THE DENTAL SERVICE AND DENTAL HEALTH OF NORTHERN NEWFOUNDLAND AND LABRADOR

- A TWENTY YEAR STUDY -

BY

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Thesis submitted for the Degree of Doctor of Dental Surgery

University of Glasgow
December, 1990

-: QUOTATION :-

"The successful removal of a molar which has given torture for weeks in a dentistless country, gains one as much gratitude as the amputation of a limb. One mere boy came to me with necrosis of one side of his lower jaw, due to nothing but neglected toothache. It had to be dug out from the new covering of bone which had grown up all round it. The whimsical expression of his lop-sided face still haunts me."

Wilfred T. Grenfell. A Labrador Doctor, (1929)

Figure P:1 The author in Kegaska. *circa* 1965.

Dedicated to my wife Ruth, children

Fiona, Murdo and Catriona.

My mother, Janet

and in memory of my step father

James Murdo Robertson (1915-1981)

James G. Messer
April, 1990

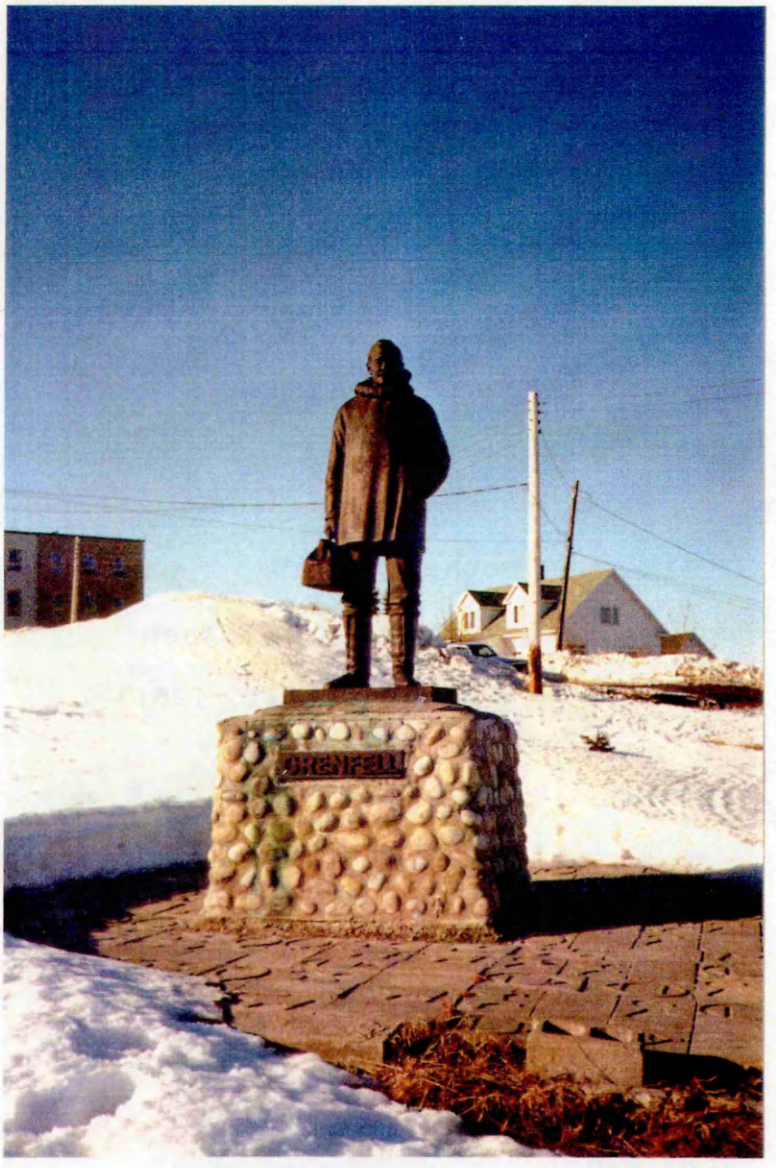

Figure P:2 Sir Wilfred Grenfell's Statue.

THE DENTAL SERVICE AND DENTAL HEALTH OF NORTHERN NEWFOUNDLAND AND LABRADOR - A TWENTY YEAR STUDY.

PREFACE

The author's association with the International Grenfell Association began in September 1964 when he was stationed at Harrington Harbour on the North Shore of the Gulf of St. Lawrence. Until 1965, he travelled from Harrington to the small isolated outlying communities along the three hundred miles of coastline. Apart from the clinic at Harrington which was well equipped, facilities elsewhere were far from ideal (Figure P:1).

The work begun by Wilfred Grenfell in 1892, when he first visited the coast of Northern Newfoundland and Labrador, has led to an organisation that dispenses health care to over 40,000 people scattered over an area twice the size of Great Britain. He was truly a pioneer in the field (Figure P:2).

It was at a lecture in the Glasgow Dental Hospital in 1963 that the author was aquainted with the work of the Grenfell Mission by Mr. Tom Kennedy, a member of staff who had worked with the Grenfell Organisation and had been instrumental in recruiting dentists for several years (Figure P:3).

Figure P:3 Mr. Tom Kennedy.

In September 1964 this led to the author being appointed as a dental officer, based at Harrington Harbour for one year (Figure P:4).

During this year the author learned of the circumstances, inherent to the area, which created many barriers against the provision of dental care. Many problems existed which had not really changed since the days of the first volunteer dentists. These problems were particularly acute at the small isolated communities served on a travelling basis from the main centres (See Figure P:1).

There was an enormous challenge to be overcome if a complete dental service encompassing all aspects of dental health was to be contemplated. This challenge existed throughout the area covered by the International Grenfell Association as indicated in reports by many dentists in the Organisation's quarterly journal "Among the Deep Sea Fishers".

After a brief sojurn in Scotland, the author returned to the International Grenfell Association in June 1967 to work in the North West River area of Labrador; this included the north Labrador coast, Lake Melville area and as the first dental appointee to work in Churchill Falls. It was during this time that the immensity of the problem became

THE INTERNATIONAL GRENFELL ASSOCIATION

ST. JOHN'S, NEWFOUNDLAND, CANADA

STAFF COMMITTEE, 25 HUNTINGTON AVENUE, BOSTON 16, MASSACHUSETTS

AGREEMENT made this 14th day of Aug: 1964 between THE INTERNATIONAL GRENFELL ASSOCIATION, as Employer, hereinafter referred to as the Association, and Mr. James Gilbert Messer of 6, Southpark Road, Ayr, Scotland. whose nearest living relative is Mrs. J.M. Robertson of 6, Southpark Road, Ayr, Scotland.

The Employee agrees to serve the Association in the capacity of Dental Officer upon the following terms:

1. The service shall extend for a period commencing September, 1964. and ending September, 1965.

(These dates shall indicate the dates of departure from and return to the address of the employee given in this agreement, and can only be approximate due to the uncertainties of travel. Prolongation or curtailment of this period is subject to agreement between Association and Employee.)

2. The Employee shall be paid for such services at the annual rate of $4,000.

3. The salary shall be paid to Bank of Montreal (person or bank)

at St. John's, Newfoundland.

4. The Employee shall be stationed at Harrington or at such other place as the Association may determine.

5. During the employment under this agreement the Employee shall give his or her entire time to the duties of the position, and shall abide by such rules and regulations as may be imposed by the Association.

6. In case of prolonged illness the Association may cancel employment at its option.

7. The Association shall have the right to terminate this employment upon any unsatisfactory performance by the employee, of which unsatisfactory performance the Association is to be the sole judge.

8. If the Employee leaves without the consent of the Association, he or she shall refund to the Association two months' pay as liquidated damages for such breach of contract, and shall not be entitled to travel expenses for the return trip.

9. The Employee accepts and assumes the hazards of travel and risks inherent in the nature of services to the Association and releases the Association from all liability and responsibility in connection therewith.

10. Salary shall be paid from the date of departure from and to the date of return to the address of the Employee given in this agreement.

11. The employee shall be entitled to a paid vacation of one month (or salary in lieu thereof) for each year of service. This vacation may be taken each year or allowed to accumulate up to three years.

12. At the conclusion of three years of service, the employee may, if he or she wishes, and if convenient to the Superintendent, take an additional leave of absence of up to three months, but salary will not be paid for this leave.

13. Travel expenses will be paid by the Association between the address of the employee stated in this contract and the I.G.A. station at which he or she is to serve, at the commencement and termination of each contract.

14. An allowance, to be agreed upon between the Superintendent and the employee, may be taken in lieu of return travel expenses if the employee does not wish to return directly home. (This allowance in lieu of travel expenses will not apply to vacations.)

15. When under the terms of this agreement travel expenses are paid by the Association, the route and method of transportation of the Employee for the outward journey shall be determined by the Staff Selection Committee. The return journey must be made by the most economical route usually traveled by members of the staff, whether it be by land, sea or air. If the Employee travels by any other route he or she must pay the difference in cost themselves unless special permission has been granted by the Superintendent.

16. This agreement shall be deemed made in Newfoundland, and shall be so construed.

17. The following special conditions are incorporated herein:

All travelling expenses will be borne by the Association.

There will be a standard deduction of $480 per annum for board and lodging.

Figure P:4 The author's contract (1964).

apparent. However, for family reasons he had to return to Scotland in 1969. Despite this he still maintained an interest and connection with the International Grenfell Association.

In 1976, after two years deliberation, the author accepted the post of Dental Co-ordinator with the International Grenfell Association based in St. Anthony. The remit of this position was to organise, co-ordinate and improve the dental services of the International Grenfell Association. In January 1978 the position of Dental Co-ordinator had been upgraded to Chief of Dental Services and the dental service became a separate division within the Organisation. In 1981 the Organisation became Grenfell Regional Health Services.

Between 1964 and 1987 there has been an overall decline in dental caries prevalence with a shift in treatment patterns from a denture/extraction-based service to one encompassing a full range of dental care including prevention and education programmes.

In 1964 there were three fully equipped dental clinics, in 1984 there were 20. The dentist/patient ratio in 1964 was 1:10,000, in 1984 it was 1:3,000. The immense challenge which attracted Wilfred Grenfell to this area in

1892 still exists today and the services and facilties are a tribute to his legacy (Figure P:2).

The author's association with the Organisation, which began in 1964, was motivated to a large extent by a recognition of the tremendous need for dental care in the area and to improve the working conditions of the travelling dentists.

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ACKNOWLEDGEMENTS

In any endeavour of this magnitude it quickly becomes obvious that many people contribute to its success. It would be quite impossible to acknowledge the individual contributions over the years, however, I would like to acknowledge the encouragement and support of those involved in the events leading to this thesis.

My introduction to the Grenfell Mission and the subsequent 24 years association with it are due to a Glasgow Dental Student Society lecture given by Mr. Tom Kennedy (Figure P:3), a senior house officer in the Oral Surgery department at Glasgow Dental Hospital. Professor James Aitchison (Figure 1:2), then the Dean of Glasgow Dental School, was also a great protagonist of the Grenfell ideal and supported my application to come to the area in 1964. Mr. Tom Kennedy's untimely death in 1973 brought personal sadness and a great loss to our profession.

Dr. Donald Hodd, Medical Officer at Harrington Harbour was a legend in his own right. His wisdom and pawky sense of humour were a constant reminder of the legacy I was privileged to enjoy. Also, during this period, my thanks go to the maintenance men, dog team/ snowmobile drivers and skippers of the coastal boats who made it possible to set up clinics and travel the three hundred miles which had become "my patch". The bush pilots who opened up the region and introduced me to

the joy of flying in small aircraft, and the cooks who fed me, were but a few to whom I owe a great debt.

In later years Dr. Tony Paddon and Dr. Gordon Thomas were sources of strength and wisdom when attempting to wrestle against the overwhelming odds facing dentists in the remote clinics. They had enough problems of their own with which to deal, yet still found time to give advice and help. Again, the hundreds of support staff who flew me, fed me, paid my salary and helped implement the establishment of dental clinics, all played a vital role.

For the last 12 years the numbers involved in this endeavour have increased. The Executive Director, Dr. Peter Roberts, has played a prominent role in the development of facilities to meet an ever-increasing and sophisticated demand for dental services at the isolated communities.

My thanks are also due to my colleagues and friends at the Glasgow Dental School who equipped, and thus enabled me to deal with the demands of the challenge with which I was faced.

The dentists, hygienists, technicians and assistants with whom I have had the privilege to work over the years, have my sincere gratitude and thanks as, without their skills, the progress we currently enjoy would not have been possible.

A special debt is due to my secretary Miss Donna Parsons, who prepared the script and mastered the computer processing involved with this study. Like so many, her skills are a tribute to the support we all enjoy and are given without compromise.

To Professor Ken Stephen and his staff for his help and encouragement in the preparation of this thesis I acknowledge my debt, and to Mrs. Anne Shaw who assisted with the analysis and preparation of the epidemiological data.

I am especially grateful to Professor James M. Dunning (Figure 1:1), a constant source of support in difficult times and who kindly helped with the development of this thesis. His long association with Grenfell's work has provided him with a balanced overview of the efforts involved.

Lastly, but by no means least I would like to thank my wife and family who have put up with my frequent absences as I wrestled with the dual problems of keeping the service going and preparing this text in the isolation of north-eastern Canada.

This undertaking involved three-quarters of my professional career and my thanks to those who made it possible are acknowledged. It has been an experience which

at times has ranged from complete despair to satisfaction beyond imagination. Nonetheless, one is privileged to be part of such a unique endeavour when so many never have the opportunity.

To all unmentioned, and to all who may follow, I acknowledge my joy at being a small part of Grenfell's vision. It has been most stimulating.

DECLARATION

This thesis is the work of the author and associates under the direct supervision of the author.

Date: November 30th, 1990

James G. Messer B.D.S., F.D.S., D.D.S.
Chief of Dental Services
Grenfell Regional Health Services

THE DENTAL SERVICE AND DENTAL HEALTH OF NORTHERN NEWFOUNDLAND AND LABRADOR - A TWENTY YEAR STUDY.

SUMMARY

Dental Health Care has been provided by the Grenfell Association for the people of Northern Newfoundland and Labrador since the late 1800's. The capability to provide dental care has been influenced by many factors including a small population living in isolated communities over an enormous geographical area with adverse climatic conditions and long lines of communication. Transportation alone presented a formidable challenge.

Until the early 1960's, dental facilities at most locations were non-existent, with the exception of the three main centres at St. Anthony, North West River and Harrington Harbour. Clinics held in outlying communities necessitated the carriage of equipment and materials, which was a constant source of irritation to all concerned. Another problem which added to the frustration of travelling by road, boat, dog-team or light aircraft, was that dentists usually had to share the nurses' clinic. In smaller communities they often resorted to church basements, school rooms and even outside porches. In many cases there was no electricity, therefore treatment largely consisted of surgery and denture work completed under trying circumstances. As a result of manpower levels which were grossly under strength, together with the constant

travelling involved, there was essentially a demoralised staff.

Based on his early experience with the Association between 1964-69, the author realised, on his return to Canada in 1976 that there was need to identify major problems, adapt existing facilities and change established philosophies, as well as to introduce new systems and methods to improve dental health-care delivery. The main areas of concern were the high prevalence of dental disease, the lack of adequate manpower, appalling working conditions and lack of overall policies.

Initially, one of the major tasks was to establish basic equipment at each clinic. Small portable light-weight dental units were designed and constructed by the author, for each dentist with a travelling commitment, these units being readily connected to on-site compressors. Thereafter, a long-term policy of equipment upgrading and replacement was pursued to enable dental staff to undertake a complete range of clinical duties. Later, when new Health Centres and Nursing Stations were established, the author had the opportunity to become involved in their design and layout.

The method of dental service financing also contributed to many of the problems. Thus the existing monetary arrangements had to be studied which, in turn, required an understanding of the sources of funding. Hence, following

analysis of financial data collected after only the first few months of 1976, it became clear that several issues required urgent action and, as monetary considerations appeared to be the crux or the problem, the author decided to introduce a standard billing system which was applied throughout the region. This was primarily operated by dental assistants to provide continuity between dental staff changes. To reduce financial hardship, fee increases to conform with general dental fees charged elsewhere in Newfoundland were introduced gradually over a five year period.

When sufficient data on the work being undertaken via the Provincial Dental Programme became available, Department of Health funding was evaluated. This led to a report and submission to the Department of Health in 1977, which was intended to exert pressure for fairer remuneration of the Grenfell Dental Service.

From the early part of the century (and certainly since 1930) the prevalence of dental caries was known to be high and had been confirmed by school surveys, repeated personal communications from many dentists, and formal reports to the Association Executive. It was these reported levels of dental disease which, more than any other factor, necessitated change in the service. It was the author's firm conviction, concurrent with strenuous efforts to improve the restorative capacity of the service, that there was a great need to take

measures to reduce this prevalence of untreated disease (i.e. 1969 5-yr-old $\bar{x}$ d = 6.44; $\bar{x}$ dmft = 7.37: 12-yr-old $\bar{x}$ D = 4.18; $\bar{x}$ DMFT = 6.20). Preventive dental programmes were urgently required. In 1978, a fluoride rinsing and preventive package was introduced into the 54 elementary schools throughout the region. This involved 7000 children from Kindergarten to Grade 6 (age 11), 300 teachers and 25 Public Health Nurses.

The effect of the measures taken by the author to increase manpower, improve facilities, reduce caries prevalence, introduce preventive measures and modify unfavourable treatment patterns has been evaluated continuously throughout his tenure as Co-ordinator and subsequently as Chief of Dental Services. The establishment of administrative pathways and centralised procedures has also provided evidence of change.

The results of these endeavours, illustrated by epidemiological and statistical data contained in this thesis, indicate improvement. Among these specific achievements have been overall reductions in the prevalence of dental caries (e.g. 1987 5-yr-old $\bar{x}$ d = 3.28; $\bar{x}$ dmft = 4.84: 12-yr-old $\bar{x}$ D = 1.42; $\bar{x}$ DMFT = 3.82), and treatment patterns which indicate a shift from extractions and dentures, towards restoration and prevention. Manpower levels have been improved from 1 : 10,000 to 1 : 3,000 and the duration of dental

employment has increased from approximately 12 to 36 months. Facilities have been upgraded and preventive and educational programmes made available throughout the region.

In addition, further recommendations regarding future priorities have been formulated to ensure continuous staff recruitment and supporting facilities required to achieve the W.H.O. dental goals set for the year 2000. Happily, with 10 years of the Century remaining, a further mean DMFT reduction of only 0.82 per child is now required to meet the target of 3.0 for 12-yr-olds.

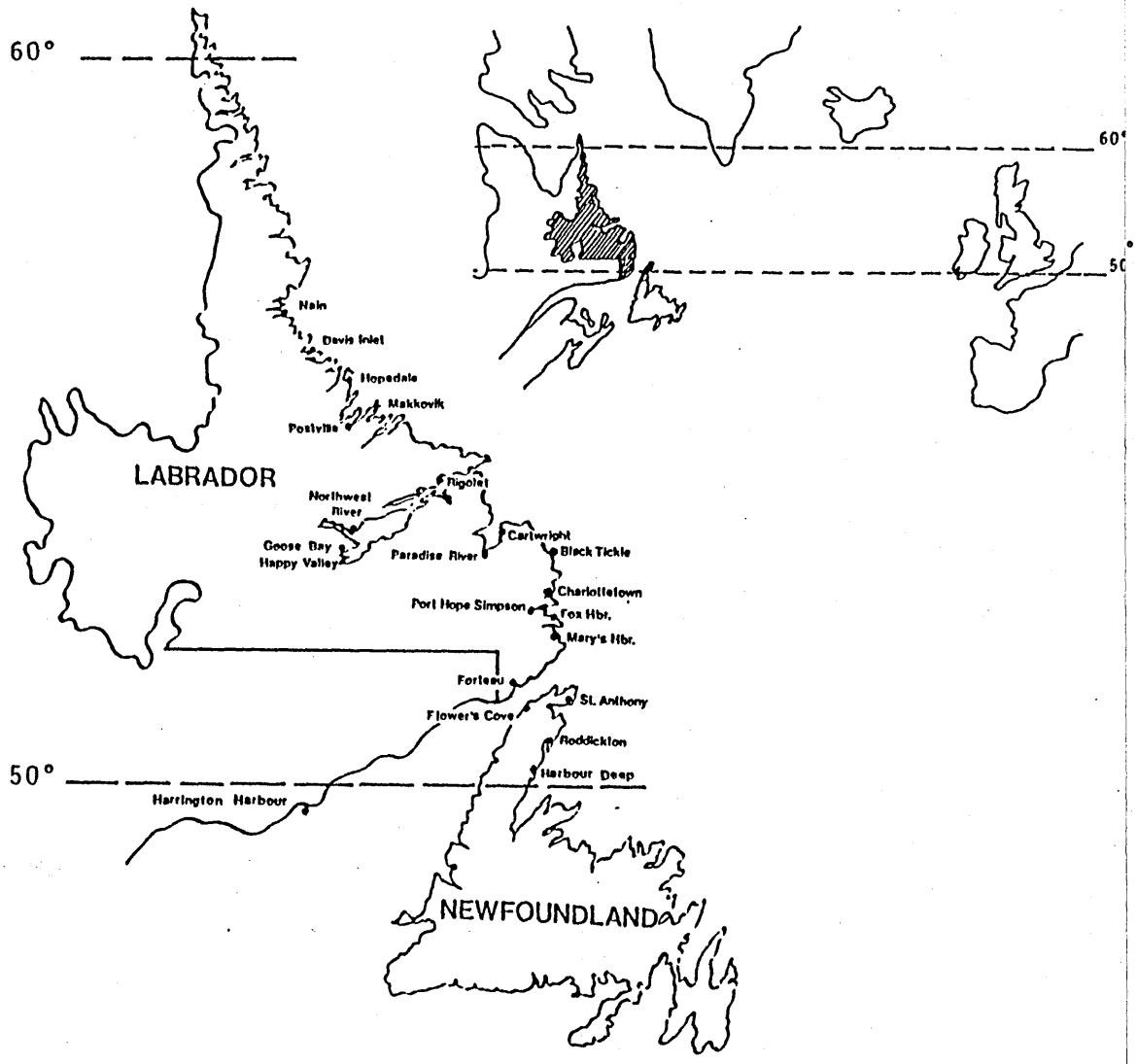


Figure B:1 Location of the communities involved in this study and the geographical location of the area.

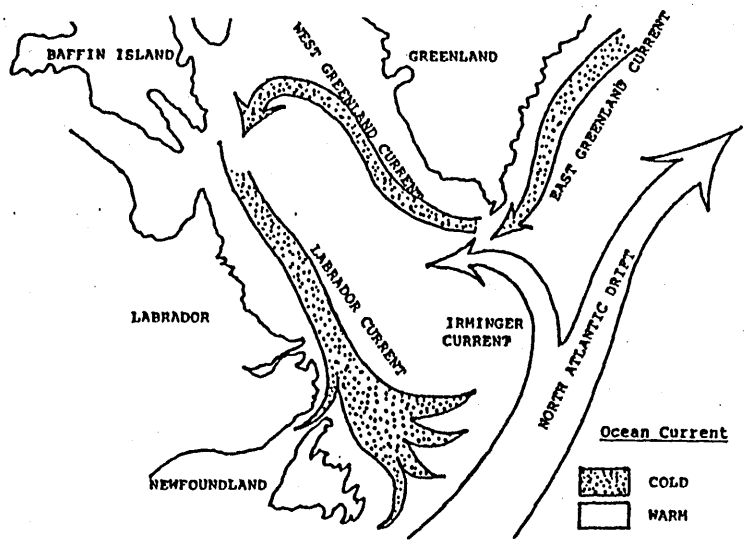


Figure B:2 The Labrador Current and the area it affects.

BACKGROUND TO THE STUDY

1) General Description of the Location of the Area Involved in the Study.

The area involved in this study covers the Labrador Coast, Lake Melville Basin and the northern part of the Great Northern Peninsula of Newfoundland (Figure B:1).

The region is approximately 120,000 square miles in area, or nearly one and one third times as large as the United Kingdom. In 1971 the population of the region consisted of around 38,000 people which included 1200 Inuit (Eskimo) and 800 Innu (Indian).

The inhabited parts of Labrador and northern Newfoundland lie in more southerly latitudes than the United Kingdom. The weather, while generally warmer in summer is much colder in winter, the climate is classified as subarctic. Average January temperature in Goose Bay is -16°C compared to Glasgow ($+ 4^{\circ}$ C), which lies 200 miles north in latitude. This phenomenon is due to the Labrador Current which originates in the Davis Strait between Greenland and Baffin Island, then flows south and is divided by the tip of the Northern Peninsula into two tongues, one entering the Gulf of St. Lawrence via the Strait of Belle Isle, and the other bathing the east and north east coasts of Newfoundland in very cold water, just above 0°C (Figure B:2).

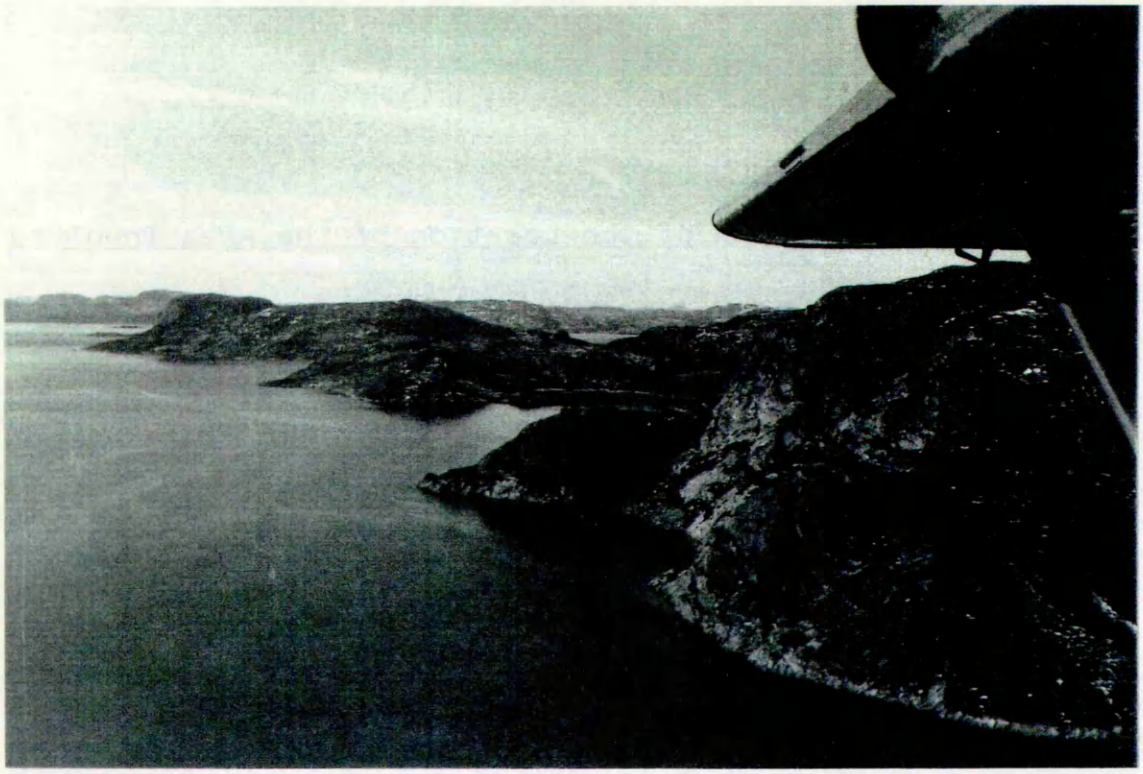


Figure B:3 Typical Labrador Coastline

Figure B:4 Iceberg grounded off the coast

As this current flows south it eventually merges with the Gulf Stream, thus explaining the great preponderance of fog over the Grand Banks area where these cold and warm currents meet. Thus, fog is common along the south and east coasts during spring and summer.

The coastline is rugged with great cliffs and shoals guarding the many bays and inlets (Figure B:3). Arctic pack ice drifts down in the late spring followed by majestic icebergs. They eventually melt when they reach the Gulfstream or ground on the offshore shoals (Figure B:4).

The land is barren and rocky on the coastal areas whereas inland, especially in the deeper South Labrador valleys, there are large forests. The Lake Melville Basin is also heavily afforested with spruce, fir, larch and silver birch.

The lakes teem with trout, pike and other freshwater species. Altantic salmon spawn in the rivers and the seas provide an abundance of fish of many types, primarily cod.

2) Population Groups and Communities

The population is made up of three main ethnic groups. White Settlers, Innu (Indian) and Inuit (Eskimos). They live in small communities scattered along the coastline from Nain in the north to Harbour Deep in the south (Figure B:1). There

Figure B:5 Goose Bay, Labrador

Figure B:6 St. Anthony headquarters of the Grenfell organisation

Figure B:7 Traditional cod trap

are larger settlements at Goose Bay (Figure B:5) and St. Anthony (Figure B:6), the latter being the headquarters of the Grenfell Organisation.

The Vikings were also known to have settled at Lanse aux Meadows near St. Anthony for three or four years before being driven out by the Eskimos. However, preceeding these groups by at least three thousand years were groups of archaic Indians and Eskimos.

3) Resources and the Economy

The Grand Banks of Newfoundland, and the Hamilton Banks off Labrador are spawning grounds for the great shoals of cod which have attracted fishermen to work these coasts since pre-Columbian times. After mining, fishing is still the single most important source of revenue and is being transformed from the romantic fisherman in his "trap boat" (Figure B:7) to a modern sophisticated industry.

Timber is also a major resource with the vast forests being used to supply the pulp and paper mills on the west coast and central regions of the province.

Iron ore mining in the Knob Lake area of central Labrador's western wilderness, developed in the 1950's, is another substantial source of employment and the largest source of revenue.

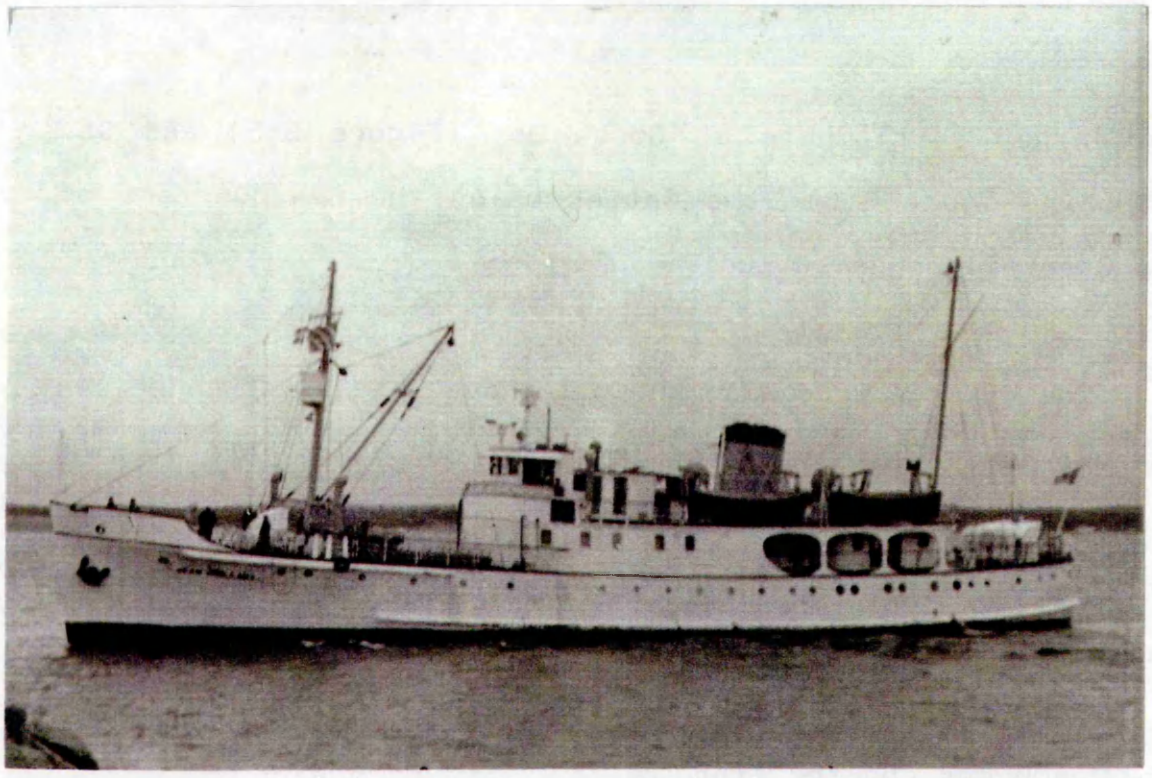


Figure B:8 Coastal boat

Figure B:9 Travelling by small boat

In the early 1940's, the allies led by the Canadians, selected a vast sand plateau near Goose Bay, Labrador, to be the site of a staging post for aircraft crossing the North Atlantic. It is fog-free, thus making it an ideal location for an air base, and it flourishes to this day. It is now used as a training ground for several NATO countries, and with its associated town of Happy Valley, is the largest community in the area covered by Grenfell Regional Health Services.

4) Transportation and Communication

In the early days when Grenfell came to the area, until the late 1930's, transportation relied almost entirely on ships and small boats in summer (Figures B:8; B:9), and dog team in winter (Figure B:10). There were virtually no roads although paths between some communities did exist. Other forms of communication were mail twice a year, and overland telegraph lines.

After the 1940's, there followed a twenty year period of transition. The use of aircraft became more commonplace. In the early days these were bush aircraft equipped with floats in summer and ski/wheels combinations in winter (Figures B:11; B:12). In the early 1970's and 1980's airstrips were constructed at nearly all Labrador communities thus enabling twin-engined, all-weather aircraft access to make the service more reliable. There are still coastal steamers and freight ships for the bulkier supplies, however, nowadays, by far the

Figure B:10 Preparing to travel by dog team. Mutton Bay 1965.

Figure B:11 Bush aircraft. Winter. De-Havilland Otter on skis-wheels.

most commonly used transportation system is the aircraft for communities still inaccessible by road.

The Northern Peninsula was joined to the Trans-Canada Highway by a paved road in 1981, and all the smaller communities have access to it on gravel-surfaced all-weather highways. Thus, all villages in northern Newfoundland have access by road to the main centres at St. Anthony, Flower's Cove and Roddickton. The only exception is Harbour Deep.

There is also a gravel-surfaced, partially-paved road between the Quebec border and Red Bay, thus linking the communities between to the Health Centre at Forteau. In summer a ferry provides a twice daily service between Blanc Sablon and St. Barbe, 12 miles across the Straits of Belle Isle.

All communities now have micro-wave telephone systems, telex and television, thus giving the people facilities similar to their southern more urban Canadian counterparts.

These changes were gradual and influenced delivery of dental services. For example, it was no problem to carry bulky dental equipment by spacious boat but quite another to occupy precious and limited space on small bush aircraft. As these changes took place, many services became more readily available which previously had been sporadic or virtually non-

Figure B:12 Bush aircraft. Summer. De-Havilland Turbo-Beaver on floats.

Figure B:13 Sub-arctic winter in Nain -42°C.

existent.

The climate is one constant problem and still frustrates much of the services, particularly to the more remote communities. While vastly improved communication and transport facilities have eased the difficulty, one is very concious of its effects. A sub-arctic climate still poses many interesting challenges (Figure B:13).

5) Social and Political Changes.

In the early days a poor fishing season could literally mean starvation. Until 1949, when Newfoundland joined Canada in Confederation, there were many "hard times". By the 1920's, much of Grenfell's work was socially as well as medically orientated, and his imaginative mind initiated many schemes to improve living conditions and provide social safety nets. Perhaps this was just as important as his health service and may be considered as an early example of preventive medicine.

After 1949, when Newfoundland and Labrador became a Province of Canada, its residents saw great improvements in their social network and were protected by welfare and unemployment insurance from the disastrous effects of a poor fishing season.

As Government controls were applied, the fish merchants

Figure B:14 The Grenfell plaque

from St. John's and Nova Scotia had less control over fish prices with local economies improving as this source of income developed into an organised industry.

In the 1980's, the economy of the area diversified to include federal, provincial and local civil service employment, as well as a developing small business sector. Service industries and tourism are also becoming growth industries.

In general, it would be reasonable to compare this area with the Western Isles region of Scotland, while accepting a much harsher climate and a population scattered over an area ten times as large.

6) The Grenfell Connection and its Dental Background

Wilfred Grenfell came to the coasts of northern Newfoundland and Labrador in 1892 and was profoundly touched by the living conditions of the indigenous fishermen and their families. The degree of untreated general disease, malnutrition and suffering appalled him. He also made frequent references to the human misery caused by the total absence of any dental care (Figure B:14).

By 1912, summer dental volunteers were being organised on a systematic basis. The work done by those adventurous pioneers was published in 'Among the Deep Sea Fishers'(The

Figure B:15 "Among the Deep Sea Fishers". The Journal of the International Grenfell Association.

Association's quarterly publication), as far back as 1922 (Figure B:15). As well as noting the basic data relating to their work, these articles also emphasised growing concern about the enormous, and largely unmet need for permanent dental care.

Dental volunteers from Harvard Dental School in Boston, Columbia in New York, and other universities played a significant role during this period. However, the need for improved facilities and additional manpower was frequently stressed as early as the 1930's.

There were other sources of information which included the records of the Moravian Church and journals of the dental schools associated with the early volunteers. Until the early 1940's, the majority of dentists came from the United States and spent the summer months as volunteers in the main centres at St. Anthony, Battle Harbour and Harrington Harbour in Quebec. They also travelled on the various "Mission Ships" cruising along the coast, and held clinics at the many small settlements.

Working under difficult conditions and with poor facilities, dentists attempted to fill teeth where possible. Accounts of these endeavours abound, describing the frustrations experienced trying to treat dental problems by restorative means which were all too often solved by

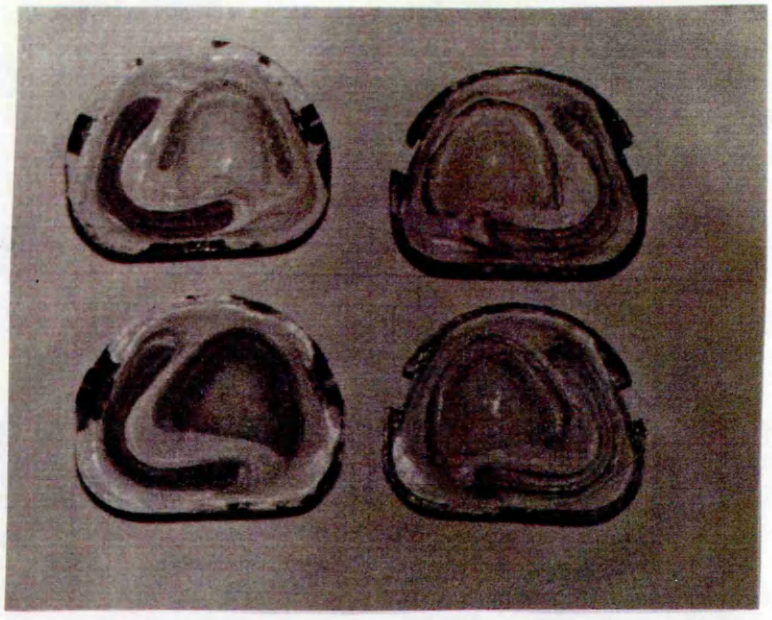


Figure B:16 Double flasking, upper and lower dentures to save plaster when travelling.

Figure B:17 Typical "dental clinic" circa 1960's.

extractions and provision of dentures. Even denture work required great ingenuity (Figure B:16). Statistical records for this period at the beginning of World War II, showed extractions to be the most frequently performed treatment.

Frustrations were more frequently expressed by dental staff as demand began to outstrip resources. Often inborn attitudes conflicted with dentists' own ideas and training about the ideal or most appropriate treatment. It was becoming increasingly obvious that old methods of delivering emergency dental care were no longer acceptable to young staff trained in modern dental techniques. By the early 1960's, the permanent dentists began to rebel against the facilities and conditions encountered (Figure B:17). Unsolicited reports were submitted by the dentists in an attempt to convince those in control that abysmal facilities and appalling working conditions precluded the practice of good dentistry.

The author carried out a dental survey in four communities on the coast of Labrador in 1968-69 which revealed the high prevalence of dental caries and the enormity of the treatment required.

These reports highlighted the need for dentists to be supported, at least by dental assistants and dental technicians. The concept of the travelling dentist carrying his equipment in wooden boxes, competing for space on over-

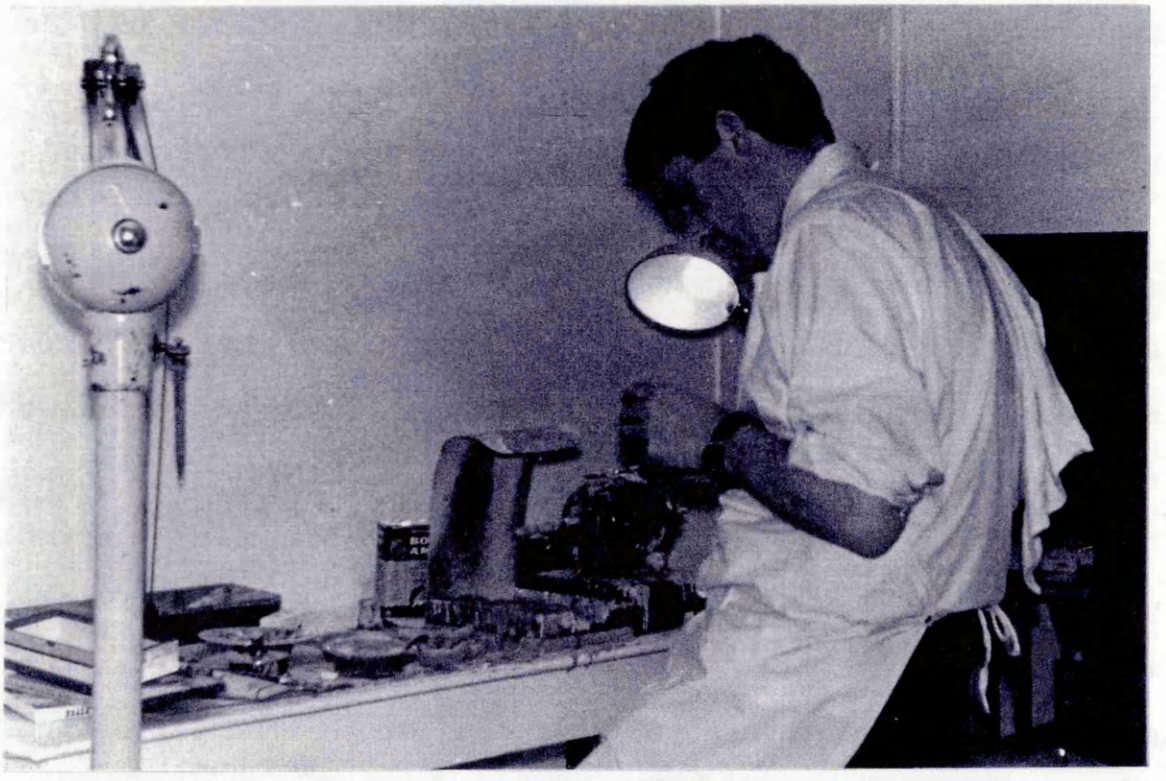


Figure B:18 Making dentures in the "wee sma oors". Nain laundry 1968.

worked bush aircraft and toiling into the "wee sma oors" making dentures, was no longer acceptable (Figure B:18).

In 1972, the Organisation responded and appointed one dentist, Dr. Bruce Wright to act as a co-ordinator. This was a major advance and represented an attempt to meet some of the recommendations made in earlier reports. This period also saw an increase in dental staff levels and an improvement in the dental service generally.

While the appointment of a part-time dental co-ordinator helped to make more efficient use of dental manpower, the continuing lack of facilities and support staff outside the main clinics added to the frustrations of the travelling dentist. Several reports commissioned by the Association in the mid-1970's, identified problems which generally concurred with earlier documentation. Further recommendations resulted in the appointment of a full-time Co-ordinator in 1976.

By 1984, the scope of the dental division included a full region-wide range of dental services including a preventive and dental education programme in schools. Restorative procedures became available to all and the population had access to basic dental care, despite geographical location. A region-wide dental health survey was conducted in 1984, thus establishing a baseline from which to assess the effectiveness of the action taken to reduce dental disease levels via future

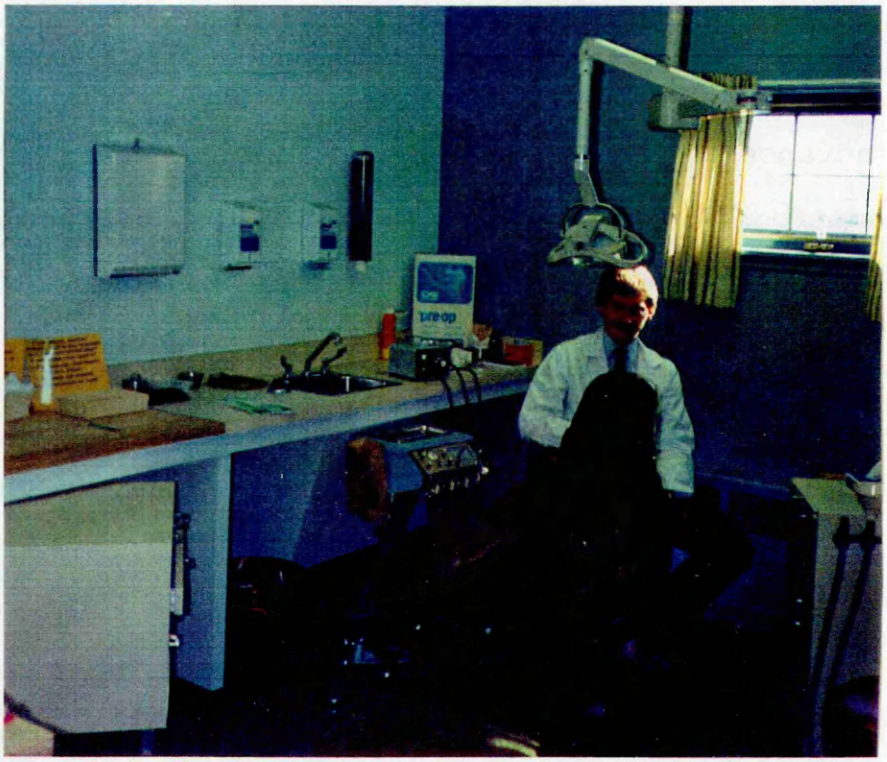


Figure B:19 Dreams to come. The dental clinic in St. Anthony, 1986.

surveys.

For those brought up in less isolated areas, and who have enjoyed the benefits of dental care throughout their lives, it may prove difficult to comprehend that, in this region, many residents did not have local access to a comprehensive dental service until the 1970's. However, circumstances did change and by the 1980's, conditions reached a stage of development which might never have been dreamt of by the early pioneers (Figure B:19).

CHAPTER ONE

HISTORICAL REVIEW

Prevalence of Dental Disease

Since the latter part of the 19th, and the beginning of the 20th century, references to the prevalence of dental disease, (i.e. primarily dental caries and its untreated ramifications), have been recorded by dentists and by others associated with the Grenfell Mission (Grenfell, 1929). *

While there were no epidemiological studies readily available prior to 1969, there were many references to the appalling state of the population's dental health. These references, again, were mainly concerned with dental caries (Gilmour, 1909; Criswell, 1925; Mount, 1927; Butt, 1932; Dunning, 1931; 1932; 1934; Thomsen, 1948; Hunt, 1948; Lumsden, 1956; 1957; Griffiths et al. 1963, (Appendix I pp: 186-226); Messer, 1969 (Appendix II pp: 227-249); Messer, 1979.

Statistical data remained sparse and anecdotal, essentially consisting of reports of operations until the early 1960's. However, in 1969, data initially unpublished

* In 1892 Wilfred Grenfell visited Newfoundland and Labrador sponsored by the Royal National Mission to Deep Sea Fishers. In 1914 the International Grenfell Association (I.G.A.) was incorporated and in 1981 Grenfell Regional Health Services assumed responsibility for health services in the region. Despite these formal changes the term "Grenfell Mission" is still used extensively.

from a survey of school children in four Labrador communities supported the view of these earlier observers (Messer, 1985a). Here, the prevalence of dental caries was high, the mean dmft index for 5-yr-olds being 7.37. For 11-yr-olds, the mean DMFT was 4.87 and the average 15-yr-old had 9.91 decayed, missing or filled teeth. In each age group, the decayed category was the largest component.

The result of this 1969 survey consolidated the observations by earlier workers that there was indeed a high caries prevalence, and that the dental service then provided was not meeting the need for treatment, especially restorative care.

During this same period, high levels of dental disease were also being recorded by other clinicians in the remote and isolated communities of the central Canadian Arctic. These workers also commented on the lack of manpower necessary to provide significant dental care. They also noted the effect of changing dietary habits as a possible contributing factor (Curzon & Curzon, 1970; MacPhail et al., 1972). Similar problems were also highlighted in a study of the Baffin Island Eskimo population in the eastern Canadian Arctic (Mayhall, 1977).

The plight of pre-school children could only be guessed at. However, in 1964, a study of 3-yr-olds in Penticton,

British Columbia, revealed that over 28% had clinically evident dental caries (Gray, 1967).

In 1977, "Nutrition Canada" conducted a dental survey on behalf of the Department of Health and Welfare. This study was somewhat flawed by poor sampling and the small number of Eskimos and Indians, however provincial and ethnic caries differences were noted between Eskimo, Indian and Newfoundland groups, as compared with other regions of Canada. Each of those three groups had higher recorded caries levels than the national average and all other Canadian provinces, with the exception of Quebec (Nutrition Canada, 1977).

One disturbing finding of these surveys was that, despite evidence of declining caries prevalence in North America in general, in the 1970's the socially disadvantaged did not reflect this trend (Greene, 1978a). Unfortunately, Newfoundland has the highest proportion of unemployed,(lowest per capita income) and lowest level of academic attainment in Canada (Statistics Canada, 1976b; 1976c). These problems applied particularly to native groups and people living in isolated or rural communities. They had higher caries levels than their urban counterparts. In one study of 176 children living in Rankin Inlet in the Northwest Territories of Canada, 144 had caries and 20% had rampant caries which was defined as seven or more carious teeth (Gelesky & Hando-Lowes, 1981).

This combination of isolation and ethnic population groups was also shown to be a significant factor in the caries levels of 14-yr-old children in West Greenland settlements as compared to children in Denmark (Vangsted, 1982). Here the filled-factor difference illustrated a variation in the treatment pattern, being higher in the urbanised areas.

More recently, further data regarding caries prevalence in 13 and 14-yr-olds in the Canadian Provinces of Alberta, Quebec and British Columbia, revealed that while levels were declining, this was not an evenly spread phenomenon (Stamm & Lizaire, 1980; Stamm et al., 1980; Hann et al., 1984).

A study of oral health in Atlantic Canada, which included part of Newfoundland, illustrated that Newfoundland 6-7-yr-olds, and 13-14-yr-olds, exhibited above average dmft/DMFT scores compared with those in New Brunswick, Prince Edward Island and Nova Scotia. Newfoundland children also exhibited the highest number of decayed teeth and the lowest number of filled teeth (Banting et al., 1984).

In 1979, a study of 700 school-children from 23 schools in Northern Newfoundland and Labrador confirmed that isolation, access to dental care and ethnic backgound, were all important factors to be considered when comparing the caries prevalence between rural groups and the larger centres at Goose Bay and St. Anthony (Groth & Messer, 1980).

The results of these surveys (Groth & Messer, 1980; Messer, 1985a; Messer, 1988a), have provided the author with sufficient data to assess the effects of measures taken during the period to improve the service, and to illustrate a changing prevalence of caries over the period under study.

Manpower

One of the many talents possessed by Wilfred Grenfell was an ability to attract adventurous, highly motivated personnel, and to use their skills to alleviate the suffering he found on his first visit to the area in 1892. In his tribute to those early dental volunteers, all 51 of whom came from United States dental schools between 1910-1926, he acknowledged the value of their service (Grenfell, 1927).

Notwithstanding the magnificent efforts of these pioneers, it was obvious that summer volunteers were not the whole answer. The need to provide dental services on a permanent basis, with well-equipped, full-time staff was evident. By the early 1930's, this was advocated by the volunteers themselves (Dunning, 1934). However, it was not until the 1940's that dentists began to be "employed" on a year-round basis. This was a major development which, by the 1950's, culminated in important changes that were to affect the future of the dental services in the 1960's and early 1970's.

The writings of the first permanent dentists reflected the magnitude of the problems they faced. Appalling working conditions, lack of support and auxiliary staff, virtually non-existent facilities outside the main centres, and an overwhelming need for dental care began to take their toll. Reports to the executive of the organisation, and articles in

"Among the Deep Sea Fishers", reflected the growing concerns of staff faced with an impossible task (Hunt, 1948; Lumsden, 1957). This increasing frustration culminated in an important report to the Executive Director in 1963. This document was a landmark as it clearly stated the problem and the impossibility of providing adequate dental care with existing levels of manpower and facilities (Griffiths et al., 1963; Appendix I).

The situation described above was that which faced the author when he first came to the Organisation in 1964. Between 1964 and 1969, the author added to these reports and described the inability of existing manpower to cope with the "emergency" and "urgent" dental needs of the area, far less contemplate making serious advances into improving the general dental health status (Messer, 1969; Appendix II). Thus in 1969, there were four dentists attempting to meet the needs of around 40,000 people with a high prevalence of dental caries, half of whom lived in isolated communities scattered throughout an area twice the size of the United Kingdom!

Under these conditions, the inevitable manifestations of "burnout" appeared. This has been defined as "... the progressive loss of idealism, energy and purpose experienced by peoples as a result of the conditions of their work" (Edelwich & Brodsky, 1980). Symptoms of this phenomenon have been

well documented. Among these are " a reduced work output when self-imposed targets cannot be met" and "frustration at being expected to cope with these continuing demands, albeit selfimposed, in the absence of a supportive environment" (Vachon, 1983).

By 1973, manpower had increased, there were six dentists covering the region, thus reducing the ratio to 1:7000. This increase resulted from pressure by the dentists themselves, and by the patients who were becoming increasingly frustrated at their inability to obtain treatment within a reasonable time. It was also due to a growing recognition of the problem by the Organisation's management.

Even the ratio of 1:7000 was inadequate to deal with the problems, and the minutes of the annual dental conferences reiterated, time and time again, the continuing concern of staff with regards to manpower. The then dental co-ordinator, while acknowledging the improvement, emphasised the need for additional dentists and auxiliary staff if the service was to cope with an ever-increasing workload (Wright & Dunning, 1974; Sarsfield, 1977).

Similar sentiments were expressed in a report commissioned by the I.G.A., which reviewed the dental services and emphasised the lack of manpower and co-ordinated region-wide policies, as well as emphasising the genuine need which

existed, but which could not be met realistically by current staffing levels and administrative philosophies (Curson, 1974). Following the examination of this document and others, members of the International Grenfell Association executive became more sensitive to the needs and requirements of the dental service. However, for many years it had not been possible to increase dental staff as this simply meant an increase in costs.

The Grenfell problem with manpower was essentially one of insufficient funding. Since its inception, there had always been dentists who were willing to come to the area, the charisma of the name and the experience of many alumni having created considerable goodwill. A strong connection with the United Kingdom and the United States thus ensured a steady stream of graduates who were attracted by tales of their predecessors. However, it is notable that these dentists rarely remained longer than one year.

One of the main advantages which the I.G.A. had over other regions of Canada facing similar problems, was the enlightened attitude of the Newfoundland Dental Board towards "foreign" dentists. Until the early 1980's, Newfoundland, with the exception of the capital city of St. John's and five larger communities, faced the same serious under-manning problems as did the northern area covered by the Grenfell organisation. Thus many communities relied on "foreign" staff

for their dental services.

