreditation standards has seen larger institutions develop policy regarding oral health; however, there is no generally accepted standard for care. If an older adult with dementia has an oral health problem, his or her general medical practitioner often attends to it. A referral may be made to a local dentist or hospital dental department, depending on the doctor or the policy of the rest home. The question of universal guidelines for referral and more general guidelines to ensure that all medically compromised rest home residents receive appropriate and necessary oral health services has not been addressed in this country.

A substantial step toward reducing dental disability and disease among older New Zealanders was the publication of a document outlining preventive dental strategies for older populations (Thomson et al, 1997). The National Advisory Committee on Health and Disability commissioned this report as part of a program on evidence-based public health interventions affecting older New Zealanders. The report used the five tenets of the Ottawa Charter as a basis for recommendations to the Committee on preventive strategies. These were, of necessity, broad public health recommendations that contrasted with recommendations proposed by Helgeson and Smith (1996) for dental care in nursing homes. Helgeson and Smith recognised that oral health care was an interdisciplinary team effort involving dental and rest home staff, medical practitioners, families and parties with financial interests. Guidelines were developed in three areas designed to promote maintenance or enhancement of the quality of life for rest home residents. These areas were in the provision of daily oral health care, the provision of routine and emergency oral health services, and rest home requirements for enhancing oral health. To complement these guidelines, Strayer and Henry (1996) recommended that dentists follow a blueprint for provision of care that is evidence-based.

4.6 Implications for Provision of Dental Services for Older People with Dementia

With older people suffering from dementia, it is difficult to determine exactly how far to proceed with a treatment plan before the disadvantages (that is, the logistical and clinical difficulties of providing care) outweigh the benefits. For example, many people with dementia refuse to wear their dentures, and the presence of partial dentures often makes oral care difficult. Individuals with dementia often confuse dentures between arches and have
difficulty placing and cleaning precision partial dentures. Similarly, the decision to place complex fillings in mouths that are poorly maintained is problematic. Difficulties with cooperation make such restorative care difficult, and in some instances the provision of a general anaesthetic may be required. It is very easy to over-prescribe treatment for this group of dependent people, and Elias and Sheiham (1998) suggested that subjective needs could be lower than normatively determined needs for the replacement of missing teeth in older people. Other studies have identified patient and dentist factors in the acceptance of a “shortened dental arch” related to satisfaction with oral function in older people (Steele et al., 1997; Witter et al., 1997). While these studies do not deal specifically with people suffering from dementia, the principles of the shortened dental arch approach can be applied to these people with special needs. The treatment philosophy should allow a pain-free, functional and aesthetic anterior dentition that preserves dignity and enhances the well-being of older people with dementia.

Despite the current study’s small sample size, a definite need for basic oral health care was demonstrated. This is consistent with the outcome of other studies of older people, with a well-defined need for basic oral hygiene and preventive programs. It is the view of this researcher that caries-arresting care, (for example, fluoride and chlorhexidine mouth-rinses, or the topical application of fluoride) should be part of a vigorous preventive program for this special group of older people. Many people with disabilities rely on caregivers for their routine mouth-care. Those caregivers need to be made aware that restorative procedures carried out in the past are no guarantee of oral health now or in the future. They also need to be educated that oral health care is more than just the placement of fillings and dentures. However, the staff from many institutions face barriers to providing oral health care. Weeks and Fiske (1994) identified the main factors preventing the provision of good mouth care as time constraints and priorities, a lack of training, and poor understanding of the processes causing dental disease. Wårdh et al. (1997) described significant associations between the educational level of caregivers and their provision of oral hygiene care, with less educated caregivers identified as providing lower levels of oral care.

There is potential for preventive dentistry to be incorporated into general health promotion programs for older people. To achieve effective oral care programmes, de Baat et al. (1993) recommended differentiation of older people into two groups: those capable of participating in educational programs, and those unwell, or cognitively-impaired individuals that require
more professional support. Different programmes would need to be developed for each group.