In other provinces, the attitude towards "non-Canadian" dentists was different. Attempts to attract Canadian graduates into the Northern regions of the provinces, or the Arctic, were not particularly successful (Pelton, 1975). There were peculiar problems associated with working in Northern communities which were highlighted by Ring (1979), and in an interesting brief, dentists were advised to look carefully at the situations before "going to the north" (Bedford, 1982).

The chronic shortage of staff thus prompted dental authorities to look at alternative methods of providing manpower. The use of dental therapists (Davey, 1974) and expanded-duty hygienists (McDermott & Oles, 1982), led to considerable controversy among the provincial dental associations. This concern about over-manning and dilution of the profession was further exacerbated by studies which prophesied serious manpower problems (House et al., 1983).

Despite these prognostications, the attitude of the Newfoundland Dental Board remained sympathetic to the needs of the Province's northern regions covered by the Grenfell organisation which, since 1980 became Grenfell Regional Health Services. Thus, when a new Dental Act was being prepared, provisions were included to continue to allow "foreign

dentists" to work in the Grenfell Area (The Dental Act, 1983). As a result, Grenfell, unlike other regions, was able to attract and obtain the services of well-trained dental staff without undue restrictions from the Provincial Dental Board. A potentially more serious obstacle, however, was the increasingly restrictive quota policy applied by Canadian Immigration, this being outside the control of Provincial jurisdiction.

Thus throughout the twenty years, the manpower position slowly improved. In 1964, the dental staff consisted of five persons, viz: three dentists, one assistant and one technician. By 1984, it had increased to include 12 dentists, 12 dental assistants, two technicians, a dental hygienist and receptionist, plus a Chief of Dental Services and a stenographer.

Facilities and Equipment

Until the 1970's, nearly all coastal clinics which were serviced on a travelling basis required the use of portable equipment. There were few permanent facilities except at the major centres of St. Anthony, Harrington and North West River.

Dentists travelling to outlying communities had to take whatever equipment was necessary. In the early days much of the work was performed on mission ships, in a house ashore, or in the Nursing Stations. During the 1940's and 1950's, as nursing stations were built at stragetic locations it became possible to share the nurse's clinic or some other space nearby, however these rooms were quite unsuitable for the practise of dentistry. The equipment was inadequate, often consisting of kitchen chairs, examination tables, obstetric lamps etc. These difficulties were compounded by the very busy clinics being run by the nurses themselves.

An insidious change which led to growing frustration amongst those working under such compromised circumstances, was a gradual alteration in staff expectations. Although it was barely acceptable to cope with such a challenge for a few months in the summer while carrying out extractions and denture work, it was quite another matter to attempt to fulfill a restorative commitment, plus a complex surgical and prosthetic workload, on a full-time basis, throughout the long dark winter months. These circumstances were important

catalysts which led to the dental reports of the 1960's. A factor which further compounded these difficulties for the itinerant operator was the absence of chairside assistance and technical support.

It would be misleading to suggest that the Organisation's attempts to equip dentists inadequately were intentional. The simple fact was that finances were limited and urgently required for a host of life-threatening problems. Also, the facilities outside of the main centres did not have space for a dental room as advocated by (Griffiths et al., 1963; Appendix I).

In the post-World War 2 period, portable equipment began to appear, specially designed for field work. However, it was clumsy and heavy to transport. Nonetheless, many ingenious endeavours had been advocated in other parts of Canada eg: converting rail-cars to include a dental clinic (Dental Public Health Committee, 1969). Facilities within the Grenfell area were greatly improved in 1964 by the constuction of the medical ship "Strathcona III" which had a fully-equipped dental clinic (Figure 2:7).

Treatment Patterns

The record of operations and dental basic statistics published over the years in " Among the Deep Sea Fishers", made it possible to examine the types of treatment provided from the earliest days when pioneering dental volunteers were essentially involved in relief of pain and replacement of lost dental tissue (Edwards, 1927). Restorative procedures and preventive measures were undertaken where possible, but made up a very small proportion of the work (Sheldon, 1930; Fenn, 1942), the ratio of extractions to fillings being about 3:1.

Many difficulties were to be overcome before restorative dentistry could become a major component of the routine treatment philosophy. While the lack of facilities and inadequate manpower were recognized as important barriers as early as the 1930's (Dunning, 1931), cultural attitudes, long-held beliefs, and pragmatism were also significant hurdles (Lumsden, 1957). It was unfortunate that amongst the indigenous population, it was often the case that there was considerable resistance to accept restorative care. This was easy to understand since, with long intervals between visits, any restorative failures became well known, and the belief that "fillings don't work" was commonplace.

It was also true of the belief that "baby teeth don't matter because they are lost anyway" was also firmly entrenched, this attitude persists to this day.

By the late 1960's, dental awareness, which was carefully fostered and encouraged by staff, was increasing the demand for restorative care and altering overall treatment patterns. Unfortunately both the facilities and manpower available during the period were insufficient to meet this growing demand (Griffiths et al., 1963; Appendix I).

A study of treatment reports from 1964 to 1976 indicated changes taking place at base dental clinics but overall, the "traditional" patterns persisted and were obstinately consistent, extractions and denture provision being the most frequent treatments performed. In the author's view this was still primarily due to lack of facilities and both inadequate space and manpower (Messer, 1969; Appendix II).

In a study of treatment patterns in Norway during the 1970's, it was demonstrated that as protheses and extractions decreased, restorative and preventive measures increased (Heloe, 1978). In addition, in a northern Norwegian population, it was noted that young people made greater utilisation of preventive and conservative measures, while older patients tended to make more use of prosthetic services. Overall, dental health in this northern community lagged behind the general level elsewhere in Norway (Norheim, 1979b).

While it might seem obvious that adequate dental

facilities would influence dental health and treatment types, in a study of cultural inequality and dental care patterns in New Zealand, there was a much higher proportion of full denture wearers than in other countries with similar levels of dental care (Davis, 1981).

Unfortunately, many older people in Newfoundland held the 'traditional' view that extractions and dentures were the perferred solution to constant, nagging toothache, a common and understandable experience bearing in mind Grenfell's observation about a "Dentistless Society" (Grenfell, 1929).

Co-Ordination

As a direct result of a meeting held at Harvard Dental School in 1907, the first Dental Advisor to the Grenfell Mission was given the task of ensuring a steady supply of dental volunteers to work in the area.

The first appointee, Dr. J. Estabrooks, was in post from 1910 - 1911. In 1912, his place was taken by Dr. R.S. Catheron until, in 1916, he was suceeded by Dr. S.P. Mallett. In 1924, Dr. Catheron again assumed this responsibility, to be followed in 1928 by Dr. R.J. Edwards, who continued in the role until 1930.

During the above period, these men attracted no fewer than 56 dentists, not all of whom were from Harvard Dental School, to serve as summer volunteers for Grenfell. They also came from Tufts, Northwestern, University of Pennsylvania, and Columbia University. However, the debt owed to Harvard graduates was immense and was readily acknowledged by Grenfell himself (Hapgood, 1930).

In the 1930's, the work continued and references to the Grenfell Mission dental service pointed to the growing need for dentists to work throughout the winter. In a survey carried out at the Grenfell Mission in Labrador, the need for preventive and children's dentistry was forseen by Dunning as long ago as 1934. He also perceived the endogenous

Figure 1:1 Professor James Dunning at Lanse aux Meadows, Newfoundland, 1988.

difficulties associated with attracting a shy, reticent people to the advantages of restorative dentistry. Furthermore, he was fully aware of the financial restrictions and sheer impracticality of providing anything but basic dental care at that time, given the circumstances which pertained. It is difficult to find any references to the existence of a dental advisor during the 1930's however, there is little doubt that Dunning played an important role. Dr. L. M. Waugh, then President of the New York Academy of Dentistry, was interested in Grenfell's work and was instrumental in aiding Dunning with his surveys.

Dunning's trip on the "Cluett" (The Mission Ship), in 1932 was at the request of the New York Academy of Dentistry. They wished to know whether the emphasis should be on equipment or manpower, the result being the latter. For several years, Dunning chaired "A Grenfell Scholarship Committee" in the academy and raised several hundred dollars to help send summer dental volunteers to the coast. To this day Dunning's enthusiasm and interest in the Grenfell activities has not faltered (Figure 1:1).

From the late 1930's, until the early 1970's, there were no clear references to specific dental advisors or consultants. Recruitment was largely by word-of-mouth and via dentists who had been on the coast attracting new recruits by personal contact.

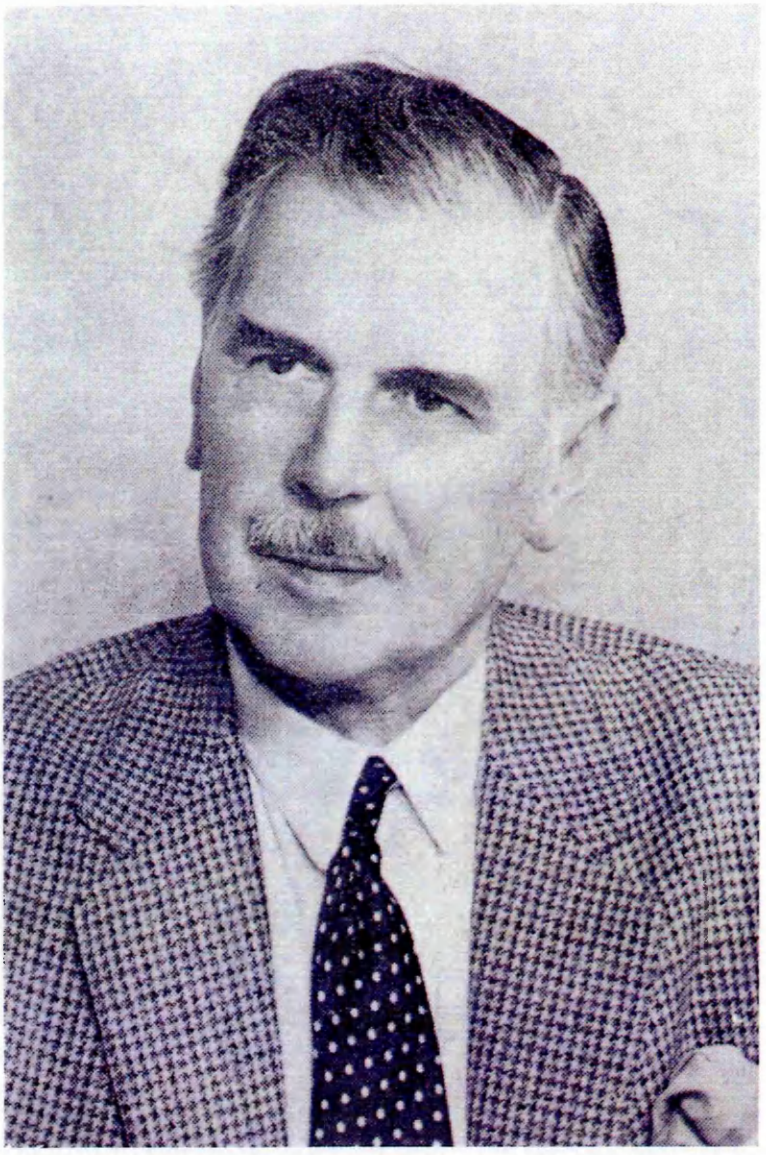


Figure 1:2 Professor James Aitchison. Dean of Glasgow Dental School. 1947-1964.

Full-time staff began to appear on the scene in the early 1940's (Betts, 1942; Chrisman, 1944), after which graduates from Glasgow University Dental School played a significant role in the development of the service (Lumsden, 1956, 1957; Griffiths et al., 1963; Appendix I).

How precisely the Glasgow connection developed is not clear although the article by Dr. Percy Arkle is the first record the author could find of a Glasgow-trained dentist to be associated with the Grenfell Mission (Arkle, 1944). One man, whom in the author's experience, played a significant part in attracting dental staff to the coast of Newfoundland and Labrador, was Professor J. Aitchison, Dean of Glasgow University Dental Hospital and School from 1947 - 1964 (Figure 1:2). Aitchison took an active interest in Grenfell's work and encouraged students to go to Labrador after graduation. It is a tribute to his efforts that, between 1947 and 1964, a steady stream accepted the challenge and provided an almost continuous Glasgow presence from 1953 to the present day (Messer, 1985d).

While the need for dental advisors and co-ordinators had been appreciated for many years, up until 1970 they were located outside the area. Nonetheless, although the role these shadowy figures played is not recorded, the results of their encouragement, interest and effort were clearly visible.

In spite of these achievements, by the early 1960's, it was becoming obvious that the dentists themselves were advocating the need for a "senior dentist" to implement recommendations and provide leadership which would support their endeavours at senior management level (Griffiths et al., 1963, Appendix I; Messer, 1969; Appendix II).

Thus, in 1970, Dr. Bruce Wright became the first 'on-site' Dental Co-ordinator to be appointed, although his role was restricted. Despite considerable efforts and improvements made to alleviate current problems, there were still too many limitations and restrictions in the job description to permit a real advance. This is not to say that progress was not being made as services improved steadily (Wright & Dunning, 1974). In the same year, Curson submitted the first of several reports repeating previous recommendations, and advocated a more effective role for the Dental Co-ordinator (Curson, 1974).

In 1976, a newly appointed co-ordinator (the author), faced a formidable challenge, no less so than that confronting the early pioneers. By this time, dentistry had advanced to a complex and sophisticated clinical science with many facets which demanded urgent attention if it were to be practised to its full extent. A preliminary assessment of the major problems likely to be encountered was made a few months after appointment and an outline plan was presented to the Board of

the International Grenfell Association the following summer.

Some of the difficulties were due to endemic circumstances which had existed since the early days. Others were simply the result of failure to recognise the rapidly changing expectations of both dentist and patient, and an inability to finance rapidly growing costs. There was also conflict between a traditional perception of dentists as purveyors of emergency care and an unwillingness of this new breed of appointees to accept this somewhat limited function. Another source of frustration was simply the lack of an overall policy. The author's previous experience as a travelling dentist was invaluable, as his motivation to change the situation was based on first-hand knowledge.

Essentially four major aspects required urgent attention:
1) A need to organise and establish region-wide policies concerning budgeting, billing, statistical assimilation, data analyses, and clinic scheduling.

2) It was essential to understand sources of income, to control useless expenditure where possible, and to establish consistent fee structures.

3) Dental manpower needs and facilities had to be assessed and appropriate steps taken.

4) Strenuous efforts had to be devoted to reducing the level of untreated dental disease by establishing preventive and dental health education programmes using available, but not necessarily dental, manpower.

Once the author had identified the above region-wide priorities, it became clear to all concerned that co-ordination would be essential if the dental service was to develop from a simple emergency facility to one which would be effective and comprehensive. How this transition was achieved forms the basis of the work recorded in this thesis.

CHAPTER TWO

IDENTIFICATION OF PROBLEMS

Prevalence of Dental Disease

When the author first arrived in the Grenfell area in 1964, there were no accessible epidemiological data available specific to the region.

The significant report by Griffiths et al. (1963), postulated that "The incidence of gross dental caries is probably no greater than elsewhere, but due to the neglect of necessary treatment the situation now presents as an epidemic. Multiple abscesses are common in the mouths of quite young school children, and even in many cases of youngsters of preschool age" (Appendix I).

Elsewhere in Canada, some data did exist; a survey of dental health in British Columbia between 1958 and 1960, (cited by Hann et al. 1984), indicated that the average 7-yr-old had a dmft score of 7.2 and a DMFT of 2.2. In 15-yr-olds, the average DMFT was 12.5, consisting of 5.2 decayed teeth, 1.1 extracted teeth and 6.2 restored teeth.

In 1969, a caries prevalence study of school children was conducted by the author in four northern Labrador communities (Messer, 1985a). Here, a plane mirror and Ash "Lustra" Exp 5 D sickle probe were employed for clinical

	BRITISH COLUMBIA (1958-1960)			NORTHERN LABRADOR (1969)		
7-yr-olds	$\bar{x}$ dmft	7.2	7-yr-olds	$\bar{x}$ dmft	8.3
	$\bar{x}$ DMFT	2.2		$\bar{x}$ DMFT	2.1
	$\bar{x}$ Decayed	5.2		$\bar{x}$ Decayed	6.1
	$\bar{x}$ Missing	1.1		$\bar{x}$ Missing	2.1
15-yr-olds	$\bar{x}$ Filled	6.2	15-yr-olds	$\bar{x}$ Filled	1.7
	$\bar{x}$ DMFT	12.5		$\bar{x}$ DMFT	9.9
	FT%	49.6%		FT%	17.1%

Table 2:1 Comparison of 7-yr-old mean dmft & DMFT and 15-yr-old mean DMFT with component Decayed, Missing and Filled indices for British Columbia (1958-1960) and Northern Labrador 1969.

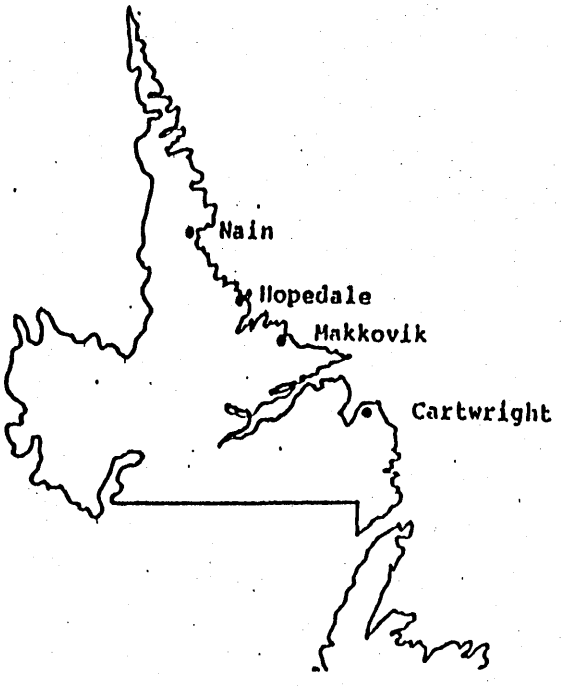
caries diagnosis which was recorded at the cavitation level only i.e., "sticky fissures" were excluded. As a result of these examinations, the mean dmft and DMFT in Labrador 7-yr-olds in 1969 was not dissimilar to the British Columbia experience ten years earlier, being 8.3 and 2.1 respectively.

In the case of the Labrador 15-yr-olds the DMFT was 9.91 with the component indices being 6.09 decayed, 2.09 missing and 1.74 filled teeth. Whereas the D and M components in 1969 were again not dissimilar to the British Columbian findings albeit 10 years later, there was a difference in the filled component, it being 6.2 in British Columbia and 1.74 in Labrador. Thus the FT% in British Columbian 15-yr-olds was 49.6% in 1958-60, while in Labrador 15-yr-olds in 1969, it was 17.1% nearly a decade later (Table 2:1).

These figures supported the contention of Griffiths et al. (1963), that the prevalence of gross dental caries in this area was probably not much greater than elsewhere, but that the treatment being offered was not improving dental health (Appendix I). The author's experience in North Labrador pre-1969, confirmed his opinion that existing methods of providing dental care were incapable of coping with the existing disease, far less of reducing the prevalence of dental caries (Messer, 1969; Appendix II).

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
27	5	7.37	3.31	-	-
36	6	7.94	2.79	0.67	1.24
42	7	8.31	2.40	2.12	1.92
60	8	7.10	2.72	2.40	1.83
59	9	-	-	3.44	1.86
55	10	-	-	3.91	3.41
54	11	-	-	4.87	3.13
55	12	-	-	6.09	4.19
34	13	-	-	6.62	3.04
34	14	-	-	7.29	3.86
34	15	-	-	9.91	4.71

Table 2:2 Mean caries prevalence ± S.D., by age in Labrador School children from four Labrador Communities in 1969.



	INUIT	SETTLER	UNCLASSIFIED*	TOTAL
Nain	114	35	3	152
Hopedale	54	30	3	87
Makkovik	24	58	6	88
Cartwright	-	163	-	163
Total	192	286	12	490

* A small number of children, usually temporary residents were not classified as Inuit or Settler but were included in the total for each age group.

Figure 2:1 Location and ethnic composition of the Labrador school children surveys in 1969.

The 1969 survey, which included 490 school children from four Labrador communities, provided some information about the caries prevalence in these areas. The initial purpose of this survey was to determine the treatment needs of the school children, and to provide a basis for estimating the manpower required. These communities were four of the ten then being covered by the author. The results of this survey (Messer, 1985a)*, expressed as dmft and DMFT data for each age group, are illustrated in Table 2:2. Here the deciduous dentition of the average 5-yr-old had 7.4 teeth either decayed, missing or filled out of the twelve c's, d's and e's scored of which 92% consisted of rampant caries. For the 9, 12 and 15-yr-old age groups, the situation was similar, with a high disease prevalence primarily because of untreated caries. In 15-yr-olds, almost one third of the permanent dentition was so affected. From these studies it was clear that the prevalence of caries was high, particularly in the deciduous dentition of younger children.

In addition, there were also two ethnic divisions in the above survey i.e. the Labrador Inuit (Eskimo) and Settlers. The composition of Inuit and Settlers in the school population in each of the four settlements is as indicated in Figure 2:1. There were differences in the caries prevalence

* In the Messer, (1985a) reference, the data were used to assess the caries prevalence of 7, 12 & 15-yr-olds in Nain, Hopedale and Makkovik only. However, in this thesis Cartwright data were included.

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
19	5	8.11	3.18	-	-
16	6	8.44	2.06	1.19	1.64
17	7	8.65	2.67	2.82	1.91
28	8	7.75	3.00	2.82	2.07
28	9	-	-	3.64	2.13
21	10	-	-	4.24	2.47
23	11	-	-	4.61	2.21
20	12	-	-	5.60	3.39
10	13	-	-	6.50	2.80
9	14	-	-	5.78	3.67
5	15	-	-	7.80	1.92

Table 2:3 Mean caries prevalence ± S.D., in Inuit school children by age from four Labrador communities in 1969.

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
7	5	5.43	3.31	-	-
18	6	7.44	3.38	0.22	0.55
25	7	8.08	2.23	1.64	1.80
31	8	6.48	2.36	2.06	1.55
30	9	-	-	3.23	1.61
33	10	-	-	3.70	3.96
31	11	-	-	5.06	3.70
33	12	-	-	6.42	4.70
24	13	-	-	6.67	3.19
25	14	-	-	7.84	3.85
29	15	-	-	10.28	4.96

Table 2:4 Mean caries prevalence ± S.D., in Settler school children by age from four Labrador communities in 1969.

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
12	5	7.58	3.23	-	-
11	6	9.00	2.37	0.82	1.08
12	7	8.42	2.57	1.75	2.01
26	8	7.31	3.16	2.85	1.93
17	9	-	-	3.41	1.37
15	10	-	-	4.40	2.32
18	11	-	-	4.17	2.18
12	12	-	-	5.25	3.28
14	13	-	-	6.36	2.56
8	14	-	-	7.50	2.62
7	15	-	-	8.86	2.97

Table 2:5 Mean caries prevalence ± S.D., in Nain school children by age in 1969.

between these two groups, these being reflected in the results shown in Tables 2:3 & 2:4. The Inuit 5-yr-old children had a caries prevalence of 8.11 decayed, missing or filled deciduous teeth, while for 5-yr-old Settler children, the modified dmft index value was 5.43. However, the difference failed to attain significance ($t = 1.85$).

For 9-yr-olds, the differences between the Inuit DMFT (3.64) and Settler DMFT (3.23) were also non-significant. ($t = 0.82$). In 12-yr-old children, again the DMFT prevalence scores were similar ie: 5.60 and 6.42 respectively for Inuit and Settler ($t = 0.58$). The caries prevalence in 15-yr-olds was high, with 7.8 and 10.28 decayed, missing or filled teeth for Inuit and Settler children respectively. However, despite these differences, results did not quite attain significance ($t = 1.97$). Due to the low numbers available in each age-grouping, the data presented in Tables 2:5; 2:6; 2:7; 2:8 relevant to Nain, Hopedale, Makkovik and Cartwright respectively, have not been subdivided into Inuit and Settler cohorts, nevertheless when the mean 5-yr-old dmft data for each community were compared, no significant differences were detected. It should be noted that Nain had the greatest proportion of Inuit, with 75% of subjects being in this group, whereas Cartwright had an entirely Settler composition (Figure 2:1).

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
9	5	7.56	4.00	-	-
10	6	7.00	2.98	1.20	1.93
6	7	8.33	2.73	3.33	1.03
7	8	8.14	2.27	1.86	1.95
12	9	-	-	4.08	2.07
7	10	-	-	4.00	2.77
9	11	-	-	4.89	1.97
11	12	-	-	6.64	4.63
3	13	-	-	7.00	3.61
7	14	-	-	7.29	3.30
6	15	-	-	8.83	2.86

Table 2:6 Mean caries prevalence ± S.D., in Hopedale school children by age in 1969.

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
4	5	6.00	3.16	-	-
7	6	8.57	1.62	0.14	0.38
9	7	9.00	1.80	3.78	1.30
11	8	6.36	2.34	2.82	1.66
12	9	-	-	3.75	2.05
12	10	-	-	3.42	2.19
9	11	-	-	5.67	1.50
12	12	-	-	5.17	3.66
4	13	-	-	5.75	1.71
5	14	-	-	6.80	5.02
3	15	-	-	8.33	5.03

Table 2:7 Mean caries prevalence ± S.D., in Makkovik school children by age in 1969.

N	AGE	$\bar{x}$ dmft	± S.D.	$\bar{X}$ DMFT	± S.D.
2	5	8.00	1.41	-	-
8	6	7.13	3.60	0.25	0.46
15	7	7.80	2.57	0.93	1.49
16	8	6.81	2.37	1.63	1.54
18	9	-	-	2.83	1.95
21	10	-	-	3.81	4.72
18	11	-	-	5.17	4.69
20	12	-	-	6.85	4.77
13	13	-	-	7.08	3.84
14	14	-	-	7.36	4.60
18	15	-	-	10.94	5.66

Table 2:8 Mean caries prevalence ± S.D., in Cartwright school children by age in 1969.

When the mean dmft's for each community were compared, no significant differences were observed although the Nain mean value (9.00) for 6-yr-olds almost attained significance at the 5% level ($t = 1.69$) when compared with the comparable data for Hopedale (7.00).

With respect to the permanent dentitions, the greatest DMFT differences were found in the 7-yr-olds' data in Tables 2:5; 2:6; 2:7; 2:8 for Nain, Hopedale, Makkovik and Cartwright respectively. Here the Cartwright mean value of 0.93 was significantly lower than both the Hopedale mean of 3.33 and the Makkovik mean of 3.78 ($p < 0.001$; $t = 4.21$ and 4.92 respectively).

In relation to the Nain data, the 7-yr-old mean score of 1.75 was significantly less ($p < 0.05$) than the mean value of 3.33 obtained in Hopedale ($t = 2.21$). This was also true when the Nain mean was compared with the Makkovik mean of 3.78. ($p < 0.02$; $t = 2.80$). There were, however, no significant differences between the mean scores for Nain and Cartwright children, nor between those who lived in Hopedale or Makkovik.

While, for the vast majority of children surveyed, the above data showed no trends, the 7-yr-old DMFT findings are interesting with both Cartwright Settler and Nain Inuit populations having significantly better dental health compared with those from Hopedale and Makkovik, albeit the sample sizes

INUIT (Eskimo)	INNU (Indian)
Nain	Davis Inlet
Hopedale	North West River
Makkovik	
North West River	
Goose Bay	

All other communities are SETTLER except for transients.

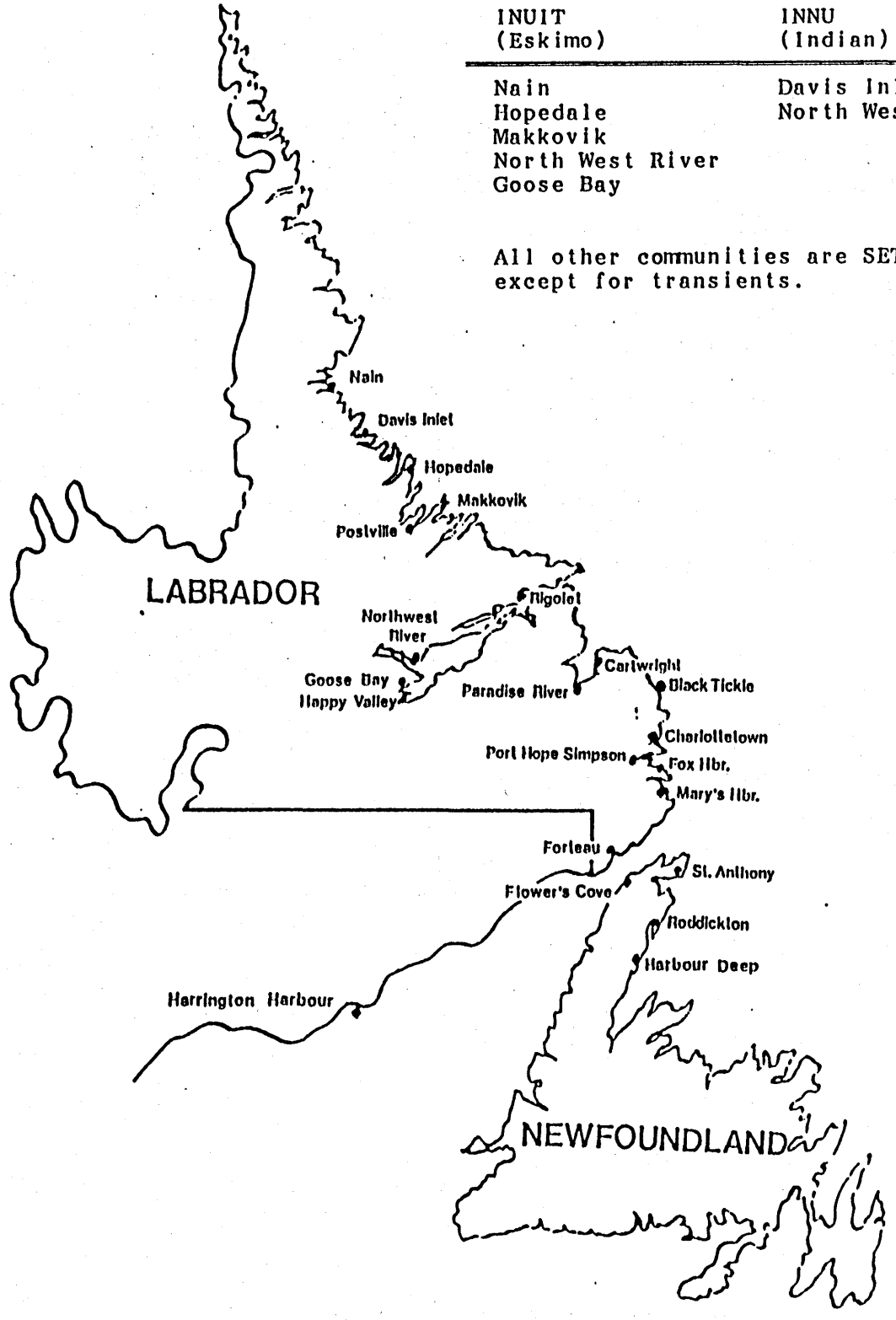


Figure 2:2 Location of dental clinics operated by Grenfell Regional Health Services, and their Relationship to Ethnic Groups in Labrador and Northern Newfoundland.

were small. The reason for such differences is not entirely clear; however, it may be that the predominantly Settler group in Cartwright, even as early as 1969, were beginning to adopt a more positive attitude to dental health, while in Nain the predominantly Inuit group had not yet succumbed to the "dubious benefits" of convenience foods.

Of course, with respect to Hopedale and Makkovik, while the sample size did permit statistical analyses, the numbers available in this age group are somewhat small to permit final conclusions. The only other data which attained significance, all at ($P < 0.05$), were the Cartwright and Nain 8-yr-olds' with means of 1.63 and 2.85 ($t = 2.26$); the Makkovik and Hopedale 10-yr-olds $\bar{x} = 3.42$ and 4.00 ($t=2.43$) and the 11-yr-old mean value for Nain and Makkovik children, 4.17 and 5.67 ($t = 2.09$).

The location of ethnic groups throughout the entire region is shown in Figure 2:2 and illustrates that the vast majority of communities were 'Settler'.

In Table 2:9 male/female caries prevalence data for the 1969 survey are shown. While those figures illustrate a tendency towards slightly higher caries prevalence in female permanent dentitions, only for 8 and 13-yr-olds did these differences obtain significance both at the 5% level ($t = 2.40, 2.25$ respectively).

	MALE				FEMALE			MALE				FEMALE		
AGE	$\bar{x}$ dmft	(N)	± S.D.	SIG	$\bar{x}$ dmft	(N)	± S.D.	$\bar{x}$ DMFT	(N)	± S.D.	SIG	$\bar{x}$ DMFT	(N)	± S.D.
5	8.00	(15)	3.14	N.S.	6.58	(12)	3.48	-	-	-		-	-	-
6	7.82	(17)	2.56	N.S.	8.05	(19)	3.05	0.53	-	1.33	N.S.	0.79	-	1.18
7	8.63	(19)	1.98	N.S.	8.04	(23)	2.72	1.58	-	1.74	N.S.	2.57	-	1.97
8	7.45	(31)	2.50	N.S.	6.72	(29)	2.93	1.87	-	1.57	*	2.97	-	1.95
9								3.46	(37)	2.08	N.S.	3.41	(22)	1.47
10								3.07	(27)	2.06	N.S.	4.71	(28)	4.22
11								4.85	(33)	3.03	N.S.	4.90	(21)	3.36
12								5.81	(27)	4.96	N.S.	6.34	(28)	3.35
13								5.56	(18)	2.38	*	7.81	(16)	3.31
14								6.82	(17)	3.50	N.S.	7.76	(17)	4.24
15								9.77	(22)	5.21	N.S.	10.17	(12)	3.81

Table 2:9 Mean caries prevalence ± S.D., in male and female school children by age from four Labrador communities in 1969, including significant differences.

* ($P<0.05$ = *; $P<0.01$ = **; $P<0.001$ = ***)

Thus, based on the evidence of the 1969 survey carried out by the author, and the remarks made in the 1963 report by Griffiths et al., it seemed reasonable to postulate that, in the Labrador and North Newfoundland area covered by the Grenfell organisation, the prevalence of caries and their sequelae was high (Appendix I). Hence it was quite clear to the author that to attempt to deal even with the caries problem, far less the whole range of dental need by means of "traditional reparative-style" dentistry, would be virtually impossible. A preventive-based philosophy had to be implemented if any improvement was to occur.

In addition to the above there also existed social, geographic and cultural variation barriers. In 1976, Newfoundland and Labrador had the lowest per capita income in Canada, the highest unemployment level, and the highest percentage of people dependent on social services (Statistics Canada, 1976b). Poverty, particularly in the more remote and isolated communities, was ever evident and, in some circumstances, conditions bordered on those of the third world. This Province also had only 1% of the population receiving fluoridated water supplies, none in the North Labrador Coastal area of this survey (Bureau of Economic Research Report 1966).

When considering the choice of a preventive programme, additional factors had also to be taken into account due to

the fact that, apart from the two largest communities, Goose Bay/Happy Valley and St. Anthony, central water supplies did not exist. There were perhaps a thousand or more known water sources which varied from rivers, ponds and lakes, to artesian wells and small streams.

The water source to Goose Bay/Happy Valley was fluoridated, a legacy inherited from the United States Air Force Base when it was turned over to the Canadian Government in 1976. In 1979, the Happy Valley water system was joined to this supply thus providing that community with water fluoridation . Unfortunately, reports by the Public Health Inspector's office showed the system rarely achieved optimum levels, and the average concentration was approximately 0.3 - 0.6 mg/litre (one third to one half the recommended level).

Fluoride concentrations in the coastal communities were largely unknown at the time, and those which did exist usually ranged from 0.3 to <0.1 mg/litre. Because of the expense of establishing the levels from a multitude of water sources, and the fact that seasonal conditions made some unusable, it was decided to assess the concentrations throughout the region gradually, over time.

Other factors which influenced the author's choice of prevention programmes were rapid staff turnover, long lines of communication, vastly differing levels of dental

experience, and great variations in school population size, ranging from 12 to 550 pupils.

Perhaps of even greater concern, was the probability that the incidence of disease would increase as dietary habits, already heavily orientated towards high levels of sugar consumption, were being increasingly supplemented by candies, soft drinks and chocolate bars, as access to these snacks became easier, particularly in the smaller Labrador communities. In addition, major social changes such as advertising, and other outside influences, were gradually replacing older, environment-based dietary habits (Mackey, 1988).

Unhappily, change was not occuring with respect to social attitudes regarding the value of "baby teeth which would be lost anyway". These views were also coupled with a historic and understandable reluctance to have teeth filled, when experience had shown that often such treatment was not successful; due possibly to the very poor facilities and equipment available in outlying communities. The natural result was that many people assumed it was simpler to have teeth "hauled"! Hence, faced with the existing disease prevalence and prevailing social attitudes, the dental service had a daunting task before it.

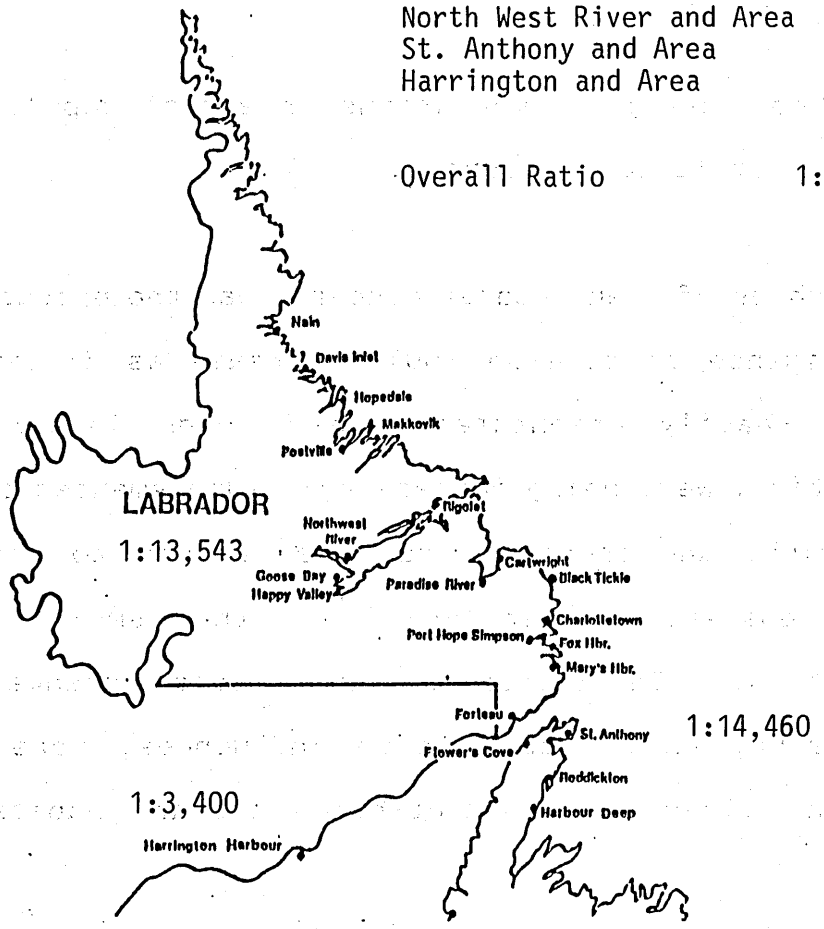


Figure 2:3 Dentist/population ratio in Northern Newfoundland and Labrador - Grenfell region circa 1964.

PROVINCIAL: Province	1971
Newfoundland	8702
Prince Edward Island	4133
Nova Scotia	3793
New Brunswick	4882
Quebec	3567
Ontario	2450
Saskatchewan	4191
Alberta	2643
British Columbia	2222
Grenfell Regional Health Services	7102

Table 2:10 Population/dentist ratios for Canadian Provinces and Grenfell area in 1971.

Manpower

In 1964, as noted previously the dental manpower of the entire Grenfell Organisation amounted to only three staff who were attempting to provide dental care throughout the region. The locations and dentist/population ratios are shown in Figure 2:3. Occasionally, additional manpower was available in the northern Newfoundland and southern Labrador areas when a second dentist travelled from St. Anthony. Such were the conditions which prevailed at the time of the report prepared by Griffiths et al. (1963), when it was obvious that one dentist could not possibly treat 10,000 people who already experienced a high prevalence of disease (Appendix I).

By the late 1960's, the situation differed little and was further disadvantaged when compared to the dentist/population ratios elsewhere in Canada (House et al., 1983). In Table 2:10, the Canadian provincial statistics for 1971 are detailed as are the comparable data for the Grenfell area. It is notable that the ratio for the Grenfell region, compared to that of the Newfoundland and Labrador province as a whole, was only slightly better. This "improvement" was due to the fact that, from 1969, four dentists were working with the organisation. The number of active dentists in each Canadian province in 1971 is given in Table 2:11.

Although it might be thought that the Newfoundland situation was appalling, it was seemingly no better in the

PROVINCIAL:	Province	1971
	Newfoundland	60
	Prince Edward Island	27
	Nova Scotia	208
	New Brunswick	130
	Quebec	1690
	Ontario	3144
	Manitoba	310
	Saskatchewan	221
	Alberta	616
	British Columbia	983
	Grenfell Regional Health Services	4

Table 2:11 Number of active dentists by Province and the Grenfell area in 1971.

northern regions and rural areas of most other provinces (McCombie, 1967). At that time, many ingenious and imaginative ideas were singularly unsuccessful! Problems with isolation, cultural differences, spousal unhappiness, transportation difficulties, poor communications and lack of professional support and advancement, were amongst the many reasons cited by dentists for either not settling in these areas, only making sporadic summer visits, or at best agreeing to one or two years' service (Bureau of Economic Research Report, 1965).

As stated in Chapter 1, the Grenfell Organisation had, up until the late 1960's, not experienced manpower recruitment difficulties. This was largely due to word-of-mouth communication, the charisma of the Grenfell name, and the small number of dentists involved. It may also have been due to the "uniqueness" of the experience for staff who came to the region. Although they seldom had any intention of making a long-term commitment, the romance and intensity of the experience left many memories.

While manpower recruitment was not a problem for the Grenfell Organisation, compared with other northern areas in the mid-1960's, there were changes occurring which were to be instrumental in altering this relatively more satisfactory situation.

Essentially, these lay in the nature of the post and the changing demand for dental treatment, as the population became more dentally aware. Such changes had a marked effect, particularly on the travelling dentist's role.

Furthermore, the growing frustrations, and even terror at facing increasingly demanding and disgruntled patients had been clearly expressed in the 1963 report of Griffiths et al. (Appendix I). Thus it was quite obvious by the end of the 1960's, that the old ways were no longer adequate, either from the dentist's or the patient's point of view.

It was a daunting prospect for a young,inexperienced, idealistic, ill-equipped and unsupported dentist to face these overwhelming demands knowing that however much was done,he could do little more than control acute pain. Conservation was very limited by the need for more urgent problems beyond restoration. Therefore, the initial joy of being in an interesting and stimulating environment, and working with remarkably resilient and friendly people, was over-shadowed by the frustration of a woefully inadequate capacity to deal with the problem. Hence, recruitment began to be affected.

The manpower problem was an issue complicated both by missionary- and medically-influenced attitudes towards dental needs which were also compounded by financial constraint.

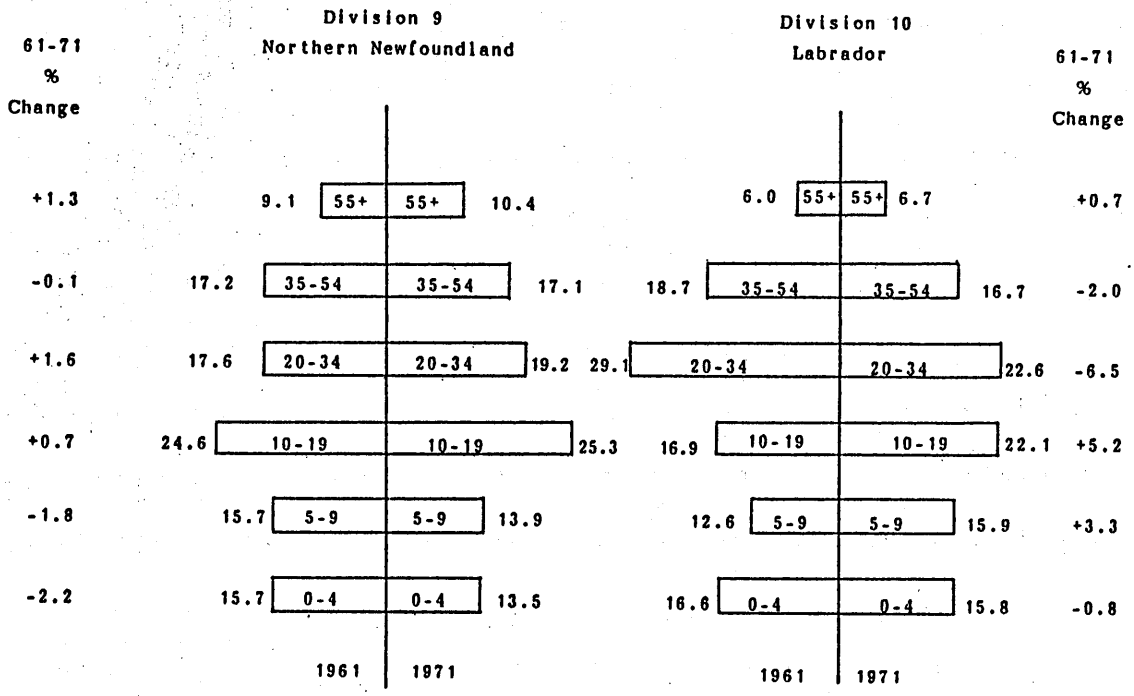


Table 2:12 Changes in composition of the population of Northern Newfoundland and Labrador by age group expressed as a percentage between 1961 and 1971.

Although it was easy to understand why life-threatening disease situations such as tuberculosis and acute general surgery should receive a higher funding priority than dentistry, nevertheless it was the level of dental demand and the increasing number of complaints by dental staff themselves that eventually prompted change.

The first step in the long overdue process of change, was the appointment of a part-time Co-ordinator in 1972. This appointment was the key to much of the subsequent progress regarding manpower, and illustrated a more enlightened attitude towards the dental health needs of the area, as well as those of the dentists, and had been long-awaited since the Griffiths et al. (1963), and Messer (1969) reports, (Appendix I & Appendix II).

Another important factor relating to the manpower situation, was the change in relative proportions of age-groupings making up the population in Northern Newfoundland and Labrador. Over the ten year period relating to the data in Table 2:12, the birth-rate increase which had been anticipated by Griffiths and co-workers (1965) and Messer (1969) did not, in fact, occur (Appendix I & Appendix II). Indeed, the birth-rate dropped by 2.2% in Northern Newfoundland and by 0.8% in Labrador. However, in both areas there was an increase in the 55+ age group which, although small, reflected a general trend throughout the decade towards

Figure 2:4 Dog team travel

Figure 2:5 Skidoo travel

an aging population with the bulge in the 10-34 year age group (Statistics Canada, 1961; 1971 Census). In view of the untreated disease prevalence, and the previous dearth of adequate data, such refinements as population compositon changes were probably unimportant from a practical standpoint, and of academic interest only.

By this time, the days when the travelling dentist went to small communities by dog team (Figure 2:4), and used other interesting modes of travel (Figure 2:5), were fast disappearing. For a young adventurous dentist, brought up in a world of trains, cars and buses with organised time-tables etc., the joy of travelling with no such schedules was appealing, and even a relief, between hectic clinics just completed or about to take place. The author, along with his predecessors, can well remember crawling to bed after an 18 hour session coping with a seemingly endless mass of emergency toothaches.

Such clinics were intensely busy, often carried out under appalling conditions (even for the 1960's), with no auxillary help and the need for laboratory work left to the dentist's willingness to undertake this additional responsibility. The normal workload was considerable and orientated towards pain-relief. Thus, it was with anticipation that, after a four or five day busy clinic, a dentist could look forward to a few day's respite while travelling on to the next community.

Figure 2:6 Aircraft replaced dog teams and skidoos as the main means of long distance travel.

However, the greater use of aircraft (Figure 2:6) changed all this and those halcyon interludes became shorter as clinics became more frequent and larger. This situation was compounded by the increasing demand which frequently outstripped a lone dentist's ability to cope with the workload on a long-term basis. It would perhaps have helped if the equipment had been modern and well designed. Unfortunately, no equipment other than that transported by the dentist was available at the travelling clinics.

In summary, manpower in the early 1960's was quite inadequate to cope with the existing and ever-growing need. This was exacerbated further by poor facilities, lack of assistants and other factors such as limited financial resources, to purchase modern equipment.

Type 1 — Regional Centre

Fully equipped dental clinic within a hospital. In-patient facilities, full back up staff, permanent dentist and full spectrum of dental services.

Type 2 — Area Clinic

Fully equipped dental clinic serving surrounding communities. Permanent dental base with x-ray facilities. Laboratory and G.A. backup at regional centre.

Type 3 — Travelling Clinic (Peripheral)

Fully equipped dental clinic, x-ray unit and suction, light, unit and compressor serviced on a regular basis from regional or area centres.

Type 4 — Rudimentary Clinic

Simple clinic with no permanent facilities, serviced on an occasional basis. All equipment brought by dentist. May have simple chair and obstetric lamp or the like.

Type 5 — Simple Space

Small Room or shared nursing clinic area.

Type 6 — No Clinic!

Dental work done in private home, porch, church basement, school, etc.

Table 2:13 Classification of dental clinics.

Location	Classification
Nain	4
Davis Inlet	6
Hopedale	6
Postville	6
Makkovik	5
Rigolet	6
North West River	1
Goose Bay	2
Cartwright	3
Black Tickle	6
Paradise River	6
Charlottetown	6
Port Hope Simpson	5
Mary's Harbour	6
Fox Harbour	6
Red Bay	6
Forteau	5
St. Anthony	1
Flower's Cove	5
Roddickton	5
Main Brook	6
Conche	5
Harbour Deep	6
Harrington	1
Mutton Bay	5
Kegaska	6
Romaine R.	6
Whale Head	5
Tabatiere	6
Musquaro	6

1 Regional Centre
2 Area Clinic
3 Travelling Clinic
4 Rudimentary Clinic
5 Simple Space
6 No Clinic

Table 2:14 Status of dental facilities circa 1964

Facilities and Equipment

One of the strongest recommendations of the 1963 report by Griffiths et al. (Appendix I), concerned the need to improve the woefully inadequate facilities and equipment available to itinerant dental staff, an outline of which is shown in Table 2:13. The overall status of the dental "clinics", as they existed in 1964 is presented in Table 2:14.

With no direction and with the lack of any coherent policy, travelling dentists were essentially left to themselves. Thus, the range of work they performed at outlying clinics depended entirely on their own resourcefulness, self-motivation, and often their ingenuity to overcome countless other hurdles.

There were communities without electricity where arrangements had to be made, for example, with the local airline agent to share his portable generator to power a simple electric drill! In communities with Nursing Stations there was usually no problem in obtaining electrical power. However, working locations often ranged from porches, to church basements, to school rooms and, of course, in nursing station clinics themselves. The very basic nature of one such clinic is illustrated by Figure P:1 in the Preface.

Furthermore, it was essential to travel as lightly as possible since transport varied between dog teams, skidoos,

S.S. White no. 18 M engine	4 Denture flasks
Straight handpiece	Compress
Hand instruments	Hand trimmer
4X4 Gauze swabs	Amalgam and silicate
Amalgam carrier	Wax, plaster, stone
Bench motor	Floor stand
Plaster knife	Extraction forceps & elevators
Local anaesthetic	Portable sterilizer
Zinc Oxide	Splash pans
Alcohol and wicks	Mortar and pestle
Endodontic kit	Bench press
Burs & drills	Wax knife
No. 15 M Arm and rheostat	Alcohol lamp
Contra-angled handpiece	Zn phosphate
Sterilizing solutions	Impression trays and material
Cotton wool rolls	Assorted other small items as experience dictated necessary.

Table 2:15 Author's Travelling Kit 1964.

bush aircraft, and small open boats. In 1968 the author's personal travelling kit consisted of the items listed in Table 2:15. However, without adequate equipment it was difficult to do much more than simple extractions and make dentures, restorative work being limited by lack of suitable lighting, a dental chair, suction or modern equipment such as an airotor.

In other areas of Canada, suitable portable equipment had been designed and used successfully. However, such changes had not yet been established in northern Newfoundland and Labrador (Gray, 1968).

While these facilities and equipment handicaps were regarded as normal by the dentally unsophisticated population, they proved increasingly frustrating to recently qualified graduates wishing to practice state-of-the-art dentistry. Thus increasing demands and the great need for restorative care, made such working conditions more and more unacceptable. Examples of minor, but nevertheless irritating and accumulative aggravations, were many. Simply keeping local anaesthetic from freezing during dog team travel in temperatures as low as -30° C (with wind chill factors giving true temperatures of -60° C) posed considerable problems, and it was usually necessary to store it within one's inner clothing. In addition, suction was rarely available and the surgical field had to be maintained dry solely by use of

Figure 2:7 The "Mission Ship" Strathcona III.
Davis Inlet, 1968.

swabs.

The difficulties experienced by earlier dentists travelling in this manner were offset, to some extent, by the romance of the situation and gratitude of the few who had their pain relieved or dentures provided. However, by the early 1960's, a "wind of change" was blowing, and for staff to perform consistently, without complaint over long periods of time under such conditions, was somewhat unrealistic to expect.

The main difficulties associated with the provision of adequate facilities was governed by two essentials. The first was lack of space at the various nursing stations and the second, financial. At the beginning of the author's first tour of duty in 1964, apart from the regional centres like Harrington, St. Anthony and North West River, dental clinics as such, did not exist (Messer, 1969; Appendix II).

From the mid 1960's to the early 1970's, dentists were able to use the excellent facilities on the Mission ship. This vessel, called the "Strathcona III", was used primarily to carry out radiographic surveys for tuberculosis screening. In addition it provided access to health care for the summer settlements and also to the communities on the coast, from Harbour Deep in the south to the summer camps in the Nachvak fiord region of northern Labrador (Figure 2:7).

The vessel was equipped with a dental room which had good facilities and a great deal of dental work was provided during these visits, although again, this consisted mostly of extractions and emergency care. By this means, the author made several trips along the Labrador coast and the provision of dental services via this ship was a significant attempt to deal with the problems at outlying communities.

While, to a dentally motivated group, it would have seemed obvious that an ill-equipped and inadeqately supported operator could not hope to provide comprehensive dental care to a population with a high dental disease prevalence, it had to be accepted that the needs of a medical/surgical orientated organisation, itself desperately short of facilities and equipment, might not place dental care uppermost in its list of priorities. Thus, the changes which subsequently came about occured as a result of efforts initiated by the dentists themselves, and an increasingly aware Organisation management. It was obviously time for change.

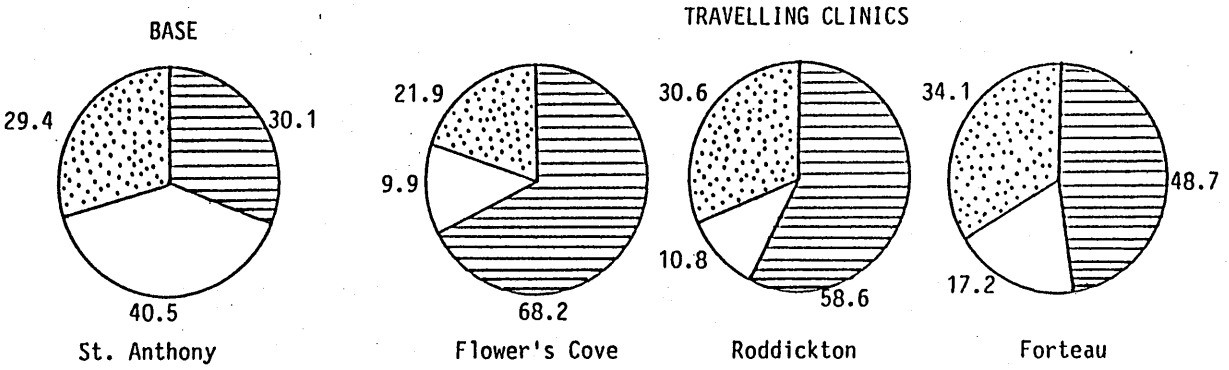


Figure 2:8 Extractions, fillings and denture treatment patterns expressed as a percent of time. Comparison of base and three travelling clinics 1962/63.

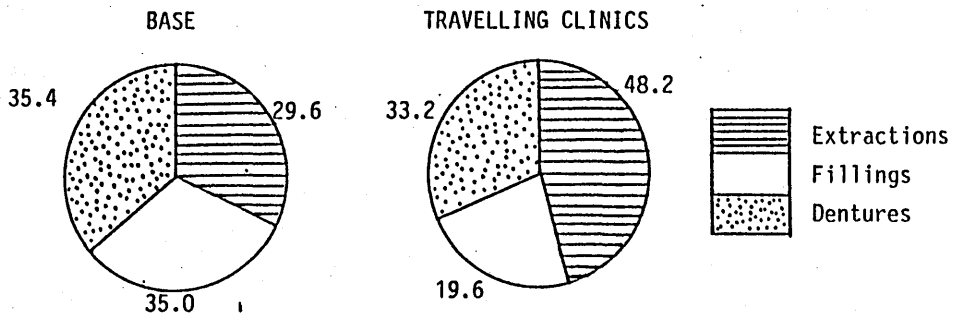


Figure 2:9 Extractions, fillings and denture treatment patterns expressed as a percent of time. Comparisons of base and travelling clinics. Harrington area, 1964/65.

Treatment Patterns

Treatment patterns in the 1962/63 (Figure 2:8), and the 1964/65 (Figure 2:9) periods clearly illustrate the variations between the types of treatment provided at the base clinics and travelling clinics; these data having been obtained from the 1963 report of Griffiths et al. (Appendix I), and the author's own unpublished records of 1964/65.

One striking difference was the preponderance of extractions and dentures, relative to restorative treatment, at the travelling clinics, as compared to the pattern at base clinics. Lack of facilities and equipment, together with lack of support staff, were contributing factors, but there were also other influences. Rapid staff turnover and expedient treatment modes were also important points to be taken into account.

In addition, in the early 1960's, dentists normally carried out all technician duties themselves, these being undertaken after daily clinics, into the night and also during weekends. This "system" had both advantages and disadvantages. It meant the time taken to construct a denture was considerably less than would have been required had the work been sent to an outside laboratory. This was important since dental clinics at most outlying communities would extend over two or three weeks at most. This would not have provided sufficient turnaround time for denture work to be completed

BASE	TRAVELLING CLINICS
Harrington Harbour	Kegaska Musquaro Romaine Whalehead Mutton Bay Tabatiere St. Augustine
St. Anthony	Flower's Cove Roddickton Forteau Mary's Harbour Cartwright
North West River	Nain Davis Inlet Hopedale Makkovik Postville Rigolet Happy Valley

Table 2:16 Base and travelling clinics covered by dentists 1962/65.

if outside laboratories -often 600 miles away- had been employed. Since visits to outlying clinics were sporadic, perhaps only once or twice every year, fitting such dentures would have been pointless. Nonetheless, it did mean that dental staff were working long hours and using valuable time doing work which could, and should easily have been undertaken by a technician. Only at St.Anthony were technical sevices available on any regular basis.

The problem of dental visit duration was further complicated by the large number of communities to be covered by each travelling dentist (see Table 2:16). To serve these areas, and at least provide emergency care, it was virtually impossible to allocate much more than two or three weeks to each visit. Thus, such thin cover made multiple visit or long-term treatment difficult. Orthodontic and endodontic cases were particularly affected by this situation. However, in spite of these problems, such treatments were carried out, albeit making up a very small proportion of the total.

A related phenomenon was the expectation of the population served, which was generally orientated towards pain relief and dentures. Furthermore, since restorative work was such a rarity, there was little demand. However, such views gradually began to change as communities developed and absorbed outside personnel in increasing numbers. Thus it was the author's experience, that restorative treatment

demands came from teachers, Royal Canadian Mounted Police officers, fish plant managers, the clergy and others who had previously enjoyed a full range of dental care.

With respect to restorative difficulties, there were many other contributing factors eg. poor equipment and facilities, and often restorations were placed, under far from optimum conditions, by tired and overworked operators. They themselves often questioned the wisdom of restoring one or possibly two teeth, when there were many others in the same patient which required restoration but which would probably never be treated prior to pulpal involvement. These were difficult and frustrating situations for dentist and patient alike, however, the net result was that restorative care could only be provided with great difficulty in outlying communities. Nonetheless, by 1969, it was the author's contention that demands for restorative care were increasing as dentists gradually brought the advantages of good dental care to the region. This was evident in changes at base clinic treatment patterns where comprehensive dental care had been available for some time. Thus these patterns acted as a yardstick and were an indication that the availability and practicality of delivering comprehensive dental care to the small isolated communities of the region would lead to an increased demand.

Co-ordination: Data Collection

Apart from reports which appeared in the publication "Among the Deep Sea Fishers", there is little readily available data concerning the work performed by dental staff prior to 1970. Working without co-ordination, they merely kept records of such work as they saw fit. There was virtually no information of a standardised nature and dentists rarely met each other to compare notes. Thus dental staff were perhaps aware of only their own work totals etc. and even the basis of these figures varied from area to area. In the early to mid-1960's, it was difficult to find information concerning the number of patients seen and treatment records were difficult to obtain, largely because of no statistical centralisation.

From a purely practical point of view, new staff would have found it helpful to have some idea of their predecessor's workload and patterns, even if only to assist with the scheduling of rotational visits. For example, had the previous dentist spent a considerable time in one community just prior to his departure, the incoming dentist should have devoted his initial visits to other communities. This was important when denture work was unfinished and the try-in or insertion stages were still to be completed. As a result, efforts to co-ordinate staff overlaps were not always successful. In addition, lack of firm data meant figures were not readily available to support the growing feeling among

dentists and expressed by Griffiths et al. (1963) that the workload was indeed very high (Appendix I).

Good data would also have highlighted the discrepancies which arose due to the vast differences between facilities at outlying communities and base clinics. The recording of treatment patterns and other relevant data was becoming important as the dental service attempted to adapt, in response to changing needs and demands.

Thus, the lack of documented information, and valid conclusions which might have been drawn, presented a severe problem to anyone attempting to organise and co-ordinate the service.

FEE SCALE HARRINGTON 1964-65

Extraction	1.00	
Amalgam 1 Surface	2.00	
Amalgam 2 Surface	3.00	
Silicate	2.00	
Denture	40.00	(Per Denture)
Denture Repair	3.00	

Table 2:17 Fee scale being charged in 1964/65 at Harrington Harbour.

FEE SCALE NEWFOUNDLAND DENTAL ASSOCIATION 1969

	1969	1974
Extraction	$5.00	$10.00
Silicate 1	8.00	11.00
Amalgam 1 Surface	6.00	9.00
Amalgam 2 Surface	8.00	11.00
Denture	90.00	71.00 + Lab
Denture Repair	8.00	7.00 + Lab

Table 2:18 Fee scale in use by practitioners in Newfoundland circa 1964/65.

Co-ordination: Finance

In the early 1960's, financial matters relating to dentistry were normally dealt with by the medical officers or Executive Director, sometimes following discussion with dental staff. Essentially, dentists were responsible for merely collecting fees and filling in claim forms for agencies, eg. the Federal Government. They had little or no imput regarding funding and budgeting in spite of the fact that dentistry was not funded by Government in the early 1960's, either partially or wholly, and the burden of providing such services rested with the International Grenfell Association, already facing great financial constraints as the Organisation grew in size.

Partly due to the remoteness of this area, but also the lack of opportunity for dentists to meet their counterparts in St. John's and other centres, the International Grenfell Association staff had little knowledge of "Canadian Dentistry". Thus U.K. trained dentists, often used to working under "free" National Health Service conditions, were somewhat resistant to charging patients directly. Hence the impression was gained that the dental service was a "luxury" the Organisation could ill afford when, in fact, dentists were quite industrious. Unrealistically low fee scales even if charged, prevented a true reflection of the dentists' efforts in a tangible financial way (Tables 2:17; 2:18).

Since there was no Co-ordinator (and probably until the early 1960's one was not really necessary), financial aspects of the dental service tended to be left in the hands of the Controller and the Executive Director who were trying to cope with a myraid of other problems beside dentistry. The net result was that the structure of the dental service was not viewed in its entirety by any one dentally qualified individual. Had this been so, a most important duty would have concerned the financial state of the service and development of appropriate methods to establish policies which would drastically improve the situation.

Another aspect of finance which required consideration concerned the absence of fluoridated water supplies and the impossibility of fluoridating the plethora of water sources. It has been shown that treating children in fluoride deficient Kingston was almost twice as costly and involved twice as much time as treating children in optimally fluoridated Newburgh (Ast et al., 1970). This being so, it would have been reasonable to expect that even if treatment had been restricted soley to children in the area involving this study, it would still have been a costly and time-consuming business ie: apart from the fluoridated Goose Bay region.

One other point which required consideration, and had important future ramifications, was what type of service and facilities should be offered, particularly in relation to the

socio-economic status of the majority of patients. While it was one thing to charge a standard denture fee to a St. John's businessman in 1964, it was quite another to expect a Labrador fisherman to pay the same amount.

By the early 1970's, therefore, when the service began to grow, finance assumed greater significance as income was needed to meet the expense of expansion. Certainly, the author considered financial aspects crucial if staff were to begin to fulfil the requests expected of a modern dental service.

Co-ordination: Programme Development

The concept of developing co-ordinated programmes in the various aspects of dental health care was non-existent when the author first arrived in the Grenfell region. Apart from individual efforts by dentists, no region-wide policy towards preventive dentistry, nor education in schools, had been considered, in spite of the fact that dentists were recording the need to deal with dental disease by such means in the 1960's. Indeed, such a policy had been advocated by Dunning (1934) as early as the 1930's. However, as no central co-ordinating source was in place, individual initiatives were limited to the tenure of each dentist. It was an unsatisfactory state of affairs which led to frustration and a plethora of unfinished, semi-organised programmes. As a result, patients were left in some confusion as to the benefits of dental care and it proved more difficult to correct this state of affairs than was first imagined.

It was obvious to all dentally orientated personnel that one of the priorities of a co-ordinator would be to organise dental resources in order to obtain maximum utilisation of dental skills. It was a daunting prospect as, with many programmes in this area, the geographic and social barriers were complex and presented significant hurdles. However, as mentioned previously (Griffiths et al., 1963; Messer, 1969; Appendix I & Appendix II), dental staff on site had expressed their views and identified such needs.

It should be noted that dental services were no worse in the area covered by the Grenfell Organisation than in many other isolated and northern regions. In the early 1960's, Dental Public Health was in its infancy. Subsequent changes in this area were often in advance of similar health care providers in other regions.

The author is well aware that the Executive of the Organisation was cognisant of the problems besetting the dental staff and, despite financial and other restraints, made strenuous efforts to alleviate the situation. In the early 1970's these efforts led to the appointment of the first resident Dental Co-ordinator.

This key appointment was to have far-reaching effects, and the efforts of those who undertook this task undoubtedly changed the role of dentistry within the Organisation. Throughout this period the encouragement of Professor James M. Dunning a long-standing and knowledgeable Grenfell dental protagonist, and many others was invaluable.

CHAPTER THREE

PROPOSED STRATEGY (METHODS)

Prevalence of Dental Disease

The magnitude of the problem confronting the dental service was illustrated to some extent by the findings of the school survey carried out in 1969 (Messer, 1985a). The caries prevalence, at the level shown by this survey, was far beyond the capacity of the dental resources available, and urgently demanded a drastic change if any improvement were to be effected. The author therefore considered two main methods of addressing the problem. The first was to improve the manpower, facilities and support staff to deal more effectively with existing disease, and the second was to introduce a region-wide prevention and education programme which might reduce the incidence of dental caries, or at least delay the onset until children attained a more manageable age.

The first, and most urgent task, was to provide dental staff with adequate facilities and equipment, both to treat existing disease and create income. The long-standing and permanent dental deficit was a significant barrier to any request for additional manpower - a complex issue which was compounded by a multitude of factors. Thus, while it was the author's contention that necessary work was being completed, dental income was not reflecting its value, and until this problem was dealt with, expansion of services would not be possible.

The methods used to improve manpower, facilities, finance and additional dental programmes will be discussed more fully under the relevant headings in this chapter. As mentioned above the strategy behind the author's attempts to treat existing disease was to be divided into two phases:

Initial (Phase 1)

a) To use such facilities as existed more effectively.

b) To design and construct functional, portable equipment to be used as an interim measure.

c) To develop basic facilities and services at traveling clinics.

d) To reduce the number of communities covered by each dentist, in order to increase the frequency of visits.

Subsequent (Phase 2)

a) To develop self-contained facilities as funding became available thus reducing the need for travelling equipment.

b) To incorporate dental facilities when new and additional health centres, nursing stations etc. were constructed.

c) To establish preventive and educational programmes.

The author began to implement these programmes six months after his appointment as Dental Co-ordinator in 1976.

Manpower

Despite very real evidence to indicate that additional dental manpower incurred additional expense, there was, nevertheless, a need to increase manpower if any progress towards improving dental health was to be achieved.

The author's assertion that manpower could be increased without adding significantly to the cost of running the dental service was based on several factors viz; firstly, the improvement of facilities; secondly, by ensuring that dentists were able to use their skills and time effectively, and thirdly, to establish that realistic fees were charged where possible.

By the late 1960's, many aspects of social and economic life were changing in the northern Newfoundland and Labrador area. Not least of these changes was the gradual transition from local resource and barter-based economies, to one based on welfare and social service supplements, unemployment insurance, with wages and salaries being paid by fish plants and other Government agencies.

Essentially, the above changes meant a move away from old practices whereby people who did not deal on a cash-orientated basis decreased, as the majority became more and more interdependent and increasingly used money as a common

denominator for purchasing and selling the items and services required.

One of the basic problems concerning the attraction of manpower to the Grenfell region related to the increasing numbers required. Previously, dentists had been attracted to the region by word-of-mouth, or because they had attended illustrated lectures, or knew somebody who had worked in the area. However, while it was always possible to attract two, or even three dentists per year on the old basis, attracting nine or more to the Coast in any given year required other than a simple word-of-mouth contact. As a result, advertising became necessary and hence the principle recruiting method.

However, in order to advertise successfully in dental journals, realistic salaries and working conditions had to be offered. Furthermore, to advertise for clinicians for a remote and rural area, then fail to provide the facilities to enable them to carry-out normal dental tasks, seemed wasteful and possibly counter productive. Thus, again, a multifactorial approach was required.

While several different methods of providing dental manpower existed, the author felt that well-trained dentists were the most effective means of delivering general dental care. Several other systems, including the use of dental therapists, and other expanded-duty auxiliaries, were

considered but rejected, as politically, it was considered much simpler to work with, rather than against, the Newfoundland Dental Association, and thus ensure that staff credentials met their standards.

Other findings relating to Canadian dental manpower which postulated an adequate supply in Saskatchewan (McDermott & Oles, 1982) and an excess in Canada by the year 2001 (House et al., 1983) were questioned by the author relative to this remote northern area. Rather than there being any evidence of critical oversupply, dental services were at a minimum. Hence, a policy of continuing to attract staff to the region and provide them with adequate facilities and a supportive work environment was considered essential. It also meant assisting their endeavours to obtain citizenship and ultimately have their credential and qualifications upgraded.

By the late 1960's and early 1970's, the author was directly involved, on many occasions, in attracting dentists to the Grenfell area. It was the author's opinion that a fair description of working conditions was preferable to portraying situations as other than they were, ie: extremely basic. Thus, following his appointment in 1976, one of the author's primary roles was to improve facilities to enable staff to fulfil effectively their tasks with some degree of enthusiasm,

and therefore to produce a job prospectus describing realistically the working conditions. The author also considered it important to find out, by means of questionnaires, how dentists felt about the "travelling dental role" (Messer, 1988b).

A major concern relating to the earlier dental staffing situation was the fact that, at the end of each year, an experienced dentist would be lost, together with all skills acquired over that period of time. Furthermore, patients undergoing treatment would lose a practitioner in whom their confidence was becoming established. By the early 1970's many patients had been exposed to at least nine, ten or even more dentists during their treatment history which caused a great deal of confusion and, in some cases, open suspicion as continuity was disrupted and differing opinions given. Dentures are never an ideal solution and often the construction stages were spread out over too great a period in time to achieve a satisfactory fit. The result was an inevitable dissatisfaction in many cases.

Unfortunately, based on past experience, it seemed inevitable that any increase in dental manpower would simply result in increased costs. Hence it was the author's burden to prove that dentists were not necessarily costly, providing they were able to work under proper conditions. Thus in 1976,

the authors's main means of increasing manpower could be summarised thus:

1) Permit dentists to work under optimum conditions where possible, in order that they would create income from their services. This would also include the introduction of more reasonable travel schedules.

2) Institute a fee-scale for the provision of the normal range of dental services, there being no reason why fair fees, similar to the remainder of the Province should not be charged.

3) Increase the quality of service and hopefully, attract patients for forms of treatment other than simple extractions and dentures.

4) Install a book-keeping system which would keep track of the fee or payment history of each patient, whereby it was hoped to collect earned income to a level which would render the dental services self-sufficient.

5) Place the duties of fee-collection in the hands of the dental assistants who, being more permanent, would provide continuity and thus ensure bad debts were collected.

6) Improve accommodation and working conditions, and encourage dentists to obtain "landed immigrant status" and Canadian qualifications, or else attract Canadian-trained dentists.

It was hoped that by establishing these policies, a more contented and satisfied staff would provide a more stable service. To assess the result of these measures the average lengths of stay of dental staff would be used as an indicator.

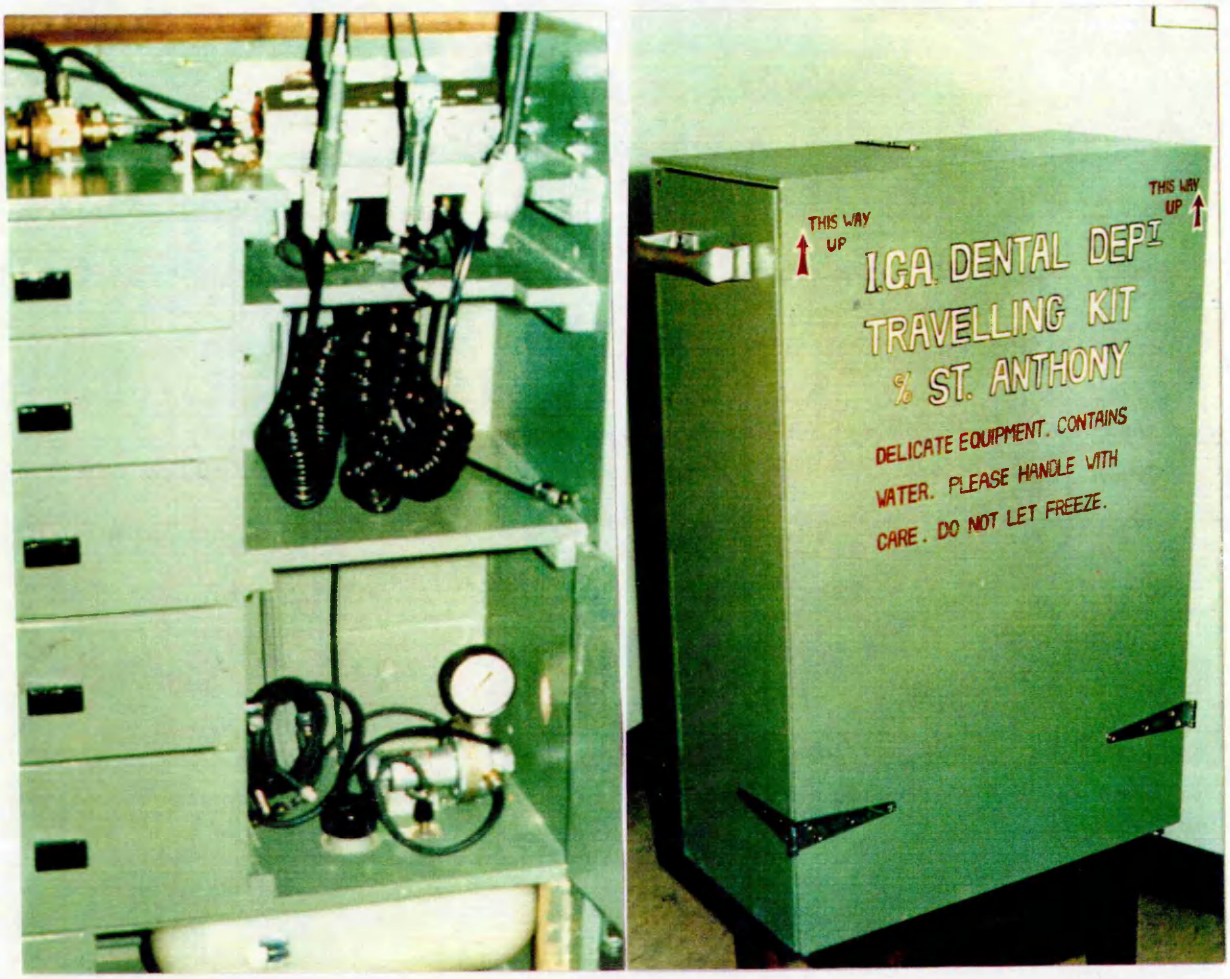


Figure 3:1 Travelling unit No 1 designed by the author shown open for use and packed for transporting.

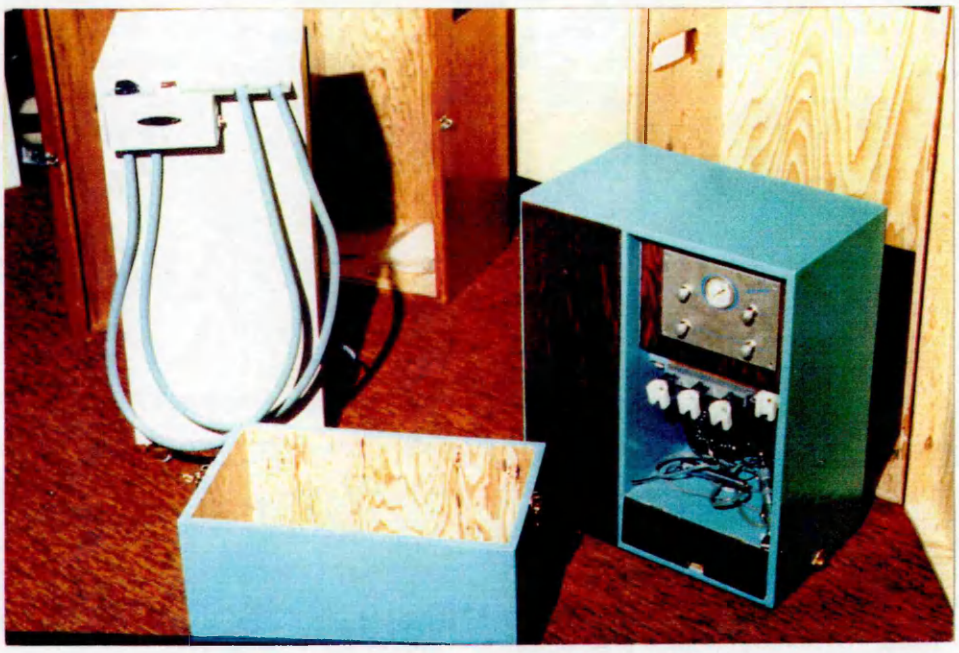


Figure 3:2 Travelling unit No 2 and a portable suction unit in their packing cases ready for transportation.

Facilities and Equipment

In 1976, the financial situation was such that it would be quite impossible to provide adequate dental facilities throughout the entire region using modern, new dental equipment. The author was given a capital grant of $20,000 from I.G.A. funds to purchase equipment. An early decision was made, therefore, to provide and improve such facilities and equipment in two stages, the first being simply to enable dentists to carry out work which would encompass all aspects of dental care and generate funds at travelling clinics. However, to implement even this decision necessitated the installation of a compressor, chair, a good light and some form of adequate suction apparatus. Until drill units could be purchased, the author designed and personally constructed small travelling units, as an interim measure, which could be connected to a compressor at each dental clinic.

The first travelling unit was built in 1977. A schematic diagram relating to which is illustrated in Appendix III (pp: 250-253). This kit, prepared for use, and in its carrying case for transportation, is shown in Figure 3:1. The second travelling unit and portable suction together with their transportation packing cases are illustrated in Figure 3:2.

By so doing, the author set out to establish 15 functional clinics during the first four years of his

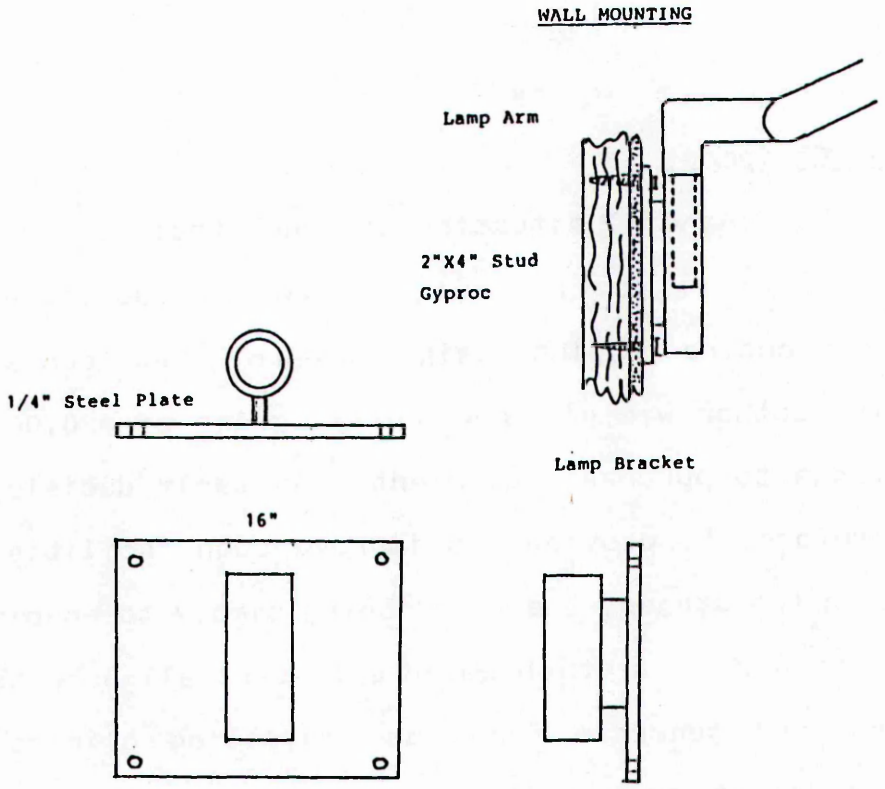


Figure 3:3 Mounting bracket for "Castle type lights.

Figure 3:4 "Castle Type" dental light

appointment with the Grenfell Regional Health Services. The target was to be achieved by acquiring second-hand compressors and dental chairs through such outlets as the Crown Assets Disposal Corporation. This group, which from time to time held disposal sales, specialised in time-expired military equipment. An additional advantage was that the Grenfell dental service was classified as a health care organisation and did not have to bid against competitive private practice. Thus, although limited the I.G.A. capital grant funding permitted the acquisition of adequate second hand equipment, that could be utilised in the smaller stations to provide basic facilities. Of these items, by far the most important were a compressor and simple dental chair. Fortunately, old hydraulic chairs were readily available.

Another important item was a source of light. The author designed light-mounting brackets (Figure 3:3), which would be used at coastal Nursing Stations where space was available, and lights such as the "Castle" variety were obtained, again at Crown Asset Sales (Figure 3:4). By such methods, it was intended that every dental clinic would have a compressor, a chair and a light by the late 1970's. Data in Table 3:1 illustrate the major items of equipment which were installed in the initial phase of the strategy.

During the second stage of development, the author was given the opportunity to incorporate dental facilities in each

Simple hydraulic chair	2nd hand compressor
"Castle type" light	Portable suction
Hot air sterilizer	Portable unit

Table 3:1 Major items of equipment to be installed at travelling clinics during stage I.

new Health Centre as they were designed and constructed. These normally consisted of a surgery (approximately 12 ft x 10ft), and a small, adjacent dental laboratory ranging in size from 8 ft x 8 ft, to 8 ft x 10 ft. In some locations, it was possible to custom design the equipment and locate the compressor and other utilities in the furnace room, thereby cutting down noise and inconvenience in the operating area. Funding for these clinics was derived from the Newfoundland Department of Health.

The stations which were primarily concerned with this replacement programme were Flower's Cove, Forteau, Mary's Harbour, Fox Harbour, Black Tickle, Cartwright, Rigolet, Postville and Makkovik. However, several of the older Health Centres/Nursing Stations are still to be replaced. These are located in Nain, Hopedale and Davis Inlet, and also at Port Hope Simpson and Charlottetown. The latter sites, although smaller and older, do have basic dental facilities located within their present structure. Problems still exist, however, with space at Davis Inlet, Nain and Hopedale, where there are no dental laboratory facilities.

The clinics established during Stage II, were designed to permit a full range of dental care and contained all necessary items of equipment. Hence, a travelling dentist would only need to transport a few instruments and some supplies.

Automatic Chair	Central suction
Autoclave	Cavitron
Ceiling mounted light	Plaster Trimmer
Compressor	Inst. cabinet
Drill unit (mobile)	Stools
X-ray unit	

Table 3:2 Major items of equipment to be installed at travelling clinics during stage II.

These stages were completed by 1985 and the need to carry boxes of dental equipment and instruments was eliminated. Thereafter, only more commonly used disposable materials, or items with a limited shelf-life eg: amalgam capsules, local anaesthetic, etc. needed to be brought at each visit, plus some personally preferred instruments.

These policies were implemented gradually from 1976-1986, and by the summer of 1986, installation of major items of equipment reached the stage of development detailed in Table 3:2.

Treatment Patterns

One means of measuring changes in treatment patterns is to evaluate trends or shifts. By monitoring such data obtained from monthly returns, which the author instituted, it was expected that such changes could be noted. Furthermore, it was assumed that improved facilities, and the provision of dental assistants, would enable a practitioner to increase restorative output relative to extractions and dentures. It was also assumed that it would be possible to assess the effect of increased man-days per community, and to demonstrate tendencies towards more sophisticated treatment modes eg: endodontic, orthodontic, periodontic, multi-visit restorative and preventive procedures.

Another anticipated response was the effect of change on increased dental awareness which, although difficult to assess, could be manifested as an increase in restorative procedures and lower extraction rates.

In general, the author intended using treatment patterns and trends as a barometer from which to evaluate the success, or failure, of measures taken to permit comprehensive dental care throughout the entire region.

As stated in Chapter 2, the areas of greatest concern were the smaller, isolated coastal settlements. Changes in treatment patterns in these regions would be indicative of the

Thus to determine the fee we have the following formula and an explanation of its components:

$$Fee = (Txc)+(TxRxp)+L$$

In the formula:

T is the time factor for the procedure (in 1/4 hour units) as established by a CDA study and revised by studies of the Ontario Dental Association (1967) and by the Fee Committee of the British Columbia College of Dental Surgeons.

R is the responsibility factor for the procedure utilizing a base value of 1.0. This factor is related to the complexity, stress and risk of the procedure. This guide designates an R value of 1.0 to all procedures which a certified dental auxiliary many perform. It designates an R factor of 1.25 (or less) to those procedures which a dental hygienist may perform.

L is the cost of laboratory charges and special supplies or drugs incurred for the procedure.

c cost of office overhead. The office overhead costs are based on the average dental practice, consisting of one dentist, with 2.5 chairs, two full-time employees and one part-time employee.

p the value of the dentist's time as determined from salaries of individuals working at a comparable level in business or industry. Fringe benefit costs for the dental practitioner have also been included here as they are directly related to net income (i.e. as net income rises, so do fringe benefit costs).

M is the cost of material which is independent of "c" (overhead cost) because of unusual price fluctuations, such as silver amalgam.

Table 3:3 Newfoundland Dental Association formula for establishing fee scales. The time factor (T).

TREATMENT MODE	TIME VALUE*
Examination	1.5
Radiograph	0.5
Extraction	1.0
Restoration (simple)	1.75
Prophylaxis	1.0
Orthodontic Treatment	6.0
Endodontic Treatment	6.0
Denture	11.0

*Based on Newfoundland Dental Association assessment of fee scale calculations.

Table 3:4 Time values allotted to major treatment groups.

effect which equipment and facilities would have on the type of treatment recommended and performed by the dentist, as well as that requested by patients.

In order to express the patterns in a simple, recognisable manner, pie diagrams were chosen to illustrate these changes graphically. Since it is probably more useful to use various treatment modes expressed as percentages of total time, a weighting value was given to each treatment type to reflect its true proportion eg. since extractions would vastly outnumber dentures, all items were allotted a time-value.

The relative time value (R.T.V.) system was designed to equate time, skill and responsibility factors with dental fee structures (Clappison et al., 1965).

The author used the T (time) factor in the Newfoundland Dental Association fee guide to weigh treatment items on a proportionate base relative to the time of completion based on 15 minute units of chair-side time. These time units are illustrated in Table 3:3.

In Table 3:4, the time-values allotted to the treatment types are illustrated. Since these values were applied throughout the period of treatment pattern assessment, the

Treatment Groups	Component Items
Examination	
Radiographs	
Extractions	a) Simple Extraction b) Surgical Extraction c) Impacted Teeth d) Biopsy e) Routine Oral Surgery
Fillings	a) Amalgams b) Composites c) Crown and Bridge
Endodontics	a) Root Canal Filling b) Pulpotomy
Prevention	a) Scale and Polish b) Prophylaxis c) Fluoride Application d) Oral Hygiene Instruction e) Fissure Sealant f) Fluoride Varnish g) Diet Counselling
Orthodontics	a) Appliance Activated b) Treatment Completed
Prosthodontics	a) Full Denture b) Partial Denture c) Mouthguard

Table 3:5 Treatment items and their use in compiling major treatment groups.

results reflected the trends consistently. One limiting factor was the method of data recording in the period prior to 1976 when only extractions, fillings and dentures were noted. Thus to maintain a true comparison, only those particular factors were compared between 1962/63 and 1986/87. The four communities with comparable data selected were: St. Anthony, which represented the base clinic, and Flower's Cove, Roddickton and Forteau, which represented a travelling/ peripheral clinic. *

The reason for selecting these four communities was the availability of data covering the entire period. In the 1963 report by Griffiths et al. (Appendix I), only extractions, fillings and dentures were recorded. By 1977, the author had implemented a more sophisticated data recording system which allowed a greater range of treatment types to be illustrated. Thus, between 1977 and 1986, more precise treatment groups could be identified.

From 1977, major treatment groups were established under the headings illustrated in Table 3:5. These were derived from the individual constituent items and from these data subtle changes could be noted.

* The terms "Travelling Clinic" and "Peripheral Clinic" are synonymous.

1) Extraction, Denture and Filling patterns 1962/63 and 1986/87 for St. Anthony, Forteau, Roddickton and Flower's Cove.

2) Comparison of Major treatment groups for the Dental Division as a whole 1977 and 1986.

3) Comparison of major treatment groups for the Base Clinics in 1977 and 1986.

4) Comparison of major treatment groups for Travelling Clinics in 1977 and 1986.

5) Outpatient General Anaesthetic statistics for St. Anthony from 1972 to 1986.

Table 3:6 Groups of treatment patterns used to illustrate changes in treatment patterns from 1962 to 1987.

For example, Class I amalgam and Class II multi-surface restorations could be identified. However, for the purpose of this thesis, such a degree of precision was unnecessary and all restorations were recorded as fillings.

To illustrate the shifts in major treatment patterns the dental service was divided into three groups: the dental division as a whole, between 1977 and 1986, and base and travelling clinics over the same period. Of most interest would be the change between travelling clinics from 1977 to 1986, as this would illustrate the effect, if any, of improvement in facilities, manpower and co-ordination aspects. Table 3:6 displays the treatment groups of patterns used to illustrate such changes, if any.

Another indicator of altered treatment patterns was also available ie. the alteration in outpatient general anaesthetic statistics at St. Anthony from 1971-1986. This was possible due to the excellent records and a standardised system developed by anaesthetists and dental staff over the period. The capacity to deal with outpatient general anaesthetic cases has increased over the years, thus any increase in utilisation could be absorbed. Furthermore, the number of cases per year, between 1972 and 1986, could be used to evaluate increases or reductions in usage, irrespective of the capacity to deal with them. Therefore, any decrease could be interpreted as a diminishing need for the service.

Co-ordination: Data Collection

Here the first priority was to devise forms which would provide data to permit assessment from the work completed by dental staff. This was important for several reasons:

1) To record treatment patterns and illustrate changes in the types of treatment provided.

2) To establish a method from which to judge the effect of measures taken to improve the distribution of dental services at the communities serviced by travelling dentists.

3) To provide information about productivity of dental staff.

4) To provide financial data in order to evaluate the work provided under Department of Health - sponsored programmes.

The forms specifically designed by the author for this purpose were subsequently approved by a meeting of the Grenfell Standards Committee in September 1976, and introduced in October 1976. These forms, their use and scope, are described in detail in Appendix IV (pp: 254-261).

Their individual functions were as follows:

1) Daily Dental Treatment Record

2) Monthly Dental Return

3) Treatment provided under Children's Dental Programme

4) Monthly Dental Return for Children

5) Daily and Monthly Record of Welfare Treatment

6) A Monthly Summary Form

The monthly returns permitted the author to assess changes in treatment patterns and evaluate productivity. They also provided raw data for financial, annual, and additional reports to governmental and other organisations, as necessary. The author also utilised the data to supply dentists with monthly assessments of productivity and finances.

Co-ordination: Finance

The origin of funds which financed the dental division was not clearly defined in 1976 and the author decided that unless there was an understanding of these sources, it would be difficult to assess the true financial situation.

There were five main sources and several minor sources of funding. They were:

A. Principle Sources of Funding

i) Department of Health grant.
ii) Patient fees.
iii) IGA funds.
iv) Insurance claims.
v) Department of Veteran's Affairs funding.

B. Other Sources of Funding

i) IGA supporting association funds.
ii) Bequests and grants.
iii) Federal funding for specific projects.

A (i) Department of Health Funding

To a new Dental Co-ordinator this source of funding was nebulous and difficult to assess. e.g. it was difficult to understand how the grant (as it existed in 1976) was calculated. It seemed to be based on guess-work and did not

reflect the true funding required. The Department of Health had a responsibility to reimburse the Grenfell Organisation for all work carried out under the Children's Programme, and the Welfare and Social Services Programme. However, dentists sponsored under the Rural Development Programme (a Department of Health underserviced-area programme) received other benefits which were not taken into consideration when calculating the Department of Health Grant for the International Grenfell Association in 1976.

Among other items these benefits included:

1) Guaranteed income supplements to ensure dentists attained a basic minimum income. The difficulty of reaching this target in remote and rural communities was recognised. The supplements were intended to offset extra transport costs, telephone costs, freight costs and service costs.

2) Establishment grants of $10,000/dentist for a 3 year period of service.

It was the author's contention that the IGA was struggling to provide dental services and was, in fact, providing remarkably consistent albeit emergency services, and that the Department of Health was not bearing a fair share of the financial burden.

As a result, the following points were investigated and used as a basis to approach the Department of Health for additional funding.

1) An accurate assessment of the true value of work undertaken on children and welfare cases. (Government responsibility).

2) An estimate of the cost of guaranteed income supplements, if the Department of Health Scheme were to replace the IGA scheme with the Rural Development Programme as a means of providing dentistry in the area.

3) An estimate of the costs of additional transport expenses, freight expenses, recruitment and transport costs of dentists, and also extra communication costs.

4) A re-evaluation of the dental salaries paid by the International Grenfell Association as these were not comparable with those provided for the Department of Health sponsored dentists.

When these arguments were prepared and the information collected, they were then presented to the Department of Health as a basis for renegotiation.

Unfortunately, any salary increase would exacerbate

further the financial difficulties under which the International Grenfell Association was working. Therefore, it seemed to the author that it was extremely important for the Department of Health to recognise this was so, and that the dental service in the area was not being funded adequately.

A (ii) Patient Fees

This source, potentially the most important, was an area of great confusion. Essentially, the author had to attempt to identify the problems, then establish clear guidelines and classify patients according to their fee-paying responsibility. The main points requiring clarification were:-

a) Classification of patients and identification of fee responsibility.
b) Establishment of fee-charging policies and guidelines.
c) Recommending fee scales based on the Newfoundland Dental Association recommended scale of fees.
d) Introduction of the accounting system and accounts receivable control, to collect unpaid debts.

(a) Patient Classification and Identification of Fee Responsibility

1) Patient Classification

a) Code 01 - Children, Birth to 12

b) Code 02 - Adolescents, 13-18

c) Code 03 - Welfare Patients

d) Code 04 - Veterans

e) Code 05 - Full Paying Adults

a) Birth to 12 years of age ie: 13th Birthday - Code 01

These patients have dental care provided by the Department of Health and the fee responsibility to the patient is limited to a co-payment fee.

b) Thirteen to eighteen year old children - Code 02

Normally this group would pay the standard Newfoundland Dental Association rate. In view of the current Grenfell Regional Health Services policies, however, these charges were modified to encourage these adolescent patients to seek dental treatment. This, in effect, amounted to a subsidy provided by the International Grenfell Association grant. The fee scales used for this group were approximately 70% of the Newfoundland Dental Association recommended scale of fees.

c) Welfare Patients - Code 03

Patients on Welfare and dependents of Welfare recipients were able to receive subsidised dental treatment for some

types of surgical procedures. This group was a Department of Health responsibility.

The categories of patients eligible for treatment under Welfare arrangements are provided by the Department of Health dental division in St. John's, and included such groups as foster-children, the handicapped and the cleft-palate group.

d) Veterans - Code 04

Patients in this category include Royal Canadian Mounted Police Officers and those covered for treatment by the Department of Veterans Affairs. These patients present with an appropriate form and payment is guaranteed by the Department of Veterans Affairs at 90% of the fee scale.

e) Full Paying Adults - Code 05

This refers to all patients over 18 years of age. There are some subdivisions i.e. I.G.A. permanent staff, dental staff, volunteers etc., but generally speaking, the policy is that all patients over 18 years of age were expected to pay according to the current Newfoundland Dental Association Recommended Fee Scale or such subsidised rates as applied in the Grenfell area.

Having identified the groups, it was essential to establish Fee Charging Policies and Guidelines. Guidelines were established to clarify the fee scales and policies due

to an ever-increasing cost of providing dental services. A deliberate policy brought these fees into line with fees being charged elsewhere in the Province.

This latter point was insisted upon by the Department of Health when the Grenfell Regional Health Services dental grant was being negotiated. It was pointed out that it would not be appropriate for the Government to subsidise dental treatment in one area, when it did not do so for the rest of the province.

The policy towards fee-collection was influenced by the ideals and aims of the Organization. However, as already stated, to maintain and improve the dental service it was necessary to increase income.

Among the guidelines established with respect to fee-collection were the following points:

1) Fees for services were to be collected at each visit where definitive treatment was carried out, and not allowed to accumulate until the course of treatment was completed.

2) In some forms of treatment involving multiple visits, the policy was that half the fee was to be collected at commencement and the balance upon completion, particularly where this involved laboratory fees.

3) It was stressed that all dentists should discuss the cost of the treatment prescribed and explain fees to a patient prior to the commencement of treatment. In some cases, alternative forms of treatment could be discussed and the patient allowed to decide the option preferred, bearing in mind the cost. It was felt there must be a clear understanding of the treatment costs and the reasons for the charges. This was included in a policy manual.

4) There was also the need for an understanding (and the author felt this particularly important), that the work commenced by any dentist, must be completed during his time in office. This applied particularly to dentures and restorative work.

5) Fee Collection, and general handling of finances, were to be undertaken by the dental assistant, or receptionist where applicable, and only by the dentist in the most remote and unaccompanied travelling areas. Receipts were to be given for all services, provided the cost was more than $1.00. In order to improve fee-collection, and maintain a more accurate long-term accounts-receivable system, a basic business system was installed.

6) Broken-appointments, which were frequent in this area, came to be classified as the failure of a patient to keep an

appointment without giving at least 24 hours warning unless, a) weather conditions made it impossible to attend, b) there had been sudden illness to the patient or immediate family, or c) unforseen circumstances which made attendance impossible.

The fee for a broken-appointment was set at $10.00. Patients who subsequently requested another appointment, and who had previously broken-appointments, were to have these added to their bill prior to the commencement of treatment.

Perhaps the most important method of improving income was the introduction of a simple, effective accounting system. An established system was introduced for dental clinics and was placed under control of the dental assistants. This maintained continuity and prevented debts being written-off when dentists terminated their employment.

Described as a "one write system" it included an accounts-receivable system which enabled unpaid fees to be followed up, irrespective of dentist turnover.

A (iii) IGA Funding

The IGA was the largest contributor to the financial support of dental service until the mid-1970's. However, at that time the ability of the Association to continue coping with ever-increasing costs was questionable.

This increasing reliance on IGA funds to maintain the service, enforced a re-evaluation of the dental care that could be provided. Also, IGA funding required re-evaluation. The emphasis seem to be changing in that funding should be used for specific projects rather than operating costs or subsidies to specific groups.

A (iv) Third Party Insurance

Third Party Insurance was an increasingly important source of income and guidelines were provided by the Canadian Dental Association.

A (v) Department of Veteran's Affairs

This group of patients, while not large, was important since guaranteed payment was the norm. These included R.C.M.P. officers and veterans.

B) Other Sources of Funding

B (i) Various supporting branches continually raised funds for special projects and the author presented many suggestions which resulted in funds to purchase several items of equipment.

B (ii) Bequests and grants from sources such as the Canadian Dental Association and the Canadian Dental Fund for Education, as well as several others e.g. dental manufacturers and dental

supply companies, who would occasionally provide equipment or services.

B (iii) For the northern areas with a native population, some Federal Grants and Services were also available. These included funding for equipment or special projects, and also the use of dental therapists trained in Fort Smith, all of which were useful additions to the dental programme.

Co-ordination: Programme Development

There was an obvious need to make some attempt to reduce the overwhelming caries prevalence by preventive measures, as well as by the traditional "fill or extract" philosophy.

There had been many attempts to introduce prevention and educational programmes by individual dentists but generally these efforts, often quite heroic, fell by the wayside, when the initiating dentist left the area.

The main problem facing the Co-ordinator was lack of both manpower and funding. Therefore, certain criteria which would obviously affect the choice and types of programmes had to be considered. These were:

1) Limited funds
2) Limited manpower
3) Impossibility of DIRECT dental supervision with current manpower.
4) Overwhelming need for prevention in children
5) Use of alternative sources of manpower
6) Communication and control
7) Modification to deal with variables in the system.

The author differentiated between educational and preventive programmes, although there was room for overlap since any programme which could raise the level of awareness

would be beneficial. Two such packages being of interest. The first was the use of fluoride rinsing once per week and, second, as far as education in schools was concerned, the author was made aware of a peer group teaching system (Teenage Health Education Teaching Assistants) which rejoiced in the acronym T.H.E.T.A. (Weiss & Lee, 1974).

The introduction and development of each of these programmes is outlined below.

1) 0.2% Fluoride Weekly Mouthrinse Programme

In geographic areas, such as those involved in this study, where central water systems are lacking, alternatives to community fluoridation for prevention of dental caries have been developed. School water fluoridation, salt fluoridation and other programmes such as fluoride tablet administration, have all been shown to be feasible alternatives to water fluoridation, although they may not be as effective in preventing caries throughout a whole population (Toth, 1973, Horowitz et al. 1972; Driscoll et al. 1978).

However in the early 1960's, the levels of fluoride in the water were unknown and there was such a large number of water sources it was considered unwise to use fluoride tablet sucking until the systemic intake was established. Furthermore, the prospect of a host of different programmes

Figure 3:5 Mouthrinse supplies.

proceeding concurrently without close supervision, was fraught with hazards.

The alternative application of topical fluorides by dental health personnel had disadvantages for public health programmes, as treatments had to be given individually by skilled manpower. Thus, to deal with around 8,000 children would obviously not be practical. As a result, it was decided to employ a fluoride mouthrinsing system which had been well documented by Torell & Ericsson (1965), Horowitz et al. (1971); and Englander et al. (1971), amongst others.

The advantages of using fluoride mouthrinsing as a means of caries prevention were:

1) Little time was involved.
2) The technique was easy to learn by children of all school ages.
3) Few supplies were required (Figure 3:5).
4) The procedure was inexpensive.
5) Non-dental personnel with minimum training could easily supervise the procedure.
6) Frequent application could be administered easily with minimum interruption to a school's academic programme and in the Grenfell area, applications could be carried out in conjunction with health science teaching.

PREVENTING TOOTH DECAY:

A Guide for Implementing Self-Applied Fluoride in Schools

national caries program

national institute of dental research

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health

DHEW Publication No. (NIH) 77-1196

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

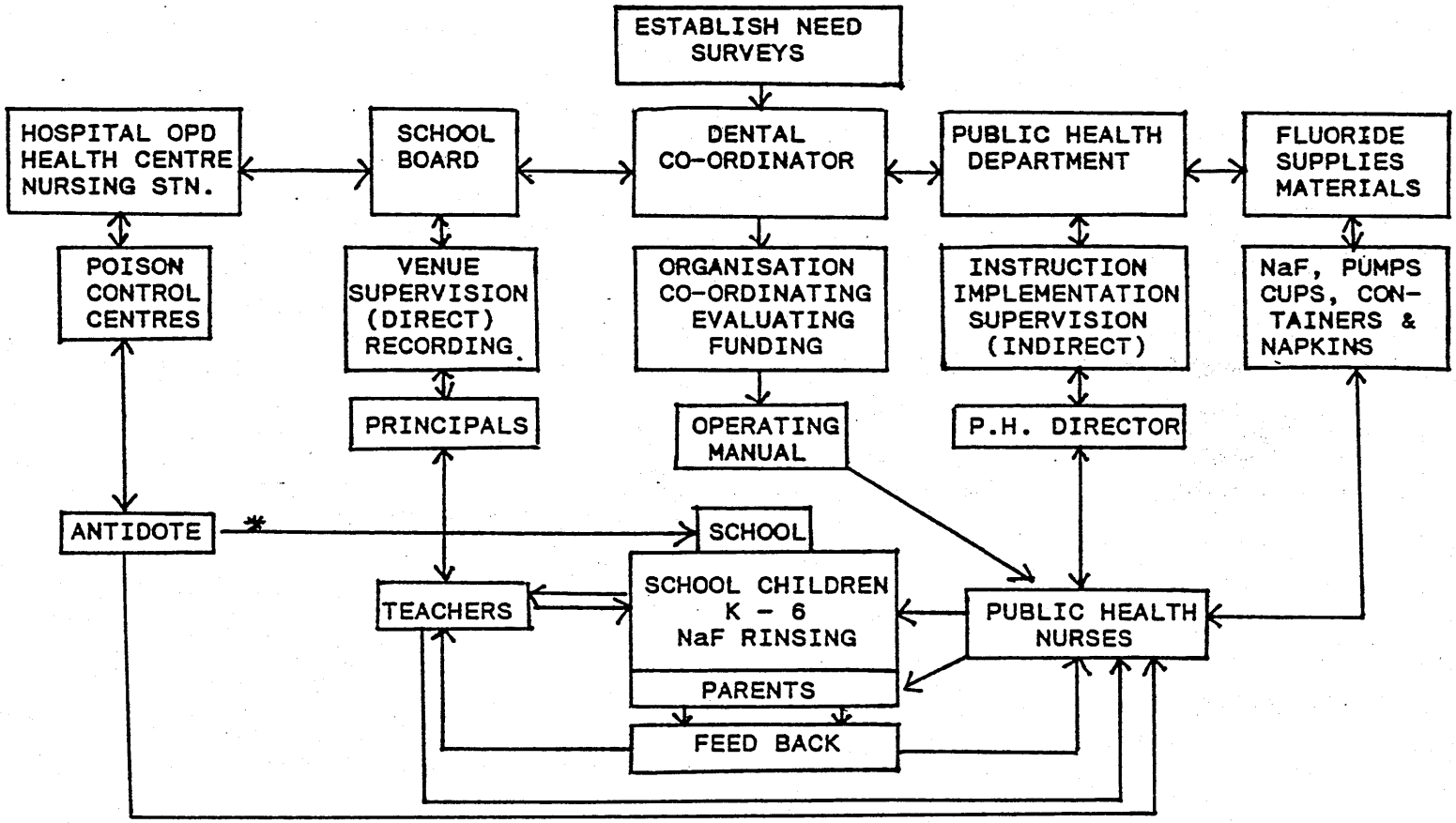
Figure 3:6 Instruction manual for Mouthrinse Programme.

Although a mouthrinse programme is beneficial, results are not so apparent until children reach the fourth or fifth grade. However, it has been shown that a 38% reduction in carious surfaces could reasonably be expected in children aged 8-11 years (Ripa et al., 1977).

The caries rate in this area was known to be high from the 1969 data (Messer, 1985a), especially in young children, and in view of the high consumption of sucrose-containing drinks and foodstuffs it was thought that there was little hope that it could be contained by existing dental resources unless a parallel reduction in consumption was obtained. This programme, therefore, offered a possible method of both dealing with the caries problem, and perhaps delaying entry to the period of maximum dental destruction when treatment might more easily be accepted.

Having decided to implement this procedure, which was obviously dependent on the co-operation of school boards, principals and teachers, as well as parents and children, it was decided not to pressure parents as it was essential their involvement be perceived as voluntary.

In the autumn of 1977, the seven school boards governing the Grenfell region were approached to ascertain their willingness to participate. Policy and procedure manuals were developed (Appendix V, pp:262-290) and the organisation of the



*Only in schools where no immediate access to Medial/Nursing or Emergency care!

Figure 3:7 Administrative pathways and organisation of the 0.2% sodium fluoride mouthrinse programme in Northern Newfoundland and Labrador.

programme was developed. The programme was based on the U.S. Department of Health Education and Welfare Publication. Preventing Tooth Decay (National Caries Program, 1977), (Figure 3:6). A flow-chart, (Figure 3:7) illustrates the complexity of this programme when the full ramifications became apparent.

Initially it was intended to use non-participants as a control-group to assess the value of the programme, however, for various reasons, this became impractical and was very difficult to undertake. What became obvious was that in some areas records were meticulously kept and it was possible to evaluate, not only the percentage of children participating, but also the precise history of the number of rinses over the entire participation period while in other areas the programme was simply not administered regularly, or was too infrequent to be of value.

2) Education Programmes in Schools

The T.H.E.T.A. Programme appeared to offer an excellent opportunity to introduce dental eduction in schools (Appendix VI, pp: 291-318). The National Foundation for the Prevention of Oral Disease was organized in 1970 by the American Academy of Periodontology. In 1973, the Teenage Health Education Teaching Assistants (THETA) Programme was offered to the Foundation by its originator, the United States Department of Public Health, Division of Dental Health Education (Weiss &

Sponsored by the
American Academy of Periodontology

THETA

Teenage Health Education Teaching Assistants

DENTISTRY

National Foundation for
Prevention of Oral Disease, Inc.

P.O. Box 2546
Scottsdale, Arizona 85252
1-602-945-6643

Figure 3:8 Manual for THETA programme.

Lee, 1974). Since that time, both the National Foundation for the Prevention of Oral Disease, Inc., and THETA have become known internationally. Presently the author is President of the International THETA Committee (Figure 3:8).