This study has identified a widespread need for basic oral hygiene care. Some of this care can be provided by caregivers in residential institutions, but there is a requirement for the involvement of dental hygienists and dentists in both treatment provider and educational roles. A moderate need for the extraction of decayed retained roots and for restorative dental care has been found. For many older people with severe dementia and behavioural difficulties, treatment can only be provided under general anaesthetic. The dementia and multiple medical problems of these people require the interdisciplinary resources of a hospital for the safe delivery of this important dental care.

4.7 Summary and Recommendations

4.7.1 Summary

This study has demonstrated a definite need for basic oral health care for older people suffering from dementia. This care is beyond the scope that attendant caregivers can provide on a day-to-day basis at residential facilities. It consists of the treatment of uncomplicated periodontal disease and dental caries. The majority of the participants in this study were found to require simple scaling to improve their oral hygiene. A large number needed the extraction of decayed-retained roots and a high proportion required restorative dental care.

These needs imply that limited self-care, specifically limited oral care is one of many possible factors that can contribute to increased levels of oral disease in older people with dementia. Their dependence on caregivers for the provision of daily oral hygiene is also a factor and this care can be hampered by other variables, the most prominent of which are patient behavioral difficulties. Failure of home-care can generate a referral to the hospital dental service because the patient has an acute problem that may necessitate treatment under general anaesthetic. The provision of oral health care under these circumstances can erode valuable hospital resources.
4.7.2 Recommendations

To efficiently address the need for oral care for these dependent older people, it becomes necessary to explore, with the Health Funding Authority and Auckland Healthcare, options for further development of oral health services for this group, in order to reduce the number of acute referrals to the hospital.

Such initiatives could include the education of caregivers about aspects of oral care in the rest home environment. Educational programs could focus on information and techniques for providing oral hygiene care to all older people, including those with disabilities. The aim would be to bring about an improvement in oral hygiene for all older people, but targeting people with dementia and other disabilities as having special needs.

Secondary and tertiary pathways of referral to a hospital-based oral health unit (and within the hospital service) should complement the development of oral health initiatives in the community. A referral pathway should be established that enables older people with dementia and other older people with medical problems to gain access to oral health care. In recognition that these people may also have social and medical problems that can impinge on the delivery of dental care, the referral pathway should be linked to an interdisciplinary assessment network. Such a network would enable oral health care to be provided safely while preventing wastage of hospital resources. Cost-effective utilisation of resources and safe, timely and effective provision of oral health care can be achieved with the development of patient management guidelines. The development of these guidelines along with appropriate mechanisms for their review should be formally established within the broader hospital service. This would ensure that older people with dementia, and other disabled older people, could access important oral health care as part of their overall health management.
Appendix 1

Approval documentation from North Health Ethics Committee
10 July 1997

Dr G Ting
Oral Health Unit
Building 12, Auckland Hospital
Private Bag 92024
Auckland

Dear Dr Ting

97/092 THE ORAL HEALTH OF REST HOME RESIDENTS WITH DEMENTIA

Thank you for your letter of 18 June 1997 and the revised application in response to the comments made by Ethics Committee Y at the meeting on 11 June 1997.

I am pleased to inform you that the study is approved until 10 July 1998. It is certified as not being conducted principally for the benefit of a manufacturer and will be considered for coverage under ACC.

Please note that the Committee grants ethical approval only. If management approval from the institution/organisation is required, it is your responsibility to obtain this.

We wish you every success with the study.

Yours sincerely

Ann Howard
Secretary
Ethics Committees

cc Research Development Office, Auckland Healthcare

APPROVED by the
NORTH HEALTH ETHICS COMMITTEE

until 10/7/98

Secretary
Date 10/7/97
If ea/th Funding Authority

email: sandrah@hfenant.govt.nz

15 June 1998

Dr G Ting
Oral Health Unit
Auckland Hospital
Private Bag 92024
AUCKLAND

Dear Dr Ting

97/092 The oral health of rest home residents with dementia

The request for reapproval of the above study was considered by Ethics Committee Y at the meeting on 10 June 1998.