The Foundation has had four purposes:

1) To keep people informed regarding oral disease.
2) To support Teenage Health Education Teaching Assistants (THETA)
3) To raise funds to support research to combat oral disease.
4) To work towards placing a dental hygienist, or dental health educator in every school system.

Background

The THETA ideal is based on a simple concept, which can be applied to education in any community or school, large or small. Essentially, THETA is an educational experience programme in which high school students teach oral hygiene and good dietary habits to elementary school children. Under the supervision of the elementary school teacher, high school students are provided with the opportunity to teach preventive dental health care, including brushing and flossing skills, to elementary school children.

The high-school students and teachers involved in the programme are trained for this responsibility by a dentist or dental hygienist.

Materials

Instructional and training materials used in the THETA Programme consist of six lessons presented by cassette tapes and film strips. The following areas of dental education are covered by these cassette/film sets.

1) Recognition of plaque.
2) Flossing and brushing to remove plaque.
3) When and how to floss and brush.
4) Frequency of eating relating to tooth decay.
5) Stickiness of food related to tooth decay.
6) Sugar in relation to tooth decay.
7) Reducing decay-producing foods for between-meal snacks and recommending good foods for such snacks.

These materials are also designed to develop the following skills:

1) How to disclose plaque
2) How to brush
3) How to floss
4) How to convert "junk" food snacking patterns to healthier, less-cariogenic habits.

Basically, the materials used in the THETA programme are an effective patient education system. They are suitable for use in any dental surgery, clinic or classroom. They are

flexible and can be expanded to fit specific needs, or can be kept down to the limits of four sessions of one hour each. Further, it is a system for patient education combined with self-learning, plus professional counselling and evaluation. It can also be modified to suit unique local circumstances. The basic kits, although developed in the United States, have a simple and obvious theme which can be modified easily to suit any situation. An example of this modification would be the use of slides reflecting local conditions pertinent to the Northern Newfoundland/Labrador area.

The Grenfell pilot programme closely followed the THETA concept used in the first trial at Flagstaff, Arizona (Ratcliff et al. 1976). In that trial three achievements occurred:

1) The students involved reduced their plaque scores by 52.77%.
2) The high school teaching assistants were so stimulated by their experience that some expressed a desire to follow a career in dental hygiene
3) Based on the success of this trial, the Flagstaff School system moved to implement THETA in the entire school district.

THE THETA PROGRAMME IN THE EDUCATION PROCESS

The use of high school students as teaching assistants to train elementary school children had many ramifications. Among these were:-

1) Use of a new teacher resource in elementary schools throughout the region.

2) Built-in opportunities for the spread of information and experience among all age-groups in the school system, and also with parents.

3) For high school teaching assistants, career education in a real world environment which included the opportunity to obtain work experience in the fields of health care, nutrition, and education, well before career choices had to be made.

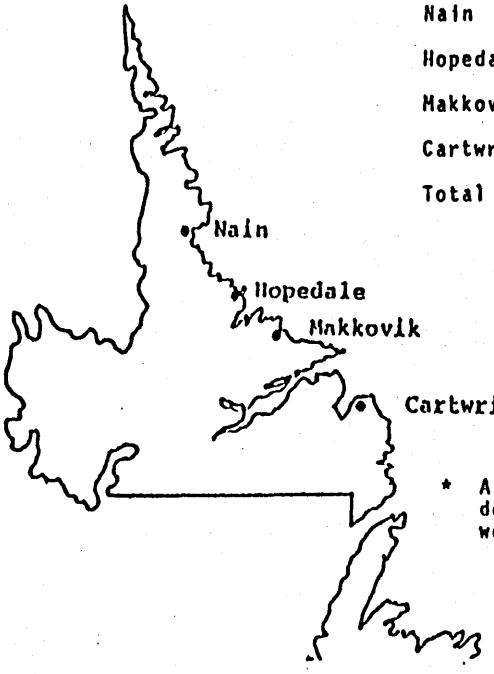
From the standpoint of public education, the potential of the THETA programme was difficult to determine in terms of the precise number of people reached. However, with few exceptions, children share what they learn with their parents and others in the community and such sharing can also be reinforced in structuring and organising the programme.

The first pilot programme in the Grenfell area was conducted in Nain. It was co-ordinated by the local public health nurse and the high school principal and backed-up by the travelling dentist. The student assistants who

Figure 3:9 THETA participants. Nain 1985/86.

participated in the programme are shown in Figure 3:9.

Thereafter, the Nain programme was to be evaluated and, if successful further programmes would be implemented as additional funds became available. The results of this study are detailed in Chapter 4 and are summarised in Table 4:25.



	INUIT	SETTLER	UNCLASSIFED*	TOTAL
Nain	165 (114)	71 (35)	- (3)	236 (152)
Hopedale	68 (54)	10 (30)	3 (3)	81 (87)
Makkovik	5 (24)	55 (58)	3 (6)	63 (88)
Cartwright	- -	123(163)	- -	123 (163)
Total	238 (192)	259(286)	6 (12)	503 (490)

* A small number of children, usually temporary residents were not classified as Inuit or Settler but were included in the total for each age group.

Figure 4:1 Location and ethnic composition of the school population of four Labrador communities in 1987. 1969 figures in parenthesis.

CHAPTER FOUR

ASSESSMENT OF THE STRATEGY (RESULTS)

Prevalence of Dental Disease

As the 1969 dental survey had included the four Labrador communities of Nain, Hopedale, Makkovik and Cartwright, Figure 4:1, children there were re-surveyed by the author in 1987, using identical mirrors and probes. Unfortunately, throughout the study, blind examination techniques could not be applied due (a) to the vastness of the area concerned which made transporting of children from different communities to the one site impossible and, (b) the obvious differences in physical features of the ethnic groups involved. Hence, examinations could only be performed in each child's home base. However, to validate the accuracy of both the author and his scribe, re-examinations were carried out on 35 subjects on two occasions, at two sites, (Appendix VII, pp: 319-324). Thereafter these were tested by the Test-Retest method advocated by Rugg-Gunn & Holloway (1974) as recommended by the Federation Dentaire Internationale (1982). The calibration comparisons gave reliable coefficients for the modified dmft (c's, d's & e's alone) scores at one location of 0.984, and 1.00 at the other, while the values were 1.000 and 0.971 respectively for the mean DMFT indices.

For the survey proper, although the numbers are small, they were not sample-based data but reflect the available

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	SIG.	(1969)	$\bar{X}$ DMFT	± S.D.	SIG.	(1969)
46	(27)	5	4.85	3.41	**	(7.37)	-	-		-
50	(36)	6	6.42	3.31	*	(7.94)	0.36	0.88	N.S.	(0.67)
55	(42)	7	6.05	3.28	***	(8.31)	1.33	1.64	*	(2.12)
49	(60)	8	5.53	2.54	**	(7.10)	1.82	1.59	N.S.	(2.40)
40	(59)	9					2.00	1.78	***	(3.44)
55	(55)	10					2.71	2.45	*	(3.91)
39	(54)	11	-	-		-	2.54	2.06	***	(4.87)
52	(55)	12	-	-		-	3.83	2.53	***	(6.09)
33	(34)	13	-	-		-	4.30	3.88	**	(6.62)
51	(34)	14	-	-		-	5.39	3.88	*	(7.29)
33	(34)	15	-	-		-	7.15	4.78	*	(9.91)

Table 4:1 Mean caries prevalence ± S.D., by age in Labrador school children from four communities in 1987 (1969 prevalence in brackets)

* ($P<0.05$ = *; $P<0.01$ = **; $P<0.001$ = ***)

population in each age group, at each location. However, even these small groups show changes between 1969 and 1987, which also compare favourably with other data from Canada and elsewhere.

In Table 4:1, the 1987 mean dmft and DMFT indices for age groups in the four Northern Labrador Communities from 5-15 years of age are presented, along with the 1969 scores (in brackets). Even a cursory glance shows a marked and general downward trend in caries prevalence, with the mean dmft for 5-yr-old children having changed from 7.37 in 1969, to 4.85 in 1987, a difference of 34% which was significant at the 1% level ($t=3.11$).

For 9-yr-olds, the mean DMFT decreased from 3.44 in 1969 to 2.00 in 1987, a highly significant difference of 42% ($p<0.001$; $t=3.88$). Similarly, the 12-yr-old's caries experience, as measured by mean DMFT, showed a 38% reduction from the 6.09 value of 1969, to 3.83 in 1987 ($p<0.001$; $t=3.40$).

In the case of 15-yr-olds, similar trends were noted. The DMFT experience in 1969 was 9.91, while in 1987 this had decreased significantly to 7.15, a reduction of 28% ($p<0.05$; $t=2.38$).

1969					1987		
$\bar{x}$d	± S.D.	n	t	SIG	$\bar{x}$d	± S.D	n
6.44	3.21	27	4.05	***	3.28	3.23	46
$\bar{x}$m					$\bar{x}$m		
0.93	1.86		0.36	N.S.	0.76	2.04	
$\bar{x}$f					$\bar{x}$f		
0	0		3.93	***	0.80	1.38	
$\bar{x}$ dmft					$\bar{x}$ dmft		
7.37					4.84		

Table 4:2 Mean number of decayed, missing and filled deciduous teeth ± S.D., for 5-yr-old children from four Labrador Communities (1969 versus 1987).

* (P<0.05 = *; P<0.01 = **; P<0.001 = ***)

		1969				1987		
		$\bar{x}$	± S.D.	t	SIG	$\bar{x}$	± S.D.	
9-yr-olds								
n = 59	D	2.85	1.76	5.44	***	1.10	1.43	n = 40
	M	0.49	0.92	4.86	N.S.	0.20	0.56	
	F	0.10	0.36	2.29	***	0.70	1.66	
12-yr-olds								
n = 55	D	4.18	3.74	4.86	***	1.42	1.88	n = 52
	M	0.98	1.30	0.96	N.S.	0.75	1.19	
	F	1.04	1.32	1.78	N.S.	1.65	2.11	
15-yr-olds								
n = 34	D	6.09	4.63	2.29	*	3.64	4.11	n = 33
	M	2.09	2.01	2.09	*	1.15	1.66	
	F	1.74	1.88	1.17	N.S.	2.36	2.43	

Table 4:3 Mean number ± S.D., of Decayed, Missing and Filled Permanent Teeth for 9, 12 & 15-yr-old children from four Labrador communities (1969 versus 1987).

* (P<0.05 = *; P<0.01 = **; P<0.001 = ***)

When the individual d, m & f scores for deciduous dentitions are examined in Table 4:2, it is evident that for 5-yr-old children, there was a highly significant reduction in the mean numbers of decayed teeth, from 6.44 in 1969, to 3.28 in 1987 ($p<0.001$; $t=4.05$). Again the mean number of filled teeth had increased significantly from 0 in 1969, to 0.80 in 1987 ($p<0.001$; $t=3.93$). However, there was no significant change in the number of missing teeth.

Data in Table 4:3, illustrate the individual D,M & F values for the permanent dentition. For 9-yr-olds it can be seen that the decayed index has shown a reduction from 2.85 in 1969, to 1.10 in 1987 ($p<0.001$; $t=5.44$). Also in this age group, there was an increase in the mean number of permanent teeth filled from 0.10 in 1969 to 0.7 in 1987 ($p<0.001$; $t=3.57$).

For the 12-yr-old age group, the reduction in the mean decayed value over the same period was from 4.18 in 1969, to 1.42 in 1987 ($p=<0.001$; $t=4.86$). A small reduction in the missing index, and slight increase in the filled index between 1969 and 1987, were not significant ($t=0.96$ and 1.78 respectively).

For 15-yr-olds, the decayed index, which was 6.09 in 1969, had lowered to 3.64 in 1987 ($p<0.05$; $t=2.29$), while the missing index component reduced from 2.09 in 1969, to 1.15 in

	1969		1987		
5-yr-olds					
dt%	25/27	92.6%	32/46	69.6%	χ^2 = 4.01 *
ft%	0/27	0.0%	15/46	32.6%	χ^2 = 9.17 **
% caries-free	2/27	7.4%	8/46	17.4%	χ^2 = 0.71 N.S.
9-yr-olds					
Dt%	51/59	86.4%	21/40	52.2%	χ^2 = 12.19 ***
Ft%	51/59	8.5%	15/40	32.5%	χ^2 = 10.72 **
% caries-free	.7/59	11.9%	21/40	30%	χ^2 = 3.95 *
12-yr-olds					
Dt%	48/55	87.3%	28/52	53.8%	χ^2 = 12.93 ***
Ft%	27/55	49.1%	28/52	53.8%	χ^2 = 0.09 N.S.
% caries-free	3/55	5.5%	5/52	9.6%	χ^2 = 0.20 N.S.
15-yr-olds					
Dt%	31/34	91.2%	24/33	72.7%	χ^2 = 2.72 N.S.
Ft%	19/34	55.9%	24/33	72.7%	χ^2 = 1.40 N.S.
% caries-free	0/34	0.0%	1/33	3.00%	χ^2 = 0.0002 N.S.

Table 4:4 A comparison of the percentage of decayed, percentage of filled and percentage caries-free 5-yr-old deciduous dentitions and 9, 12 & 15-yr-old permanent dentitions (1969 versus 1987).

* (P<0.05 = *; P<0.01 = **; P<0.001 = ***)

1987 ($p<0.05$; $t=2.09$). There were no significant changes in the mean 'F' values of 1.74 and 2.36 respectively.

In Table 4:4, the significance of the differences (expressed as percentages) in the decayed, filled and caries-free dentitions are shown. In the deciduous dentitions of 5-yr-olds, the dt proportion had been reduced from 92.6% in 1969, to 69.6% in 1987 ($p<0.05$; $\chi^2=4.01$). In the same group the increase in ft, which was 27% in 1969 and was 32.6% in 1987, was also significant ($p<0.01$; $\chi^2 = 9.17$). However the caries-free proportion increase from 7.4% to 17.4% was not significant ($\chi^2 = 0.71$). With regards to the 9-yr-olds, the decayed proportions which in 1969 accounted for 86.4% of the DMFT index, had reduced to 52.2%, this being a highly significant difference ($p<0.001$, $\chi^2 = 12.19$). For the FT%, equivalent figures were 8.5% and 37.5 respectively ($p<0.01$, $\chi^2 = 10.72$), and in 1969 11.9% of this group were caries-free whereas in 1987 30% enjoyed this status ($p<0.05$, $\chi^2 = 3.95$).

When considering the permanent dentitions of the 12-yr-old group, the Dt proportion had changed from 87.3% to 53.8%, a difference of 33.5% which was highly significant ($p<0.001$, $\chi^2 = 12.93$). Neither the filled proportion, nor caries-free proportion showed any significant changes, being 4.7% in the former, and 4.1% in the latter ($\chi^2 = 0.09$ and 0.20 respectively).

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	SIG	(1969)	$\bar{X}$ DMFT	± S.D.	SIG	(1969)
20	(15)	5	7.20	2.40	N.S.	(8.11)	-	-		-
28	(16)	6	7.11	2.83	N.S.	(8.44)	0.39	0.83		(1.19)
30	(17)	7	6.63	2.77	*	(8.65)	1.77	1.70		(2.82)
29	(28)	8	5.83	2.63	*	(7.75)	1.86	1.64		(2.82)
14	(28)	9	-	-		-	3.07	1.82		(3.64)
24	(21)	10	-	-		-	4.04	1.85		(4.24)
17	(23)	11	-	-		-	3.65	1.77		(4.61)
22	(20)	12	-	-		-	4.64	2.26		(5.60)
13	(10)	13	-	-		-	5.77	5.12		(6.50)
27	(9)	14	-	-		-	6.07	4.21		(5.78)
14	(5)	15	-	-		-	9.00	5.76		(7.80)

Table 4:5 Mean caries prevalence ± S.D., in Inuit school children from four Labrador Communities in 1987 (1969 prevalence in brackets).

* (P<0.05 = *; P<0.01 = **; P<0.001 = ***)

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	SIG	(1969)	$\bar{X}$ DMFT	± S.D.	SIG	(1969)
26	(7)	5	3.04	2.95	N.S.	(5.43)	-	-		-
22	(18)	6	5.55	3.71	N.S.	(7.44)	0.32	0.95		(0.22)
25	(25)	7	5.36	3.74	* *	(8.08)	0.80	1.44		(1.64)
20	(31)	8	5.10	2.40	*	(6.48)	1.75	1.55		(2.06)
26	(30)	9	-	-		-	1.42	1.50		(3.23)
31	(33)	10	-	-		-	1.68	2.37		(3.70)
20	(31)	11	-	-		-	1.55	1.82		(5.06)
30	(33)	12	-	-		-	3.23	2.58		(6.42)
19	(24)	13	-	-		-	3.37	2.59		(6.67)
22	(25)	14	-	-		-	4.64	3.29		(7.84)
18	(29)	15	-	-		-	6.06	3.37		(10.28)

Table 4:6 Mean caries prevalence ± S.D., in Settler school children from four Labrador communities in 1987 (1969 prevalence in brackets).

* (P<0.05 = *; P<0.01 = **; P<0.001 = ***)

For 15-yr-olds, no significant changes were demonstrated for any parameter, although there was some apparent clinical improvement.

Thus it is clear from Tables 4:2 and 4:3 that, in the 5-yr-old's deciduous dentitions, and the permanent dentitions of 9, 12 & 15-yr-olds there have been reductions in the mean caries prevalence scores which are statistically significant. Furthermore the trend in the younger age-groups was noted to be towards tooth retention and restoration, rather than to caries and tooth loss, as had been so long the case.

In Tables 4:5 and 4:6, results for the two ethnic groups are presented. Data for Inuit children are shown in Table 4:5, while Table 4:6 illustrates the Settler children's caries experience. In both some notable differences are apparent.

For 5-yr-old Inuit* there were no significant differences between the mean caries experience measured by the dmft index of 8.11 in 1969, and 7.2 in 1987 ($t=1.00$), as was true for similarly-aged Settlers. However, there was a significant difference between the mean caries experience of Inuit children (7.20) compared with the Settler children's value of 3.04 in 1987 ($p=<0.001$; $t=5.27$), although no such variations existed in 1969.

* It should be noted that Inuit is the plural form of Inuk, the accepted term for "Eskimo" in Canada.

For 9-yr-old Inuit children compared with Settler children, there was no significant DMFT difference in $\overline{X}$ score between the two groups in 1969, nor in 1987 (t=0.82 and 0.24 respectively).

When Inuit and Settler 12-yr-olds were compared, there was again no significant difference in 1969 caries experience (DMFT = 5.60 & 6.42 respectively). However, by 1987 Inuit 12-yr-old children had a significantly higher mean caries experience, the DMFT being 4.64 as compared with 3.23 in the Settler group ($p<0.05$; t=2.09). Again for the 1987 data, in 10-yr-old Inuit and Settler children, this trend was also significant, with the 10-yr-olds' mean DMFT being 4.04 and 1.68 respectively ($p<0.001$; t=4.15). For 11-yr-olds, the mean DMFT was 3.65 for Inuit and 1.55 for Settlers, again these data were highly significant ($p<0.001$; t=3.55).

Although for all 15-yr-olds there was a significant reduction in caries experience between 1969 and 1987 (Table 4:1), no statistically significant differences in caries experience between Inuit and Settlers were found. In 1969, the mean DMFT values were 7.80 and 10.28 respectively (t=1.97), the equivalent data in 1987 being 9.00 and 6.06 (t=1.70). However, from Table 4:5 & 4:6 data it would appear the reduction was due mainly to the Settler children mean caries experience decreasing significantly from 10.28 in 1969 to 6.06 in 1987 ($p=<0.01$; t=3.47) rather than the Inuit mean

	dt% 1987	(1969)	ft% 1987	(1969)	% Caries-Free 1987	(1969)
INUIT	90%	(94.7%)	15%	(0%)	0%	(5.3%)
SETTLER	53.9%	(85.7%)	46.2%	(0%)	30.8%	(14.3%)
χ^1	5.38	(0.004)	3.68	(0)	5.46	(0.004)
p	<0.05	(N.S.)	NS	NS	<0.02	NS

Table 4:7 Percentage of decayed, filled and percentage caries-free for 6-yr-old Inuit versus Settler children in 1987 (statistical values calculated from raw data, not the percentage figures shown),(1969 data in brackets).

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	(1969)	$\bar{X}$ DMFT	± S.D.	(1969)
19	(12)	5	6.32	3.18	(7.58)	-	-	-
16	(11)	6	7.88	2.66	(9.00)	0.69	1.25	(0.82)
30	(12)	7	6.70	3.30	(8.42)	1.93	1.74	(1.75)
22	(26)	8	6.05	2.73	(7.31)	2.18	1.71	(2.85)
15	(17)	9	-	-	-	3.13	1.73	(3.41)
31	(15)	10	-	-	-	3.35	2.67	(4.40)
18	(18)	11	-	-	-	3.28	1.84	(4.17)
26	(12)	12	-	-	-	4.50	2.47	(5.25)
16	(14)	13	-	-	-	4.31	3.42	(6.36)
27	(8)	14	-	-	-	6.44	4.09	(7.50)
16	(7)	15	-	-	-	9.19	5.54	(8.86)

Table 4:8 Mean caries prevalence ± S.D., in Nain school children in 1987 (1969 prevalence in brackets).

caries experience which, in fact, rose from 7.80 to 9.0 over the period ($p=>0.05$; $t=0.68$).

In Table 4:7, details of the changes encountered in the deciduous dentitions of 5-yr-old children are given. Here it can be seen there was a difference of 36.1% for the proportion of Settler decayed teeth versus Inuit in 1987 ($p<0.05$; $\chi^2 = 5.38$), whereas there had been no significant difference in 1969. Also in 1987, their were no Inuit caries-free, whereas in Settler children, 30.8% were in this condition ($p<0.02$; $\chi^2 = 5.46$). Although there appeared to be a difference between the proportion of Inuit and Settler filled teeth in 5-yr-olds, this was not significant ($\chi^2 = 3.68$). In 1969 there were also no significant differences in the filled or caries-free categories.

The caries prevalence results for individual communities in 1969 and 1987 are shown in Tables 4:8 to 4:11. In 1969, there were no significant inter-community differences for mean caries experiences as expressed by the dmft index, in all age groups from 5-yr-olds to 8-yr-olds. By 1987, there were significant differences between 5-yr-olds in Nain and Makkovik, the mean dmft values being 6.32 and 3.10 respectively ($p<0.05$; $t=2.41$). Also, there was a more significant difference between Nain 5-yr-olds and those in Cartwright, where the mean value was 2.89 ($p<0.01$; $t=2.92$). The only other significant difference noted was between

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	(1969)	$\bar{X}$ DMFT	± S.D.	(1969)
8	(9)	5	5.75	2.76	(7.58)	-	-	-
14	(10)	6	6.21	2.75	(7.00)	0.29	0.73	(1.20)
10	(6)	7	6.30	2.26	(8.33)	0.50	1.08	(3.33)
13	(7)	8	4.67	2.32	(8.14)	1.54	1.56	(1.86)
6	(12)	9	-	-	-	2.33	1.63	(4.08)
4	(7)	10	-	-	-	3.75	2.06	(4.00)
4	(9)	11	-	-	-	1.50	1.29	(4.89)
7	(11)	12	-	-	-	3.71	2.89	(6.64)
4	(3)	13	-	-	-	10.00	6.06	(7.00)
8	(7)	14	-	-	-	3.88	3.91	(7.29)
3	(6)	15	-	-	-	5.33	3.79	(8.83)

Table 4:9 Mean caries prevalence ± S.D., in Hopedale school children in 1987 (1969 prevalence in brackets).

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	(1969)	$\bar{X}$ DMFT	± S.D.	(1969)
10	(4)	5	3.10	3.54	(6.00)	-	-	-
7	(7)	6	5.71	3.40	(8.57)	0.29	0.76	(0.14)
5	(9)	7	4.20	3.49	(9.00)	0.40	0.89	(3.78)
7	(11)	8	6.14	2.12	(6.36)	2.43	1.13	(2.82)
5	(12)	9	-	-	-	1.00	1.00	(3.75)
7	(12)	10	-	-	-	2.43	1.62	(3.42)
9	(9)	11	-	-	-	3.11	2.42	(5.67)
4	(12)	12	-	-	-	5.25	2.06	(5.17)
3	(4)	13	-	-	-	1.67	1.53	(5.75)
4	(5)	14	-	-	-	5.50	2.52	(6.80)
2	(3)	15	-	-	-	4.00	1.41	(8.33)

Table 4:10 Mean caries prevalence ± S.D., in Makkovik school children in 1987 (1969 prevalence in brackets).

n	(n)	AGE	$\bar{x}$ dmft	± S.D.	(1969)	$\bar{X}$ DMFT	± S.D.	(1969)
9	(2)	5	2.89	2.76	(8.00)	-	-	-
13	(8)	6	5.23	4.15	(7.13)	0.08	0.28	(0.25)
10	(15)	7	4.80	3.71	(7.80)	0.80	1.48	(0.93)
7	(16)	8	4.86	2.61	(6.81)	0.57	0.98	(1.63)
14	(18)	9	-	-	-	1.00	1.41	(2.83)
13	(21)	10	-	-	-	1.00	1.47	(3.81)
8	(18)	11	-	-	-	0.75	1.17	(5.17)
15	(20)	12	-	-	-	2.33	2.32	(6.85)
10	(13)	13	-	-	-	2.80	1.40	(7.08)
12	(14)	14	-	-	-	4.00	3.33	(7.36)
12	(18)	15	-	-	-	5.42	3.15	(10.94)

Table 4:11 Mean caries prevalence ± S.D., in Cartwright school children in 1987 (1969 prevalence in brackets).

Hopedale and Cartwright youngsters with 5-yr-old mean dmft scores of 5.75 and 2.89 respectively ($p<0.05$; $t=2.13$). However, some of the significant differences between these communities may be a reflection of their ethnic make-up as Nain and Hopedale have the highest proportion of Inuit children, whereas Makkovik and Cartwright have the highest proportion of Settlers. In fact, Cartwright has a wholly Settler population.

With respect to the permanent dentition, there were several inter-community differences, the most significant being that between the 10- and 11-yr-olds from Nain and Cartwright. In 1987, the mean DMFT for Nain 10-yr-olds was 3.35, whereas in Cartwright it was 1.00 ($p<.001$; $t=3.73$). Again, for the 11-yr-olds, the values were 3.28 and 0.75 respectively ($p<0.001$; $t=4.22$). Significant differences were also noted between these two communities in the 8-yr-old children the DMFT being 2.18 and 0.57 ($p<0.01$; $t=3.10$), the 9-yr-olds having 3.13 and 1.00 ($p<0.01$; $t=3.65$), the 12-yr-olds 4.50 and 2.33 ($p<0.01$; $t=2.82$), and the 15-yr-old children in Nain having 9.19 compared to the same age group in Cartwright with 5.42 ($p<0.05$; $t=2.28$).

The community of Hopedale also compared unfavourably with Cartwright regarding the 10-yr-old and 13-yr-old age group's mean DMFT scores, where the differences were significant. ($p=<0.05$; $t=2.48$ and 2.35 respectively).

	MALE				FEMALE			
AGE	(n)	$\bar{x}$ dmft	($\bar{x}$ dmft 1969)	± S.D.	SIG	(n)	$\bar{x}$ dmft	($\bar{x}$ dmft 1969)	± S.D.
5	24	4.67	(8.00)	3.69	N.S.	22	5.05	(6.58)	3.14
6	18	6.67	(7.82)	3.63	N.S.	32	6.28	(8.05)	3.16
7	24	6.21	(8.63)	4.11	N.S.	31	5.94	(8.04)	2.53
8	32	5.94	(7.45)	2.56	N.S.	17	4.75	(6.72)	2.39

AGE	(n)	$\bar{x}$ DMFT	($\bar{x}$ DMFT 1969)	± S.D.	SIG	(n)	$\bar{x}$ DMFT	($\bar{x}$ DMFT 1969)	± S.D.
6	18	0.22	(0.53)	0.55	N.S.	32	0.44	(0.79)	1.01
7	24	0.88	(1.58)	1.39	N.S.	31	1.68	(2.57)	1.76
8	32	1.50	(1.87)	1.32	N.S.	17	2.41	(2.97)	1.91
9	23	1.83	(3.45)	1.75	N.S.	17	2.24	(3.41)	1.86
10	24	2.54	(3.07)	3.19	N.S.	31	2.84	(4.71)	1.71
11	22	2.68	(4.85)	2.19	N.S.	17	2.35	(4.90)	1.93
12	28	3.68	(5.81)	2.48	N.S.	24	4.00	(6.34)	2.62
13	19	3.74	(5.56)	3.54	N.S.	14	5.07	(7.81)	4.31
14	28	4.64	(6.82)	3.58	N.S.	23	6.30	(7.76)	4.12
15	19	5.16	(9.77)	3.24	N.S.	14	8.50	(10.17)	6.20

Table 4:12 Mean caries prevalence ± S.D., in male and female school children by age from four Labrador communities in 1987 (The comparable data for 1969 are shown in brackets).

* ($P<0.05$ = *; $P<0.01$ = **; $P<0.001$ = ***)

Comparisons between the communities of Makkovik and Cartwright also revealed significant differences. In Makkovik, the mean DMFT for 8-yr-olds was 2.43, whereas the same age group in Cartwright experienced 0.57 decayed, missing or filled teeth ($p<0.01$; $t=3.29$). For 11-yr-olds, the Makkovik DMFT was 3.11 compared with only 0.57 in Cartwright ($p<0.02$; $t=2.60$).

In general, the above statistically significant differences would again appear to relate to the ethnic composition of the communities, as locations with the higher Inuit populations compared unfavourably with those which housed a higher percentage of Settlers.

While numbers in each one year-wide cohort examined were somewhat small to permit meaningful analyses by Inuit and Settler criteria for each community between the 1969 and 1987 surveys, caries prevalence reductions were most marked in Cartwright (100% Settler), and least marked in Nain (70% Inuit).

The data shown in Table 4:12 illustrate that, in 1987, there were no significant differences in mean caries prevalence with respect to the deciduous dentitions of male and female children. The same was true for the permanent dentition. However, when the deciduous dentition of males were compared between 1969 (Table 2:9) and 1987 only data

relating to the 6-yr-olds were not significant. Hence, for 5-yr-olds the 1969 mean dmft of 8.00 had dropped to 4.67 ($p<0.01$, $t=3.01$) 18 years later, and for the 7- and 8-yr-olds the equivalent values were $p<0.02$ ($t=2.54$) and $p<0.05$ ($t=2.37$) respectively.

Female differences were restricted to 7- and 8-yr-olds, when the 1987 values were significantly reduced ($p<0.01$, $t=2.89$; and $p<0.02$, $t=2.47$ respectively).

Regarding the permanent teeth, for males the significant differences were found (all at the 1% level) for 9- ($t=3.24$), 11- ($t=3.08$) and 15-yr-olds ($t=2.70$). However, the differences for 12-14-yr-olds were also close to attaining significance ($t=1.84$ - 2.01).

With female subjects, differences at the 5% level were obtained in relation to the 9- and 10-yr-old DMFT data, while for 11- and 12-yr-olds this increased to the 1% level. Of the other comparisons, only the 13-yr-old's data relating to 1987 came close to being significantly less than that for the equivalent group in 1969 ($t=1.93$).

Comparison of the 1969 and 1987 surveys (Table 4:1) shows that caries prevalence was lower in 1987, for nearly all age groups. This was less pronounced for communities with a high composition of Inuit children (Tables 4:8; 4:9; 4:10; 4:11).

In 5-yr-olds there was evidence of significant increases in the percentage of filled deciduous teeth (Table 4:4) and a significant reduction in the percentage of decayed permanent teeth in 12-yr-old children (Table 4:4). Unfortunately, for 15-yr-olds, it may be that the change in dental emphasis had not been established long enough by 1987 to influence greatly their intra-oral status. Nonetheless the trend was towards a reduction in caries prevalence, this being most pronounced in the 10, 11 and 12-yr-old permanent dentitions of all children irrespective of gender.

However, when comparing male children between 1969 and 1987, significant DMFT reductions were apparent, as was the case for females.

STATISTICS CANADA - BASIC POPULATION FIGURES

Area	1961	1971	1976	1981
Roddickton Area	5905	4415	4078	3953
Flower's Cove Area	4312	4170	4777	5047
St. Anthony Area	4250	5685	6184	6861
Forteau/Red Bay Area		2080	2141	2225
Cartwright/Mary's Harbour Area		2150	2689	2784
Goose Bay/Happy Valley	13,534	7290	8452	7032
North West River and N. Labrador		2619	3126	3421
Total	28,001	28,409	31,420	30,963
Labrador Total	13,534	14,143	16,381	15,462
Northern Peninsula Total	14,467	14,226	15,039	15,501

Table 4:13 Population figures for the area covered by Grenfell in 1961, 1971, 1976 and 1981.

YEAR	DENTISTS
1961	3
1971	4
1981	11
1984	13

Table 4:14 Dental manpower employed by Grenfell in 1961, 1971, 1981 and 1984.

PROVINCE	1971	1976	1981	% Increase
Prince Edward Island	27	42	43	59%
Nova Scotia	208	239	306	47%
New Brunswick	130	166	191	47%
Quebec	1690	2013	2572	52%
Ontario	3144	3756	4469	42%
Manitoba	310	373	428	38%
Saskatchewan	221	277	333	51%
Alberta	616	814	1058	72%
British Columbia	983	1393	1670	70%
Newfoundland	60	103	125	108%
Grenfell Regional Health Services	4	8	11	175%

Table 4:15 Number of dentists working in each Canadian Province and the Grenfell area. 1971, 1976 and 1981 and the percentage increase.

Manpower

During the 1960's - 1980's, the period of this study, manpower increased considerably while the population generally remained static. In Table 4:13 the population figures between 1961 and 1981, are illustrated (Statistics Canada, 1961; 1971; 1976a; 1981). The population distribution has not changed a great deal over that period with a 14.2% increase in Labrador, whereas that of the Northern Peninsula only rose by 7.1%.

From Table 4:14 data it is evident that the three dentists in the region in 1961 covered a population of 28,001 (1:9,333), while by 1984, 12 dentists were employed, covering about 30,963 people (1:2,580). Thus, manpower figures have changed dramatically over the period, with a three-fold improvement. In addition, since 1972, the North Shore, Harrington Harbour area in Quebec has no longer been part of the region serviced by Grenfell Regional Health Services, although it continues to be a referral area.

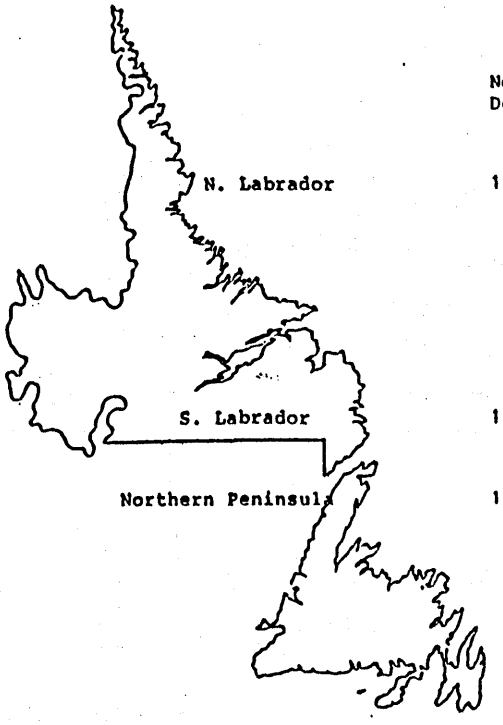
The number of active dentists, by province, is outlined in Table 4:15. Since 1971 until 1981, the percentage increases in dental manpower are as shown and indicate that manpower increases are greatest in the less industrialized provinces.

In Table 4.16, the results of efforts to spread available

	1961	1971	1976	1981	1986
Harrington	1:3000	1:3600	-	-	-
St. Anthony	1:14,467	1:8135	1:5685	1:3430	1:3228
North West River	1:13,534	1:6104	1:3126	1:3431	1:2475*
Goose Bay	-	-	1:2808	1:3953	1:3758
Roddickton	-	-	1:4078	1:3953	1:3758
Flower's Cove	-	-	-	1:5047	1:4915
Forteau	-	-	-	-	1:2325
South Labrador	-	-	1:8118	1:3280	1:2035

* In 1986 North West River and Goose Bay were merged administratively and included the North Labrador Coast.

Table 4:16 Dentist/population ratio in the area covered by Grenfell 1961, 1971, 1976, 1981 and 1986.



	1964			1986		
	No of Dentists	Dentist Pat. Ratio	No Comm.	No of Dentists	Dentist Pat. Ratio	No Comm.
N. Labrador	1	1:4000	9	1	1:1880	3
				1	1: 877	3
				1	1:1908	3
S. Labrador	1	1:3000	5	1	1:2035	4
Northern Peninsula	1	1:8000				

* In 1984 only Harbour Deep has no direct access to dental clinic and is serviced from Roddickton on a biweekly basis.

Figure 4:2 Dentist/population ratios for travelling dentists covering peripheral clinics. A comparison between 1964 and 1986.

manpower more evenly throughout the region are shown. Here it can be seen that, in general, dentist population ratios are improving. It should be noted that in 1976 Flower's Cove and Forteau were serviced by one dentist. By 1986 three dentists carried out the same task. One in Flower's Cove, one in Forteau and one in South Labrador.

The author's reorganisation of the areas covered by travelling dentists has permitted greater flexibility in the use of available manpower, and reduced the number of communities serviced on a travelling basis (i.e. peripheral clinics) by each dentist. As is evident in Figure 4:2 there has been an improvement in the peripheral dentist/patient ratio at such clinics between 1964 and 1986. The reduction in the number of communities served, and the greater flexibility, can be assessed by the working days spent at each peripheral community in Northern Labrador indicating the changes between 1977 and 1984 (Table 4:17).

Perhaps one of the most obvious indicators of the manpower improvement is the length of service given by dental staff, the average length of stay in 1977 being slightly less than one year. However, as illustrated in Figure 4:3, the average length of employment gradually increased over the ten year period from 1977. By 1980, this had risen to 16 months; by 1983 to 21 months and, by 1987, the time a dentist remained on the staff averaged 34 months.

Location	No. of Days 1977	1986
Nain	18	74
Davis Inlet	3	18
Hopedale	4	34
Makkovik	12	12
Postville	3	15
Rigolet	5	29
Cartwright	18	37
Total	63	219

Table 4:17 No. of working days at peripheral clinics in Northern Labrador. A comparison between 1977 and 1986.

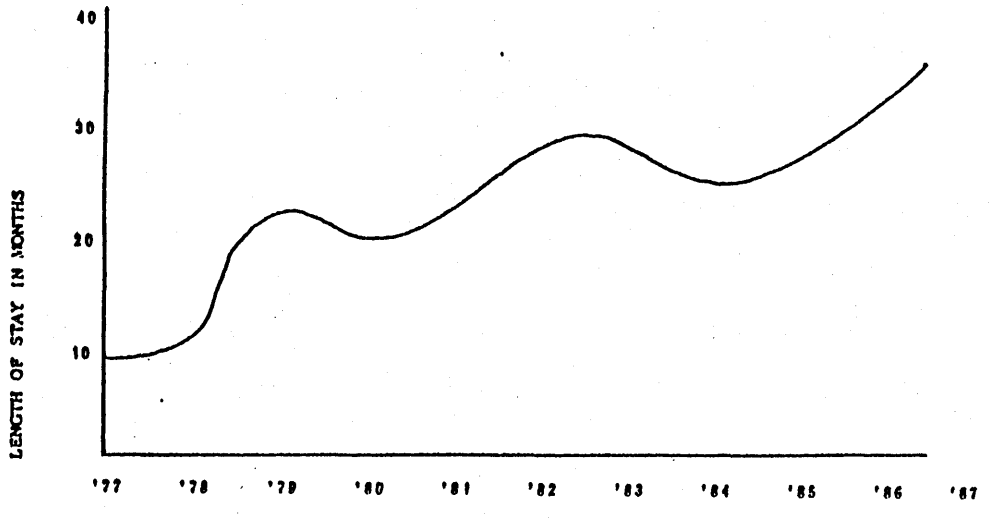


Figure 4:3 Average length of stay of dental staff from 1977-1987 expressed in months of service.

Facilities and Equipment

During the 1960's dental treatment was limited by the lack of facilities at outlying communities. It was the author's experience, and also that of many other travelling staff, that carrying all equipment necessary was both a tiresome and impractical means of delivering dental care. Hence efforts began in the late 1960's to have equipment installed at more remote clinics not linked to larger centres by road, the locations of which were as shown in Figure 2:2.

The methods used to overcome this problem were discussed in Chapter Three, these occuping two stages from 1976 - 1980 and 1980-1984. Until 1976, with the exception of Cartwright and Charlottetown, there were no dental facilities outside the regional centres at Goose Bay, St. Anthony, North West River, and the Area clinic at Roddickton.

From 1976, the first phase in developing adequately equipped clinics at the remote coastal communities was implemented. In order to assess improvement, clinics as they existed in 1976, were classified according to the basic level of equipment and space (See Table 2:13).

By 1980, the methods used in Stage I to upgrade facilities at coastal communities had made considerable progress. In Table 4:18, communities which had basic equipment installed are indicated. This equipment was

LOCATION	DATE
Nain	1977
Davis Inlet	1977
Hopedale	1977
Makkovik	1978
Cartwright	1979
Mary's Harbour	1978
Port Hope Simpson	1977
*Forteau	1979
*Flower's Cove	1978

Table 4:18 Dental clinics which had basic equipment installed by 1980.

LOCATION	1986	1964
Nain	3	4
Davis Inlet	3	6
Hopedale	3	6
Postville	3	6
Makkovik	3	5
Rigolet	3	6
North West River	3	1
Goose Bay	1	2
Cartwright	3	3
Black Tickle	3	6
Paradise River	*	6
Charlottetown	3	6
Port Hope Simpson	3	5
Mary's Harbour	3	6
Fox Harbour	3	6
Red Bay	4	6
Forteau	2	5
St.Anthony	1	1
Flower's Cove	2	5
Roddickton	2	5
Main Brook	3	6
Conche	*	5
Harbour Deep	3	6
Harrington	+	1
Mutton Bay	+	5
Kegaska	+	6
Romaine R.	+	5
Whale Head	+	5
Tabatiere	+	6
Musquaro	+	6

KEY

1 - Regional Centre
2 - Base Clinic
3 - Travelling Clinic
4 - Rudimentary Clinic
5 - Space Only
6 - No Clinic

* These clinics are now closed.

\+ No longer included in Grenfell Regional Health Services Region.

Table 4:19 Status of dental clinics in 1986 compared with 1964.

obtained from a variety of sources and, although not ideal, all essentials were available and these clinics were then classifiable as "travelling clinics". From Table 4:19, it can be seen that, in 1964, very few communities had dental clinics which could then be classifed as travelling clinics.

By 1984, the second stage of development was virtually completed. Between 1978 and 1984 there was enormous expansion of facilities generally throughout the Organisation and dental clinics, equipped to a very high standard were incorporated. All necessary equipment for these clinics was standardised as much as possible, to simplify maintenance and reduce the inventory of spares. However, dentists would still carry handpieces and instruments of personal preference, together with perishable materials, but generally these clinics were more-or-less self-contained.

In addition, clinics at Conche and Paradise River were closed as their population then had access to clinics at Roddickton and Cartwright respectively, while the clinic at Red Bay is still under review, although there are basic facilities located in the school.

Thus, between 1961 and 1984, the dental facilities at all communities were upgraded to permit all forms of dentistry normally performed in general practice. In 1970, only one peripheral clinic (Cartwright) was fully equipped, but by

1986, there were 15. At Flower's Cove, Forteau and Roddickton the clinics had been promoted to Base Clinic status (Table 4:19). There was obviously some overlap between Stages 1 and 2 of the development, and some of the older nursing stations and health centres are still scheduled for new facilities. However, the status of clinics has changed insofar as the installation of more up-to-date equipment is continuing and the effect of this can be gauged by the types of treatment now carried out at these sites, as compared to the 1960's. These data are discussed in the following section concerning treatment patterns.

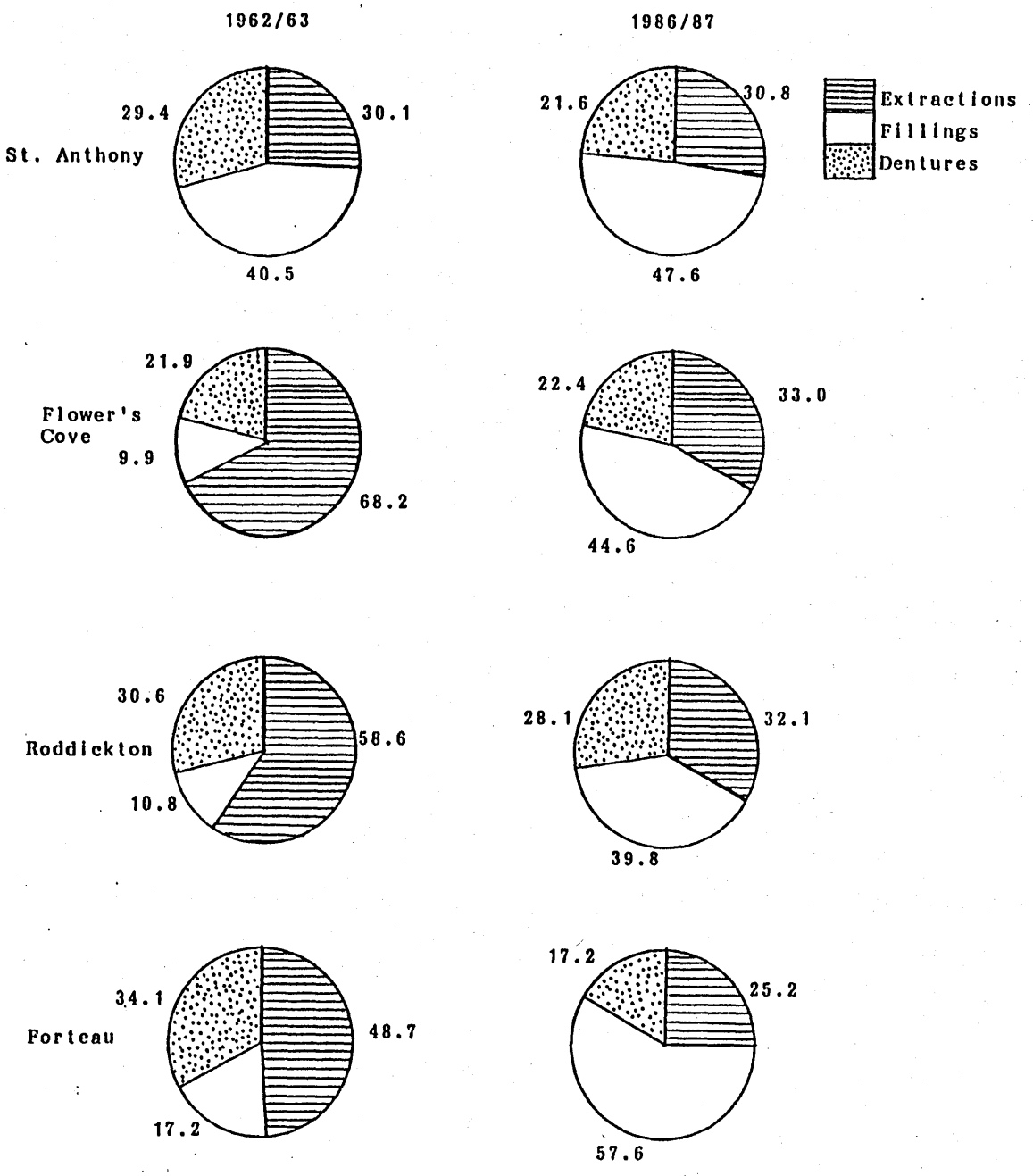


Figure 4:4 Comparison of percentage of time spent on extractions, fillings and dentures. 1962/63 versus 1986/87.

Treatment Patterns

The treatment patterns illustrated in Figure 4:4 show the changes in the proportion of time devoted to extractions, fillings and dentures between 1962/63 and 1986/87 in Flower's Cove, Roddickton, Forteau and St. Anthony.

In 1962/63, the first three communities were serviced on a travelling basis from St. Anthony but, by 1986/87 they were all base clinics with permanent dental staff. Throughout the period,the St. Anthony clinic was a regional centre.

In 1963, dentists at the three travelling clinics were spending about 50 - 70% of their time carrying out extractions, and between 10 - 20% placing fillings, and 20-30% making dentures. By 1986/87 these patterns had altered dramatically, albeit over a period of 24 years. Extractions now make up between 25 - 33% of the total time, whereas fillings accounted for between 40 - 50%, i.e. virtually the reverse of the 1963 situation. Denture work, although slightly reduced, was about the same proportionately except in Forteau where it almost halved.

It is also evident that the greatest changes took place during the period when Flower's Cove, Roddickton and Forteau had been travelling clinics as, by 1986/87, they had been reclassified "Base Clinics". The general treatment patterns illustrate a change from an extraction-orientated service

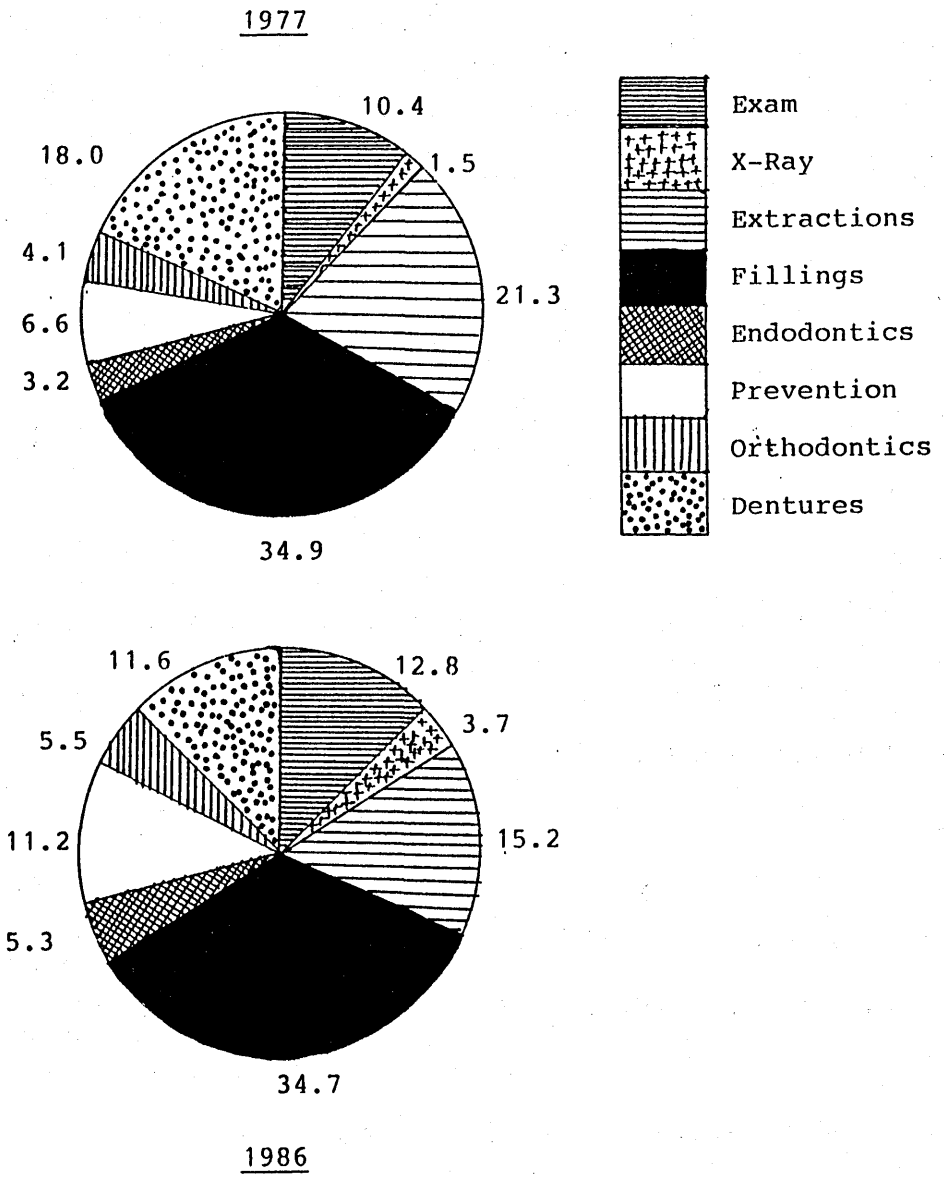


Figure 4:5 Comparison of dental division treatment patterns expressed in major treatment groups as a percentage of total time. 1977 versus 1986.

(essentially emergency) to a restorative one.

As stated in Chapter 3, it was not possible to compare major treatment groups for both time-periods because the necessary data were not available in 1962/63. By 1977, however, more sophisticated data-collection enabled major treatment groups to be recorded and used to illustrate more refined changes.

The comparison of dental division treatment patterns, expressed in major treatment groups as a percent of total time between 1977 and 1986, is displayed in Figure 4:5. The overall picture is of a change in patterns with more complex types of treatment increasing e.g., orthodontics, endodontics and, most of all, prevention, with extractions and dentures taking up less time. Again, the shift is away from extraction/denture activity to a more restorative-based pattern but with a desireable increase in prevention.

In 1977, dentists were spending 39 % of their time carrying out extractions and making dentures, while 48 % was occupied with fillings, orthodontics, endodontics and prevention. Examinations and x-rays made up the remainder.

By 1986, this had altered to 27 % for extractions and dentures with the restorative/preventive orthodontic/ endodontic orientated groups increased to 56% of

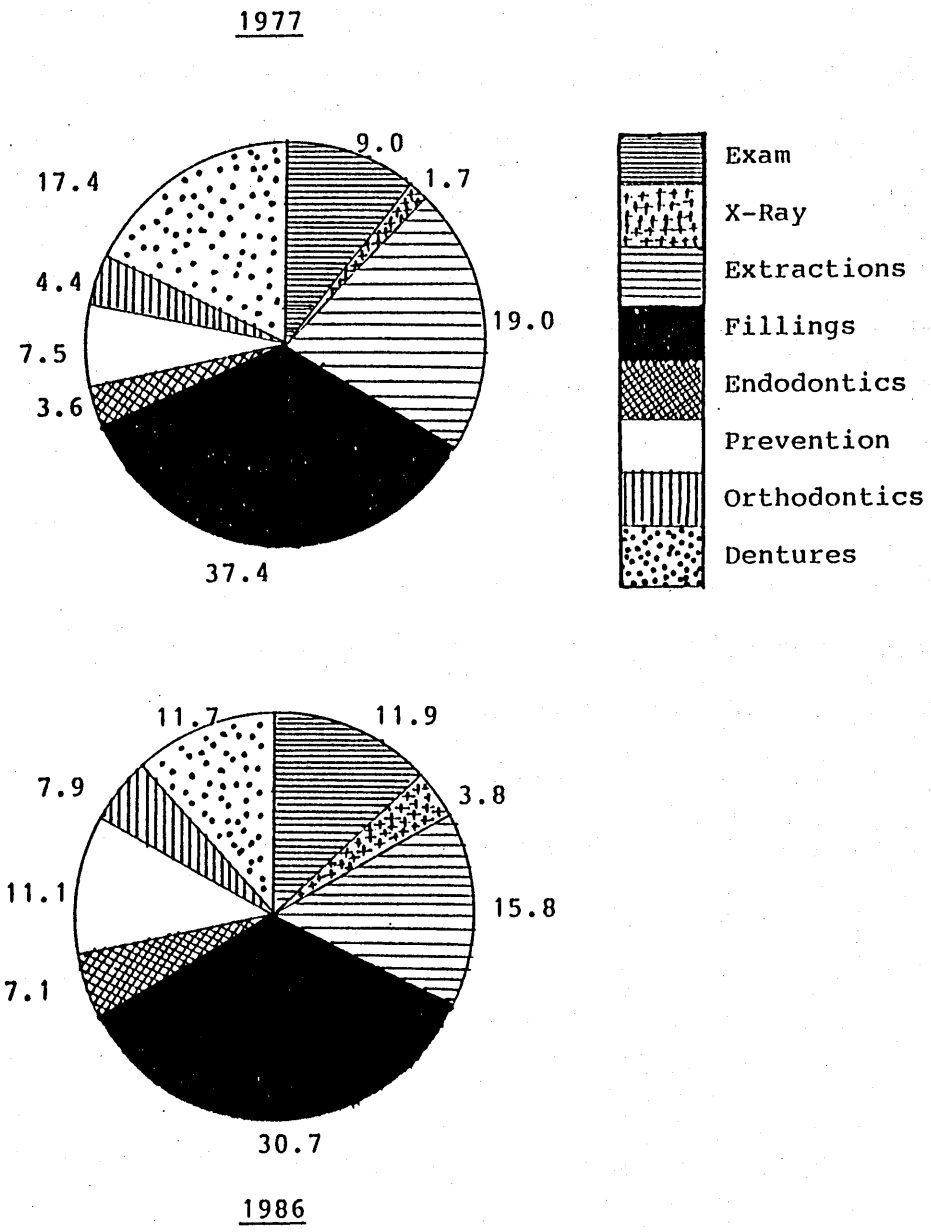


Figure 4:6 Comparison of Base clinic treatment patterns expressed as major treatment groups as a percentage of total time. 1977 versus 1986.

the total. Examinations, and the taking of radiographs accounted for 17%, with the use of radiographs having more than doubled.

Comparative base clinic data are shown in Figure 4:6, for 1977 and 1986 with treatment changes being very similar to those of the division as a whole (Figure 4:5), and at travelling clinics (Figure 4:7). At these travelling clinics, between 1977 and 1986, there have been quite dramatic changes. The percentage of time spent doing extractions in 1986 was only one third of the 1977 total and fillings doubled over the period. Prevention was fifteen times more evident over the ten year interval and it is worth noting that the prevention figures did not include mouthrinsing in which approximately 4000 children participated on a weekly basis. In addition, examinations are less frequent and the time spent in orthodontic and endodontic treatment had increased almost three fold.

Without doubt, these changes in treatment patterns at the travelling clinics are a reflection of the increases in manpower, improvement in facilities and co-ordination to concentrate the great need for dental care in outlying areas.

Furthermore, as 2521 patients were seen at the travelling clinics in 1977, and over 7000 in 1986, these treatment

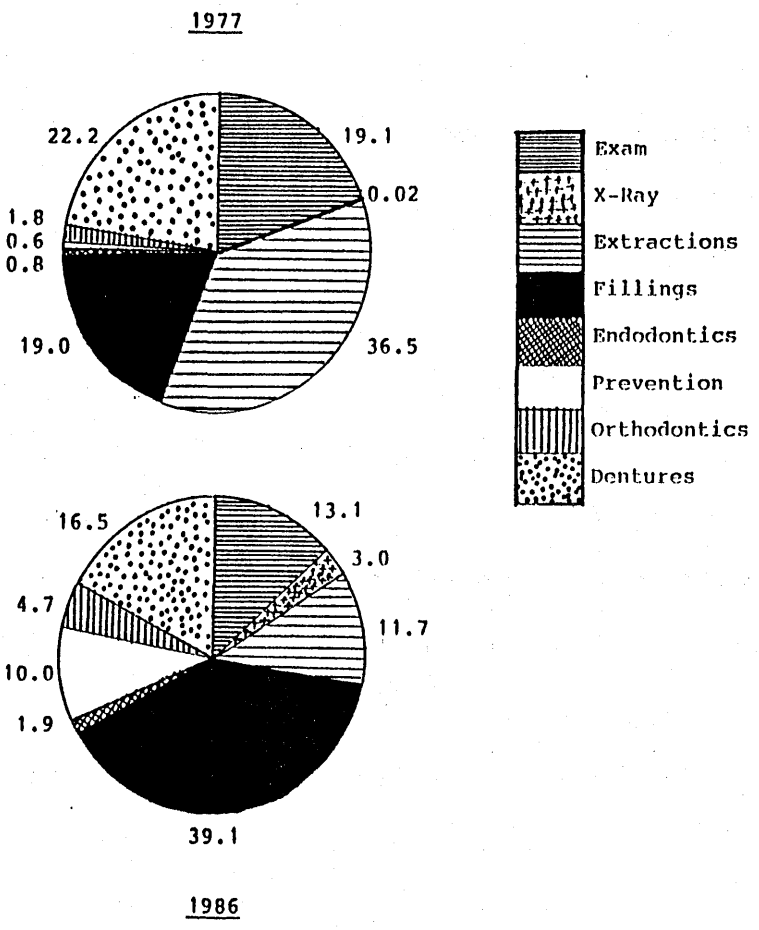


Figure 4:7 Comparison of peripheral clinic. Treatment patterns expressed as major treatment groups as a percentage of total time. 1977 versus 1986.

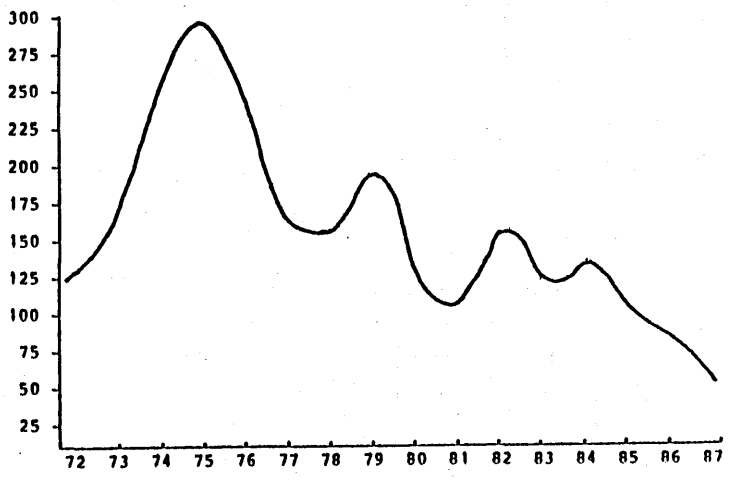


Figure 4:8 Outpatient general anaesthetic cases in St. Anthony. 1972 - 1987.

patterns changes not only reflect a shift in emphasis but also represent a considerable increase in the number of patients treated.

Finally, Figure 4:8 illustrates the number of general anaesthetic short-stay cases performed in the St. Anthony outpatient department between 1972 and 1987. From this diagram, it is evident there has been a steady decline in the number of children requiring multiple extractions, (usually deciduous teeth), over the period, the 1987 total being less than thirty percent that of the 1975 figure.

	1977/78		1986/87	
	Population	Man Days	Population	Man Days
Nain	812	18	1018	74
Davis Inlet	274	4	385	18
Hopedale	447	4	477	34
Makkovik	307	12	340	12
Postville	164	3	220	15
Rigolet	238	5	317	29
Cartwright	675	18	674	37
Division 10 Sub Div B	1131	34	909	38
Mary's Harbour	366	26	463	36
Port Hope Simpson	548	34	604	24
Harbour Deep	276	8	245	36
	5238	165	5685	353
Division 10 Sub A (Lanse Au Clair - Red Bay)	2205	25.5	2119	208
Division 9 Sub C (Bird Cove - Eddies Cove)	5057	30.5	5069	147
	12,500	221	12,873	708

Table 4:20 Comparison of man days at each travelling clinic between 1977/78 and 1986/87.

Co-ordination: Data Collection

The forms designed by the author (Appendix IV), and used throughout the Dental Division since 1976, have provided two basic sources of data from which the effects of the measures taken could be assessed:

1) Monthly treatment totals (vide supra).
2) The time spent in man days in each community. The results of which are illustrated in Table 4:20.

During the period from 1977/78 and 1986/87, the clinics covering the Canada Census areas known as "Div 10, sub-division A (Forteau and Red Bay)", "and Div 9, sub-division C (Flower's Cove)" changed in status from communities served on a travelling basis, to that of base clinics. Thus each had a permanent dentist, although in 1986/87 the Flower's Cove clinic was only serviced three days per week by staff from St. Anthony and Roddickton while major renovations were carried out at the residence.

The coastal communities from Nain in northern Labrador to Harbour Deep on the east coast of the Northern Peninsula were, and still are, serviced by travelling dentists. Again, in Table 4:20, it can be seen that the man-days spent at peripheral clinics by travelling staff have more than doubled, and that attempts to produce schedules to meet population

GROUP COMPONENTS	TREATMENT GROUPS	UNITS OF WORK	
		Dentist A	Dentist B
	Total units of work:	440	447
	No. of days worked:	22	22
	Units of work/day:	20.00	20.31
	Examination	140	83
	Radiographs	107	67
a) Simple Extraction	Extractions	120	81
b) Surgical Extraction			
c) Impacted Teeth			
d) Biopsy			
e) Routine Oral Surgery			
a) Amalgams	Fillings	25	159
b) Composites			
c) Crown and Bridge			
a) Root Canal Filling	Endodontics	-	-
b) Pulpotomy			
a) Scale and Polish	Prevention	47	43
b) Prophylaxis			
c) Fluoride Application			
d) Oral Hygiene Instruction			
e) Fissure Sealant			
f) Fluoride Varnish			
g) Diet Counselling			
a) Appliance Activated	Orthodontics	-	3
b) Treatment Completed			
a) Appliance Activated	Prosthodontics	1	11
b) Partial Denture			
c) Mouthguard			

Table 4:21 Comparison of work output in one month between two dentists meeting the minimum units of work criteria. The dentists evaluated worked under identical conditions at the same clinic.

needs on a per capita basis, have improved in most instances.

Another statistic which could be derived from the data forms is illustrated in Table 4:21, i.e. the variation between two dentists' work-output and productivity, as measured by units-of-work per month when performed under identical conditions at the same clinic. It can be seen that considerable variations in the type of productivity exist. Although both dentists met the basic criteria of 20 units-of-work-per-day the content varied dramatically. The data thus provided the author with a graphic illustration of a dentists' work-pattern and productivity, as 367 of the dentist A's work units consisted of examinations, extractions and x-rays. Dentist B, on the other hand, had 231 units-of-work in these categories, Both dentists worked under identical conditions at the same clinic. The term "unit of work" is refined and illustrated in Table 3:5.

In addition, dentist A carried out a mere 73 units-of-work in fillings, crowns, orthodontics, dentures and prophylaxis, whereas dentist B produced 216 units in these categories. These variations, their ramifications and significance are discussed in Chapter 6. However, they do reveal one aspect of the complexities which a dental co-ordinator experiences when dealing with set "production" targets and different staff personalities.

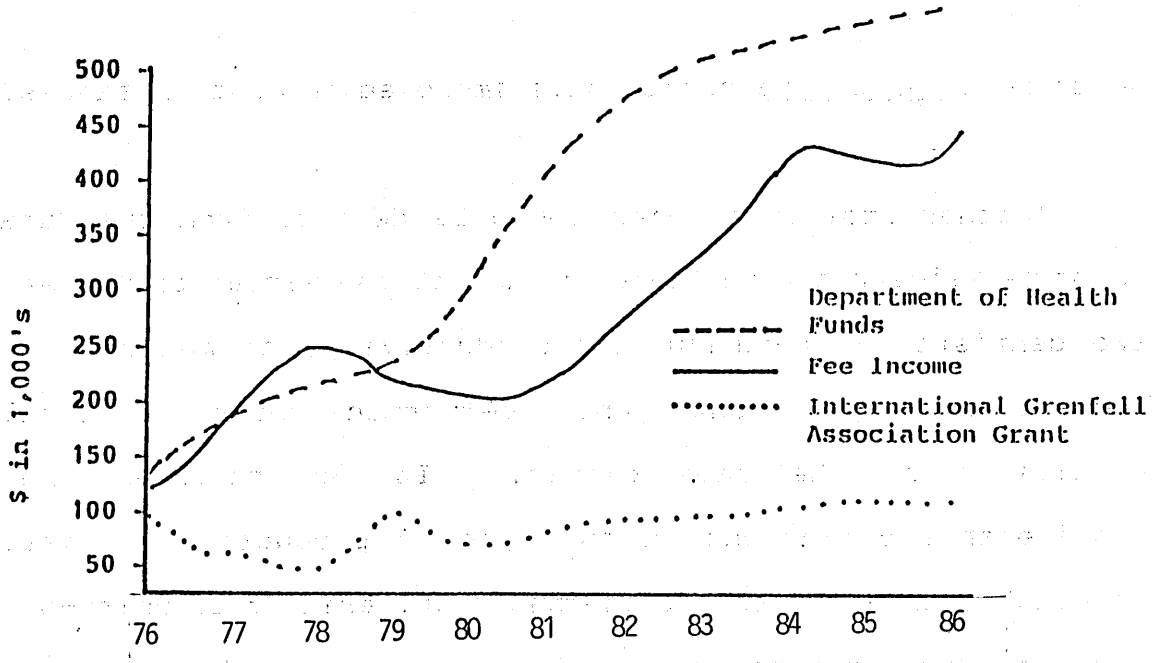


Figure 4:9 Sources of funding for dental division. Total amount from 1976 - 1986.

	1977	%	1986	%
Department of Health	128,000	37.9	500,000	48.8
Patient Fees	121,000	35.9	425,000	41.5
I.G.A.	88,000	26.1	100,000	9.7
	337,000		1,025,000	

Table 4:22 Percentages of income derived from the three sources. A comparison between 1977 and 1986.

Co-ordination: Finance

a) Department of Health Funding

The funding for the Dental Division was derived, essentially from three sources, as shown in Figure 4:9. Monies from the Department of Health during the period 1976/77 to 1986/87 clearly illustrates the increase in budget over the years. In 1976 it constituted 38 percent of the total income whereas, in 1986, 49 percent of financial support was derived from this source (Table 4:22). These results reflected the increasing amount of work being carried out on children eligible to receive treatment under the Provincial Dental Health Programme. The most significant rises took place between 1976 and 1982, being due mainly to improved data collection. This in turn, enabled the author to present a strong case for improved funding to the Department of Health which reflected the increased dental care being provided, the results of which were clearly visible.

b) Patient Fees

The introduction of the billing system and standardisation of fee-collecting using dental assistants to ensure continuity, also had an effect. In 1977, fees represented 36 percent of income whereas, in 1986, they made up 41 percent of total income, the monetary value of which increased from $121,000 to $425,000.

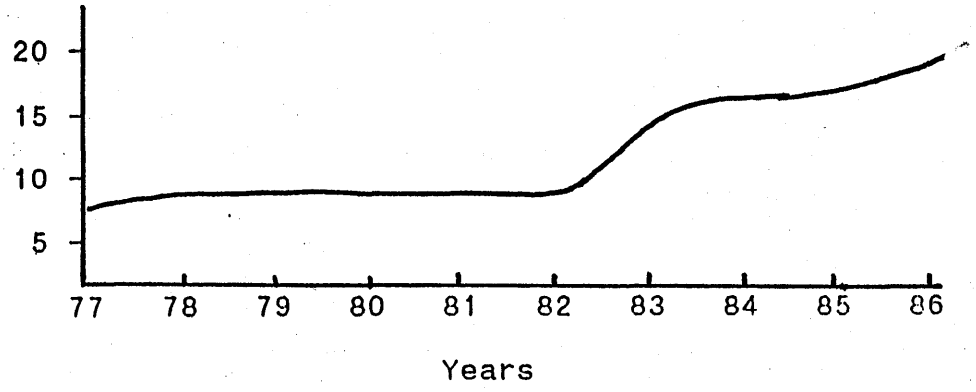


Figure 4:10 Fees generated per patient visit between 1977 and 1986.

Accounts Receivable

Location	1972 - 1978	1978 - 1984
St. Anthony	17,369	2,508
Goose Bay	11,242	7,658*

* In this case the account receivable (unrecovered fees). Comparison of the six year period before the introduction of a billing system and the subsequent six year period.

Table 4:23 Accounts receivable (unrecovered fees). Comparison of the six year period before the introduction of a billing system and the subsequent six year period.

c) International Grenfell Association Grant

The funding from the International Grenfell Association has not increased dramatically, over the period 1976 to 1986, in actual monetary value, thus indicating less reliance on this source. Its contribution was nonetheless vital, although, in real terms it has decreased proportionally during these years e.g. in 1976 it constituted 26% of the service income but, in 1986, it was only 10% of income. In Table 4:22, the percentage of income derived from the three principle sources between 1977 and 1986 are indicated.

The results of using firm charging policies, and more accurate fee structures, is reflected in the fee income generated by dentists. This is illustrated in Figure 4:10 in terms of income derived per patient visit, being $7.79 in 1977 compared to $18.37 in 1986.

The accounting system, introduced by the author in 1978 to ensure collection of outstanding debts and provide continuous surveillance of a patient's financial indebtedness, had a significant effect on the number of unpaid bills.

Accounts receivable (unpaid fees) for St. Anthony and Goose Bay clinics are compared, between 1972 - 1978, before the billing system was introduced, and from 1978 - 1986 after it was in use, in Table 4:23. Between 1972 and 1978, St. Anthony Clinic had accumulated $17,369.00 of accounts

Location	INCOME 1978-1984	ACCOUNTS RECEIVABLE 1978-1984	% UNRECOVERED FEES
St. Anthony	424,272	2,508	0.6%
Goose Bay	579,173	7,658	1.3% *

* Includes unrecovered fees carried forward.

Table 4:24 Unrecovered fees for the 1978-1984 period expressed as a percentage of income.

receivable (unpaid fees), whereas in Goose Bay, over the same six year period, the figure was $11,242. However, with the introduction of the billing system in 1978, the accounts receivable accumulated over an eight year period were $2,508. and $7,658. respectively which, in the case of Goose Bay, included the amount carried forward.

In Table 4:24, the effect of this accounting system can be evaluated by illustrating the percentage of unpaid fees in relation to the fee income over the period. For St. Anthony, less than 0.6 percent of fees were unpaid and in Goose Bay, 1.3 percent were unpaid, although this again included the sum brought forward from the pre-1978 system. These results demonstrated that the new accounting methods were effective in reducing outstanding fees.

Co-ordination: Programme Development

Two programmes, introduced by the author, were designed to reduce caries prevalence and increase oral hygiene and dental awareness in the area. These were:

1) The Sodium Fluoride Mouthrinse Programme
2) The Teenage Health Education Teaching Assistants Programme (THETA)

1) Sodium Fluoride Mouthrinse Programme

The implementation of a 0.2% NaF mouthinse programme began in 1978. In that year, over 3500 of the 4000 eligible children opted to participate, although the acceptance rate deteriorated over subsequent years. However, by 1984 there were still 2800 regularly involved.

One of the major areas of difficulty with this type of programme, spread over such a large area, was the reliance on school teachers and public health nurses for the continuing enthusiasm necessary to keep the programme effective.

2) Teenage Health Education Teaching Assistants (THETA)

The first pilot study of this programme took place in Nain during the winter of 1984/85, with the results of the oral hygiene scores (Greene & Vermillion, 1960; 1964) Table 4:25 carried out on THETA participants at random. Here, six volunteers from Grades 10, 11 and 12 who were trained by the

	1st EXAM	2nd EXAM	% REDUCTION
THETA VOLUNTEER (1)	1.33	0.83	37.6
THETA VOLUNTEER (2)	1.16	0.66	43.1
THETA VOLUNTEER (3)	1.33	0.83	37.6
THETA VOLUNTEER (4)	0.66	0.50	24.2
THETA VOLUNTEER (5)	0.83	0.50	39.8
THETA VOLUNTEER (6)	0.83	0.66	20.5
TOTAL	6.14	3.98	
MEAN	1.02	.66	33.8%

Table 4:25 Oral Hygiene Index (Debris) scores for THETA Volunteers in the Nain Programme.

public health nurse and the area dentist, were examined without prior knowledge, on two occasions, the time interval being 4 weeks.

Results show a reduction of approximately 34% in the Oral Hygiene (Debris) Index of these teenage students following examination prior to being taught the oral hygiene, plaque control and dietary aspects of the THETA programme. While this pilot study does indicate a reduction in debris scores for teenagers who were taught oral health skills directly, further research would be needed to evaluate long-term benefits, and also the effects on children taught by these volunteers.

CHAPTER FIVE

DISCUSSION

The prevalence of dental caries and its sequelae, first noted by Grenfell during his early visits to the coast of northern Newfoundland and Labrador (Grenfell, 1927), still present a major health problem.

The results of surveys carried out in Labrador in 1969, and 1987, indicate there has been a reduction in the overall caries prevalence for 5 to 15-yr-old children in the four communities involved in these studies.

Since there were no region-wide data prior to 1984, when a base-line study was carried out, it is difficult to assess changes in caries prevalence throughout the area. However, that study (Curson, 1986; Smith, 1986) demonstrated that the caries prevalence in northern native communities of coastal Labrador was higher than that found in the urbanised area of Goose Bay/Happy Valley, where there was also a higher percentage of filled teeth. This finding was also noted when the caries status of isolated communities in West Greenland were compared with larger settlements in Greenland and Denmark (Vangsted, 1982). These differences were attributed to geographical factors which made it difficult to provide adequate dental care to meet the needs of the more isolated

regions. Another variation exists due to the three ethnic groups making up the region. High caries prevalences have been recorded in native peoples in Canadian arctic regions (McPhail et al., 1972) and also in the Foxe Basin area of the Northwest Territories (Mayhall, 1977). Differences were also noted in the prevalence of dental caries between Inuit (Eskimo) and Indian groups, and non-native Canadians in the Nutrition Canada dental survey of 1977. In all cases, the native groups had a higher disease prevalence, with the Indians being particularly susceptible. In Rankin Inlet, an Inuit community on the west coast of Hudson's Bay, an oral health assessment revealed very high caries levels (Gelesky & Hando-Lowes, 1981).

A study in 1983-84 by the Indian Health Service of the U.S. Public Health Service, showed that the American Indian and Alaskan native children developed more tooth decay than children in the general population of the U.S. Nursing bottle caries was particularly noticeable, with 50 percent of all pre-school Indian and Alaskan native children demonstrating the disease (Indian Health Service, 1985).

The results of the 1969 and 1987 surveys in northern Labrador tended to parallel these findings, insofar as the northern Labrador communities with Inuit populations had a higher caries experience than Settler communities such as Cartwright. Nursing bottle caries was reported by all

dentists in the northern Labrador area and the dmft of 5-yr-old children reflected the U.S. study, in that children with nursing bottle caries tended to have a higher caries prevalence in general. Evidence of this trend is seen in the Inuit children when compared with the Settler children in northern Labrador. Suggested reasons have ranged from the effects of changing diet over recent years with large increases in sugar consumption (Sreebny, 1982), to earlier eruption dates for permanent teeth in native children (Masson, 1986) and morphological differences between mongoloid and caucasian teeth (Mayhall, 1972).

In a study of chronic ear disease in Northern Labrador and Newfoundland, it was found that the Inuit had a higher prevalence than their Settler counterparts (Ratnesar, 1976). It has also been shown that medications containing sugar can contribute to an increased caries prevalence (Consumer's Association, 1981). Since much of the chronic ear disease is treated by oral antibiotics frequently suspended in syrups, it is possible that frequent prescriptions of such medications could contribute to an increased caries prevalence.

In a study of DMF Teeth indices in eight developing countries as compared with Alaska, it was noted that in all cases the mean DMFT scores rose with age, with the exception of Alaska where 10-yr-old Alaskan's had a higher DMFT than 40-yr-old adults. Here one might postulate that the

native diet eaten by adults throughout their life was less cariogenic than the recent "white man's diet" of the younger people (Russell, 1963).

Another obvious difference relates to the availability and access to dental care in isolated groups of remote communities, as illustrated by differences in metropolitan, urban and rural caries studies in Albertan school children (Stamm & Lizaire, 1980). This was also found to be the case in Quebec, where rural 13- and 14-yr-olds had a mean DMFT of 9.6 as compared with 8.1 for metropolitan school children (Stamm et al., 1980). Hence it would be surprising if isolated northern communities in the region covered by Grenfell dental staff had not reflected this general trend. However results of the 1987 survey in these Labrador communities clearly indicate that Settler children were not so disadvantaged as Inuit children living in the same communities.

Despite the fact that the caries experience of the native children, particularly in the 5-year-old group, was higher, there was evidence in the 1987 survey that treatment was also more in evidence, and there was a reduced frequency of carious tooth extraction. In two native communities, Nain and Hopedale, results showed higher levels of untreated disease as compared with the settler community of Cartwright, although they also showed higher levels of restorative and surgical intervention.

In the Keewatin district of the Canadian Northwest Territories, a very high caries experience was reported from a survey in 1983/84 with a DMFT index > 4 in 7-year-old children, as compared with 1.3 in Labrador. For the 15-yr-old Keewatin child with over 15 decayed, missing or filled teeth, the Labrador equivalent was 9.0 for Inuit, and 6.1 for Settler children (MacDonald & McMillan, 1988).

For the above groups, available evidence would suggest that diet and poor oral hygiene were major areas of concern, in view of the considerable evidence to link their combination with increased caries prevalence (Bradford & Crabb, 1961, Ismail et al., 1984; Cleaton-Jones et al., 1984a; 1984b; Loesche, 1985). Results presented here also tend to support the contention that children from deprived areas appear to have higher levels of untreated caries irrespective of treatment availability (Sutcliffe, 1977; Blinkhorn et al., 1983a). However, the Labrador data would tend to support the concept that, once exposed to dental programmes, there is a reduction in caries, irrespective of social standing, but associated with ethnic background.

There is evidence to show that when developing countries adopt western lifestyles, caries prevalence increases whereas in western countries there is evidence of a caries decline (Sardo-Infirri & Barmes, 1979, Heloe, 1982; Mandel, 1985), which is attributed to dietary changes and availability of

preventive programmes, particularly fluoride usage.

The Sioux Lookout Reserve in northern Ontario was the target of an intensive treatment-orientated dental programme between 1973 and 1983. Despite a considerable increase in manpower and services, results were disappointing in that no significant reduction in caries prevalence was observed. It was then recommended that increased efforts be directed towards fluoride programmes and fissure sealants (Titley & Bedard, 1986).

The Labrador experience reported here suggests that the prevalence of caries is declining in northern coastal communities. However, the native groups show less of a decline than their Settler counterparts and in the case of 15-yr-old Inuit children in Nain, it appears as though an increase in caries prevalence is underway albeit the difference in the data were not significant.

In a mortality study of Labrador Innu and Inuit, from 1971 to 1982, it was clear that these groups demonstrated greater ill-health in general than their native counterparts elsewhere in Canada and considerably greater than their Settler neighbours (Watton, 1984). Here, great emphasis was put on problems associated with environmental, socio-economic and self-determination aspects of life-styles, and it is reasonable to assume that, compared with such problems, dental

disease assumed a relatively lower priority. The absence of running water, sewage systems and a high prevalence of general disease, alcoholism and poor quality, highly cariogenic dietary habits are likely to be reflected in a poor dental health status.

Since prevention programmes have been a definite policy in Labrador since the 1970's, it could be speculated that the reduced caries levels in the Labrador area when compared with the levels being reported in the Keewatin district (and the failure of the Sioux Lookout treatment-project to lower caries prevalence), demonstrates their effectiveness.

The value of mouthrinsing has been illustrated in many studies. Due to the impracticality of fluoridating the water sources in the Labrador and Grenfell region, this method was employed as a possible means of reducing caries prevalence. Not only is the therapeutic effect recognised another possible effect of using this technique appears to be that it is also likely that children learn when they participate that this simple habit can become part of their future life-style (Torell & Ericsson, 1965, Horowitz et al., 1971; Englander et al., 1971; Ripa et al., 1977).

In recent years, some doubt has been raised regarding the cost-effectiveness of fluoride rinsing (Bohannan et al., 1985). Nevertheless, this was based on data from studies

involving children with low caries prevalence in urban areas, many of whom had been exposed to prevention information by their family dentists, and almost universal availability of fluoridated dentifrice. As such, it does not reflect the social environment, treatment availability, nor dietary habits of small, isolated arctic communities where water fluoridation is not feasible and where the introduction of fluoride dentifrice is fairly recent.

Dietary habits continue to cause concern and, in this regard, the Newfoundland Report of the Canada Health Attitudes and Behaviour study (1985) demonstrated that Newfoundland had the lowest percentage of young people meeting the "Nutrition Canada" four food group requirements. They also had the highest _per capita_ intake of sugar, fat and salt and the lowest fibre intake. The Province also had a substantially higher proportion of young people consuming soft drinks (King _et al._, 1986), the cariogenicity of which has been recognised (Ismail _et al._, 1984).

In a study of food use by the Inuit and Innu of northern Labrador, it was noted that food is classified as "country food" and "store" food. Whereas country food is subdivided into categories related to source and use, store food is a recent addition and, as yet, there are no sub-categories. The idea that some store foods contribute little or nothing to one's health and may, in fact, be harmful, is foreign. The

belief is essentially, that if the "white man" eats the food in the store, it must be nutritious and healthy (Mackey, 1988).

A paper, delivered to the conference on Dental Hygiene Research in Winnipeg, Manitoba, in 1982, cast doubt on preventive measures which involve active participation by the population in general. An evaluation of the Manitoba Children's Dental Plan, while revealing a reduction in caries prevalence, did not find oral hygiene, as measured by gingivitis and plaque (oral debris) had changed over the study period. It was postulated further that social change was required before alterations could be made in daily routines, compliance behaviour being a complex and, as yet, poorly understood aspect of modifying life-style (Fish, 1982).

Furthermore, attempts to correlate diet and oral hygiene to caries prevalence have been inconclusive (Richardson et al., 1977; Cleaton-Jones et al., 1984a; 1984b).

The reasons for the decline in caries prevalence currently being seen in western, developed countries, are not clear. Many hypotheses have been suggested including water fluoridation and more recently the effect of mouthrinses and other fluoride preparations or the universally available fluoride dentifrice.

There is little doubt that dietary habits, when modified, have also played a complimentary role. In one interesting study involving dentist's children compared with other professional peer groups, restriction of sugar intake and reduction of frequency of intake were illustrated as the primary source of a caries prevalence reduction in the dentists' children (MacDonald et al., 1981).

Basic to the author's philosophy was the contention that, by eliminating pain associated with untreated dental disease, the value of preventive dental care would achieve validity, and that when a certain proportion of the population attained a pain-free dental status, it would then become the established norm not to experience oral pain. As a result dentists and related professionals would provide and motivate the population with the means to control this aspect of their well-being. Nonetheless, some high risk groups will then still require passive (non-motivational) measures e.g. fluoridation by appropriate means, and fissure sealants. Motivational measures, such as oral hygiene instruction to create healthy habits, and nutritional counselling to permit modification of life-styles, will be effective only when the social attitudes of the majority regard dental health as an important aspect of their well-being. These changes will occur when socio-economic, environmental and general health conditions are raised to quantitative levels capable of permitting qualitative decision-making.

In the meantime, active treatment and caries preventive programmes will be necessary to achieve this objective and it is essential that established and well-proven methods of reducing caries should not be abandoned simply because caries levels may be in decline. Such a situation was illustrated recently in Scotland where an increase in caries prevalence was observed after water fluoridation was discontinued (Stephen et al., 1987).

In the area involved in the present study, a reduction in caries prevalence is evident but, since it is a complex process, results cannot be attributed to any one single factor. Hence, over the period in question there have been increases in manpower, development of facilities, and the introduction of co-ordinated prevention and educational programmes. The use of fluoridated dentifrices has also become widespread through out the area.

Nonetheless, results show a general caries prevalence reduction which is perhaps the most important indicator of a dental health improvement. However, there have also been changes in treatment patterns which are attributable to the ability of staff to increase the dispensing of traditional dental care, and shifts from extraction/denture treatments towards restorative care, are also evident. As such, manpower and facility improvements appear to have been key elements in this latter change.

In common with many other northern agencies attempting to provide dental health to small isolated communities, the Grenfell Region is not typical of an urban scenario. In general, attempts to encourage practitioners into remote and isolated areas have been singularly unsuccessful (Pelton, 1975). The record with the Grenfell Region has been better than most, due largely to the historical background and publicity spread from person to person over the years. This, coupled with the enlightened attitude of the Provincial Dental Board, appears to have overcome the effect of adverse comments about working in the North. These negative influences have not been damaging to the Grenfell area thus far (Ring, 1979; Bedford, 1982).

As manpower has increased, so too has the effort required to recruit, support and replace dental staff. It seems ironic that while it has been reported that there is a serious threat of under-employment among dentists, in some metropolitan parts of Canada, there is great reluctance to move into the North. In Scandinavia, the prospect of dental unemployment has been described as a reality (Moore, 1985).

Results of a survey regarding the problems and attractions of working as a travelling dentist in the coastal areas of Labrador covered by Grenfell Regional Health Services revealed remarkably consistent responses. The general conclusion was that all staff enjoyed the task and found it

both an exciting and stimulating experience (Messer, 1988b). Drawbacks were the constant travelling, which all found disruptive, if the number of peripheral clinics covered was greater than four. However, since facilities have been improved, staff have been generally satisfied, but still felt that many minor irritations could be alleviated.

Contrary to expectation, isolation and purely dental problems were not causes for irritation, so much as changes to schedules due to weather, space problems on aircraft, bizarre flight times, bureaucratic disruptions over accommodation, and time spent travelling (Messer, 1988b). Professional satisfaction was generally high and mirrored the views of Lange et al. (1982) who noted that clinical freedom was regarded as important for professional satisfaction. However, although the job was regarded as stressful by all dentists, none considered it unduly so and all denied feelings of "burnout" as described by Vachon, (1983); and Wycoff, (1984).

Alternative methods of delivering dental health care are now anticipated and "dental therapists", trained in Saskatchewan, have worked in Labrador field clinics. The effect of these clinics can be measured by the work achieved and demands for their return. There is also a financial incentive since such field trips are federally funded, thus there is no charge to patients. The possibility of permanent

field clinics is a most encouraging sign.

Now that dentist/population ratios and facilities are making conditions more acceptable for dental staff, they tend to remain longer in post. Unfortunately, continued restrictive measures and additional hurdles placed by various government bodies (both Provincial and Federal) are making recruitment of foreign trained (mainly, U.K. and U.S.A.) dentists more difficult. Thus the future seems to be moving towards a Canadian-only direction which will present new challenges, as the succes rate for recruiting Canadian practitioners to work in the North has not been encouraging. The factors influencing a dentist's choice of location are not well known, however, in the United Kingdom there appears to be a tendency for graduates to return to their area of origin (Taylor et al., 1976).

It is possible that, if dental unemployment becomes a significant reality (such as has been reported in Scandanavia), dentists may be forced to move into underserviced areas. Iceland, however, does not appear to experience such difficulties despite a dentist/population ratio of 1:1,158 (Moore, 1985). Unfortunately the traditional response to over-manning has been to cut back the student intake, which may result in a future manpower shortage.

For agencies providing dental care in the northern

regions of Canada, the future is unclear. However, the actions taken by pressure groups within the profession to protect their status, appear to be oblivious to the needs of rural and isolated areas, and a more realistic attitude will be required if future shortages are to be prevented.

It was also postulated in the early 1980's that there would be a need for dentists with public health training (Leake, 1983). It is the author's contention that while this may be desirable it would not influence dental health unless accompanied by additional manpower, such as hygienists with community public dental health training as advocated by (Clovis & Frechette, 1984).

Increases in manpower, and improvements in facilities and equipment, have resulted in treatment pattern change and, from the scope of work carried out, it is evident that staff work more effectively in suitable surroundings.

There are other factors which have to be considered when several dentists use the same facilities. Different staff obviously have preferences for certain types of equipment, and the productivity of both dentists and auxiliaries can be affected by design. Since the mid-1970's, when dental clinics were incorporated at the planning stage of new health centres, it has been possible to design facilities with these various factors in mind. The essential aspects of surgery design were

based on creating as pleasant a working area as possible to reduce mental and physical fatigue (Mayhew, 1973). In addition, such a working environment has also been found to help attract patients and remove much of the stress for both patient and operator (Harris & Crabb, 1978). Unfortunately these goals have been only partially achieved in Davis Inlet, Hopedale and Nain, due to physical limitations within the buildings.

Placement of equipment was influenced by the shape and size of space available. It was found simpler to arrange equipment relative to the position of the dental chair, after which the light was then sited to provide adequate illumination for the operative field. Normally, ceiling lights were used to relieve floor and wall space for other items considered important (Preston & Ward, 1978), and to enable easy movement of patients and staff to and from the chair. Radiographic apparatus was installed to comply with radiation regulations (Johnson & Barone, 1977). By using mobile equipment and central suction systems, left-handed staff could be accommodated by simple repositioning, as long umbilical cords specified when purchasing the equipment eliminated this problem (Kilpatrick, 1976).

Other aspects which improved the working environment were the use of colour-schemes, wall decorations and daylight. Even during Phase I of the re-equipping policy, when using older,

second-hand equipment, the value of blending colour themes proved to be an effective way of "brightening up" surgeries. The use of plants, paintings and window shades, especially in the bright arctic sunlight of spring, also improved the overall atmosphere (Giangrego, 1986).

Changes in treatment patterns reflect both the type of treatment sought by patients and the types of treatment advocated by dentists. In the former case, these will undoubtedly be influenced by availability of services, and patient's priorities, largely determined by financial factors. In the latter case, the treatment provided by dentists will depend on training, expertise, availability of facilities and support staff, and a dentist's personal preference based on training and experience (Messer, 1985b).

In a study of Norwegian rural areas in the 1970's, the increasing availability of dental care resulted in dental treatment pattern changes, i.e. they moved from an extraction/denture service, to a restorative/preventive-oriented service. Patients also attended more regularly and sought care at an earlier stage (Heloe, 1978). This finding concurred with treatment patterns in isolated and rural communities of northern Labrador.

The assumption that improved availability would have an affect on the frequency and type of dental care sought by

patients increasingly exposed to advice about the benefits of dental care, was found also in a population in northern Norway who used dental services more frequently as they became available (Norheim, 1979a).

This connection between availability and utilisation of dental services was also studied in rural Manitoba where the correlation had been found to be positive, more than a decade earlier (McCormick, 1966).

Inequalities between different cultural groups have been observed in New Zealand (Davis, 1981). Similar differences in treatment patterns between cultural and ethnic groups within northern Labrador and Newfoundland, who are subject to the same dental service availability, were also noted. It could be that differences in treatment patterns are the result of ethnic or cultural differences in attitude towards dental care. There is evidence to suggest that young people in Scotland have attitudes towards dental care which are mainly concerned with short-term gratification, relief of pain, and that brushing and long-term benefits are less important as a good health habit and more important as a cosmetic aid (Blinkhorn et al., 1983b).

In Newfoundland and Labrador, evidence from recent studies in health attitudes and behaviour suggests that dental habits, together with other types of health practice patterns,

are unfavourable when compared with the remaining Canadian provinces, and Canada as a whole (King et al., 1986).

Similar findings have been reported from a study of treatment-type received by frequent and infrequent dental attenders in Scotland, where significant differences were noted (Nuttall, 1984). In areas where services were intermittent and not readily available, high extraction rates were seen which may be explained by the attitude that once a tooth is extracted it will no longer pose a problem. Such feelings are understandable especially if, due to poor facilities and equipment, fillings may be unsuccessful and any resulting acute pulpitis cannot be dealt with by endodontic care or even extraction, since a travelling dentist may then have moved on to another community. In Scotland the reasons underlying tooth extraction have been investigated, and similar attitudes have been detected (Kay & Blinkhorn, 1986).

The caries prevalence patterns described in this thesis indicate that the caries decline throughout developed regions of the world (Naylor, 1982) are also being experienced in Northern Newfoundland and Labrador. However, the reduction is not uniform, and native peoples appear to be at a disadvantage in this regard. They also live in the communities most difficult to service, a factor previously noted in a study of West Greenland Communities (Vangsted, 1982).

Treatment advocated and carried out also varies between dentists. Thus, with a high travelling clinic staff turnover-rate, there was a tendency for different treatment prescription when a new dentist began a tour of the communities, a similar treatment planning problem having been noted in Scotland by (Elderton & Nuttall, 1983). In addition, there is also evidence that a change in dentist tends to result in increased treatment (Davies, 1984). This finding may explain a great deal of the scepticism regarding the validity of dental treatment plans in the remote peripheral clinics of northern Newfoundland and Labrador.

In general, treatment patterns indicate a move towards restorative, rather than surgical/prosthetic care. However this change is again slower in communities serviced on a travelling basis, and rapid dental staff turnover is probably a contributing factor, together with intermittent availability and cultural/ethnic differences. The trend seen in Labrador and northern Newfoundland reflects the situations reported in Somerset (Palmer, 1984) and in Scotland (Elderton & Eddie 1983a; 1983b). In the former, more children attended for check-ups rather than emergency care, and in the latter, it has been reported that restorative treatment was increasingly being sought by the general public. This finding was also noted in the 1983 update on Adult Dental Health in Great Britain as a whole, and to a lesser extent in Scotland (Population Studies, 1985).

Another interesting observation concerning treatment patterns relates to the number of times a patient is examined, as compared to the actual treatment completed. While no specific analyses have been undertaken by the author, it is clear from results thus far that the higher the turnover in staff, the more likely it is that a patient will be examined and the treatment plan not completed by the same operator. This finding presents a strong argument for a longer duration of stay in clinics at each community. However, it was generally the feeling of travelling dentists that increased residence was impractical due to the need for frequent visits to communities in order to deal with acute problems.

Another factor, difficult to control, is the productivity of dentists working on a salaried basis, as their output varies considerably. There is also a wide range of treatments prescribed to cope with essentially the same pathology, such problems, which are difficult to explain and have been described in Scotland (Robertson & McKendrick, 1982). Without doubt, this whole area of treatment preferences and work output offers a fascinating field for future study.

In recent years, dentists have been encouraged to take a more active stance regarding preventive dentistry. It is ironic, however, that dietary counselling, fissure sealing and oral hygiene instruction are not recognised as definitive treatment items for payment within the Newfoundland Government

Dental Programme. This could be due to the difficulty of ensuring that these treatment items have indeed been undertaken and were thus eligible for payment. If such is the case, then it is unfortunate that the service, having moved from one which is extraction/denture-oriented, to one with a restorative emphasis which then became preventive-based should be prejudiced by an inability to assess the accuracy and honesty of such claims. Methods of verification of such treatments need to be developed.

Inadequate dietary and oral hygiene habits of the residents are two of the major problems confronting dentists in the Grenfell Region, therefore there is an urgent need to review the policy towards treatment modes that cannot be verified by present methods. Current International Grenfell Association financial assistance in the form of grants, designed to promote oral health and diet control, are laudable. However, additional skilled manpower will be required to implement these endeavours. It is inappropriate, in the author's opinion, that this responsibility to promote preventive philosophies is being left solely to charitable organisations and private practitioners' goodwill. Perhaps the time has come to target preventive services to areas of greatest need, such as has been proposed in Saskatchewan (Young, 1986). Such dental care is essential if the encouraging treatment patterns which have emerged over the last few years are to be continued.

The ideal of having dental care targetted to cope with specific needs, and orientated towards prevention is attractive, but currently beyond the present financial capability. Nonetheless,, it must be a long-term goal. The failure of the Northern Ontario Sioux Lookout programme for Indian children to produce any significant caries prevalence reduction over a 10 year period, despite intensive clinical dental care, was disappointing. However it has been recommended that preventive measures using fluoride programmes and fissure sealants be given greater emphasis (Titley & Bedard, 1986). By so doing, dental care may then be a reality for all segments of society, rather than a mere ideal (Greene, 1978b).

To assess disease trends and treatment patterns, the collection and analyses of data are vital. The forms designed by the author did provide sufficient data to allow monthly assessment of dental performance, to illustrate treatment patterns, and to prepare financial statements for presentation to Government and other funding agencies.

No major modification of these forms has been required which suggests they were flexible enough to cope with additional information, as and when needed. Unfortunately, annual reports contain an ever-increasing amount of data, much of it due to computerisation, and there is a growing tendency

for excess information storage, much of questionable value. Nonetheless, the need for accurate records and inpatient notes was highlighted by Hoffman (1979) and in this era of ever-spiralling medico-legal situations, they must be secure and sufficiently detailed to record all matters relating to patient care for future reference (Rozovsky, 1980).

The assessment of a dental work-load based on a Best Time - Weighted Estimate (BTE) has been shown to be an effective means of judging the number of hours required to treat a known quantity of dental disease (Parker et al., 1982). From recent school surveys conducted throughout the Grenfell region, it has been possible to make a reasonable estimate of the man-hours required to treat a specific group within the region. It has also been possible to keep track of each dentist's work-output and note prolonged episodes of over-or, under-activity, based on a unit-of-work system (Table 4:19).

Attempts to compare a denture with an extraction, or the insertion of a removable appliance, would be like comparing apples to oranges. However, comparisons were not intra-dentist, but inter-dentist. The unit-of-work method of establishing productivity was useful, in that it permitted the Co-ordinator to note deviant trends from the norm which, in some cases, led to these being brought to the attention of the operator in question. If a dentist's work-output consisted almost entirely of examinations, radiographs and extractions,

it would indicate a very limited and easily obtained acceptable level of productivity. As a result, one of the values of having an experienced co-ordinator, was his ability to recognise any such trends, to connect them and, if necessary, act upon them (Messer, 1985b).

Variation in treatment planning is not unique to the Grenfell area and in a Scottish study, wide variations were found particularly in restorative treatment (Elderton & Nuttall, 1983).

In view of the ever-increasing need for more precise data, and a growing awareness by dentists working for Grenfell Regional Health Services that salaries did not reflect Provincial or National averages, a more sophisticated method of calculating work-output may be required if incentive schemes are to be considered. Nonetheless, based on North American dental practice surveys, there is substantial evidence to suggest that salaried Grenfell Regional Health Services dentists are as productive as their general (private) practice counterparts (Bureau of Economic Research and Report, 1963) and, under conditions existing at travelling clinics, probably more so.

In the future, information required for annual reports and work-outputs will undoubtedly become a more important part of administrative policy. Therefore methods of obtaining,

analysing and preparing such infomation will continue to be necessary, and it seems likely that dentists with an administrative responsibility will require training in these skills (Downer et al., 1979).

As far as epidemiological information is concerned, much controversy exists concerning the ideal manner in which to present such data. Differences of opinion exist with respect to the selection of certain age groups, which surface/tooth scoring system should be used and, until recently, there was an absence of a single reliable periodontal scoring index. Happily, the introduction of the Community Periodontal Index of Treatment Needs (C.P.I.T.N), developed by a W.H.O. working party (Ainamo et al., 1982), has assisted greatly in that aspect. While means of modifying the DMFS and DMFT system of recording caries prevalence have been proposed by (Marcus et al., 1983; Anaise, 1984), the problem of introducing new data presentation methods is the difficulty which arises when attempts are then made to compare new data with those from earlier surveys employing different systems. Fortunately, guidelines on epidemiological data-collection and presentation have been dicussed frequently in the dental literature, as have analyses and interpretation of such data (Bulman, 1984a; 1984b).

As dental services were expanded in the Grenfell Region economic factors became increasingly influential, as funding

and income in this economically deprived area did not provide adequate financial resources to cope with the problem in an ideal way. Hence, the billing systems and fee-charging policies prior to 1976, were unable to gather sufficient income to continue the process of expansion within the dental service provided by Grenfell Regional Health Services. The reasons for this poor financial return for work completed have been discussed in Chapter Two, and the action taken to introduce payment systems and realistic fees has been explained and assessed in Chapters Three and Four.

In a survey of expenditure on dental health in each of the Canadian Provinces, it was shown that in 1960, Newfoundland had the lowest per capita expenditure with the exception of the Northwest Territories. In 1980, this had changed and Newfoundland then had the lowest per capita expenditure bar none, with the average Canadian spending $53.00 on dental care while the Newfoundlander spent only $19.00 (Leake, 1984).

However, while public sector funding in Newfoundland ranked seventh of the provinces, it had an excellent children's dental programme although, after age 13, the burden of paying for dental care rested with patients. Therefore, to a large extent, the patient's priorities determined the expenditure allocated to dental health. In an unpublished survey of patient attitudes in the Grenfell Region in 1982,

the author found 30% of patients thought fees too high but agreed they were probably lower than elsewhere in Canada; 40% felt they were average, and 30% rated them "very high". In fact, the fees charged by the Grenfell dentist's were about 30% less than the average provincial fee scale.

The more recent advent of third party payment systems is having an effect, and as increasing numbers of patients are covered by such insurance schemes and payment is guaranteed, it would seem likely that dental income will increase and patients will benefit. Furthermore, it is possible that when a political decision regarding funding of native groups is finalised, the cost of providing care to the northern communities will be reduced, and income will be sufficient to provide the extra efforts required to deal with the higher disease prevalence and unique circumstances.

Many dentists working in Canadian rural areas have made suggestions as to how dental care should be improved. In Winnipeg, financial incentives and the use of recent graduates to service rural Manitoban areas was advocated (McCormick, 1968). However, despite such activities, dental programmes did not develop as a result of private practitioners providing services and inexperienced new graduates were not ideal members for an isolated workforce. As a result, most programmes which ultimately addressed the problem of rural dental health care emanated from public funds through either

Provincial or Federal Government agencies. The Yukon experiment (Pugh, 1969), and the package developed in Sutherland, Scotland by Bennie et al. (1978), were examples of co-ordinated, preventive, educational and treatment-based programmes. As such they had one common factor ie. they were targetted to a specific group within a manageable geographical area and also included a significant preventive component. The "Sioux Lookout" project in Northern Ontario was essentially a treatment orientated programme despite an initial prevention component (Davey, 1971). A subsequent evaluation of this project showed in contrast to the findings of Bennie et al. (1978), no statistically significant reductions in dental caries prevalence over a period of ten years (Titley & Bedard, 1986). A recommendation resulting from this evaluation was that additional manpower, to promote use of fluorides, fissure sealants and dental education, should be a priority.

The problems associated with attempts to provide intensive dental care to a scattered population spread over an immense and largely inaccessible area are more difficult. The region covered by Grenfell Regional Health Services is larger than the U.K. yet has a total population of only 40,000 in over 50 communities which range from 7,000 to 250 inhabitants. From a clinical aspect there was a great need to provide dental care to the entire population, however to attempt to reduce the prevalence of disease with limited

resources a target philosophy was essential and the school based population segment did receive emphasis (Messer, 1984).

Hence the prospect of attempting to organise intense dental programmes similar to those in the Yukon or Sutherland, Scotland was daunting. The service introduced to Prince Edward Island has often been used as an example of what a Province-wide dental programme could achieve. However, in this case, in one tenth the area covered by Grenfell, communities were all accessible by road from larger centres. In addition, auxilliaries were used to deal with primary care, but had instant back-up and referral support from established pratitioners and specialists. However, since Grenfell had neither the manpower nor resources to implement such labour intensive preventive programmes, the author sought viable alternatives.

By the early 1970's mouthrinsing schemes had been introduced by many dental agencies with considerable success, caries reductions of up to 40% being reported (Horowitz et al., 1971). The advantages of a mouthrinsing programme from the author's point of view, were that it could be implemented quickly, be supervised by non-dental personnel and the fluoride dosage was non-systemic, this last point being especially important since fluoride levels in the multitude of water sources were unkown at that time. However, the assumption that all sources were low in fluoride was

subsequently found to be incorrect as some artesian waters apparently had a significant fluoride content.

From an administrative point of view, the only practical means of any mouthrinse delivery was via public health nurses and school teachers. The fact that this continuous programme still attracted about 58% of eligible children in 1986, is gratifying. Schemes of this nature often falter after two or three years, and the use of school teachers as promoters of dental programmes can be a problem. Studies in Canada have shown that the rate of compliance is related to teachers' enthusiasm and that this varies considerably (Mutter, 1978, Silversin & Kornacki, 1984; Messer, 1985c).

The author did not encounter such problems in most cases, although apathy and non-compliance did occur in some schools. By-and-large, success appeared to be largely dependent on the attitude of the Head teacher, as School Boards were unanimously supportive. Indeed in recent years, progress has been made towards having dental health education incorporated in the school curriculum although the benefits of such action do not always achieve the expected results. One such programme employed in Bedfordshire, England, demonstrated that despite an obvious improvement in dental awareness this was not necessarily successfully followed by an improvement in dental health habits (Blinkhorn et al., 1981).

One aspect of mouthrinse programme administrative policy which was not so successful, concerned the records of children who participated. In many, but not all schools, a record of each child's rinsing history was maintained, but there was wide variation in the record-keeping consistency which made it difficult to interpret this information. However, it is possible that later analysis of areas which were receptive to the programme, and where records were complete, may permit comparisons between the caries status of these subjects and those from non-participants. Unfortunately, this will be a separate task which is beyond the scope of this thesis. However, simple observation would suggest that caries prevalence is lower in the high participation areas, although statistically this has not been confirmed.

Since these early days, now that water assays have been completed on over 300 of the more frequently used supplies, mouthrinsing will continue in areas with more than 0.4 mg/L fluoride in the water. There are no optimally fluoridated areas. Elsewhere, rinsing will be replaced by a daily 0.5 mg fluoride tablet sucking programme which is easier to administer at school and highly cost effective (Stephen & Campbell, 1978).

Notwithstanding almost double the cost of providing restorative care in non-fluoridated areas as asserted by Ast et al. (1970), and albeit most of the Grenfell school

population relied on rinses or tablets to obtain the benefits of fluoride, the true cost of providing dental care in fluoridated and non-fluoridated areas can be questioned.

In a study of diagnostic and preventive services, it was noted that while resotrative care costs would be 49% less in fluoridated areas, total care (including maintenance costs ie: diagnostic and prevention services) would only be 12% less expensive (Burt, 1977).

Apart from the recognised benefit which many studies have demonstrated, and despite recent results of the U.S. National Preventive Dentistry Demonstration Programme (Bohannan et al., 1985), there have been other valuable side-effects. Without doubt, teachers are more aware of " preventive dentistry" and its worth in reducing "cavities", this information being derived from a questionnaire sent to over 400 teachers in 1983 (Messer, 1985c). However, in a 1973 study of 428 teaching staff in Minneapolis, although 226 participated, their knowledge appeared unaffected by the length of time exposed to, or participation in, the oral health programmes (Loupe & Frazier, 1983). In another study it was shown that costs lessened as the programme length extended (Doherty et al., 1984).

As the dental division of Grenfell Regional Health Services is part of a much larger medical organisation, it is

possible to utilise communal facilites and manpower. Hence, the public health division of Grenfell Regional Health Services has played a significant role in the dental programmes, and a questionnaire distributed to public health nurses indicated a most positive attitude towards dental health (Messer, 1985c). In fact, they were instrumental in both initiating and maintaining many of the schemes.

While it might be reasonable to assume that a willingness by non-dental personnel to spread and implement dental programmes would make the public more aware of the value of oral health and that they would use the advice accordingly, there is evidence to suggest that a wide gap exists between the perceptions of those advocating oral health practices and public acceptance (Silversin & Kornacki, 1984). In another study on the effects of repeated dental education on gingival health, it was found that recipients benefitted from such measures (Tan et al., 1981). However, the difficulty of assessing the effects of education programmes on clinically identifiable improvements in dental health remains. In an investigation into the effectiveness of community preventive programmes in improving oral health Meskin et al. (1978) encountered major problems in assessing the impact of such activities. However, a strong relationship has been found between dental cleanliness, dental caries incidence and gingival health by Beal et al. (1979).

It is the author's experience that, in the Grenfell area, dental health programmes directed towards large groups tend to be more readily accepted by the more socially advantaged and affluent section of the population. As such, targetting specific programmes towards high-risk groups will entail much more effort since they are also often disadvantaged in many other social, economic and life-style parameters. Hence motivation may involve raising an individual's concern about his oral health which is initially an educational problem, this opinion being shared by many that simply urging people to clean their teeth and control sugar intake, is not sufficient to combat caries (Horowitz, 1981).