The Committee recommended that the rest-home manager be present at the time of the interview.

The study is reapproved until 10 July 1999.

Yours sincerely

Sandra Haydon
Administrator
Ethics Committees

cc Research Development Office, Auckland Healthcare(?)
Appendix 2

Data capture form used in the study
**General Information**

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<th>Occupation</th>
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</table>

**Other Data**

Specify and provide codes (if applicable).

**Clinical Assessment**

**Extra-oral Examination**

0 = Normal extra-oral appearance
1 = Ulceration, sores, erosions, fissures (head, neck, limbs)
2 = Ulceration, sores, erosions, fissures (nose, cheeks, chin)
3 = Ulceration, sores, erosions, fissures (commisures)
4 = Ulceration, sores, erosions, fissures (vermilion border)
5 = Cancerous
6 = Abnormalities of upper and lower lips
7 = Other swellings of face and jaws
8 = Not recorded

**Oral Mucosa Condition**

0 = No abnormal condition
1 = Malignant tumour (oral cancer)
2 = Leukoplakia
3 = Lichen planus
4 = Ulceration (aphthous, herpetic, traumatic)
5 = Acute necrotizing gingivitis
6 = Candidiasis
7 = Abscess
8 = Other condition (specify if possible)
9 = Not recorded

**Community Periodontal Index (CPI)**

0 = Healthy
1 = Bleeding
2 = Calculus
3 = Pocket 4-5 mm (black band on probe partially visible)
4 = Pocket 6 mm or more (black band on probe not visible)
X = Excluded sextant
9 = Not recorded

**Loss of Attachment**

0 = 0-3 mm
1 = 4-5 mm (cementoenamel junction (CEJ) within black band)
2 = 6-8 mm (CEJ between upper limit of track band and 8.5-mm ring)
3 = 9-11 mm (CEJ between 8.5-mm and 11.5-mm rings)
4 = 12 mm or more (CEJ beyond 11.5-mm ring)
X = Excluded sextant
9 = Not recorded

*Not recorded under 15 years of age
### The Oral Health of Rest-Home Residents

**Researcher:** Graeme Ting

#### Denition Status and Treatment Need

<table>
<thead>
<tr>
<th>Primary tooth</th>
<th>Permanent tooth</th>
<th>STATUS</th>
<th>TREATMENT</th>
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</thead>
<tbody>
<tr>
<td>Crown (96)</td>
<td>Crown/Root (92)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Root (96)</td>
<td></td>
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</tr>
<tr>
<td>Treatment (96)</td>
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</table>

#### Prosthetic Status

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<th>Lower</th>
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</thead>
<tbody>
<tr>
<td>(163)</td>
<td>(164)</td>
</tr>
</tbody>
</table>

#### Prosthetic Need

<table>
<thead>
<tr>
<th>Upper</th>
<th>Lower</th>
</tr>
</thead>
<tbody>
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<td>(165)</td>
<td>(166)</td>
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</tbody>
</table>

#### Need for Immediate Care and Referral

<table>
<thead>
<tr>
<th>Life-threatening condition</th>
<th>Pain or infection</th>
<th>Other condition (specify)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Notes

- Referral: 0 = No
- 1 = Yes
- 9 = Not recorded
References:


Ferguson, F.S., Cinotti, D., Kin, W., Berentsen, B.J. Facilitation of informed consent for agency residents with developmental disabilities. Special Care in Dentistry, 16: 15-17, 1996.


Sainsbury, R. Dementia predicted to double in next 20 years - Advice on Alzheimer's and other dementias. New Zealand Health and Hospital, 49: 9, 1997.


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