Educating the public about oral health values is seen as a major role for dental programme developers. The format being employed by Grenfell staff consists of routine inspection and oral hygiene instruction in schools, delivered by dentists, and non-dental personnel such as public health nurses and community health representatives. It is costly, and follow-up is very time-consuming, and often not feasible on a regular basis when dentists are fully occupied dealing with acute and chronic disease.

In a study of 202 schoolgirls aged 15 to 16 years who completed a 3-year school-based plaque control programme it was found that the influence on oral hygiene performance was still present one year later (Ashley & Sainsbury, 1982).

However, this programme involved attending a hygienist every two weeks for oral hygiene reinforcement and a professional prophylaxis. Since hygienists were not available in the region being studied this programme was not possible thus other methods of delivery had to be considered.

The T.H.E.T.A. (Teenage Health Education Teaching Assistants) concept has opened up the possibility of educating children about oral health, based on peer group influence (Weiss, 1974). This system has proved to be effective and, in one pilot study, demonstrated a 30 percent reduction in oral hygiene indices (Ratcliff et al., 1976). Several pilot studies in the Grenfell region have also produced encouraging results, especially in the Nain Pilot Study where there was a 34% reduction in OHI (Debris) scores (Messer, 1987). It is therefore intended to tailor this teaching material to reflect typical Labrador and Northern Newfoundland community conditions, and to use local children and adults when spreading this preventive message.

In an evaluation of Teenage Health Teaching Modules (THTM) as a method of increasing positive health attitudes, the value by this method of improving health practices was clearly demonstrated. Students in the THTM classes showed significant increases by positive health practices compared with students in classes not receiving health instruction (Hubbard & Young, 1988). It is the author's opinion that

these systems offer a great opportunity to improve dental health practices.

The passive aspects of preventive dentistry, such as fluoride mouthrinsing and tablet-sucking, appear to be having an effect when judged by caries prevalence studies. However, the active aspects promoted by educational programmes which incorporate diet control and oral hygiene are, as yet, in the early stages of development, and may not be so effective unless underlying social conditions and attitudes are changed. Hence, despite many imaginative and enthusiastic attempts in this field, the experience of others is not encouraging in poor, socio-economically deprived areas. It would therefore seem that fluoride still offers the most effective means of improving dental health in such regions.

CHAPTER SIX

CONCLUSIONS

In common with many other areas of western developed countries, the lowering caries prevalence trend is reflected in northern Newfoundland and Labrador.

It is also noticeable that caries prevalence among Inuit ethnic peoples, although repeating the general downward tendency, has more in common with other native arctic groups, as indicated by levels of untreated disease which are almost double the average for the area. As the multifactorial aspects of dental caries' aetiology are recognised, the solutions will require a broad-based preventive approach, as well as intensive counselling targetted at such high risk groups.

It is evident that infrequent and unco-ordinated oral hygiene instruction, occasionally augmented with dietary advice, cannot be expected to erase the effect of underlying social problems related to far more serious issues influencing health care in general. The native groups suffer many of the disadvantages associated with third world conditions, together with an increasing appetite for a poor quality diet, orientated towards convenience foods. The prognosis for improving oral health does not appear optimistic in the immediate future for these groups wrestling with cultural,

social and economic difficulties.

Many of the decisions affecting long-term strategies will require political momentum from the communities themselves, and there is evidence of an increasing awareness in this respect. It would seem obvious that, unless a more suitable environment conducive to health care is created, major advances in dental health will be slow to materialise. These improvements will be necessary if the change in attitude towards health in general is to be attained, since it is the author's opinion that family reinforcement is presently deflected from a healthy life-style philosophy by acute and chronic social deprivation within the native population.

Nonetheless, caries prevalence is declining in the region and may well be associated with the general phenomenon which is occurring. However, it may also be a reflection of the increasingly available dental services and preventive programmes. While the effectiveness of these programmes in high risk groups is not clear ,eg: Inuit/Settler differences, perhaps one might reflect on the situation which might have arisen had they not been implemented.

This caries decline has also taken place during a period when there have been improvements in dental manpower. However dentists employed throughout the study period were mainly of "non-Canadian" origin, but barriers facing foreign graduates

are increasing and it is likely that future dental recruitment will rely on Canadian sources. Fortunately, the inclusion of dental facilities in the new health centres has now permitted the division of dentistry to provide suitable facilities for its dental staff.

The traditional "travelling dentist" philosophy has been successful in providing primary dental care to outlying communities. However, dentists are not always the most appropriate personnel to activate educational programmes in schoos as teaching is a skill requiring different attributes from those taught to dental students at university. As such, many dentists are not prepared to allocate clinical time to teaching preventive dentistry skills, and many can often feel uncomfortable out of their traditional clinical environment.

The use of non-dental, skilled, or semi-skilled manpower has been a successful means of developing information and supervising active prevention e.g. mouthrinsing. Nonetheless, such programmes depend on goodwill and the ability of supervising dental staff to maintain enthusiasm and ensure standards. Such statements are readily made, but not so readily acted upon in remote and isolated communities with a high staff turnover. Teachers often have great difficulty adjusting to the lifestyle associated with the north, and additional demands on their time are not always welcome, especially in situations where they face serious language and

cultural barriers.

Manpower and staffing needs demand the use of fully-trained dentists to plan overall strategy. However, educating parents and young children is a complex procedure and requires many skills and in an environment where major health issues and social problems override the qualitative aspects of health awareness, expecting dentists to cope with all aspects of treatment, prevention and education, is not realistic.

Manpower levels have improved during the period of the study and this is reflected, both with respect to treatment profiles and changes in disease patterns. Auxilary manpower is a relatively new concept in this region and, thus far, the use of therapists, hygienists and lay educators is an exciting prospect which, in time, may prove to be an effective means of covering areas not yet reached by established disease treatment methodology.

Facilities and equipment have been improved over the period and now permit the full range of general dental practice in all communities covered by Grenfell Regional Health Services. Selection of equipment was based on simplicity and reliability, a strategy which has been effective. However, attempts to standardise equipment at all locations have only been partically successful. Equipment maintenance has not presented serious problems as, annual

visits by engineers have, in most cases proved adequate to deal with normal wear and tear.

The use of portable equipment has been restricted to schools and other specific projects, and has not been employed by the regular travelling dentists. However, there is no doubt that well-designed equipment for use at portable clinics is an effective means of delivering dental care, as has been shown by the dental therapy system developed at the National School of Dental Therapy (Davey, 1974). Furthermore, therapists are taught to use this equipment from the outset of their training.

Treatment patterns are a reflection both of the type of treatment advocated by staff, and that sought by patients. Each is dependent on the infrastructure being available to carry out the therapy, and is obviously influenced by the ability of patients to pay for the service.

Changes in treatment patterns have indicated a move from extraction and dentures to a more restorative-orientated service. It is also evident that more complex treatment such as crown and bridge work, endodontic and orthodontic care are becoming more frequent. It is noteworthy that the more sophisticated background of Goose Bay residents is reflected in the highest proportion of restorative care, and the lowest extraction rate. Unfortunately, there appears to be a time-

lag between the introduction of comprehensive dental care and its acceptance by the residents, as indicated by the still high proportion of extraction/denture treatment patterns seen in the more isolated, most recently-serviced areas.

Treatment patterns also show considerable variation between dentists working under similar conditions. Thus inter-dentist variations are also noticeable and the problem of how to standardise tasks such as treatment planning, is an interesting one which is beyond the scope of the work contained in this thesis. However, there seems little doubt that a frequent turnover in dental staff tends to increase the number of examinations proportionate to definitive treatment although, as the length of time dental staff stay in office increases, this particular difficulty is becoming less obvious.

Without improved methods of data collection via the monthly return forms, the dental division would have been unable to monitor the quantity of work performed and the above output variations. This ability to assess treatment items and prepare statistical data for annual reports is a further reflection of their suitability, which has also proved adequate to provide sufficient information for research purposes.

As the same collection system has been standardised

throughout the region since 1976, a consistent framework has been available. Thus changes in treatment patterns could be evaluated. In addition, evaluation of financial aspects has been feasible, in spite of the difficulties associated with a salaried dental service. Advance income estimation is fraught with pitfalls, not the least of which relates to patient demand and ability to pay in an area with the lowest per capita income in the poorest province in Canada.

While the Department of Health funds, covered basic operating costs, they did not allow for additional programmes, nor did they totally reflect the cost of providing care, especially in the Labrador Coastal area. The Childrens' Dental Programme sponsored by the Department of Health also did little to institute or maintain an agressive prevention campaign using auxilary staff.

Over the period of this study it can be concluded that business-related methodology has indeed increased income by permitting more accurate book-keeping, and by enabling the collection of bad debts. Accounts receivable have been reduced dramatically and, allowing for consumer price index adjustment, both fee and Department of Health income have increased in real terms since 1976. On the other hand, the International Grenfell Association grants, while used essentially to provide additional preventive programmes, have decreased in value over the years.

For the future, unless realistic attitudes towards funding are adopted, it will become increasingly difficult to maintain the present level of general dental service, far less to supplement additional preventive programmes which in high risk and low income groups, are clearly needed to reduce disease prevalence.

Despite financial restrictions and increasing costs, prevention is still a priority within the oganisation and fluoride mouthrinse or tablet sucking is covering virtually the entire region. This has had varying degrees of support but despite reports to the contrary, has not been easily maintained. Nonetheless, the general lowering of caries would suggest it has been a contributing factor. In addition, it has played a secondary role of increasing the awareness of a healthy dental life-style not associated with traditional dental treatment.

Unfortunately, assessment of the mouthrinse programme's value according to true clinical trial protocol was difficult, largely due to the complexity of compiling data which was, at times, incomplete. However, one would wonder what the caries prevalence might have been had such an endeavour not been undertaken, viz: the Inuit fifteen-year-old age group Table 4:5.

Finally, while the T.H.E.T.A. Programmes have yet to be fully developed, a pilot study indicated a drop of approximately 30% plaque and debris scores using the modified oral hygiene index. Hopefully, this success will prove translatable to the child population as a whole, since undoubtedly, the major problems which exist today relate to diet and oral hygiene. Of course, social deprivation and other more serious problems will have to be addressed first, before the opportunity to achieve good oral health habits will be realised in a practical sense, throughout the region. Here, school boards, public health educationists and lay educators may have an increasingly important role to play, since there is probably a limit, beyond which, dentistry (both technical and preventive) cannot penetrate unaided. This is particularly so if the WHO oral health goals for the year 2000 are to be met with respect to all members of all groups within the Grenfell area of responsibility. Nonetheless, the comprehensive dental service being provided by the dental division of Grenfell Regional Health Services in 1990 has the potential to develop and achieve this goal (Messer, 1985; Messer, 1988a).

POST-SCRIPT: RECOMMENDATIONS

These recommendations are presented to assist a person or organisation in the process of developing a rural-based community dentistry programme. It is important to stress that while they may be set out in an orderly sequence, many would be carried out simultaneously.

1) Evaluate the existing service and assess the factors which have led to its present state of development.
2) Make a general assessment of dental disease and identify variations or high risk groups.
3) Study geographic, social, ethnic, financial and other factors relating to the area.
4) Study manpower needs relative to the population and disease levels being observed.
5) Establish an inventory of facilities, equipment and supplies.
6) Research Dental Board and Association laws, and study restrictions & limitations to sources of suitable manpower.
7) If no data exist, or they are inadequate, develop data collection systems in order to monitor treatment.
8) Establish financial guidelines and budget services within this framework.
9) Assess future needs to reach adequate manpower goals, both dental and auxiliary, then approach financial and funding agents.

10) Design and develop equipment units, then use such facilities as exist to establish clinics at strategic locations.

11) Work out travelling routines. These should be based on the following criteria:-

a) Each community should receive at least four visits by a member of the dental team per year.

b) No more than four communities, including the base clinic, should be covered by any one dentist.

c) Not more than half the dental-working-days-per-annum should be spent away from base.

d) Duration of such visits will depend on the population, disease prevalence, and accessibility to the base clinic.

12) Make concerted efforts to keep in contact with Dental Boards, associated dental groups facing similar problems and University dental departments.

13) Establish clear policies and guidelines, and prioritise treatment needs.

PRIORITY 1:

Emergency and urgent cases only.

PRIORITY 2:

Carry out routine and preventive care for high-risk groups.*

a) Removal of untreatable teeth.

b) Fluoride varnish application to act as a possible caries retardant.

c) Fissure sealing (with light or chemically-activated composites).

d) Initial caries removal and replacement with Immediate Restorative Material, if this can be done without the use of local anaesthetic.

* The sequence is not important but the general philosophy is to arrest the advance of existing lesions and then restore tooth structure when time permits. At this time reinforce O.H.I., fluoride application and diet control.

PRIORITY 3:

a) Development of "local" dental care programmes based on education, prevention and treatment. This programme should utilise local manpower such as community health representatives, dental assistants and public health nurses, as well as others who might be interested in participating.

b) Public health nurses should be involved in nutrition counselling, fluoride mouthrinses and tablet-sucking programmes. They should also advise on the use of fluoride supplements.

c) Community health representatives should primarily be involved in THETA programme oral hygiene instruction and

toothbrushing demonstrating after being instructed by the dentist or hygienist. Dental assistants could also participate in these activities.

d) Establish annual school check-ups and record findings on standardised forms in order to provide information when new staff take over, as this will help reduce the number of examinations performed without treatment follow-up. High-risk children and treatment priorities should be dealt with first.

e) Co-ordinate the programmes between the various health care groups, and follow-up progress.

PRIORITY 4:

Specific community dental programmes, open-house days, and use available media such as television, radio, and local newspapers to promote good health practices.

14) Preventive programmes should be further developed; however some points should be borne in mind.

a) Dental manpower, busily treating existing disease should be encouraged to spread the basic prevention message although it cannot be done at the expense of neglecting the treatment of existing disease.

b) Explore alternative sources of manpower to organise prevention and education programmes. These can include

dental hygienists, teachers, community health workers and volunteers.

c) Assay water sources and promote fluoride programmes using appropriate delivery systems to best meet the circumstances.

d) In conjunction with medical and public health personnel, promote fluoride supplements for high-risk groups.

15) Financial systems should be developed and controlled by long-term staff: Dental assistants are ideally suited for this role.

16) "Trust in God but keep your powder dry" (Valentine Blacker, 1778).

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APPENDICES

APPENDICES

APPENDIX I

GRIFFITHS, HUTTON AND MASON REPORT 1963

GRIFFITHS, HUTTON AND MASON REPORT 1963

DENTAL SERVICES IN NORTHERN NEWFOUNDLAND AND SOUTHERN LABRADOR*

INTRODUCTION

This report represents the combined and unanimous views of the three dentists employed by the International Grenfell Association on this coast. It should in no way be considered a series of personal complaints; indeed it should rather be borne in mind that, as each of us shall shortly be leaving the employ of the I.G.A., we do not stand to benefit by the implementation of any of the suggestions herewith made. On the contrary, it is solely with the interests of the people of this area at heart that we have felt obliged to compile this report, in order that the exact position may be made known to those in authority. It is our hope that some attention will be given to the following points, and that worthwhile action will be forthcoming in the very near future.

1) To give perspective to a detailed analysis of the present dental situation in this area it might be well to make a few generalisations concerning the exact duties of a dentist and his staff, and of the nature of his requirement if these duties are to be carried out efficiently and adequately.

* The situation in N. Labrador is discussed in an appendix by Dr. Ramirez (Page 220).

A dentist is a person trained to observe, correct, and maintain in health the masticatory, speech-making, and aesthetic apparatus of each patient, and to recognize and treat any pathology of the teeth, jaws or associated structures. Obviously this involves somewhat more than extractions of painful teeth and their replacement with artificial dentures, a regrettably common misconception of the function of a dentist among the local people of the Coast. In fact, the work of a dentist includes the provision of a preventive and conservative service, an orthodontic service and a paedodontic service, involving the regular bi-annual examination of the mouths of all the patients under his care, and the carrying-out of treatments in such a way and at such a time that each and every patient will receive maximum benefit. It has been estimated that the optimum number of patients that a dentist can effectively treat varies between ONE THOUSAND AND FIFTEEN HUNDRED. This point is of significance in relation to later paragraphs.

If a dentist is to devote his time to treating his patients with a minimum of unnecessary distractions he requires the assistance of (a) a trained dental technician or "mechanic", and (b) a chairside assistant.

a) In any private dental practice the services of a trained technician are considered indispensable. It is quite true to say that a skilled technician can halve the work of

the dentist, or, more important, allow the dentist to see and treat twice the number of patients he would otherwise have time for. Indeed, the dentist seldom takes anything to do with the work of a laboratory at all, other than to give the appropriate instructions for each case and occasionally to assist with some specially intricate piece of work. This is a far cry from the experience of the station dentists, who have to spend so much of their precious time manufacturing all the required dentures themselves, or with the willing but totally inadequate help of a so-called "apprentice". It is quite wrong to imagine that a dentist can train a technician and carry out his own work at the same time. The former has neither the time nor necessarily the teaching ability to carry out this extra task, and the result is all too often frustration and confusion on both sides, and invariably a great deal of wasted time.

b) A dentist without the benefit of assistance of any kind suffers from the same kind of disadvantages which would afflict a general surgeon working alone. Apart from the very obvious waste of time and skill involved in carrying out time-consuming procedures connected with the preparation of instruments and surgery, it must be realised that there are many treatments which can NOT be correctly carried out without assistance. Some of the duties which can be delegated to a chairside assistant to the great benefit of the practice are as follows:

i) Bookwork: Making and checking appointments, writing-

up treatments, filling out charts, answering letters from patients, compiling statistics for monthly reports, and generally keeping all records up to date.

ii) Surgery routine: Removal of instruments from the sterilizer and their arrangement in the required order, handing instruments to the dentist exactly when needed, mixing lining cements, sedative dressings and all filling materials in anticipation of requirements, cleaning and replacing burs, mixing slabs, etc. when used, and removing all traces of treatments between patients.

iii) Assistance during operations: Holding retractors, gags, auxiliary light etc., operating aspirator and swabbing blood and mucus from the mouth, and passing instruments.

These and many other routine tasks can be adequately carried out by an assistant with a considerable saving of the dentist's time. In this connection it is of interest to note that the volume of dental work carried out in St. Anthony Hospital, where the dentist has chairside assistance and a trained mechanic, is much greater than that carried out by either Station dentist. In considering this point it should be borne in mind that the Station dentists must work up to sixteen hours a day if their contribution is to be in any way worthwhile. It is a general experience among us that one's ability and dexterity lessens considerably after midnight.

2) In addition to the trained help required, a dentist must also have at his disposal a basic minimum of necessary equipment, and equally important, suitable accommodation in which to carry out his exacting duties in comfort. This latter feature is absent in many I.G.A. Stations, to say nothing of the large number of remote settlements where there are literally no facilities of any kind. The existing situation will be discussed in detail in later paragraphs.

The essential minimum for a dental surgery worthy of the name should consist of:

a) A room of such a size that one can perform one's work without being hemmed-in by necessary apparatus. (Harrington Hospital provides a good example of such a surgery).

b) Adequate heating, ventilation, and, above all, lighting. The latter should include overhead strip lighting and a specially constructed dental lamp.

c) A sink unit placed in a strategic position.

d) A minimum of three correctly - placed power points.

e) A supply of compressed air

f) The main equipment should include a cuspidor with running water, an electric drill, a high-speed turbo drill, a unit with air and water syringes, electric mirror, cautery etc., and a dental X-ray unit. The compressor motor is best located in an adjacent room or recess, or at least in an enclosed cupboard to muffle the irritating noise.

Provision of an adequate dental laboratory is as indispensable to a dentist as his 'office'. Minimum requirements include:

a) Heating, ventilation and space. Lighting of the "artificial daylight" type is to be preferred, together with an "angle-poise" lamp for close up work.

b) Five power-points, correctly distributed.

c) Hot and cold water supply. The sink unit should be of the deep type, with a filter plug to trap unavoidable residue.

d) Work benches should be covered with synthetic material of the "formica" type and one bench should be specially strengthened to accommodate lathe, presses etc.

e) Considerable shelf and cupboard space.

f) Ideally the laboratory should be in close proximity to the surgery, but where this is not possible some form of

intercommunication would be an asset.

g) Essential equipment must include a dual-speed dental lathe, a heavy-duty hand drill, and a plaster-trimmer.

It is of interest to compare these minimum requirements with the facilities which at present exist. Observance of these features would ensure at least normal conditions, and in eradicating much wasted time would appreciably ease the burden of both dentist and technician, enabling both to limit their activities to their respective fields in a much more profitable manner.

3) GENERAL DENTAL HEALTH SITUATION

The incidence of gross dental caries is probably no greater than elsewhere, but due to the neglect of necessary treatment the situation now presents as an "epidemic". Multiple abscesses are common in the mouths of quite young school-children, and even in many cases of youngsters of pre-school age. Periodontal disease is rife and causes needless loss of an enormous number of teeth. The one bright spot in this deplorable situation is the fairly good dental health of patients in the St. Anthony area, where there has been a "resident" dentist for a number of years, a sure indication that the position could be greatly improved by increasing the number of dentists on the coast. This point is discussed below.

The position is such that one, or even two, travelling dentists can do little more than "show a flag" in many settlements. Due to the time factor one can do little more than surgical and prosthetic dentistry, and usually insufficient of that. In short, the amount of conservative and preventive dentistry is at present totally inadequate to obtain and maintain a tolerable standard of dental health. In view of the increase in population in this area this can hardly be considered surprising. For example, in one station, (Flower's Cove) the number of births recorded between September 1962 and August 1963 was 120, compared with a death rate of under 20 in the area during that period. A spokesman for a Memorial University survey team noted that the population in the St. Barbe area had increased by 35-45% between 1951 and 1961, and that there was no sign of this trend diminishing. According to a conservative estimate compiled from figures given by the Dept of Welfare, the R.C.M.P. and I.G.A. source the population of this area is now approximately:

South Labrador (Cartwright and Mary's Hr. areas) ...	4,200
Forteau area	2,000
Harrington Hr. and area	3,000
N. Newfoundland (Harbour Deep and Barr'd Hr. north)	13,000
Total	22,200

Only one dentist will be available to administer to the

needs of these people during the year 1963/64. As previously mentioned the optimum patient/dentist ratio is 1,500/1.

4) In order to provide even the most rudimentary dental service it will now be appreciated that an increase in the number of dentists on the Coast is a prime necessity. The absolute minimum aimed at should be four, possibly stationed as follows:

i) St. Anthony, as at present

ii) Flower's Cove District. It is most essential that one dentist be permanently stationed in this populous area. At present there is no regular source of dental care between St. Anthony and Corner Brook, and the cost of travel from, say, Brig Bay to St. Anthony may often be prohibitive, especially in the case of large families. Furthermore, the dentist in St. Anthony has more than enough work in his own area. When the proposed hospital at Plum Point/Brig Bay is completed, it is to be hoped that provision will be made for a fully equipped dental department. One dentist could spend six months here and six months at Flower's Cove station providing at least a "skeleton" dental service in the St. Barbe area.

iii) WHITE BAY. One dentist could, with difficulty, cover the districts of Roddickton, Main Brook, Englee, Conche and Harbour Deep.

iv) SOUTH LABRADOR At least one dentist would be required for this area, including the districts of Harrington, Forteau, Mary's Harbour and Cartwright. It will be appreciated that even two dentists would be kept very busy in this area.

Present facilities for dental practice on the Coast.

Few of the Nursing Stations can at present accommodate a dentist without some disruption of the normal routine, and in many cases facilities for dentistry can only be described as ridiculous. If, in the average private dental surgery, the dentist considers it worthwhile to involve himself in a fairly large capital outlay in order that he may be able to give of his best under conditions conducive to efficient practice, it is no less incumbent upon an association like the Grenfell Mission to provide the best working conditions possible. The following detailed account of the present state of affairs gives an indication that there is indeed room for a great deal of improvement here. Where possible, an account of the work carried out at each Station has been given, in order to highlight the outstanding preponderance of surgical and prosthetic dentistry, and the token amount of conservative dentistry able to be done. Only in St. Anthony does the extraction/filling ratio approach that of an average practice elsewhere.

ST. ANTHONY

The present dental surgery, although well-equipped, is much too small. It is to be hoped that this will be given due attention in view of the projected replacement of the hospital buildings.

With the assistance of a dental technician and a chairside helper, the following amount of work was carried out in a ten month period between September 1962 and June 1963:

Patient appointments	4,200
Conservative treatments	2,949
Extractions (incl. surgicals)	2,265
Denture cases	262
Fees received	$7,675.63

(It should be noted at this point that school - children receive dental treatment, except dentures, free.)

FLOWER'S COVE

Structural alterations have taken place recently, including the provision of a dental surgery. This room, although tiny, is adequate at the moment, and its emergence is to be applauded. Some form of ventilating system is urgently required, as this room becomes unbearably hot during the summer. This is a prime factor in precipitating patient "faints", and likewise exhausting the person who has to spend all day in such confined quarters. A compressed-air supply is

needed together with a unit, including turbo-drill, and an instrument cabinet.

At present the existing pump-room is being used as a temporary laboratory, in the absence of any other accommodation. Provision of facilities and some structural changes could make of this little room a fairly adequate laboratory. There is a sink unit present, but it appears to have been disconnected from the drainage system. Is it really necessary to have a W.C. bowl in this room? There are now four bathrooms in the station, so the removal of this object may already be planned. Power points and strip lighting would have to be installed together with a ceiling to cover the unsightly display of naked pipes. This latter would have more than an aesthetic function as it is really most irritating to have condensation moisture drip down one's neck during work.

In a five-monthly period between March 23rd and August 23rd, 1963, the following amount of work was carried out:

Patient appointments	1,485
Conservative treatments	264
Extractions, (incl. Surgicals)	3,185
Denture cases	93
Fees received	$3,491.00

Of the original list of dentures required, there still

remains approximately 124 to be completed. This takes no account of the vast number of patients who have been rendered edentulous in this time. Less than one quarter of the school-children will have received dental treatment of any kind, and only a token number will have received a course of treatment to render them dentally fit for six months. The last visit by a dentist to this area took place over four years ago, and that for SIX WEEKS. The population of the area served by this Station is, according to the sources mentioned, between 4,500 and 5,000 in 28 settlements spread over 80 miles of coastline.

RODDICKTON

This station, designed and built in 1958, has no facilities for dental practice of any kind. Happily, there is a room, adjoining the present dispensary, which could be easily converted to an adequate dental surgery. For example provision of a sink unit would involve no great structural changes as there is already a piped water supply at the adjacent wall of the dispensary. Heating, ventilation and window lighting are good, and the number of power points could be increased without much difficulty.

The major disadvantage at present is the lack of privacy due to the absence of any form of solid partition between the "surgery" and the dispensary. Extension of the dividing wall would be required.

A fully equipped dental surgery, including X-ray unit, would be desirable in this station, as the dentist would have to spend at least six months of the year in this area, serving a population of 1,400 in Roddickton and 700 in Mainbrook.

At present there is no individual room suitable for use as a dental laboratory. During dental visits the drug room has been used for this purpose, but as there is no water-supply, inadequate lighting, and an insufficient number of power points this has not been satisfactory. It should be possible to equip this room without interfering with the work of the nurses. Alterations would not necessarily involve much reconstruction, and the available space would not be appreciably reduced.

This station was visited twice during the year 1962, giving a total of four and a half months. Our experience has been that this is not nearly long enough to carry out our work properly, especially in view of the inevitable large back-log of treatments required. There was little diminution in the amount of work requested during the last few weeks at the station. The total amount of work completed here was:

Patient appointments	1,022
Conservative treatments	208
Extractions (inc. surgicals)	1,979
Denture cases	94

Fees received $3,350.00

There is a great need here, as elsewhere, for a large increase in the amount of conservative dentistry carried out. This centre provides an excellent field for an intensive dental health campaign. It is sorely needed.

ENGLEE

As far as dentistry is concerned, this station is as well provided with facilities as a private house. To obtain space for a surgery one must either displace the nurse from her dispensary or clear one of the wards. The latter course was chosen during the limited time devoted to this large settlement, (4 weeks). There being no other available space, part of the same ward had to be used as a laboratory, without, of course, any of the necessary conveniences (see pages 6,7 & 8).

It is frankly asking too much to expect a dentist to spend any length of time in the station under the present set-up. Nothing short of major reconstruction or a new building would provide anything resembling the basic working conditions already discussed. If the dental health of the population is not to be completely ignored, as it has been in the past, something must be done. There is still a very large amount of work left undone in Englee, (pop. 850 excluding Canada Harbour and Hooping Harbour). Of dentures alone, there remain over 75

yet to be completed. The amount of conservative treatment carried out bears no relation to that required and the dental health of the average school child is, to put is mildly, shocking.

CONCHE

This is a newly built station of an attractive design, and kept in spotless condition by the nurse in charge. As before, there is no provision made for the visiting dentist. Previous to a three day series of "extraction clinics" in the summer of 1962, four years had elapsed since a dentist had been in Conche, a not uncommon experience among many of the settlements on the coast. Naturally there is now a formidable backlog of work to be dealt with. There are at least 150 dentures required to say nothing of the drastic need for conservative dentistry. Since there is absolutely no space available it is difficult to see how either aspect can be dealt with. Additional building alone would not solve the problem.

A minimum of six months hard work would be required to "clear the decks" and thereafter an annual series of clinics of two months or more.

HARBOUR DEEP

Again there are simply no facilities for dentistry of any kind. It might be said that to perform even the most apparently simple extraction in the tiny dispensary of this

station is to take a considerable risk. There is no dental chair, (an ordinary kitchen chair has to be used), no mobile light and no sterilizer. During a recent afternoon clinic, (the annual visit in this case), when 73 extractions were carried out, all instruments had to be carried upstairs, between patients, and boiled on the kitchen stove. The only available light was a naked bulb projecting from the low ceiling. During the latter half of the afternoon this light was extinguished by the dentist's head and the remaining extractions had to be done by the light of a tiny pencil-torch. It is doubtful if this is much of an improvement on conditions sixty years ago. What may have been considered "pioneering" in those days can only be described as professional squalor today. Certainly there can be no question of an extended visit to carry out necessary conservative and prosthetic work under these circumstances.

HARRINGTON HARBOUR

Both dentists who had the pleasure of visiting this hospital were very highly impressed with the dental facilities available and suggest that the set-up here might be used as an example of what can be done with some planning and foresight.

The surgery is spacious, well heated and ventilated, and equipped with an efficient unit including cuspidor, saliva ejector and a compact, easily-maintained turbo-drill.

Unfortunately, there is no dental X-ray unit to complete this very attractive picture.

The little laboratory is adjacent to the surgery, which is ideal. Equipment here is also very good, lacking only a model trimmer. Such pleasant conditions make one's work much easier, and enable one to carry out a greater number of treatments in any given time. Consequently, the immediate vicinity of Harrington is fairly well cared for dentally. A fairly large amount of conservative and prosthetic work has been completed and treatment-planning has been possible and carried to its conclusion in many cases, a cheering thought.

However, it should be remembered that this hospital serves a large outlying area, where the local inhabitants have no regular dental service of any kind. The only form of dentistry possible is surgery, and that performed in private houses by the light of oil lamps, using a simple domestic chair. Each of us has had much experience with this sort of thing, and remain convinced that it is a most unsatisfactory, and indeed dangerous method of attempting dental surgery. Some form of mobile dental clinic is urgently required. In the more remote islands of Scotland this problem has been effectively tackled by the use of boats fully equipped as dental surgeries, in conjunction with motorised clinics in suitable regions. Admittedly, the use of the former is limited here by the freeze-up, but even in six months a dentist could cover a

considerable area, and carry out a large amount of treatment efficiently and in comfort. During the rest of the year Station work could be carried out. Some experience has been had along these lines with the "Maraval". Past dentists have spoken highly of this boat, and one wonders if any progress has been made since then.

MUTTON BAY

There being neither water-supply nor electricity in this station, the practice of dentistry is out of the question. Extractions may be carried out under primitive conditions in the nurse's dispensary. Major construction would be required to provide the basic minimum of accommodation and facilities. The dental health or rather ill health of the population can be left to the imagination.

FORTEAU

At present the nurse's dispensary is the only room in which any form of dentistry can be practised, the nurse being obliged to hold her clinics in the adjoining waiting room. There is no dental chair, other than one of the worthless collapsible type, a source of constant irritation. Lighting facilities are quite inadequate.

For a laboratory, the only space available is a clearing in the stone-floored basement, where every form of necessary

equipment is lacking. As Forteau was visited during the winter, the temperature of this subterranean hideaway descended to a point where the walls became encrusted with hoar, and the water in the supply buckets froze. On many occasions work had to be postponed until conditions improved. Rather than disappoint the people of this area, (pop. 2,000 including district) dental clinics were continued until the Spring although this required an effort of will and physical endurance not easily repeated. Major reconstruction will be required to effect any improvement here.

Since the last dental visit of any length took place over seven years ago, there is an enormous amount of work required in this area. In four months, between November 22nd, 1962 and March 15th, 1963 , the following work was completed, being little more than the surgical and prosthetic back-log.

Patient Appointments	1,033
Conservative Treatments	26
Extractions, (incl. surgicals)	1,319
Denture Cases	84
Fees received	$ 2,374

The settlement of Red Bay has no building in which dentistry can be practised. During two short clinics, in a total of three day's work, over three hundred extractions were carried out by the light of a Tilley lamp, using an ordinary

kitchen chair and boiling all instruments on a kitchen stove. One shudders to think of the consequences of a patient collapsing from, say, Xylocaine allergy in such circumstances. Patients wishing dentures or conservative treatment had to come to Forteau for up to two weeks, - quite impossible in many cases. There is still a large amount of work left undone here.

MARY'S HARBOUR

Here again the only room suitable for dental surgery is the dispensary, which has to be shared with the nurse, to the great inconvenience of both. The dental chair is of the portable type already mentioned, being neither easily portable nor strictly speaking a dental chair. These unattractive structures may have fulfilled a deeply-felt need in the past, although it is difficult to imagine that they were ever very popular, being clumsy, uncomfortable, ugly, and in no way suited to the function they are supposed to serve. It is hoped that each station will shortly be equipped with pneumatic dental chairs of the type recently installed at Roddickton, and Flower's Cove. Lighter chairs of the type now at Englee could be used for travelling purposes. This chair is an efficient unit, elegant, functional and fairly comfortable, although in common with the old "collapsibles", a little heavy to carry around.

During the winter the surrounding district was visited by

dog-team, in company with the nurse and doctor. This was a memorable experience, and up to a point most enjoyable. From the dental point of view, this trip became a form of mental and physical torture. The afternoon clinic most frequently proved to be a marathon session of extractions extending well into the early hours of the morning. Invariably the "surgery" was a lamplit kitchen, with the inevitable wooden chair. It is far from the function of a dentist to spend his time rendering the populace edentulous en masse, however, much of the general dental health situation may indicate such a step. When recalcitrant three and four year olds have to be forcibly held down and literally manhandled, albeit for their own good, no dentist worthy of the name can feel anything but horror and revulsion. This type of "dentistry" was supposed to have passed with the disappearance of the last itinerant barber surgeon. Its reappearance is much to be deploded.

The following amount of work was carried out during the months of March, April and May 1962.

Patients seen	605
Conservative Treatments	397
Extractions (incl. surgicals)	505
Denture Cases	62
Fees Received	$1,705

CARTWRIGHT

The sole dental facilities in this station at present consist of a dental chair and engine in a fair sized, reasonably lit room. There is no unit, no cuspidor,no steriliser and no sink. There is no room for use as a laboratory, and no waiting room. Dental X-rays can be obtained only by the use of a machine quite unsuited to this purpose.

In the past two years a dentist has spent a total of four months in Cartwright, where there are close on four hundred school children alone. With the large surrounding areas the overall population is now over two thousand souls.

During a visit to Paradise River two years ago, children of fifteen and over were encountered who had never SEEN a dentist.

The first experience of dental surgery, in the typical bizarre setting of a lamplit kitchen, was a far cry from the ideal. It may be added that this experience of encountering primitive ignorance has been shared on several occasions by all three of us. Only recently, one of us had the alarming experience of coming across the results of an extraction carried out by one of the individuals known locally as "Tooth-Haulers",in this case no misnomer. The patient had a severe osteitis with massive superficial infection and two residual roots in a splintered condition. Happily this patient escaped

osteomyelitis, and has now recovered following extensive treatment and considerable suffering. This took place in one of the larger, less-remote settlements, where the arrival of a dentist was awaited for many years. A similar case in Labrador had more serious consequences, the patient sustaining a fracture of mandible and subsequent osteomyelitis. Although recovery was eventually obtained, external scarring of an unsightly nature will remain an indication of the patient's ignorance, the "Tooth-Hauler's" lack of skill and incidentally, a monumental reminder of the regrettable absence of any form of dental health service.

In the case of Cartwright, as in Roddickton, the situation is particularly galling in that an adequate dental surgery, complete with laboratory, could be provided with a minimum of upheaval, expense or reconstruction.

6) SUMMARY

Such are the facilities available for the practice of dentistry in this area. Much needs to be done, and that at the very earliest. Procrastination can only lead to a deterioration of this regrettable situation. That a great deal should have been done over the years is an obvious fact. It may be that lack of finances or other circumstances have had something to do with this blatant omission. Whatever the reasons, the facts are now exactly as detailed. It will be observed that the amount of conservative dentistry completed

in St. Anthony is considerably greater than that able to be carried out at other centres, for reasons already discussed. Furthermore, it should be borne in mind that the dentistry practised in the stations is , in most cases, available only to those living within easy travelling distance. This varies with climatic conditions and the calls made upon breadwinners during seasonal employment. A man cannot reasonably be expected to drive his children 20, 30 or even 50 miles to visit the dentist a number of times, if it means missing a morning's employment at fishing or wood-cutting, both short-season jobs in this region. Where travel is by boat, ie. in the majority of cases, this is completely out of the question.

What then can be done to better this situation? Nothing short of the creation of a full dental service will be of any avail. Serious consideration must be given to this, as the alternative is to have one dentist stationed in St. Anthony to attend to the needs of the hospital staff and local schoolchildren, and to abandon altogether the idea of providing dental treatment for the rest of the population. It is highly unlikely that independent dental practitioners could be persuaded to set up practice on the Coast in the forseeable future, due to the nature of the terrain, the difficulties of travel, and the wide distribution of the population. It can fairly be said that the I.G.A. has a duty to provide dental treatment as long as it provides a medical service. This cannot be denied by anyone who has the interests of the people,

and the Mission, at heart.

The prime necessity must remain an increase in the number of dentists on the coast, and a vast improvement in the existing facilities to enable each practitioner to carry out the maximum number of treatments in his power. We have considered the latter aspect in some detail, since we feel that in this respect we have between us, accumulated sufficient experience to be in a position to offer constructive criticism. We trust that it will be accepted as such. Likewise, having arrived on the coast "raw recruits" we feel that we may have something to add in the nature of suggestions for the further recruitment of dentists and associated staff and these we offer in good faith.

7) RECRUITMENT OF DENTISTS AND ASSOCIATED STAFF

The problem of recruiting a minimum of four dentists annually cannot be considered to be insurmountable. For example, in Glasgow University Dental School there is a tradition that one graduate goes each year to work with the Grenfell Mission, details of conditions being obtained from alumni. That there should be at least one potential "recruit" each year in Glasgow is surely a fair indication that it would be possible to obtain another three from the remaining sixteen dental schools in the United Kingdom alone. This takes no account of the young dentists in Canada and the United States

who may be interested in the work of the I.G.A. but, with the prevailing shortage of dentists and the high salaries which graduates can command in those countries, the attraction of crossing the Atlantic to work for a time is a factor of some importance, and an indication that the most fruitful source of graduates may yet be the United Kingdom. The salaries offered at present are unlikely to attract mercenaries from any part, but it may be said that dentists from Britian would, in the circumstances, be less likely to be dissuaded on this account than their colleagues in Canada and the United States.

In order to exploit this source sufficiently, it would be necessary to ensure that the needs of the Mission are made known. In recent years the majority of I.G.A. dentists have been informed of vacancies by Tom Kennedy, now a consultant oral surgeon at the Glasgow Dental Hospital. By virtue of his employment, Dr. Kennedy has had continuous contact with students, and has given much of his valuable time to the Mission in presenting a first-hand account of conditions on the coast to interested students. His efforts are to be highly appreciated. However, it is unlikely that a further three dentists could be recruited annually from Glasgow. There is naturally a limit to the number of graduates who would be in a position to travel, and work, so far from home for any length of time.

From our own experience we would suggest that more needs

to be done to inform and attract graduates from other Dental Schools, and put the following points forward for consideration:

a) A personal letter to the Dean of each dental school in the U.K. giving a brief outline of the requirements of the Grenfell Mission, together with information on the work, with special emphasis on the clinical experience to be gained.

b) A fully explicit pamphlet, compiled with the assistance of a dentist, giving details of work , travel, outdoor activities, living conditions, salary scale, etc., to be distributed to each Dental School through the Dean's office.

c) Advertisements in the main dental journals, e.g. The British Dental Journal, The Probe, The Dental Practitioner, etc., when a post is about to become vacant.

d) Potential recruits should be put in touch with a dentist currently employed on the coast, and where possible an alumnus.

There are very many attractive points which might be put forward in b). It is not to be thought that we consider our time spent on the Coast to be exclusively a series of traumatic experiences. On the contrary, we have thoroughly enjoyed our work with the Mission, and shall always remember our days on the Coast with great pleasure. Some of the features with which we have been most favourably impressed are worth recounting:-

i) Complete autonomy in work. One is able to carry out treatments of the type and method one prefers, without having to defer to the ideas of a senior, or practice principal.

ii) The experience to be gained in all branches of dentistry, especially dental and oral surgery. Although the amount of conservative work which one can carry out at Stations is regrettably small, there is an almost infinite variety of restorations required. Advanced laboratory work can be sent to St. John's, where it will be carried out quickly and well. Orthodontic work at stations is a problem because of the time factor, but again there is a very large amount required.

iii) The possibility of travel in connection with work. To city dwellers and commuters the ideal of travelling between settlements by aeroplane, boat, dog-team, or snowmobile is indeed most attractive.

iv) The complete co-operation of medical and nursing staff, and the many friendships gained thereby.

v) Comfortable living conditions.

vi) The great variety of outdoor activities. One is able to enjoy skiing, skating, sailing, salmon and trout fishing or even swimming, to mention but a few. In addition, one may find

time to participate in some more unusual pastimes such as trout fishing through the ice, cod and squid jigging, smelt angling by torchlight, or helping with the cod or lobster traps. If lucky, one may get an opportunity to accompany the local men on an "expedition" into the country after caribou, fur game, partridges, etc. The list is endless.

vii) The chance to visit Canada and the United States while on this side of the Atlantic.

viii) The opportunity of "amassing" a splendid collection of slides and movie film of all aspects of life in Newfoundland and Labrador throughout the seasons.

These are but a few of the aspects of life on the Coast which have given each of us much enjoyment and interest, and which might be expected to appeal to many of our colleagues.

DENTAL TECHNICIANS

The craft of the Dental Mechanic calls for a very high degree of manual skill, and extreme care and dexterity in the manipulation of precision instruments and materials. Dental materials are so accurately graded that a mistake in handling, resulting in an error of one thousandth of an inch in the finished appliance, would be considered beyond the limits to tolerance. The training of an apprentice technician takes a considerable time and requires a certain amount of study,

together with an intensive course in the use, properties, and manipulation of a wide variety of materials commonly used in prosthetic and orthodontic dentistry. Until he ha familiarized himself with the basic details and developed or acquired skill in the manufacture of dentures and other dental prostheses, an apprentice cannot be considered to be more than a liability to his employer. This required degree of proficiency cannot be attained in less than two years of continuous apprenticeship and study. In the United Kingdom a student must normally remain an apprentice for a minimum of five years before he is considered to have completed his training, which usually includes classes in technical college.

From the above it must be obvious that a dentist cannot adequately train a technician and carry out his own duties at the same time. Similarly, a dentist cannot profitably do the work of both. What then is to be done?

From every point of view the employment of local people as trainee technicians is to be commended. However, it would be much more profitable in the long-run if training was carried out in St. John's or mainland Canada for two years. We appreciate that this opportunity was open to the present "apprentice" technician, but for health reasons he was unwilling to go so far from home at that time.

At least three trainees should thus be recruited as soon

as possible, and sent for 'basic instruction'. Again this cannot be postponed indefinitely if any form of dental service is to be created.

Meantime, would it not be possible to obtain the required number of technicians on a contract basis from the U.K.? It is unlikely that technicians from Canada or the United States would consider the salary offered adequate, but again this would not necessarily be true of personnel from the United Kingdom. It seems likely that the features of work with the I.G.A. which we have listed as being particularly attractive to dentists would, in the main, also appeal to technicians. Perhaps some arrangement could be arrived at along these lines, whereby a trained technician would be engaged for each dentist currently employed on the coast. This is well worth some investigation, and we feel sure that alumni would be glad to make enquiries and give their views on the feasibility of such a step.

CHAIRSIDE ASSISTANTS

Since the chairside assistant works throughout the day in the surgery, it is no great drain on the dentist's time to train her in her duties and help her become familiar with the surgery routine. Once trained, she can, as already mentioned, help make the work of the dentist a great deal easier, and enable him to carry out his duties much more quickly and efficiently. Recruitment of local girls should not be a major

problem.

8) FINANCIAL ASPECT

That a great deal of money will be required to effect the improvements so desperately needed is an all too obvious fact, and one that has not been entirely ignored in our discussions during the preparation of this report. It is beyond our scope to discuss in any detail the finances of the I.G.A., but we would suggest that the outlay required for this purpose be regarded as a capital investment, on which returns will be obtained at a later date. From a humanitarian point of view it might be said that the benefit would be immediate and considerable, but we fully appreciate that the financial aspect in this case will be of prime importance. We have calculated in great detail the potential income, assuming four dentists to be working in favourable conditions with adequate equipment and are assured that the dental service, far from being a drain on the resources of the Mission, could in fact be a source of substantial income. In our study we have not allowed for any increase in dental fees, since we feel that radical changes would be unjustifiable at present. The problem then is equipment in I.G.A. hospitals and stations, in order that a minimum of four dentists may be able to carry out their work efficiently and comfortably. If the dental health of the population of this area is not to become the disgrace of the North American continent it must be realised that the finances MUST be obtained, and something must be done NOW.

We understand that the Government of Newfoundland does not normally provide dental services in isolated communities, but might it not be possible to come to some arrangement whereby the Government undertake to supply certain facilities, and the I.G.A. provide staff? In this connection it is worth noting that all school children receive dental treatment, except dentures, free. Also, as mentioned, it is unlikely that any private practitioners could ever be persuaded to attend to this area without substantial Government assistance.

APPENDIX I

DENTISTRY IN NORTHERN LABRADOR

The present state of dental health in Happy Valley, North West River, Rigolet, Postville, Makkovik, Hopedale, Davis Inlet and Nain is similar to that prevailing in South Labrador and Northern Newfoundland and leaves very much to be desired. One dentist can do little to improve the situation, or indeed to stem the widespread flood of dental ailments. The main factors responsible are:

a) Lack of dentists.

b) Lack of auxiliary personnel.

c) Absence of any form of dental health education.

d) Dietary condition of indigents.

e) Inadequate facilities in Stations.

f) Absence of accommodation for clinical and laboratory practice in many places.

g) Shortage of instruments and equipment.

h) Difficulty of communication in the case of Eskimo and Indian patients.

The dental office in Happy Valley is ill-equipped and small commensurate with the population. Patients have to wait several weeks for an appointment, and transportation problems often make it impossible for some patients to attend during clinic hours. The population of Happy Valley is increasing rapidly, and a full-time dentist is required in this expanding community alone. The R.C.A.F. dentists stationed here have given much assistance in connection with a dental health programme initiated in Happy Valley Schools. They have undertaken to carry out all the oral examinations and, according to statistics compiled and submitted by Major Fell, senior officer of the dental unit, there is work for a full-time dentist for FOUR YEARS treating SCHOOLCHILDREN ONLY. There is also an enormous amount of orthodontic and prosthetic work required, necessitating the services of two full-time dental technicians.

The most rigid dental health measures are urgently required. Patients in their teens and early twenties are already wearing dentures and the evidence of total dental neglect in previous years is appalling. Approximately 90% of schoolchildren need palliative treatment, (usually extractions), aside from other measures. Fluoridation is not possible because of lack of central water supply, and the

dentist has no time to carry out regular courses of local application of stannous fluoride. The employment of a dental hygienist in addition to other auxiliary personnel is well worthy of consideration. The preventive treatment of caries and periodontal disease is the prime aim of the dental profession, and it is much to be regretted that dentists in this area are so swamped with palliative and prosthetic work that little attention can be paid to the former aspect. At least 50% of teeth lost are extracted because of advanced periodontal disease which could have been prevented by simple oral hygiene and regular scalings. To have to deal with this sort of thing every day is a galling and bitter experience for any conscientious dentist.

In North West River the problems, although considerable, are less grave than those of other stations. Orthodontic treatment is urgently required in a large number of cases, and as usual a long term dental health programme is needed. Funds are needed to provide a suitable drive amongst schoolchildren to raise interest and stimulate co-operation. The Indian population have had a minimum of dental treatment previously, and are still apprehensive of any unfamiliar techniques. Hence an educational programme is much required here also.

Nain, Makkovik and Hopedale are alike badly supplied with equipment, instruments and materials, and facilities for dental practice. Nurses give much assistance but this is naturally

limited in scope. Lack of X-ray apparatus prevents thorough oral examination, and patients requiring radiographs must come to North West River, which in many cases is virtually impossible due to travel difficulties. Transport is indeed a major problem in this region, and much time is lost in this respect.

Eskimo patients are often unable to make their main complaint known because of the language barrier. Perhaps it would be possible to employ auxiliary staff able to converse with Eskimo patients?

Postville, Rigolet and Mud Lake are without stations, with the result that all procedures are carried out, if at all, under the most primitive conditions. Many types of treatment cannot be done in these places, and follow-ups are, of course, impossible. Further and more frequent visits of longer duration are necessary. Again preventive dentistry and a programme of dental health education are required urgently.

The comments on facilities and personnel in other parts of the I.G.A. district also apply to North Labrador. A complete reappraisal of the needs of the large population in this area is long overdue. An organised dental service suited to the conditions peculiar to the Coast must be instituted at the earliest time possible, and a very large increase in dentists and auxiliary staff should be considered vital to the

well-being of the ever-increasing population.

Ramon I Ramirez, D.D.S.

(Dentist N. Labrador)

SUMMARY

The above report gives the opinions of the dental staff attached to St. Anthony Hospital, and the Appendix gives the opinion of the North West River dentist, regarding the practice of Dentistry under I.G.A. Especially discussed are facilities available for dentistry in the various Nursing Stations, recruitment problems, finance, with the possibility of expansion of the service borne in mind.

Cursory reading of the report is sufficient to show that conditions are far from ideal, and that the present set-up cannot be allowed to continue. The Superintendent and Directors of I.G.A. have a responsibility to the people of Labrador and Northern Newfoundland to see that it does not continue. Dental practice is a lucrative business elsewhere in the world; there is no good reason, providing proper facilities are made available, why it should not become so under I.G.A.

Certainly reform must come soon, and whether that involves expansion of the existing services, or their abandonment; whether it involve financial or business principles; or whether the health of the patients concerned takes precedence over such matters; in any event, the compilers of this report earnestly hope that in it's pages they have provided not only constructive criticism of the existing set-up but that they have made suggestions which will be of some assistance to

future reformers.

Ruth E. Griffiths L.D.S. (Dunelum)

William R. Hutton B.D.S. (Glas. U)

David A. Mason B.D.S. (Glas. U)

With an appendix by Ramon I Ramirez D.D.S.

APPENDIX II

DENTAL REPORT FOR NORTH WEST RIVER AREA

(June 1967 - June 1968)

James G. Messer B.D.S.

Dental Surgeon

DENTAL REPORT FOR NORTH WEST RIVER AREA (June 1967 June 1968)

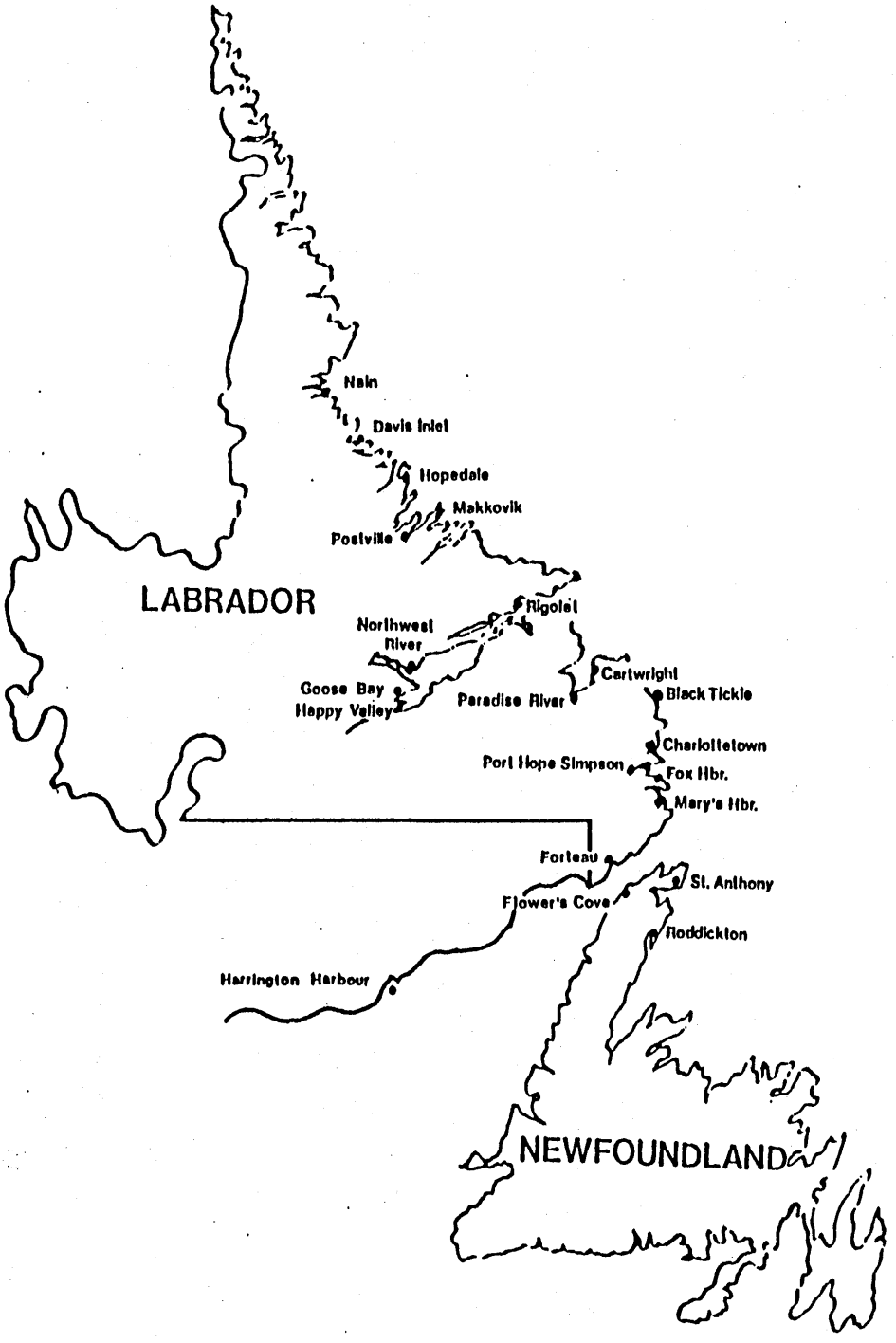
North West River
July 28th, 1968

James G. Messer B.D.S.
Dental Surgeon

INTRODUCTION

The purpose in making this report is to try and show the amount of dental work needed in this area and also to perhaps bring to light some of the problems confronting any dentist working in this area. Since January 1968 the additional burden of Happy Valley has been added. This was unusual and unfortunate and may not happen again but nevertheless the repercussions of the time spent there and the added work load have meant that less time was spent on the Coast. The standard of dental health and hygiene in the small coastal villages is very poor. In some cases indescribable. The dental services provided are minimal and at the moment are not even maintaining a status quo.

In normal circumstances the dentist at N.W.R. will not be responsible for Happy Valley therefore, in this report only the coastal area and N.W.R. will be considered, however, a few remarks based on recent experiences there may be helpful.



MAP OF THE AREA

The report itself will be made under the following headings:

1) Map of the area.
2) Population Figures.
3) Facilities and Equipment Problems.
4) Dental Health in General.
5) Financial Aspects
6) Urgent Recommendations.
7) Long Term Policies

APPENDIX

1) Statistics for 1968/69.

The above list of headings will be further subdivided where necessary and the relevant references given. Every attempt has been made to make this report accurate and objective, although in a profession which involves such a high degree of personal contact and detailed work the conclusions must be of a personal nature in some respects.

1) MAP OF THE AREA

2) POPULATION FIGURES

A) Labrador North (Approx)

Settlement	Population	Increase per year
Nain	689	25
Davis Inlet	180 (approx)	9
Hopedale	328	14
Postville	118 (approx)	4
Makkovik	342	12
Rigolet	120 (approx)	3
North West River	1100 (approx)	20
Total : 2,877		

B) Labrador South

Cartwright	760 (approx)	18
Paradise River	270 (approx)	7
Black Tickle	100	3
Batteau	90	2
Seal Islands	50	?
Total: 1,2700		

TOTAL:	4,147	97

The birth rate in N.W.R. would, on a personal estimate be about 30 to 40 per annum. This would mean the annual increase in population is around 130 for the whole area.

2) FACILITIES AND EQUIPMENT PROBLEMS

a) NAIN: This is the most northerly settlement consisting of about 700 people. 2/3 of the population are Eskimo, and the remainder being White settlers.

Facilities: Nain is probably the best equipped station in Northern Labrador. There is a dental chair. A light and simple facilities for patient recovery. There is ample space for dental mechanics and also the accommodation is very good.

Working Conditions: In Nain these are quite good. The nurse has instilled a fair system and patients rarely come after hours or on Sundays. Those who do are usually genuine. The children, as in most places, are mixed in their behaviour but in the 3 1/2 to 8 age group among the Eskimos especially not too much can be done. The only way that the appalling amount of chronic sepsis in this group can be reduced is by mass extraction under G.A.

Fees: The standard charges are completely unrealistic here with the exception of a few people who have government jobs. Department of Northern Labrador Affairs. Most people cannot

afford them. The ways in which this causes problems for the dentist will be discussed later.

b) DAVIS INLET: This is an Indian settlement of about 180 people.

Facilities: None. All equipment has to be brought in.

Working Conditions: Fair, but as with any indigenous people the language barrier is a problem. This is offset in part by the Priest there who is very helpful.

c) HOPEDALE: The same as for Nain applies with the following exceptions:

Facilities: Poor. There is no chair, the dispensary is cramped and difficult to work in. During the nurses clinic it is impossible to work. Facilities for making dentures are very poor, little space. Accommodation is poor but being rectified this summer. There is no internal phone service in Hopedale.

d) POSTVILLE: This small community has no Nursing station and the only facilities available are at Mrs. Sheppard's. No light, no chair, no running water, variable electricity, no space for denture making no trained help, no patient recovery facilities. All that can really be done here are simple extractions and very simple fillings.

e) MAKKOVIK: Smaller community than Nain but has similar facilities. One exception is there is no chair.

f) CARTWRIGHT: A settler community with no Indians or Eskimos.

Facilities: Excellent. A fully equipped surgery with equipment. Air-rotor. X-ray (to be wall-mounted yet). The accommodation in the staff house is excellent.

Working conditions: Very difficult in some ways. Patients tend to come when it suits them. Cartwright seems to be a village at war with the facilities they feel they should have. Many complaints and a lot of difficult patients. The children generally are very good. Most people are very good at paying the fees asked but reductions are necessary in many cases. One problem for some people is getting over to the surgery as transport is scarce.

g) RIGOLET, BLACK TICKLE, BATTEAU, PARADISE,AND SEAL ISLANDS
I have not yet visited but would assume the facilities and accommodation to be minimal.

h) NORTH WEST RIVER: The largest community and the base from which the dental services work. Consists of Indians (400), Eskimos (30) and Settlers.

Facilities: Excellent. The only problem is space. The dental lab is small and cramped, also more space is needed for records and office work.

Conditions: Reasonable. One serious drawback is the lack of communication between the dental and medical staff.

Happy Valley and Goose Bay (D.O.T.)

In writing this part I would like to state the following information which is accurate to the best of my knowledge.

It is the intention of the I.G.A. to have ONE dentist in charge of the Valley which has a population of around 4,500 people. Also there is to be ONE dentist who will spend alternate two weekly periods between a clinic at the D.O.T. area in Goose Bay and Churchill Falls. Allowing for the fact that between them these two dentists will carry the load (as far as I am aware at this moment) of the civilians on the U.S.A.F. Base of Goose, it seems a pretty big undertaking. The problem is that in Churchill Falls, even with a peak of 5,000 people the number of people going through Churchill in a year must be nearly double this number. Leaving the Churchill / D.O.T. part aside, I am uncertain if the I.G.A. has an obligation under the Newfoundland Hospital Plan to provide dental services to the dependents of military personnel.

With this in mind it seems to me that to expect any dentist to provide (Happy Valley) with more than a very rudimentary service is wishful thinking. The intention that he/she will also be doing school checks and treating children on a routine system seems ludicrous. In Scotland, I spent a full year in a school of 450 children aged from 5 to 13. This was working steadily five days a week with a full-time qualified chairside assistant and a dental mechanic. This was

also in an area where dental facilities were available. It took me a year to clear up the dental problems. In Happy Valley there are about 1,200 children at school and NO qualified assistants. If my time was devoted entirely to the children and allowing for the 400 people on the list to be seen it would seem that the Valley dentist is going to be a busy person. How long a dentist can work under that pressure will remain to be seen. As of now NO visiting dentist has expressed any desire to return. It is unreasonable to expect one person to cope with the load. It is obvious that it is better for the I.G.A. to provide some service than have none at all but when one dentist is asked to do the work of two the strain is immense.

In conclusion it would seem that to expect two dentists to carry out and do good dental work with a population already in a poor dental condition of around 15,000*, is unrealistic.

* This figure is arrived at by adding Goose Bay 8,000 and Churchill Falls 3,000 to the North West River area of 4,000.

4) DENTAL HEALTH IN GENERAL

The only large group that can be studied fairly quickly and easily are the school children. The dental health of this group is appalling, especially the younger children of 6-12 years of age. Up till now I have carried out detailed chartings and examinations of the schools in Cartwright; Hopedale; and Black Tickle. I intend to complete the other

schools in the area by June of this year. These two communities, Cartwright and Hopedale, are fairly typical in that one is an all-Settler community and the other is mixed, Eskimo/Settler. From the thirty or so pre-school children that I have seen; the only conclusion that can be reached is that the dental health in this group gives rise to serious concern. These children are if anything worse off than their elder brothers and sisters. This group (3-5 year old) are also the hardest age-group to treat. It is very hard to arrange general anaesthetic sessions on the coast. The best that can be done at the moment is to bring them in, in two's and three's to N.W.R. and treat them here. Tabulated below are some of the findings to come out of the surveys. The figures indicate the work <u>that requires to be done</u>.

Table 1 <u>Cartwright</u>

Grade.	No.	Ext.	Fil.	Ortho.	Urgent.
1	18	99	16	0	7
2	16	57	14	0	2
3	23	72	30	3	4
4	18	44	28	2	3
5	19	71	32	2	4
6	16	34	18	1	2
7	12	8	38	1	2
8	17	15	69	2	6
9	29	39	112	3	8
10	11	11	32	2	4
11	2	2	3	0	0
Totals:	181	458	392	16	42

Table 2 Hopedale

Grade.	No.	Ext.	Fil.	Ortho.	Urgent.
Kgtn.	18	78	10	0	12
1	14	47	31	0	4
2	12	47	18	0	2
3	7	17	12	0	2
4	13	19	51	2	2
5	7	9	34	0	0
6	6	14	22	0	3
7	3	1	7	0	1
8	6	2	23	0	0
Totals:	86	234	208	2	27

The above figures only represent the children seen on the main survey. There were about 40 absent, some of them have been seen since. All fillings marked are required in permanent teeth, and the ortho., treatment is required in severe cases of occlusal dysfunction only. The aesthetic side which was found in many others was not included in this list.

Even from these two groups alone, several similarities can be seen. The actual amounts bear a fairly equally distributed caries pattern. I also have the figures for the deciduous fillings needed and they shown that the 5-7 age group are in poor shape, dentally. In fact dental health is appalling.

There is vastly more work available than can hope to be done. Even if things stayed exactly as they are now it would

take the service of a dental team, working under prevailing conditions at least a year to clear up the work. In Cartwright there is a transport problem between the village and the clinic. In Hopedale there are no dental facilities.

The dental health of the other communities is very similar, with regard to the school children. In N.W.R. there are now about 200 Indian children in the Indian school on the other side of the river. If the few that have come for treatment are typical, their dental health must be very poor. When a year was mentioned in reference to the above work, that only included Hopedale and Cartwright school children, not the entire school population.

At the moment a <u>minimal</u> emergency service is being rendered. Unless something more effective is done there will be a hopeless situation by 1974. At the moment it is deplorable and it will not improve in the near future with current manpower and facilities.

5) FINANCIAL ASPECTS

<u>Dental Fees Collected During the Year 1968.</u>

Fees collected and handed into the accounts office in N.W.R.. This list does not include bills which have been paid directly into the office, nor does it show the fees paid by patients during my visits to Happy Valley Hospital. This list

also does not include the fees collected at the nursing stations after the dentist has left. At least three times as much as shown is still owing. The chances of recovering this sum are not good since no follow up system is in place.

Table 3 Finances Collected in 1968

DATE	Receipt No.	Amount
9-1-68	41003	66.75
18-1-68	41074	100.00
12-2-68	31979	48.85
22-2-68	14302	341.0
6-3-68	14385	100.65
6-3-68	14384	16.15
24-4-68	148	196.0
8-4-68	116	131.00
3-5-68	217	141.50
11-6-68	367	152.50
13-6-68	369	15.00
6-8-68	504	347.00
10-8-68	507	327.00
12-9-68	557	80.00
12-9-68	558	73.00
18-11-68	661	200.00
18-11-68	662	205.00
9-12-68	670	24.00
	Total	$2,565.00

1) In the northern settlements a situation exists where Eskimos and Indians are not expected to pay for treatment. The White settlers are and this causes resentment. It is a difficult situation and one tries to handle it as tactfully as possible but it does make collecting fees difficult. The nurses at the stations take the brunt of the resentment. Bills are occasionally sent but it is rare for them to be paid. It is useless in most cases to charge the current I.G.A rates so

usually an attempt is made to charge what the patient can afford, working on the principle that it is better to collect something than nothing at all. The only places where cash is forthcoming is N.W.R. and Cartwright.

2) Many of the more expensive forms of treatment are carried out in hospital, at N.W.R. Extensive surgical procedures and denture work done on in-patients are not paid for because it is assumed they are covered under the Hospital insurance scheme. It is possible the I.G.A. receives payment from the Department of Health for these procedures, however, this is not made clear.

3) A great deal of a dentist's time is spent working on school children, who receive certain forms of treatment free. This time must therefore be considered as lost to the Mission as income is concerned.

It is pertinent to give some facts and figures. This Jan/Feb., during a trip to Hopedale lasting ten days the difference between what was earned and was collected is interesting. It also demonstrates that in a place where people can afford the normal rates there is no reason why a dentist should not collect $2,000 a month. In Churchill Falls and the Goose Bay clinic it should be possible for the I.G.A. to make a profit. It is my understanding that it costs I.G.A. about

1,500 dollars a month to maintain a dentist. Below are tabulated the Hopedale results.

Table 4 Hopedale Visit Jan 29th - Feb 8th (incl) 11 days

No of Patient visits	178
Eskimo	103
Whites	73
Negro (Marconi employees)	2

Item	Quantity	Value(Approx)
1) Extractions	98	300.00
2) Full Dentures	7	350.00
3) Denture Relines	5	150.00
4) Partial Dentures	3	75.00
5) Fillings	16(PERM)	50.00
6) Scalings and Med.	9	60.00
7) Check ups	87	--
8) Miscellaneous (Polishes, dressings etc.)		20.00

Total Value of Treatment Provided: $1,005

The amount of hard cash collected amounted to $96.00 with a possible $100.00 to be sent in later. Allowing for the fact that some of the fillings and extractions were carried out on children the above figures given some idea of the problem.

Half the total cash earned is for denture work in its various forms, since the dentist does all the laboratory work the loss is to a great extent minimized. If these dentures were made in a commercial lab., the cost to I.G.A. would be

appreciable. This laboratory work is done outside normal working hours except in N.W.R.

The simple fact is that people are not willing to pay for dental services. There are many reasons for this which are complex. On occasion some forms of treatment have been refused until some payment is made, eg. dentures. This may produce a $5.00 bill or more rarely $10.00. Another point is that it is almost impossible to decide at times whether a person is Eskimo, Indian or White. A person I would consider definitely to be white will say he is Eskimo and refuse to pay. It is not so much that people refuse to pay they simply never have any money (at least for dental treatment) on hand. It is rather a difficult situation.

It would be useful to have some information on the Indian/Eskimo payment system. The present system of working by the numbers seen is hazy to say the least. The hospital insurance scheme also needs clarification.

6) URGENT RECOMMENDATIONS

While understanding that the I.G.A. is very short of funds and assuming that this means that very little can be done to help the area it is important that if any policy is planned for the future it would be best to go about attacking this problem on a broad front. It is ineffectual to continue sending dentists into this area unless they are supported by a team

that is trained and equipped to assist him. My remarks are confined to N.W.R. and the coast. Happy Valley/Goose Bay and Churchill Falls are a different problem. Listed below is a method of trying to achieve the maximum effect using the minimum of funds with as few staff as possible.

1) Fluoridation

The water supplies of the communities are mostly on a personal basis therefore a water fluoridation scheme for each settlement would neither be practical nor possible. A suitable way to administer fluoride would be by tablet or drops. Vitamin drops which contain fluoride, in the form of Sodium Fluoride, could be administered to children from birth to 3 years of age. Tablets are available for children from 3 until 19.

Essentially fluoride administration should be carried out from birth until fifteen. A bottle of fifty tablets costs $1.50 thus the cost to the parent is 3 cents per child, per day. This may be too much for some, but if a subsidy could be arranged it would still be less expensive to I.G.A. than the free treatment these children will inevitably require. By its ability to prevent dental caries fluoride also helps to delay the onset of caries thus putting children into an older age group before they require dental treatment, thus enabling dentists to treat these children restoratively.

The administration of this programme should be done by a dental hygienist. The duties of a hygienist, as set out in the British Dental Association Journal are as follows:

1) Removal of calculus (Scaling)
2) Cleaning and polishing of teeth
3) Individual and group instruction in oral hygiene and dental health education.
4) The topical application of fluorides or other prophylactic solutions.

This last function particularly would be of considerable benefit. The advantages of having a full-time hygienist cannot be over-emphasised. The fact that children could be continually exposed to dental education and training from an early age would help enormously. Currently, few children have a toothbrush never mind know how to use one. Many parents would also become aware that dental decay can, to a large extent, be prevented. This would in itself be an advantage.

In their capacity to supervise and promote dental health, as well as apply topical fluoride the hygienist would be a great asset. They should be qualified hygienists, a girl trained locally by the dentist is not the solution.

2) Essential Equipment

The days when communities were small enough to require only a few extractions using a kitchen chair and dim lamplight are gone. Nowadays, patients demand and expect more, quite

correctly. For a dentist to function effectively and perform intricate and good conservative treatment, they need basic equipment.

Conservative work done on children is very tiring for many reasons e.g. saliva control, behaviour, length of time procedures last, small areas to work in etc. My experience as a school dentist in the U.K. for 1 1/2 years taught me how to handle children know their limitations and carry out paediatric restorative dentistry. The minimum equipment necessary for reasonable treatment is:-

1) A dental chair
2) A unit and handpieces
3) A light
4) An aspirator

More important however is space to locate this equipment. In Hopedale or Makkovik it is impossible to locate them at present, especially in Hopedale. The weight of a dental chair makes it a permanent fixture. A unit, if its services are to function, properly has to be permanently placed.

This means that a small permanent dental office has to be added to the stations. This small room need not be very large. 12x14 would be ample. This requires funds, however, it might be possible to use the services of the Summer Volunteers for the labour and construction. Having a small permanent clinic room at each station is essential.

Denture work could be centralized in either Happy Valley or N.W.R. (wherever the technician was based) and fitting and insertion done at the stations. In future few dentists will be capable of or prepared to do their own laboratory work. Facilities for such work at the moment are non-existent and only the dentists ingenuity makes it possible.

3) Other Auxiliary Staff

A dentist should be supported by:-

a) A dental assistant

b) A dental technician

c) Access to an anaesthetist with dental anaesthetic experience.

The assistant should accompany the dentist on trips to the coast and the technician should be located in a centralized laboratory (Goose Bay). The anaesthetist should be available to allow G.A. sessions on the coast as well as N.W.R. The more complex and difficult cases to be referred to N.W.R.

These are urgent requirements if there is to be any hope to improve dental health of the children in this area. At the moment there are a dozen children between ten an fifteen years of age in Cartwright who are, or will be, edentulous by the time they have the necessary dental treatment carried out. These suggestions will not stop the urgent need for more dental

services, but they might retard the rapidly accumulating backlog.

7) LONG TERM POLICIES

By 1972 there should be two dental teams working in this area.

Team A

A dentist primarily concerned with school clinics. This dentist should be supported by the following.

i) Essential basic facilities in each location

ii) The backing of a Dental Hygienist

iii) A dental assistant

This group would also be responsible for the preschool children. They hygienist, in her capacity as a dental public health nurse, would also work in liaison with the team. For example the hygienist would inform patients of pregnant mothers requiring dental care.

Team B

A dentist primarily concerned with adult dentistry. This team would also be responsible for the patients requiring hospital care. This team would be made up of:-

i) Dentist (Preferably with oral surgery experience)

ii) Dental assistant

iii) Dental technician

Both of these teams would require the services of an anaesthetist with experience in dental anaesthesia. The orthodontic work should be done by the school dentist but both dentists could engage in the follow-up procedures. The technician should be able to make removeable appliances.

Although these measures are suggested as a solution to the problem in the N.W.R. area, they would also be useful in Happy Valley, with its large school population. This area obviously requires another dentist if any progress is to be made. Over the entire Mission responsibility the need is probably the same and in some areas it might be more urgent.

After Medicare is introduced and people have a right to dental treatment, and are led to believe dental services are available, it will make life impossible for dentists under current conditions. It is hard to cope with present demands.

It is possible that the idea of two dentists working in an area of 5,000 people will be considered more than necessary if solely judged by the dentist/population ratio. In Canada and the U.S.A. dentist population ratio 1:2,000 is considered adequate for a dentist. However, with the present backlog, and the difficulties inherent in the area, a smaller ratio is probably justified. Whether anything can be done at the moment depends on finance and the present financial outlook seems to be bleak, so sadly, in the next few years the prospects for

improved dental services do not look good.

However, it is worthwhile making some plans because unless there is a sense of direction the future is not encouraging for dentists working with I.G.A. in this area. It is disheartening to know that no matter how much work one does there is always ten times the amount left untouched. Perhaps it is being idealistic to hope for more.

I hope the suggestions I have made will help if a dental plan is considered for this area.

James G. Messer B.D.S
Dental Surgeon
North West River

February 25th, 1969

APPENDIX III

TRAVELLING (PORTABLE) DENTAL UNITS

APPENDIX III

Travelling (Portable) Dental Units

The travelling dental units illustrated in Figures 3:1 & 3:2, were designed and constructed by the author between 1977 and 1978.

They were designed to be activated by compressors located at each of the travelling clinics where no dental facilities existed and to replace the previous units which had a self-contained compressor. These units were very heavy, and were easily damaged. They were a constant source of frustration.

The basic design has a self-contained water system that is pressurised by air from the compressor, the pressure being adjusted by the valve located in each unit. Having a self contained water reservoir served two purposes. Firstly, it obviated the need for plumbing at each clinic. This would have meant installing a unit which in 1977/78 was not possible at most clinics since neither space nor funding for such units was available. Secondly, since many of the water supplies had high levels of sediment in the water and clogged the control blocks the water bottle would be filled with distilled water or clean water.

Other built-in features were either drawer space or a container to carry hand instruments and materials. The holsters were located on sliding extension in order to make them accessible when in use (Figure 1).

TRAVELLING UNIT NO 1. MARCO UNIQUE CONTROL BLOCK

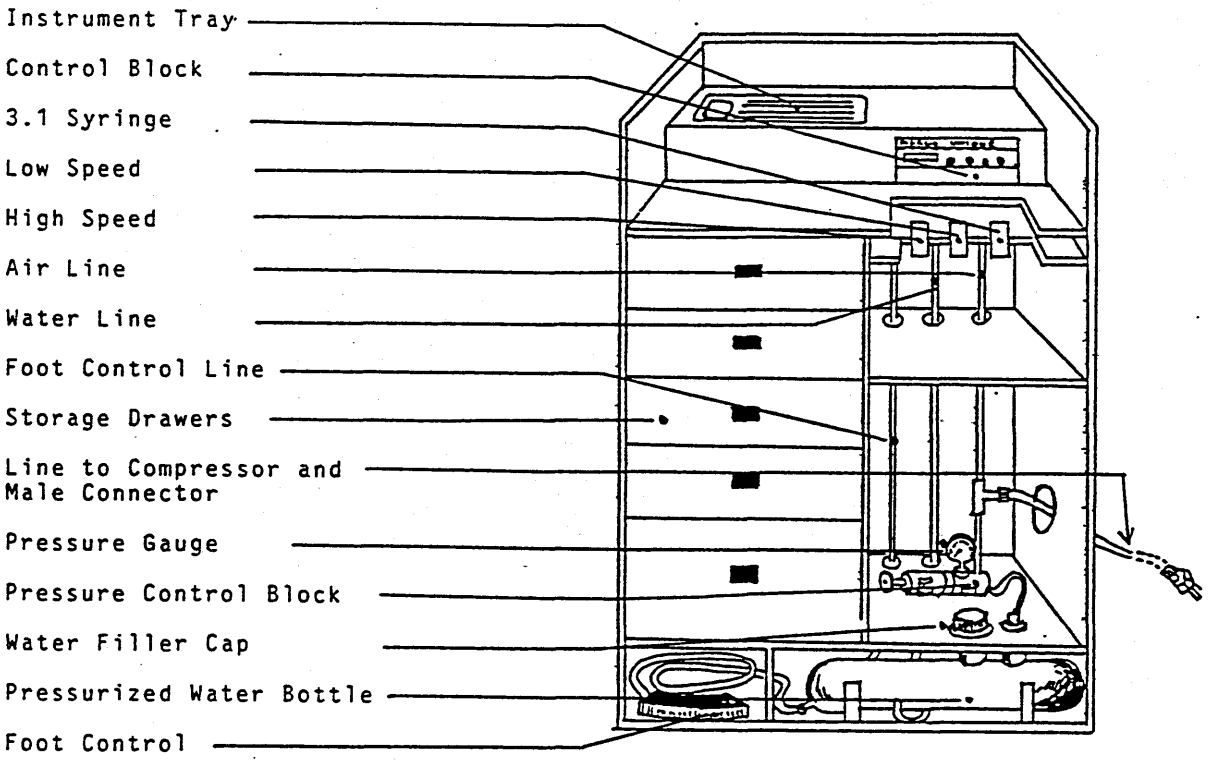


Figure 1 Diagram of Travelling Unit No. 1 showing location of Parts.

The weight of each unit was 26lbs, Unit 1, (Figure 1) and 14 lbs, Unit 2, (Figure 2) including water in the bottle. Stout cases were also used to protect them during transit.

Instructions regarding their use were attached to each unit and handpiece system. The instructions were as follows:-

UNIT INSTRUCTIONS:-

To use these units please read this information carefully and carry out the instructions precisely to ensure satisfactory service and safety.

1) Ensure there is an adequate supply of water in the container.
2) Always use clean water and maintain the level between the maximum/minimum levels.
3) DO NOT under any circumstances attempt to refill or remove the water container filter cap when pressurised.
4) If the outside temperature is below freezing point when travelling between clinics you should empty the water container or damage will result.
5) Make sure the male connector is correctly located in the female connector on the compressor. The safety clamp should be fully in place.
6) The water pressure value should be correctly set, however, if compressor pressures vary it can be adjusted by turning it clockwise to increase pressure and counter-clockwise to reduce pressure.

TRAVELLING UNIT NO 2. MARCO CONTROL BLOCK

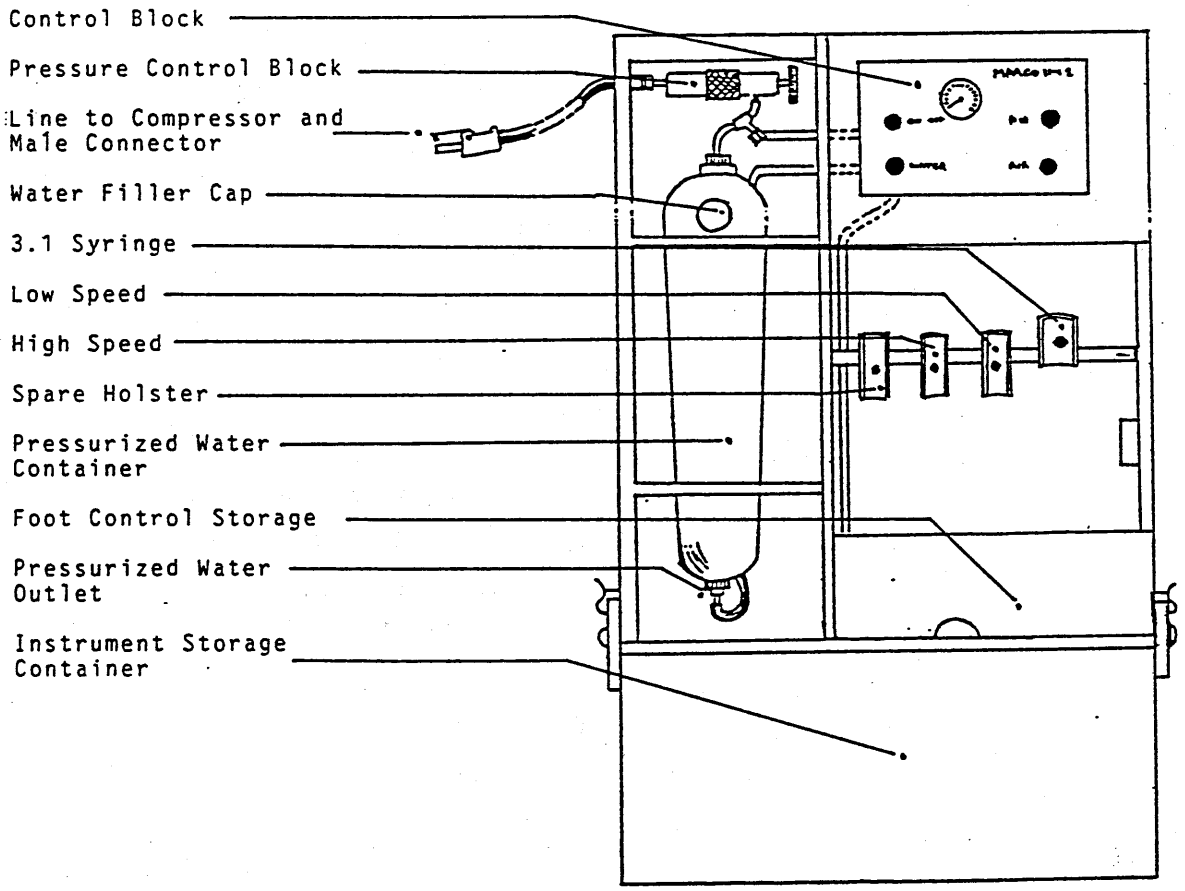


Figure 2 Diagram of Travelling Unit No. 2 showing location of Parts.

7) The water supply container (Volkswagen windsource washer bottles) will sustain approximately 12-14 hours use depending on 3:1 syringe usage.

HANDPIECE INSTRUCTIONS:-

1) Ensure the handpieces are connected to the correct outlets. 3 part connectors are for high speed and 4 part connectors are for the slow speed Kavo Motors.
2) Insert the handpieces in the correct holster. The holster valve is set for high speed (water) and low speed (no water).
3) Put the water valve switch in the off position when using the slow handpiece.
4) Make sure the handpiece holster shelf is inside the unit before putting on the carrying case cover.
5) Store the handpieces securely in the space allocated for them during transit.
6) DO NOT use oil in the highspeed handpieces, only the low speed.

Finally, these units are an interim measure, they are only intended to be used until permanent units are installed at each travelling clinic.

The instructions are the same for units 1 and 2.

APPENDIX IV

DENTAL STATISTICS FORMS

APPENDIX IV

DENTAL STATISTICS FORMS

Introduction

The forms are required for dental statistics and essentially designed to fulfil two purposes. Firstly, to keep accurate statistics for G.R.H.S. records of the dental work being done and secondly, to permit the accurate calculation of the value to the work we carry out under the various Department of Health and Department of Social Services Dental Programmes. They are also designed to provide statistics for research purposes.

Forms currently in use are tabulated below, followed by instruction.

1) GRHS-2e Daily Dental Treatment Record
2) GRHS-6e Dental Monthly Return
3) GRHS-9e Dental Treatment Provided under Children's Health Programme
4) GRHS-7e Dental Monthly Return for Children 1-12
5) GRHS-8e Daily and Monthly Record of Welfare Treatment

1) GRHS - 2e: DAILY DENTAL TREATMENT FORM

This form is used daily and has the following roles:

i) Daily treatment record for dentist

ii) Daily treatment record for hygienist

G.R.H.S. -2E
Location_____

DAILY DENTAL TREATMENT RECORD

Dentist/Hygienist_____ _____

NAME	STATUS: Birth-10	11-19/Staff	Welfare	Veterans	Full Rate	Insult	Indian	A.N.K.	DIAGNOSIS: Exam & Chart	Consult	Periapical	Bitewing	Other	EXODONTICS: Deciduous	Permanent	G.A. Outpatient	G.A. In-patient	Surgical Outpatient	Surgical In-patient	OPERATIVE SURGERY: AMALGAMS / SURFACES / Decid 1 2 3 4 / Perm 1 2 3 4	Composite: Simple	Composite: Complex	Acid Etch	Inlay	Pin Tech	P.J.C.	Acrylic J.C.	Bridge	Dressing	Trephination	Pulpotomy	Root Canal F.	Sc & Pol	Surgery	Splint	PREV.: Prophylaxis	Fl.App.(Incl.Prophy)	O.H.I.	C.	ORTHO.: Study Models	Appliance F.	Adjust	Finished T.	PROSTHODONTICS: Misc. Procedure	Reline	Repair	Insertions: Acrylic F.U.	Acrylic F.L.	CC F.U.	CC F.L.	P.U.	P.L.	Drug Rx	Other Procedure	Number
																																																				1
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Code	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	

GRHS - 2e Daily Dental Treatment Record

iii) Monthly Accumulation form for both hygienist or dentist.

Information which the form will supply:

Columns 01-07 give the status of each patient and columns 09-60 provide information on the work and treatment carried out by the dentist or hygienist. On this basis it is possible to calculate the amount of work being done and locate the community where the treatment is being carried out.

Other Roles

This form has 23 spaces down its right side, this is to permit the form to be used as a monthly accumulator. There are rarely more than 23 working days per month thus each daily total can be entered and added to give a monthly total which can easily be transferred to the Monthly Return Form, the name column being used as a date column. This also makes it easier for travelling dentists who may work in three or four places in any month keep a separate accumulation for each location.

TRAVELLING DENTISTS

It is important for financial and statistical records to know how much work is being done in each community. By using the form as an accumulator for each location, there will be a complete total for the month and a total for each location. A dentist may visit three of four locations in any one month, therefore, by using three or four forms for this purpose the totals can be prepared. They

DENTAL MONTHLY RETURN

Dentist/Hygienist ____________________

Base ____________________

Month ____________________

	Location					Monthly Totals
01						
02						
03						
04						
05						
06						
07						
Total						TOTAL NO. OF PATIENTS

	No. Seen
06 Inuit	
07 Indian	

08						08		A.N.K.
09						09		Examination & Chart
10						10		Consultation
11						11		
12						12		Radiographs
13						13		
14						14		Extractions Decid
15						15		Extractions Perm
16						16		G.A. (Outpatients)
17						17		G.A. (Inpatients)
18						18		Surgical (Outpatients)
19						19		Surgical (Inpatients)
20						20		
21						21		Amalgam Decid
22						22		
23						23		
24						24		Amalgam Perm
25						25		
26						26		
27						27		
28						28		Ant. Rest.
29						29		
30						30		Acid Etch
31						31		Inlay
32						32		Pin Technique
33						33		P.J.C.
34						34		Acrylic J.C.
35						35		Bridge
36						36		Dressing
37						37		Trephination
38						38		Pulpotomy
39						39		Root Canal F.
40						40		Scale & Polish
41						41		Surgery
42						42		Splint
43						43		Prophylaxis
44						44		Fl.App.(Incl.Prophy)
45						45		O.H.I.
46						46		Study Models
47						47		Appliance F.
48						48		Adjust
49						49		Treat. Completed
50						50		Misc. Procedure
51						51		Reline
52						52		Repair
53						53		F.U.
54						54		F.L.
55						55		P.U.
56						56		P.L.
57						57		P.U.
58						58		P.L.
59						59		Drug Rx
60						60		Other Procedure

Travelling Clinics		
Place	Patients	Days

19 SURGICAL INPATIENTS		
OPERATION	LA	GA
Hours in OR		

No. of days worked	
Travelling Time	
Leave	
Days lost through illness	

Fees Receipted		
Fees Collected		

COMMENTS:

Date / /

Signature ____________________

G.R.H.S. -6E

GRHS - 6e Dental Monthly Return

should collectively equal the complete monthly total. These totals can then be transferred to the Monthly Return Form.

2) GRHS-6e: MONTHLY RETURN FORM

This form is sent to the Dental Office in St. Anthony at the end of each month. It includes ALL categories of work done and is the basis for providing monthly statistics.

The same general remarks apply as in the Daily Form but it provides more complete information as follows:

a) Location statistics for travelling dentists.

b) Total amounts of work done per month i) Out-patients
ii) In-patients

c) Number of patients seen by Dentists/Hygienists.

(1) Location Grid: The left hand column of this form gives a monthly record of work carried out from the Daily Returns. In the case of a dentist or hygienist working in one location, it involves one column; in the case of a travelling dentist it may involve three or four. The space does not permit complete names, therefore, use abbreviations, e.g. Post. for Postville or P.H.S. for Port Hope Simpson. Then add to the right and give complete monthly totals down the centre column.

(2) Inuit and Indian: Enter total number seen as shown in box on right. Do Not Include in-patient totals as they will be entered in one of the previous status categories.

(3) Travelling Clinics: Enter location and number of working days spent there.

(4) In-Patients: This box includes all patients who are admitted and receive dental treatment. Briefly note type of operation, e.g. Impacted 8's, or Cystectomy, or Abscess drainage or removal of unerupted canine, etc. These statistics allow an estimation of the value of the work which is contributed to G.R.H.S. funds from M.C.P. payments.

(5) Hours in O.R.: Estimate the time spent in the Operating Room.

(6) This section concerns the number of days worked and should coincide with the time sheets.

No. of Days Worked: This is the actual number of days worked and does not include travelling time or statutory holidays.

Travelling Time: This includes the days or half day units used travelling to clinics. It should apply to travelling dentist only.

Leave: This includes all leave, either annual or study leave, educational leave and statutory holidays.

CODE 01

DENTAL TREATMENT PROVIDED UNDER CHILDRENS HEALTH PROGRAMME

LOCATION: _____

DENTIST/HYGIENIST _____

NAME	Inn	Ind	Age	DIAGNOSIS: A.N.K.	Exam.	Periptical	Bitewing	Occlusal	Other Rad.	SURGERY: EXTRACT L.A. 1st/Quad.	Sub/Quad.	G.A. 1st/Quad.	Sub/Quad.	Replantation	Trephination	Temp. Dressing	OPERATIVE DENTAL SURGERY: AMALGAMS SURFACES DECID 1	2	3	4	PERM 1	2	3	4	Silicate	COMP Simple	Complex	Acid Etch	Pin Tech	CROWN Acrylic	Porcelain	Stainless	Splint(Ant.)	END Pulpotomy	Root Treatment	PRV Prophylaxis	Fl. App.	ORTH Rem.App.Fitted	PROS Treatment Comp.	Upper F	Lower F	Upper P	Lower P	MISC. SPECIFY				NUMBER
																																															1
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DATE				TOTAL																																										
				CODE	106	107	100	108	101	102	103	104	105	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	

G.R.H.S. -9E

GRHS - 9e Dental Treatment Provided Under Children's Health Programme

Days Lost Through Illness: Should record all days lost in half day units.

(7) Fees Receipted: Includes all fee income which is recorded by receipt or in the account.

Fees Collected: Includes all money collected. The difference is usually due to the sale of small items such as toothpaste, floss etc. which is not receipted.

3) GRHS- 9e: DENTAL TREATMENT PROVIDED UNDER CHILDREN'S DENTAL PROGRAMME

This form permits GRHS to estimate the value of the treatment provided to children under the Department of Health Children's Dental Programme. While not required to use the standard Department of Health forms for each patient, the work carried out on children eligible under the scheme forms a substantial part of our Government Grant. It is, therefore, necessary to keep an accurate record of the work done.

This form is used in the same way as the Daily return form but only for category (01) patients, ie. children up until their 13th birthday. It is easier if the form is simply kept on a daily basis and accumulated as before. Normally one form will last for three or four days. These forms are for your records. Note the following remarks:

DENTAL MONTHLY RETURN FOR CHILDREN 1 - 10 Code 01

06	Inn	
07	Ind	

Dentist/Hygienist _____

Base _____

Month _____

TOTAL NUMBER OF CHILDREN SEEN [ ]

CODE	ITEM				TOTAL	VALUE/ITEM	TOTAL
101	Exam.						
102	Periapical						
103	Bitewing						
104	Occlusal						
105	Other Rad. (Specify)						
109	EXTRACT	G.A.	1st/Quad				
110			Sub/Quad				
111		L.A.	1st/Quad				
112			Sub/Quad				
113	Replantation						
114	Trephination						
115	Temp. Dressing						
116	AMALGAMS	SURFACES	DECID	5 4 3 2 1			
117				5 4 3 2 1			
118				5 4 3 2 1			
119				5 4 3 2 1			
120			PERM	5 4 3 2 1			
121				5 4 3 2 1			
122				5 4 3 2 1			
123				5 4 3 2 1			
124	Silicate						
125	COMP	Simple					
126		Complex					
127		Acid Etch (Incisal edge)					
128	Pin Tech						
129	CROWN	Acrylic					
130		Porcelain					
131		Stainless					
132		Splint (Ant.)					
133	Pulpotomy						
134	Root Treatment						
135	Prophylaxis						
136	Fl. App. (Includes Prophylaxis)						
137	Rem. App. Fitted (See Schedule)						
138	Treatment Comp.						
139	Upper F						
140	Lower F						
141	Upper P						
142	Lower P						
143	(Misc.)						
144	"						
145	"						
146	"						

SIGNATURE _____

COMMENTS

N.B. In (Misc) columns insert items for which fees are given in N.D.A. 1975 (Fee Schedule). Items which are not included in the above list may occasionally require prior approval from: Dr. J. Russel
Dental Division
Government Building
Harvey Road
St. John's, Nfld. (737-3425)

G.R.H.S. -7E

GRHS - 7e Dental Monthly Return for Children 1-12.

(1) It is important to differentiate between teeth extracted under L.A. and G.A. The fees to which we are entitled differ, therefore, note the 1st/Quad. means the first tooth per quadrant for which the fee is higher than each subsequent extraction for the same quadrant.

(2) Miscellaneous (Specify): It is impossible to put all the items of treatment tabulated in the Newfoundland Dental Association Fee Schedule on one form, therefore, these columns are left for use when carrying out other forms of treatment prescribable under the scheme. e.g. fissure sealants, etc.

(3) Travelling Dentist: It is not necessary to separate these totals by location on this form as they are already included in the monthly return.

4) GRHS 7e: DENTAL MONTHLY RETURN FOR CHILDREN

This form should be completed at the end of each month and sent to the Dental Co-ordinator's Office. Simply transfer the total treatment carried out on children in the categories shown for each month.

(1) Travelling Dentist: It is not necessary to separate these totals by location.

CODE 03

DENTAL TREATMENT PROVIDED TO WELFARE PATIENTS

G.R.H.S. -8E
LOCATION:

* Children of welfare recipients up to 11th birthday are treated under Childrens Programme. Only those 11 - 18 are classified as Welfare.

NAME	WELFARE NUMBER	Inn	Ind	EXTRACTIONS L.A. Dec. 1st/Quad	EXTRACTIONS L.A. Dec. Sub/Quad	EXTRACTIONS L.A. Perm 1st/Quad	EXTRACTIONS L.A. Perm Sub/Quad	EXTRACTIONS G.A. 1st/Quad	EXTRACTIONS G.A. Sub/Quad	FILLINGS Simple	FILLINGS Complex	FILLINGS Acid Etch	FILLINGS Amalgam	DENTURES PU + LF	DENTURES PL + LF	DENTURES FU + LF	DENTURES FL + LF	MISC. SPECIFY				NUMBER
																						1
																						2
																						3
																						4
																						5
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DATE	TOTAL																					
	CODE	106	107	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	

MONTHLY RETURN

CODE 03

WELFARE

LOCATION: DENTIST:

NO. OF PATIENTS MONTH:

CODE	ITEM			TOTAL NO. ITEM	VALUE /ITEM	TOTAL
301	EXTRACTIONS	L.A.	DEC 1st/Quad			
302			DEC Sub/Quad			
303			PER 1st/Quad			
304			PER Sub/Quad			
305		G.A.	1st/Quad			
306			Sub/Quad			
307	FILLINGS		Simple			
308			Complex			
309			Acid Etch			
310			Amalgam			
311	DENTURES		P.U. + L. F.			
312			P. L. + L. F.			
313			F. U. + L. F.			
314			F. L. + L. F.			
315	MISC.					
316						
317						
318						

INUIT
INDIAN

TOTAL VALUE OF WORK

COMMENTS:

SIGNATURE:

GRHS - 8e Daily and Monthly Record of Welfare Treatment

5) GRHS 8e: DENTAL TREATMENT PROVIDED TO WELFARE PATIENTS

This form is used on the same principle as the others and concerns Welfare Patients. At the end of each month detach and return the information on the right side of the form for use in calculating the value of work carried out on behalf of the Department of Social Services.

APPENDIX V

MOUTHRINSE PROGRAMME PROCEDURE MANUAL

Appendix V

Mouthrinse Programme Procedure Manual

Introduction:

In geographic areas which lack central water systems, alternatives to community fluoridation for prevention of dental disease have been developed. School water fluoridation and the fluoridation of salt as well as other supervised programmes of fluoride tablet administration have been shown to be feasible alternatives to water fluoridation, although they are not as effective as water fluoridation in preventing dental caries, nor do they reach as many children with such ease. Application of topical fluorides by dental health personnel has disadvantages in public health programmes because the treatments must be given individually and by skilled manpower. In dealing with numbers such as 5,000 children, this is obviously not practical, therefore alternative solutions have been developed. One such method is to use a mouthrinsing technique which has been in use for some time now - 15 years in some cases, and has been proven to be effective in reducing the prevalence of dental decay.

Researchers have now become aware that the effect of any topical fluoride provides maximum benefit to teeth if applied immediately after they erupt. The adult dentition or permanent dentition begins to erupt into the mouth around the age of five and continues to do so until the age of twenty-one, however, by the age

of fourteen most of the secondary dentiton has erupted and is present in the mouth. Therefore, it is during this period from five years until about thirteen or fourteen years that teeth gain the maximum effect when fluoride is administered in the form of a mouthrinse. By using a once-weekly mouthrinse solution during the school year, the teeth are at least exposed to fluoride for approximately two-thirds of the year and depending on the time when the fluoride is administered, the effects can be of value. In one evaluation programme in which a group of children were given fluoride mouthrinse solutions once a week at 0.2% and a control group were given a mouthrinse containing sodium chloride, it was found that the test group who were getting the fluoride had dental decay reduced by up to 58% compared with the control group who were receiving sodium chloride solution. It was also noted during this period that the children who received the maximum benefit were those who were having tooth eruption during the period when the fluoride was being administered.

Although a mouthrinsing programme is beneficial, the results are not so apparent until the children reach the fourth or fifth grade level. However, there is still nearly a 38% reduction in carious surfaces expected in children ages eight to eleven. Between this study and many others which have been conducted in the last 10 or 15 years, there is substantial evidence that fluoride mouthrinsing is beneficial and does protect children's teeth.

With high consumption of sucrose-containing drinks and food stuffs, the prevalence of dental decay is high, especially in young children, and unless something is done to reduce this level of dental destruction, there is little hope that this can be contained by our reparative dental resources. Therefore, this programme offers a partial solution to the problem of dental decay. It will not eradicate dental decay nor will it solve many of the other problems associated with loss of teeth during the early years of life such as overcrowding, teeth being malpositioned and subsequent orthodontic problems. However, it does mean that the child will come into the period of maximum decay and dental destruction in an older age group when treatment is more easily provided.

The advantages of using fluoride mouthrinsing as a means of helping to prevent decay are as follows:

1. Little time is involved for the preventive measures.
2. A technique of application is easy to learn by school children of all ages.
3. Few materials and supplies are required. The procedure is inexpensive.
4. Non-dental personnel with minimum training can easily supervise the procedure.
5. Frequent applications can be administered easily with minimum interruption of a school's academic programme. In this area the applications can be carried out in conjunction with health science teaching.

Finally, remember that this programme depends on the co-operation of the School Boards, Principals and Teachers as well as parents and children. Parents who have not decided to accept the programme should not be pressured as it is essential that their co-operation is voluntary. The more information and explanation you can give of the programme's value, the more likely we are to succeed.

There is no doubt problems will arise; however, the programme can be modified to suit particular needs and once initiated, these requirements can be dealt with as they arise.

James G. Messer B.D.S., F.D.S., D.D.S.
Chief of Dental Services
Grenfell Regional Health Services

Revised: 1982

DENTAL CO-ORDINATOR'S ROLE

Overall planning and organization of the programme. This includes the general assessment of the programme's value, and methods of implementation. The following areas are under the responsibility of the co-ordinator:

1) Liaison with School Boards.
2) Estimation of supplies and materials.
3) Providing adequate instruction to Public Health Nurses.
4) Designing forms and programme methods.
5) Acquiring leaflets and information.
6) Preparing procedure manuals.
7) Informing the dental and medical staff who will be indirectly involved.
8) General assessment of programme.
9) Radio, T.V. and press releases to explain programme.

PUBLIC HEALTH NURSES ROLE

The public health nurse's role is vital as we do not have sufficient dental manpower to control the program throughout the area. Public Health Nurse's Role:-

1) Liaison with dental co-ordinator, principals and school teachers.
2) Demonstrating the techniques in the classroom.
3) Instructing teachers in the procedure.
4) Passing on forms and leaflets and necessary supplies.
5) Mixing the solutions.
6) Keeping an accurate record of fluoride dispensed.

7) Collecting fees from teachers.

8) Showing films, etc.

9) Returning classroom records to Dental Co-ordinator.

TEACHER'S ROLE

The teacher's role is most important and is as follows:

1) Supervise the classroom procedure after instruction.

2) Keep a record of rinses, swallowers, etc.

3) Disperse correct forms to children and collect fees.

4) Inform the Public Health Nurses of problems or difficulty

5) Return classroom record forms to Dental Co-ordinator at end of year.

INITIAL CONTACT

At the beginning of each school year you should advise the principal of the day when you will make the initial visit. At this visit distribute the consent forms to the teachers and go over the procedure with them. At this time you can also make the opportunity to explain any new information and answer questions. In the interests of good public relations advise the teachers when you intend collecting the fees and the consent forms. At this time it would be helpful if you completed the class lists on the rinse record form with the teacher.

This initial contact is important and will vary from school to school depending on circumstances.

e.g.: Are there a lot of new teachers who are not familiar with the programme? Is this the first time the Public Health Nurse has been involved with the Programme?

DISTRIBUTION AND COLLECTION OF CONSENT FORMS

A consent form signed by a parent or guardian must be received before a child can be enroled in the programme. Forms have been designed to include what is generally considered to be necessary information on a consent form. Any consent form, must reflect local needs and standards.** Request that the consent form be returned regardless of whether the parent accepts or not. In addition to sending a consent form home with each child, you may wish to consider having a copy of the form published in the local newspaper along with a notice of the programme. Such a notice will permit the parents of children who did not receive or who misplaced their forms an opportunity to be informed of the SAF programme.

Forms are reproduced on G.R.H.S. stationary. (Samples can be provided). An extra supply of forms will be needed for second notices and for students who enrol in school after the programme begins. If leaflets describing fluoride mouthrinsing are used, they should be stapled to the consent form. (For kindergarten and newcomers only).

Have the forms delivered to each school, preferably on a Monday, for distribution to the children on Tuesday. Tuesday is

**Translation into Indian or Eskimo where applicable.

recommended rather that Monday because Monday is generally a day of high absenteeism. Request the principal and the teachers to remind the students that the forms are to be returned by the following Thursday. The deadline for return can also be stated on the form. It is important to make personal contact with the school principals and the teachers to encourage a timely distribution and collection of the forms. Just dropping them off and hoping for the best is not satisfactory. Remember, a child cannot participate unless there is a signed consent form on file.

Many consent forms and other kinds of information sent home from schools never reach their destination. If the first form is not returned by Thursday, a second form should be sent home that day. If the second form is not returned by the next day, a phone call to the parent is in order. There should be a known status of participation for all children.

The forms should be separated into participating and non-participating groups, and subsequently they should be alphabetized by group and filed for future reference. A master list of the participants should be made for each class (and for each teacher in the programme). This can be done using the Rinse Record Form.

FEES

The fees should be collected by the teacher and passed on when the consent forms are received by the teacher. They should be collected by the teacher and passed on to the Public Health Nurse.

The Public Health Nurse should deposit the cash either into the Station Account or into the local G.R.H.S. administration office. A receipt will be issued and should be kept by the Public Health Nurse. On the receipt should be noted where the funds were collected and also that they were for the Fluoride Mouthrinse Programme and that they are for the credit of the Dental Income Account.

INSTRUCTION AND DEMONSTRATION TO THE TEACHERS

Where there are new teachers or where there is a request the 16 mm movie entitled "Topical Fluorides" should be shown to the teacher and the students.

Before actually beginning the programme, the participating students should receive adequate information about the SAF (Self-applied Fluoride) procedures. This orientation can be scheduled just before the first rinsing session. An orientation session can help ensure student co-operation and a smoothly operating programme. It has been found useful in many schools to conduct a "practice session" of the mouthrinsing procedure using plain water, before initiating the first weekly session. The practice session has been found to be particularly helpful in working with younger (Kindergarten and first grade) children. A "tell-show-do" approach can be used, that is, explain the procedure, demonstrate it and then have the students carry out the rinsing procedure with plain water. In addition, it is suggested, particularly in working with younger children, that each child's nasal passage be clear before

beginning rinsing. This is particularly important during the winter months when many children have colds. Reminding the children before the mouthrinsing procedure begins to use a tissue to blow their noses (if necessary) is a simple way to avoid their not being able to breathe during the rinsing, and thus inadvertently swallowing the solution and possibly choking or spitting out the solution.

PRACTICE SESSION

How the cups of fluoride mouthrinsing solution are distributed to each student can be determined by the classroom teacher. Some teachers do it themselves while others allow students to take turns in dispensing the cups from the tray. Other teachers have the students come to her desk to pick up their own cup and napkin. Any organized method is satisfactory. For both the practice session and the regular sessions the following sequence has been found to work well.

1. "NaFpacks" - 3 gram sodium fluoride packets of powder - are sealed in airtight laminated polyethylene, and printed with complete instruction. When a 3 gram packet of powder is diluted with 1500 ml of tap water, it will produce a 0.2% neutral sodium fluoride solution.

2. Graduated polyethylene jugs (showing a 1500 ml graduation) are printed with complete instructions for mixing the powder with the water, etc.

3. Specially designed dispenser pumps which are screwed onto the

jug, are constructed with stainless steel fitments. The pumps dispense 10ml of the fluoride solution with each stroke (10 ml is the correct amount of solution for mouthrinsing).

4. The fluoride solution is then dispensed into non-waxed 3 ounce flat bottom paper cups. The child empties the contents of the paper cup into the mouth, and swishes the fluoride solution around and through the teeth for one minute. The solution is then expectorated back into the cup; it is not swallowed.

5. Paper napkins are then used to wipe the mouth after rinsing, after which they are stuffed into the paper cups to prevent the expectorated solution from spilling out of the cup.

6. Water proof polyethylene garbage bags and ties are used to dispose of the cups and napkins. After all the cups and napkins are deposited into the trash bag, it is tied. This is an additional precaution against undue leakage from the cups onto the classroom floor.

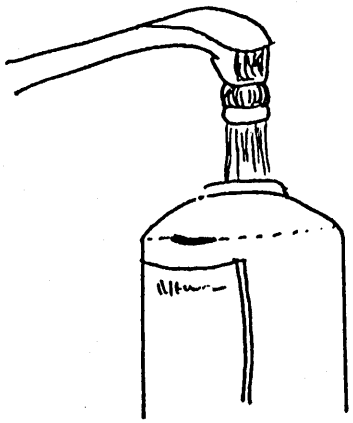
PROCEDURE FOR ADMINISTRATING THE MOUTHRINSE IN A CLASSROOM

The following instructions are merely guidelines; you may use any method that will accomplish the same purpose.

MIXING THE FLUORIDE SOLUTION

The solutions should be mixed by the public health nurse and delivered to the school ready for use. This is especially important in areas where the water supply at the school may be poor.

1. Open the fluoride packet and empty the powder into the container.



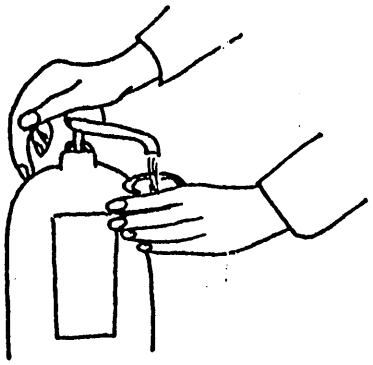
2. The container is filled with tap water to the designated mark.

Each child is provided with a cup filled with 10 ml of the fluoride solution and one paper napkin. (The cup is filled from a jug with a special pump, which dispenses the exact amount of solution with every stroke).

The favourite method of distribution can be determined by the classroom teacher or by the person in charge of the programme we offer the following two methods:

METHOD 1. The distribution of the paper napkins and filling the cups with the fluoride solution is accomplished while the pupils are at their desks.

One of the pupils in the classroom will distribute the cups, and another pupil will distribute the paper napkins, one of each to every pupil. The teacher will then walk from desk to desk with the jug of fluoride solution, place the jug on top of the pupil's desk and with one stroke of the pump, fill the cup with the fluoride. The rinsing process is now ready to begin.



1. The teacher ejects 10 ml of solution into a cup by a stroke of the pump and gives the filled cup together with a napkin to the child.

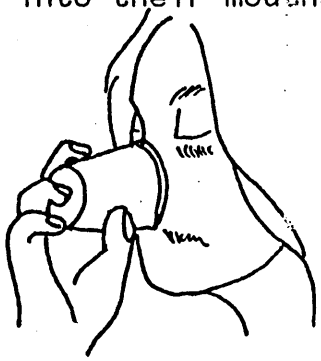
METHOD 2. The filled jug with the fluoride solution is set up on a table or teacher's desk together with a stack of paper cups and napkins. One pupil is in charge of the cups and another is in charge of the napkins. The teacher is in charge of the jug.

The pupils form a line in front of the table or desk. Each pupil receives a cup and a napkin, after which the cup is then filled with fluoride solution by one stroke of the pump. After the cup is filled, the pupil returns to his desk until everyone is seated in his respective place. The rinsing process is now ready to begin.

THE RINSING PROCESS

1. When all the children have their filled cups and napkins in their hands, remind them not to swallow the solution. (If a child were to accidentally swallow the 10 ml. of fluoride, it would produce no adverse reaction.)

2. Have all the children slowly empty the contents of the cups into their mouths and begin to rinse for one minute.



2. The children empty the contents of the cup into their mouths, and swish for one minute.

CORRECT RINSING

To rinse correctly with maximum results, requires the swishing of the solution all around the teeth, so that the liquid is strained back and forth through the spaces between the front and back teeth. When correctly done, the cheeks and lips will puff rhythmically. Some children may just shake their heads back and forth without accomplishing anything; they should be watched. The first rinsing exercise should be done at a practice session using water. Instruct them exactly what to do while they are rinsing.

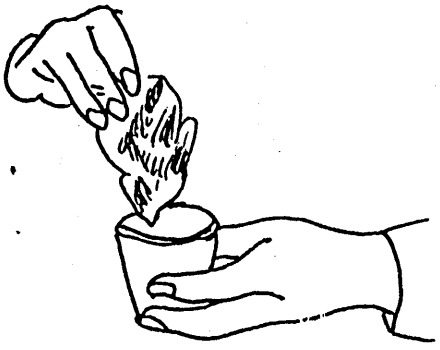
You should have on hand or preferably on the classroom wall a timepiece with a sweep second-hand. Supervise the rinsing for

the full 60 seconds either by instruction or by rinsing with the class.

3. When the mouthrinsing has ended, direct the pupils to expectorate the solution back into the cup and blot their lips with their napkins.

3. The children then spit the solution back into the cup.

4. Then, slowly stuff them into the paper cups to absorb the liquid. The cups are then deposited into the plastic waste bag and tied . The entire procedure after practice can be accomplished for 5 or 6 minutes.



4. The children first wipe their mouths with the napkin, then stuff it into the cup to absorb the excess solution. The used cups and napkins are then discarded into the plastic waste bag.

5. The children are then instructed not to eat or drink for 30 minutes after mouthrinsing. Therefore, do not schedule the mouthrinsing immediately before lunch. The most beneficial time

for rinsing is the first thing in the morning, which is shortly after they brushed their teeth.

The same basic procedure (with some possible deviation) may be set up for groups larger than classroom size, but a student to supervisor ratio should exceed 35 or 40:1.

6. The dispensing container with the fluoride solution should be stored in a safe place until the next session. It must not be left unattended in a location where children could have access to it. This is essential where flavoured solutions are used.

RECORDING THE MOUTHRINSE APPLICATIONS

A record should be kept of each student's use of the designated SAF agent. The information can serve to measure the success of the programme in terms of how many children participated annually and at what frequency. Usually, the classroom teacher records the use of the SAF agent. Some schools have students record their own participation.

Several methods of recording this information are presently in use. A sample of the record form for the weekly fluoride mouthrinse procedure is shown in Appendix.

** N.B. On the form a) means the child mouth rinsed, or "X" means that for some reason he did not and or shaded out means he/she swallowed. The completed form should be collected by Public Health

Nurses and sent to the Dental Co-ordinator at the end of each school year.

MIXING, DISPENSING, STORAGE AND HANDLING SOLUTIONS

The concentrated packs of NaF must be kept in a safe place where only professionally trained nurses, dentists, and hygienists have access.

The solution should always be mixed by the public health nurses and other trained staff mentioned above. The NaF packs have to be accounted for and an accurate record kept of the quantities used, their location and frequency.

Suggested method for dispensing is as follows:

1. Initially public health nurses supply the school being introduced to the programme with full containers of NaF solution prepared according to instructions.

2. (a) Solution must be changed every two weeks. There is a deterioration in the taste due to stagnation of the water. Discard all solutions once they have been mixed for two weeks. Clean and rinse the containers before mixing the new solution.

(b) Shake the containers well before each rinsing session.

(c) Pumps should be removed after each day's rinsing session and flushed out using clean water. The child proof caps should be used to seal the container when not in use.

(d) The container of solution should be passed from class to class where possible on the mouthrinse day so that it is used up

in the two week period. Unused solutions are disposed of after two weeks. Assess how many containers you will need to give each school to ensure a two week supply. To calculate this, multiply the total number of participants by 20 (two mouthrinses) which will give you the total amount of solution required in ml. Divide this by 1500 to give you the number of containers required. Remove the surplus containers and pumps from the school, clean and dry them and store in public health office for future use or replacement.

(e) In schools with small classes a full container will last more than two weeks. Dispose of any solution remaining after two weeks and replace with freshly made up solution.

(f) Extra supplies of fluoride will be available on request.

SOME PROBLEMS AND QUESTIONS

Problems and swallowers

One of the problems with administrating this procedure in a classroom is that there is no doubt that some children will swallow a 10 ml of sodium fluoride solution rather than expectorating it back into the cup. The ingestion of 10ml of the sodium fluoride 0.2% solution is in itself no danger and should not be considered as a serious problem. However, if a child repeatedly swallows the 10ml of 0.2% fluoride solution, his name should be noted. If he persistently swallows the solution, this should be noted, and after three such occasions, the child should receive no further fluoride mouthrinse for that term. I repeat, there is no danger in

swallowing that amount of fluoride, however, it has been suggested by some researchers that repeated swallowing of the fluoride could be harmful if it was continued over a long period of time. Therefore, I would suggest that you ask the teachers to take a note of the name of any child who swallows the fluoride solution and should he do this on more than three occasions, that child should not receive a further mouthrinse until the following term. During the initial stages, there are bound to be problems just simply with logistics in the sense that some children will not spit. There may be some problems with, for example, children not being quite sure what to do and some will not swish the solution in their mouths properly, but after a period of time with the teacher giving a demonstration using normal water, if he prefers, then this should be overcome.

Other Methods of Application

There are many methods of applying fluoride to the teeth however this can be broken down into two main procedures. One is that carried out by a dentist or dental hygienist who applies prophylactic pastes or solutions of fluoride directly to the teeth. The second method of application is that whereby fluoride is applied either systemically or topically to the teeth through a mass programme such as mouthrinsing or by direct central water supplies. There is research being carried out just now into the benefit of simply having children suck a fluoride tablet each day It is well known that the ingestion of one tablet per day is beneficial in the reduction of caries and can be as beneficial as

having centrally fluoridated water supply. The disadvantage of this is that the children and only the children are receiving the benefit whereas with the central fluoridated supply, both the preschool children and young adults are also receiving the benefit. The method of sucking tablets is being looked into and should further development indicate that this is a preferable way to administer fluoride topically, as well as systemically in areas where other fluoride sources are not being used, we may adopt this system.

CHILDREN ALREADY TAKING FLUORIDE TABLETS OR LIVING IN AREAS WHERE FLUORIDE WATER SUPPLIES EXIST

Ingestion of fluoride tablet or taking fluoride from water supplies at recommended dosage does not mean a child should not participate because the mouthrinse programme does not significantly increase the SYSTEMIC levels of fluoride, remember the fluoride is spat out and NOT swallowed. Therefore, this is not reason to exclude a child from the programme.

CHILDREN WITH GOOD ORAL HYGIENE AND CARIES-FREE TEETH

Some parents may question the value of this procedure if their children have no decayed teeth. You can simply explain that the secondary or permanent dentition does benefit and it is advisable to protect these teeth. Children, who parents are highly motivated and whose oral hygiene is excellent with diet control and dental care will not gain significantly from a mouthrinse programme.

Goose Bay, Happy Valley

At the moment the Goose Bay area is having fluoride added to the water , therefore, although the benefits of the mouthrinse programme will not be so apparent, it should for the time being be included.

ORDERING SUPPLIES

Each year around the end of April, the "Mouthrinse Program Supplies" form will be circulated to each public health nurse. It takes approximately two months from the time of placement of the order till the receipt of the supplies.

The bulk supplies are ordered, in round numbers, usually not down to less than 1,000 in the case of cups and napkins. Therefore, when ordering the policy is to round up or down within each public health area so that the total amount is roughly what is ordered. There is no alternative if we have bulk supplies sent directly to the schools.

A sample of the order form is enclosed and is simple to use.

ANNUAL UPDATE INFORMATION

With each year's programme information including changes and modifications will be given to the Public Health Nurse Supervisor to give to the public health nurses. This information should be passed on to the teachers and if further information is required notify the Dental Co-ordinator.

"ACCIDENTAL OVERDOSAGE, ANTIDOTE AND TREATMENT PROCEDURE"

General Remarks

This programme has several built in safety procedures, and if the instructions are followed correctly, there is little risk of an overdose. There is a more than adequate safety margin with the quantities and concentration being used, however it is always possible that through a series of errors a child could obtain a toxic dose and the antidote and treatment should be known. This applies to all fluoride containing materials, tablets, gels etc. The following notes are to give you the current information on this aspect of the programme. It should be inserted into the manual and the old instructions returned to me.

OVERDOSAGE

1 Gram of Sodium Fluoride (NaF) yields 450 mgm of Fluoride (F). Therefore, 2.2 mgm NaF yields 1 mgm of F. (It is the Fluoride which is the active element.

A 0.2% solution contains 8.8 Grams NaF in 4544 ml of Water

1.0 Grams NaF in 516.3 ml of Water

3.0 Grams NaF in 1548.9 ml of Water

Medical Products Laboratories instructions are 3.0 Grams NaF in 1500 ml therefore it is just over a 0.2% solution. For practical purposes it will be taken as an exact round 0.2%. This simplifies the following calculations.

In each 1500 ml of 0.2% solution, there are 3.0 Grams NaF. 3.0 Grams of NaF will yield 3,000 -. 2.2 mgm F. equals 1363.6 mgm F. Therefore, there are 1363 mgm F. in 1500 ml of the solution.

The solution is dispensed in 10 ml doses by the pump per child therefore the dose per child is 1363.6 -. 1500 x 10. = 9.09 mgm F per 10 ml dose. It should be noted that this only applies if the solution is swallowed and this is not normally the case. Therefore, by spitting out the solution only a small amount of residual fluoride is in fact ingested. The procedure is that children who swallow the solution on three occasions are removed from the programme. Thus, unless a child has somehow gained access to the container and swallow the solution in an unsupervised situation the maximum dose he could swallow would be 10ml or 9.09 mgm F. (Fluoride).

According to Spoeke; Bennet; Gullekson, Abstract from AACT-AAPCC Meeting March 1979. Toxicity related to Acute Low Dosage Sodium Fluoride.

Toxic Range of F. (Fluoride) is 5-10 mgm F/Kg Body Weight

G.I. Symptoms is 3- 5 mgm F/kg body Weight

The estimated toxic dose is 6.4 mgm F/Kg body Weight.

<u>IN THE MOUTHRINSE PROGRAMME, THE SAFETY MARGIN IS AS FOLLOWS:</u>

There are 9.09 mgm F in each 10 ml dose. Taking a 5 year old child at approximately 22 Kg it would mean that an estimated toxic

dose would be 22 x 6.4 mgm F. ie: 140.8 mgm. Therefore a toxic dose would mean swallowing 140.8 -. 9.09 = 15.489 ml doses ie: 15.5 doses.

The acute toxic dose could be reached for a 5 year old child if he ingested 15 doses. G.I. effects could be evident if 10 doses were ingested.

Therefore, there is a wide safety margin and the only real possibility of overdosage would occur if a child had access to the solutions without supervision.

TABLET OVERDOSAGE:

Many parents have tablets of sodium fluoride in the medicine chest. Overdosage could occur if a child swallowed an excess of tablets. The amounts are as follows and a 5 year old or 22 Kg child is the basis.

Each 2.2 mgm tablet of NaF contains 1 Mgm of F(Fluoride). Therefore, 6.4 x 22 = 140.8 This represents approximately 140 tablets.

Overdosage using the 0.2% solution would occur after ingestion of 15 doses. Overdosage using tablets (2.2 mgm NaF) would occur by ingesting 140 tablets.

ANTIDOTE

Milk, Calcium Chloride, Calcium Lactate or Calcium Gluconate. There are supplies of Calcium Chloride at each Nursing Station, Hospital and Health Centre. In some areas the school will have supplies in the drug cupboard.

SYMPTOMS AND TREATMENT OF OVERDOSAGE:

If the history or knowledge of an incident suggests overdosage with fluoride, the symptoms are:
NAUSEA; VOMITING; ABDOMINAL CRAMPS; SHALLOW RESPIRATION; WEAK PULSE; CYANOSIS; DIARRHOEA; MYDRIASIS (Widely Dilated Pupils); COLLAPSE.

TREATMENT:

Break open 1-3 vials of Calcium Chloride. Put in a tumbler and administer orally. Repeat if necessary.
N.B. If not available use milk (1-2 pints).

If the patient is conscious and co-operative, let them swallow the antidote and follow this by an emetic after a few minutes. Repeat if necessary. In an unconscious patient, use a stomach pump and gastric lavage. Do not use an emetic in an unconscious patient. For further help or advice contact the Poison Control centres at St. Anthony or St. John's.

Poison Control Officer, St. Anthony, 454-2685 or 454-3333 ext. 134(Hospital).

Poison Control Centre, St. John's, (709) 722-1110 (Direct Line) 24 hours.

THE FORMS USED IN THE FLUORIDE MOUTHRINSE PROGRAMME

A. FORMS

Form GRHS 23 e (4) is the Rinse Record Form. An example of this form is shown and it is self-explanatory. This form is filled in by the teacher and should record the name of the child, whether consent has been obtained from the parents, and whether the fee has been paid. The next columns indicate whether the child has rinsed, on which occasions, or missed through absence, etc. and also if the child swallowed the solution. Children who swallow should be carefully watched and if this happens on more than three occasions, the child should not participate in the programme for three months. I suggest that if a child does swallow the solution, the square is shaded out firmly so that it is visually quite obvious that the child has a record of swallowing the solution.

These forms should be filled in and returned to the Public Health Nurse, who in turn sends them to the Dental Co-ordinator at the end of each school year. In that way, record of the participation in the programme is available. The programme will be assessed in four or five year's time.

Forms GRHS 23e (1),(2),(3) are the consent forms and are available in Inuit and Indian. This form should be given to the children as described in the procedure manual.

Form marked "A" GRHS 21e (Fluoride Stock Control) concerns the concentrated fluoride in packets. This concentrated fluoride must be stored in a safe place, preferably in the Public Health Building or in a Nursing Station. It should be under lock and key and access should only be available to someone who has been instructed in the correct procedure for mixing these solutions. This form should be kept with that particular supply and every time a pack is withdrawn from stock, it should be recorded. The balance of packs left should then be recorded. The total number of packs which are initially distributed to each place should be carefully noted so that we have an accurate record of the dispensing of the fluoride concentrate.

B. PAMPHLETS

Pamphlets and other information. A very simple handout will be given along with the consent form for parents to read before joining the programme. These handouts will also be accompanied by local publicity in order to spread the information as widely as possible. Copies of the papers on which this programme is based and a brief synopsis of the rationale behind the programme is included. Anyone wishing further information should contact me. It is possible that as research continues better and more efficient ways of carrying out these programmes may be discovered in which case they will be implemented as and when necessary. There are bound to be problems and difficulties in the initial stages of this programme just simply because of the large number of people

involved. However, most of these problems can be dealt with at the school by the Public Health Nurses and the teachers.

APPENDIX VI

TEENAGE HEALTH EDUCATION TEACHING ASSISTANTS

(T.H.E.T.A.) PROGRAMME INSTRUCTION

MANUAL

National Foundation for the Prevention of Oral Disease, Inc.

THETA
Teacher's Manual

Teenage Health Education Teaching Assistants

Preventive Dental Health Education
Grades K-6

THETA

Teenage Health Education Teaching Assistants

TABLE OF CONTENTS

APPENDICES

INSTRUCTIONAL UNIT I

INTRODUCTION TO PLAQUE

Instructional Objectives:

The student will be able to:

1. List at least three reasons why teeth are important for health and happiness.

2. Identify plaque on disclosed teeth.

3. State why plaque causes gum disease and tooth decay.

Primary Teaching Points:

The Teaching points are the primary basis on which this instructional program should be evaluated.

1. TEETH ARE IMPORTANT FOR EATING.

   a. The teeth are vital to that part of the digestive function which occurs in the mouth. They are responsible for biting (incision) and for chewing (mastication).

2. TEETH ARE IMPORTANT FOR SPEAKING.

   a. Teeth serve as walls against which the lips, cheeks, and tongue move in forming specific sounds.

   b. The clarity of speech is influenced by the condition and occlusion (bite) of the teeth.

   c. Protruding upper front teeth which interfere with normal closure of the lips affect the clear pronunciation of the p, b, and m sound.

   d. Missing front teeth affect the clear pronunciation of the s, c, and th sound.

3. TEETH ARE IMPORTANT FOR PERSONAL APPEARANCE.

   a. Good grooming, which includes bright clean teeth, contributes to the personal image which is perceived by self and others.

   b. Teeth which become visible during smiling and laughing become an important aspect of the expression of emotion.

c. The symmetry of the face and occlusion of the teeth are influenced by heredity, growth, and such environmental influences such as dental disease or thumb sucking.

4. PLAQUE IS A STICKY, ALMOST INVISIBLE FILM.

a. Bacterial plaque is usually heaviest near the gums and between the teeth. However, plaque can cover most of the tooth surface.

5. PLAQUE CAN BE SEEN BY COLORING IT RED.

a. The disclosing tablet is made of a harmless red food coloring. When one chews a disclosing tablet until it is dissolved, the red stain adheres to an invisible substance called plaque. It appears on and between the teeth and on the gums.

b. The disclosing tablet provides a means of observing plaque on the teeth and to better understand its distribution on the teeth and gums.

c. The disclosing tablet is simple to use. It is a good idea to provide close supervision (and precautions) while children are using disclosing tablets. Accidents will happen but stains on clothing or carpeting are only temporary. Even the redness on gums, lips, or tongue will disappear in a short time.

6. PROCEDURE FOR USING DISCLOSING TABLETS:

a. First, chew one red tablet until it completely dissolves in the mouth. With the help of the tongue, be certain to get the solution on all surfaces on your teeth. Swish well for about 30 seconds. Rinse with water or just swallow.

b. Second, look for the red areas of the teeth. This is plaque - masses of living bacteria. These are the places which need to be cleaned.

7. BACTERIAL WHICH LIVE IN PLAQUE ARE THE CAUSE OF TOOTH DECAY AND GUM DISEASE.

a. In addition to bacteria, plaque is composed of their products and sometimes food debris and dead tissue cells.

b. If the bacterial plaque is removed by flossing and brushing, tooth decay and gum disease can be prevented.

c. For most people, and particularly children, the brush and and floss are adequate for preventing gum disease.

d. Mouth washes and water irrigators will not remove plaque.

e. Toothpicks, rubber tipped brushes, and other special cleaning devices usually are not needed if flossing is done regularly.

f. Most specialized cleaning devices are prescribed by the dentist for those who have serious periodontal problems.

8. PLAQUE PRODUCES ACIDS AND TOXINS WHICH CAUSE TOOTH DECAY AND GUM DISEASE.

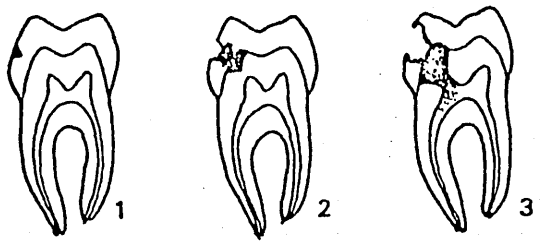
a. Tooth decay is caused by the acid produced by bacterial plaque. Decay occurs frequently on three areas of the tooth:

i. The pits and fissures which are located on the tops of the back teeth.

ii. Surfaces between the teeth.

iii. The gumline.

b. Decay starts on the enamel surface (1); in illustration (2) decay has reached the softer, inner layer of the tooth and the destructive process has speeded up. When the decay reaches the nerve filled core (pulp) of the tooth (3), the tooth is lost. At this advanced state (almost always accompanied by a painful toothache), the pulp becomes infected and causes an abscess at the ends of the roots.



If untreated too long, the decay will destroy not only the tooth but eventually the surrounding bone as well. Abscesses from pulp death can also follow injury to a from a blow. But since dental decay is the major cause, most of these abscesses can be prevented.

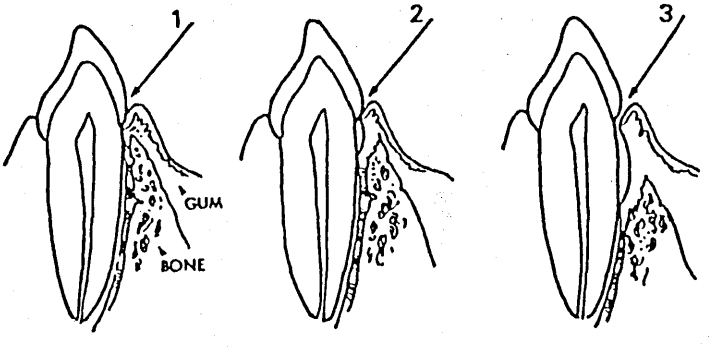
c. The tooth decay process is shown in the following formulas:

BACTERIAL PLAUQE + SUGAR = ACID
ACID + TOOTH = <u>TOOTH DECAY</u>

d. Even though teeth are actually made to last a lifetime, many people believe that losing teeth is just a part of growing old. Research has shown, to the contrary, that dental decay (caries) can be prevented. People must change their attitudes and must practice preventive measures if this is to become a personal reality.

e. The hidden danger of gum disease is that the disease often progresses with little discomfort. It develops so slowly that the victim accepts the situation as normal. In illustration (1) notice that in a normal situation, the gum attaches tightly to the crown of the tooth. As a result of beginning infection (2), the gum looses its normal attachment to the tooth and a pocket forms. This pocket is an ideal place for bacteria to accumulate thereby opening the way to additional destruction.

At this stage the gums are reddened and swollen. As the inflammation spreads, (3) the pocket deepens and the bone dissolves (resorbs). After the walls of the tooth's bony socket (the Alveolus) are destroyed, the tooth becomes loose. The infection continues also causing bone loss around the neighboring teeth. The newly affected teeth may also become loose and eventually be lost.



f. The process of gum disease is shown in the following formulas:

BACTERIAL PLAQUE = TOXINS

TOXINS + GUM TISSUE = GUM DISEASE, (periodontal disease)

g. Periodontal disease, although it is generally thought to be a disease of older persons, often begins in childhood.

Suggested Activities:

1. EATING, SPEAKING, AND PERSONAL APPEARANCE

   a. Refer to soft foods that babies must eat until they have their own teeth, and discuss why teeth are necessary.

   b. Children may recall the difficulty they have experienced in biting certain foods after losing their front teeth. (The importance of chewing food can be stressed in relation to the school lunch.

   c. Have the students say the alphabet to discover how often the teeth come together or touch the tongue or lips in pronunciation. Ask the students to write down the letters that would be most difficult to say without teeth. Discuss words beginning with these letters.

2. PLAQUE, TOOTH DECAY, AND GUM DISEASE.

   a. Develop a vocabulary for the list of terms related to plaque dental decay and gum disease.

   b. Have the students look into their own mouths for decay and filed teeth.

   c. Apples can be used to illustrate dental decay. A tiny spot can eventually decay the whole apple. Decay can also spread to adjacent apples.

   d. Effect of acid on teeth: One way to demonstrate the softening effect of acid on the teeth is to use an uncooked egg and a bottle with a neck slightly smaller than the egg. Obviously, the egg will not enter the bottle, but when the egg is allowed to soak in vinegar for approximately 5-6 hours, the shell is softened so that it can enter. This change is similar to that seen when a tooth in the mouth is subjected to the action of acid.

   e. Discuss how teeth can not repair themselves - once tooth structure is destroyed it is permanently lost (like a finger amputated).

   f. Let the students form small groups and discuss and identify the cause and symptoms of gum disease (periodontal disease).

   g. Let the students chew a disclosing tablet (see #6 for procedure) and look for plaque on their teeth.

Teaching Materials:

Disclosing Tablets

Paper Cups

Hand Mirrors

Paper Towels/Tissue

PERSONAL TEACHING NOTES

INSTRUCTIONAL UNIT II

BRUSHING

Instructional Objectives:

The student will be able to:

1. State how often to brush.
2. Identify plaque on disclosed teeth.
3. Identify the type of toothbrush to use.
4. Remove plaque with a toothbrush.
5. Use the disclosing tablet as a way of evaluating brushing effectiveness.

Primary Teaching Points:

The teaching points cover both knowledge and manual skills. They are the primary basis on which this instructional program should be evaluated.

1. BRUSHING SHOULD BE DONE AT LEAST ONCE A DAY.

   a. It takes about 24 hours for dangerous amounts of sticky plaque to form on teeth. However, brushing after eating is a good rule to follow, especially for children.

2. PLAQUE CAN BE SEEN BY COLORING IT RED.

   a. The disclosing tablet is made of a harmless red food coloring. When one chews a disclosing tablet until it is dissolved, the red stain adheres to an invisible substance called plaque. It appears on and between the teeth and on the gums.

   b. The disclosing tablet can be used before brushing to determine which areas need to be cleaned.

   c. Brushing removes plaque from the visible surfaces of the teeth (in contrast to flossing which removes plaque between the teeth).

   d. The disclosing tablet is simple to use. It is a good idea to provide close supervision (and precautions) while children are using disclosing tablets. Accidents will happen but stains on clothing or carpeting are only temporary. Even the redness on gums, lips, or tongue will disappear in a short time.

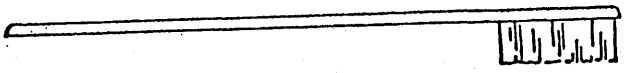
3. PROCEDURE FOR USING DISCLOSING TABLETS:

   a. First, chew one red tablet until it completely dissolves in the mourth. With the help of the tongue, be certain to get the solution on all surfaces of your teeth. Swish well for about 30 seconds. Rinse with water or just swallow.

   b. Second, look for the red areas on the visible surfaces of the teeth, particularly along the gum line. This is plaque - masses of living bacteria. These are the places which need to be brushed or that were missed in brushing. Brush until these red patches of plaque are thoroughly removed.

4. A SIMPLE DESIGNED, SOFT BRUSH SHOULD BE USED.

   a. This is one type of brush to use:



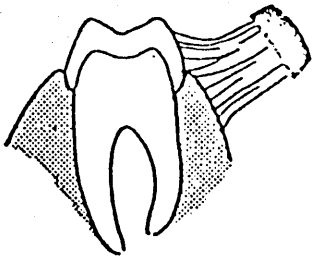
   It has a straight handle, a small head, a flat brushing surface, soft nylon bristles with at least three rows of tufts.

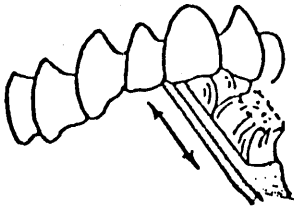
   b. An electric toothbrush with the same characteristics is acceptable.

   c. Other types of brushes may be recommended by your personal dentists.

5. THE BRUSH SHOULD BE ANGLED TOWARD TO JUNCTION OF THE TEETH AND GUMS.

a. Half of the bristles are placed on the tooth and half on the gums.





b. Sometimes it is easier to place the brush in a vertical position to clean behind the upper and lower front teeth.

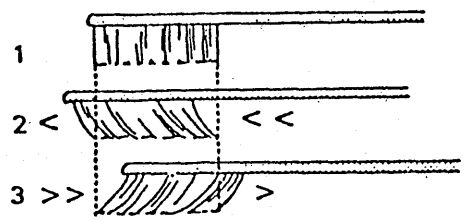
6. BRUSHING IS DONE WITH A SHORT SCRUB STROKE.

   a. The brush moves slightly back and forth - a jiggling or vibration.

      First, the brush is placed flat againt the teeth and gums.

      Second, the head of the brush moves in one direction about ½ inch without moving the bristle surface. Flexing the bristles is all that is necessary.

      Third, move the brush in the opposite direction in the same manner. Now speed up the movements and it becomes a vibratory motion.



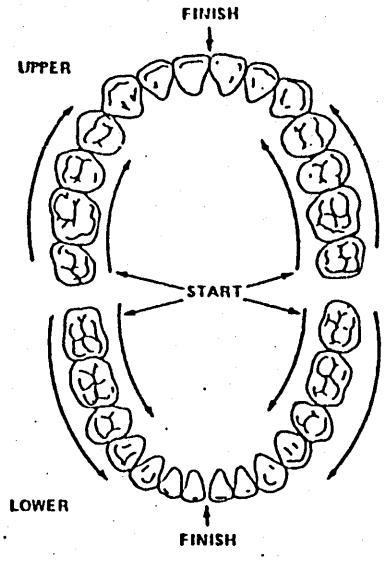
   b. Only light pressure is needed in brushing. Plaque is soft and can easily be removed.

7. A BRUSHING PATTERN IS NEEDED TO SYSTEMATICALLY COVER ALL TEETH.

   a. The toothbrush covers about two teeth at one time. Therefore, the stroke should be applied to two teeth and then the brush advanced to the next two teeth.

   b. The number of strokes in each area depends on how many it takes to remove the plaque.

c. This diagram shows a pattern for systematically brushing all teeth.



Notice that brushing always starts at the back of the mouth and moves forward; first on the outside or cheek side, and second, on the inside or tongue side. Finish with a vigorous brushing of the chewing surfaces of the back teeth.

8. THE DISCLOSING TABLET EVALUATES BRUSING EFFECTIVENESS.

a. The teeth should be disclosed after the brushing procedure so that remaining plaque can be identified and removed. This latter use leads to improvement of brushing skills.

Suggested Activities:

1. Research has shown that it takes approximately 5 days, for a 10-11 year old to learn this skill. Therefore, as a priority in follow-up to the program instruction, it is recommended that daily or periodic practice be included in your instruction.

2. If the students are presently using a different method of brushing than is being taught, discuss why this new method and brush are easier to use and more efficient in removing plaque.

3. To give the best visibility, do not use toothpaste while learning to brush.

4. Discuss with the children how often to brush and how they will know when the plaque has been removed.

5. Reinforce the characteristecs of the right brush to use with this brushing method.

6. Demonstrate the basic, vibratory stroke and pattern for brushing all the teeth with the oversized mouth model and toothbrush. Have the children practice the basic vibratory stroke on the palms of their hands.

7. Let the children chew a disclosing tablet and look at their teeth for plaque before and after brushing.

8. Give the students mini-posters on how to brush, and encourage them to take them home and post as reminders.

Teaching Materials:

Toothbrushes

Hand Mirrors

Disclosing Tablets

Paper Cups

Paper Towels/Tissue

Mini-Poster - Brushing

Mouth Model and Toothbrush

PERSONAL TEACHING NOTES

INSTRUCTIONAL UNIT III

FLOSSING

Instructional Objectives:

The student will be able to:

1. State how often to floss.
2. Identify plaque on disclosed teeth.
3. Remove plaque with dental floss.
4. Use the disclosing tablet as a way of evaluating flossing effectiveness.

Primary Teaching Points:

The teaching points cover both knowledge and manual skills. They are the primary basis on which this instructional program should be evaluated.

1. FLOSSING SHOULD BE DONE AT LEAST ONCE A DAY.

   a. It takes about 24 hours for sticky plaque to form on teeth.

   b. Flossing can be done any time - whenever it's most convenient, even while reading or watching T.V., but flossing at bedtime ensures a clean mouth throughout the night time hours.

   c. Flossing removes plaque from between the teeth where the toothbrush can't reach.

2. PLAQUE CAN BE SEEN BY COLORING IT RED.

   a. The disclosing tablet is made of a harmless red food coloring. When one chews a disclosing tablet until it is dissolved, the red stain adheres to an invisible substance called plaque. It appears on and between the teeth and on the gums.

   b. Although it is difficult to see disclosed plaque between the teeth, the disclosing tablet can help evaluate flossing effectiveness. If the plaque is removed from the surfaces that are visible between the teeth, it can be assumed that the plaque on the invisible surfaces has also been removed. As in evaluating brushing effectiveness, the tablet can be used before and/or after flossing to check for thorough plaque. removal.

c. The disclosing tablet is simple to use. It is a good idea to provide close supervision (and precautions) while children are using disclosing tablets. Accidents will happen but stains on clothing or carpeting are only temporary. Even the redness on gums, lips or tongue will disappear in a short time.

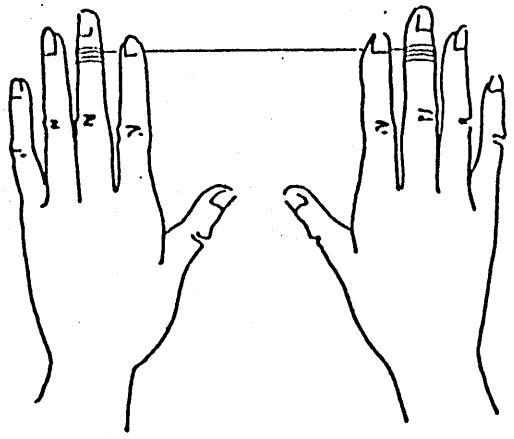
3. PROCEDURE ON USING DISCLOSING TABLETS:

a. First, chew one red tablet until it is completely dissolved,in the mouth. With the help of the tongue be certain to get the solution on all surfaces of your teeth. Swish well for about 30 seconds. Rinse with water or just swallow.

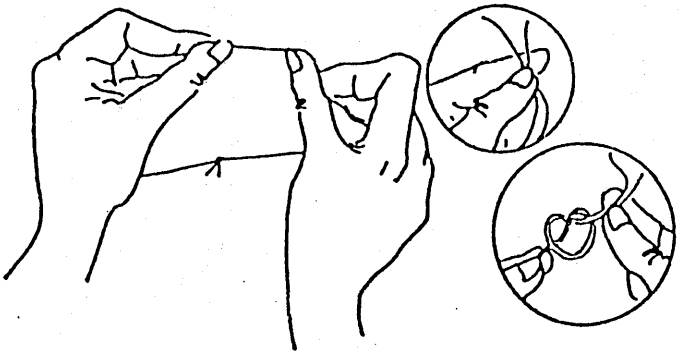
b. Second, look between the teeth for traces of red. This is plaque - masses of living bacteria. These are the places which need to be flossed, or that were missed in flossing. Floss until these red patches of plaque are thoroughly removed.

4. FLOSS MUST BE HELD SECURELY.

a. About 18" of floss is used. This floss is wrapped around the index or middle fingers of each hand. It should be held taut.

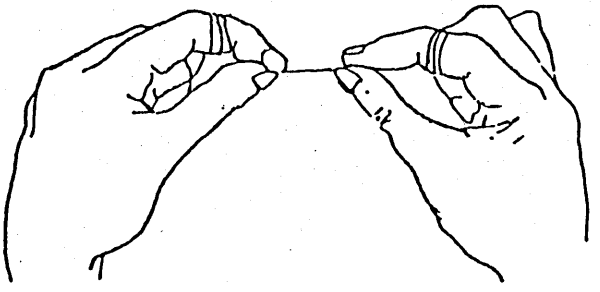


b. If the student has difficulty holding the floss, an alternate method can be used. Tie the floss into a loop about the size of an orange.

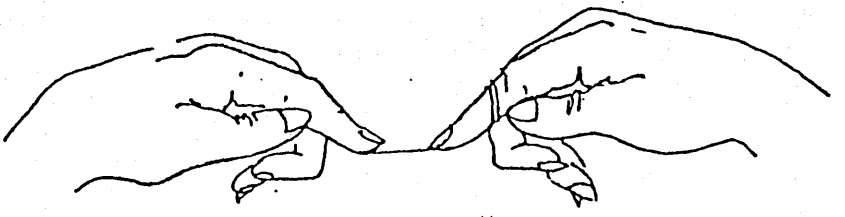


5. THERE ARE TWO WAYS TO USE FLOSS: ONE FOR THE UPPER TEETH AND ONE FOR THE LOWER TEETH.

   a. For flossing the upper teeth, the floss rides on the ends of the thumbs with about 1/2 - 1" of floss between them that is free to work with.



b. For flossing the lower teeth, the floss rides on the index fingers.

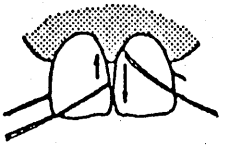


6. FLOSS SHOULD BE EASED BETWEEN THE TEETH.

   a. In placing the floss, use a gentle sawing (back and forth) motion, as the floss is eased between the teeth. Do not force the floss so that it snaps into the gum.

7. FLOSSING IS DONE WITH A VERTICAL STROKE.

   a. The floss should be curved around the tooth and held taut against it. The floss moves up and down - going from under the edge of the gum toward the edge of the tooth. When one tooth is cleaned, shift the floss around the adjoining tooth.



8. FLOSSING PATTERN IS NEEDED TO COVER THE WHOLE MOUTH.

   a. The basic flossing stroke is applied throughout the mouth in each area where two teeth meet.

b. When the floss becomes frayed or soiled, use a fresh section of floss.

c. At first, flossing may be awkward and slow, but continued practice will increase skill and effectiveness.

9. THE DISCLOSING TABLET EVALUATES FLOSSING EFFECTIVENESS.

a. The teeth should be disclosed after the flossing procedure so that remaining plaque can be identified and removed. This latter use leads to improvement of flossing skills.

Suggested Activities:

1. Research has shown that it takes 5 days for a 10-11 year old to learn this skill. Therefore, as a priority in follow up to the program instruction, it is recommended that daily or periodic practice be included in your instruction.

2. Cover your hand with thick, tempera paint, explaining that your fingers represent teeth covered with plaque. Hold fingers tightly together and use a toothbrush to remove paint. Then open your hand to show that the brush has not cleaned between the fingers (teeth) and explain that floss is able to clean areas the toothbrush cannot reach.

3. Demonstrate the basic flossing stroke by using two bottles, cartons or other objects. A length of string, ribbon, or cloth strip will show how to manipulate the floss between these objects (teeth). This exercise strengthens the process of visualising the basic flossing stroke.

4. Discuss with the children how often to floss and how they can tell when the plaque has been removed.

5. Demonstrate the basic flossing stroke by having the children in pairs, practice manipulating the floss between two fingers.

6. Let the children chew a disclosing tablet and look at their teeth for plaque before and after flossing.

7. Give the students mini-posters on flossing, and encourage them to take them home and post as reminders. (Appendix C).

Teaching Materials

Dental floss

Hand mirrors

Disclosing tablets

Paper cups/tissues

Mini-Poster Flossing

PERSONAL TEACHING NOTES

INSTRUCTIONAL UNIT lV

DIET

Instructional Objectives:

The student will be able to:

1. List the characteristics of foods which trigger tooth decay.
2. Discuss sugary/sticky foods.
3. To identify hidden sugars on packaged foods.
4. Explain that the frequency of eating "sugar foods" is directly related to decay production.
5. List snackfoods which are not decay-producing.

Primary Teaching Points:

1. SWEET AND STICKY ARE THE TWO CHARACTERISTICS OF FOOD WHICH TRIGGER DENTAL DISEASE.
   a. Sugar (sucrose) causes tooth decay. Bacteria living in dental plaque use sugar to form a powerful acid which destroys tooth enamel. Honey and syrups are forms of sugar.
   b. Sticky foods prolong acid action, and oftentimes sticky foods too, contain sugar.

2. MOST POPULAR BETWEEN MEAL SNACKS ARE SUGARY/STICKY FOODS.
   a. Some examples of popular items are:
      i. candy
      ii. cake
      iii. cookies
      iv. soft drinks
      v. jelly
      vi. gum

3. "HIDDEN SUGARS" CAN BE FOUND IN THE LIST OF INGREDIENTS ON PACKAGED FOODS.

   a. Forms of hidden sugar are: sucrose, honey, or syrup.

   b. Sugar is often found in foods such as: bread, crackers, soups, frozen and canned fruits and juices, frozen and canned vegetables and juices.

4. THE FREQUENCY OF CONSUMPTION OF SUGAR(SUCROSE) HAS MORE BEARING ON THE INCIDENCE OF DENTAL DECAY THAN THE AMOUNT CONSUMED.

   a. Each time sugar is eaten, acid formation is triggered regardless of how much or how little sugar is consumed. Thus, from the standpoint of dental health, it would be comparatively safer to eat a pound of sugar all at once than to eat a teaspoon of sugar, e.g., breath mints, every half hour.

   b. When trigger foods are eaten, the bacteria in plaque react almost immediately and the acid action lasts for approximately twenty minutes.

      Rule for eating trigger foods: avoid trigger foods for between meal snacks, eat trigger foods only at meals.

5. THERE ARE MANY SNACKFOODS WHICH ARE NOT DECAY-PRODUCING.

   a. Select foods that help full-fill your basic nutritional requirements which do not contain sugar, sucrose, or honey, molasses, or syrup.

   b. Fresh fruit and vegetables are delicious snacks. Raw vegetables are excellent snacks by themselves, or with dips that do not contain sugar.

   c. Canned or frozen fruits or vegetables are available in any season of the year. Many contain sugar. Select the ones labeled "no sugar added" or "packed in water."

   d. Canned and frozen fruit juices are also available without added sugars.

   e. Protein foods, such as meat, fish, poultry, eggs, cheese, and cottage cheese make good snacks. All kinds of nuts and edible seeds are good protein snacks for children over five years of age. Milk is a good between-meal drink and thirst quencher; there's regular, low fat, skim, dried, or buttermilk.

Suggested Activities:

1. Have class bring labels from foods and have them sort into those with and without sugar, honey, and syrups. Displays, discussion or guessing games can be developed around this project.

2. Demonstrate the stickiness of foods such as marshmallow-filled cupcakes. Using a knife to represent teeth, cut into cupcake and note the amount of cake which clings to the surface of the knife. Then cut into an apple, orange, or grapefruit and note how clean the knife is.

3. Have a good snackfood party with the menu being decided by the class. Use Suggested List of Snackfoods (Appendix A) as a guide.

4. Have students keep a food record for a five-day period. Include every food eaten at meals and in between. Have students circle all foods eaten between meals which are "trigger foods." (All foods eaten at once are considered only one "trigger food.")

   a. Grades K-3

      Discuss how often the teeth had acid baths because of "trigger foods" snacks. Suggest alternates to current snack favorites.

   b. Grades 4-6

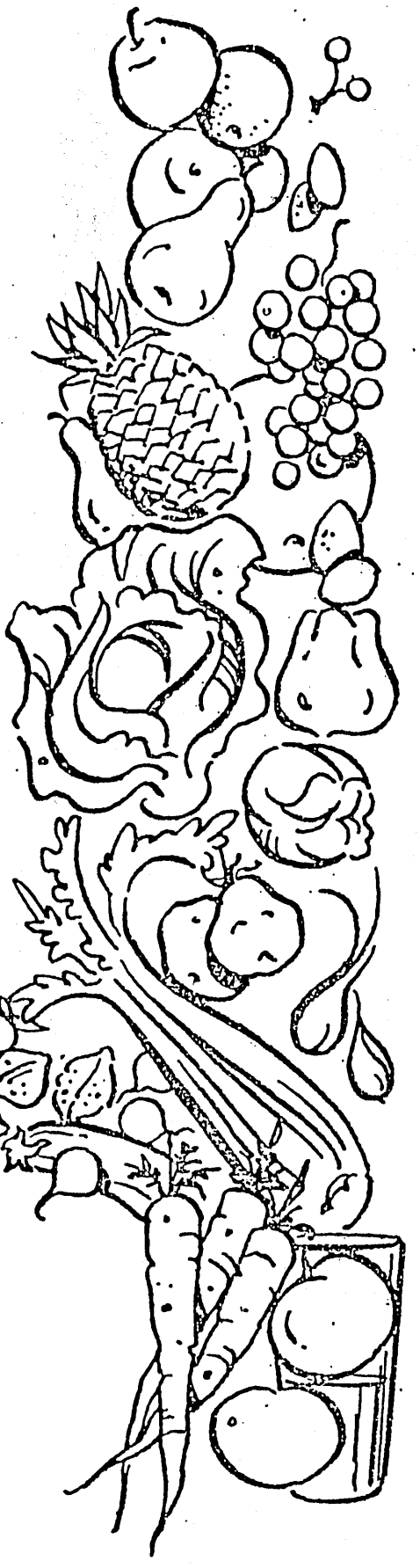
      Provide each student with a copy of Acid Attack Score Sheet (inside back cover). Have students add the circled number of "trigger foods" for each day on their diet sheet. Record each day's total on The Acid Attack Score Sheet and continue the calculations as indicated. Discuss the implications of these acid baths, and suggest alternatives to current snack favorites.

Teaching Materials:

Suggested List of Snackfoods - Appendix A

Acid Attack Score Sheet - Inside Back Cover

SUGGESTED LIST OF SNACKFOODS



FRESH FRUITS

- APPLES
- ORANGES
- TANGERINES
- TANGELOS
- GRAPEFRUIT
- GRAPES
- PEARS
- PLUMS
- PEACHES
- PINEAPPLE
- CANTALOUPE
- BERRIES

FRESH VEGETABLES

- CARROTS
- CAULIFLOWER
- CELERY
- CUCUMBERS
- GREEN PEPPERS
- PEAS
- RADISHES
- TOMATOES
- TURNIPS

PROTEIN FOODS

- CHEESE, COTTAGE CHEESE, YOGURT (plain)
- EGGS
- FISH
- MEATS
- NUTS
- POULTRY
- SOUPS and DIPS made from DRIED BEANS or PEAS

THIRST QUENCHERS

- BUTTERMILK and PLAIN MILK (low fat or skimmed)*
- FRUIT JUICES, canned, fresh, frozen, but no sugar added. (Look for word "juice" when purchasing; the label indicating "fruit drink" usually says "sugar added.")
- VEGETABLE JUICES, without sugar

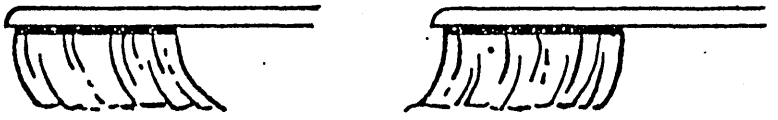
*Also "Protein Foods."

Save TRIGGER FOODS for mealtime. Examples of such foods are:

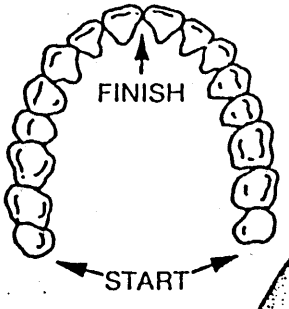
Bananas	Chocolate milk	Ice Cream
Bread	Cookies	Jam
Breakfast cereals	Crackers	Jelly
Candy	Cupcakes	Peanut Butter
Cake	Dried fruits (dates, figs, raisins, prunes, apples, apricots, etc.)	Potato Chips
Canned fruits in syrup		Soft drinks with sugar added.

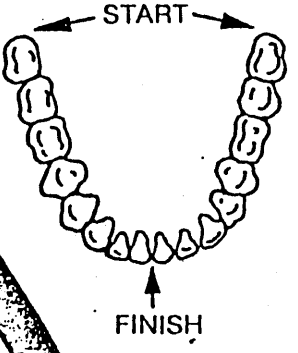
REMEMBER TO

BRUSH! BRUSH! BRUSH!



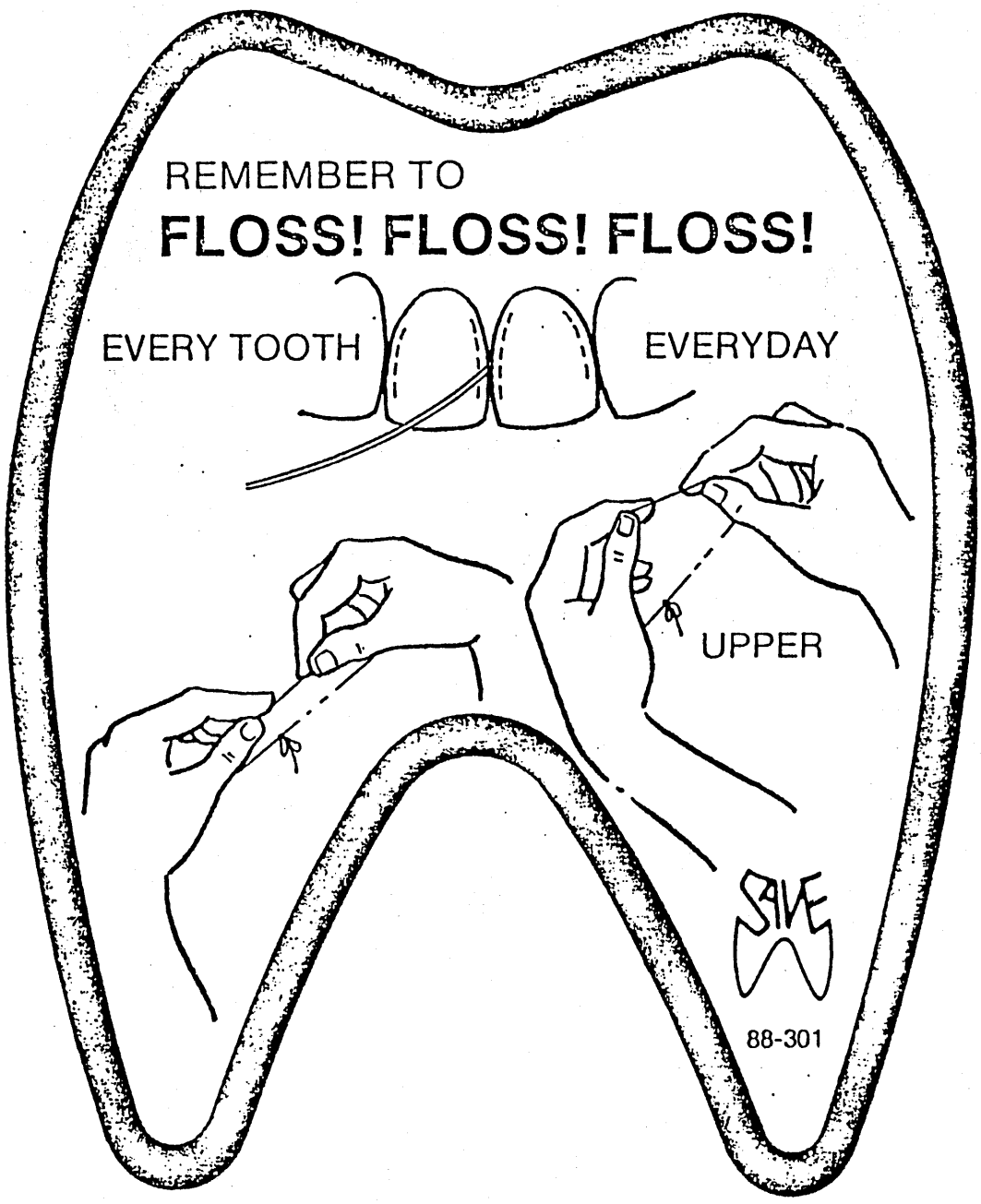
MOVE BRUSH FORWARD ABOUT ½ INCH WITHOUT MOVING BRISTLE SURFACE. FLEXING THE BRISTLES IS ALL THAT IS NECESSARY.





SAVE

88-401


REMEMBER TO
FLOSS! FLOSS! FLOSS!
EVERY TOOTH
EVERYDAY
UPPER
SAVE
88-301

Acid Attack Score _____ Date _____

NUMBER OF SNACKS	MINUTES OF ACID ATTACK				
5	100	100	100	100	100
4	80	80	80	80	80
3	60	60	60	60	60
2	40	40	40	40	40
1	20	20	20	20	20
0	FIRST DAY	SECOND DAY	THIRD DAY	FOURTH DAY	FIFTH DAY

TOTAL NUMBER EXPOSURES (5 DAYS) = _____ X 20 MINUTES = _____ MINUTES ÷ 60 = _____ HOURS

PROPOSED ACTION

APPENDIX VII

CALIBRATION DATA

APPENDIX VII

CALIBRATION DATA

This data relates to 35 subjects from two schools examined and re-examined on separate occasions for dmft (modified) ie. C's, D's & E's alone) and DMFT calibration purposes prior to applying the Test-Retest method of Rugg-Gunn & Holloway (1974).

The students were from Grade K, 3 and 6 and were chosen at random by the recorder. The schools involved are identified as A & B and the students identified by number only. The same examiner (the author) was assisted by two recorders, one for each school. The schools representative of the groups involved in this study.

The examinations were carried out on 14th February and March 14 and were chosen from 141 children who were examined on these days.

Every effort was made to standardise the examinations which were carried out using disposable mirrors, and self-made disposable explorers (ss orthodontic 0.5mm wire embedded in plastic handles (designed by the author) and only detectable cavitation was recorded.

EXAMINER J.G. MESSER
RECORDER SCHOOL A M. HARRIS
RECORDER SCHOOL B P.J. HORNETT

DATE 1: FEBRUARY 14th
DATE 2: MARCH 28th

SCHOOL A NO'S 1 -
SCHOOL B NO'S - 35

a = 1st Examination
b = 2nd Examination

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X = missing - missing* / MISSING
F = filled - filled / FILLED
= Unerupted
* = Extracted

STUDENT NO		DOB	AGE	SEX	EO	GD	Dental Chart Right	Left	d D	e M	f F	t T	
1	a	81/05/28	8	M		3	6 X D^C C 2 1 1 2 4 X 6		5	2	0	7	✓
							6^C E^C D^C 2 1 1 2 D^C E^C 6		1	0	0	1	✓
	b	"	"	"		"	6 X D^C C 2 1 1 2 4 X 6		5	2	0	7	✓
							6^C E^C D^C 2 1 1 2 D^C E^C 6		1	0	0	1	✓
2	a	81/03/12	8	F		3	6^F X X C 2 1 1 2 C D^F X 6^F		0	7	1	8	✓
							6^F X X 3 2 1 1 2 3 X X 6^C		1	0	3	4	X
	b	"	"	"		"	6^F X X C 2 1 1 2 C D^F X 6^F		0	7	1	8	✓
							6^C X X 3 2 1 1 2 3 X X 6^C		2	0	2	4	X
3	a	81/11/07	8	M		3	6^C E^C D^C C 2 1 1 X D^C E^C 6^C		7	1	0	8	✓
							6^C E^C X 2 1 1 2 D^C E^C 6		3	0	0	3	X
	b	"	"	"		"	6^C E^C D^C C 2 1 1 X C D^C E^C 6		7	1	0	8	✓
							6^C E^C X 2 1 1 2 D^C E^C 6		2	0	0	2	X
4	a	80/01/28	8	F		3	6 E^C 4 2 1 1 2^C 4 E 6^C		2	0	1	3	✓
							6^C E^F 4 3 2 1 1 2 3 4 E^C 6^C		4	0	0	4	X
	b	"	"	"		"	6 E^C 4 2 1 1 2 4 E 6^C		2	0	1	3	✓
							6^C E^F 4 3 2 1 1 2 3 4 E^C 6^C		3	0	0	3	X
5	a	81/02/01	8	F		3	6 X X X 2 1 1 2 C X X 6^F		0	8	0	8	✓
							6 X X C 2 1 1 2. X X X 6		0	0	1	1	✓
	b	"	"	"		"	6 X X X 2 1 1 2 C X X 6^F		0	8	0	8	✓
							6 X X C 2 1 1 2 X X X 6		0	0	1	1	✓
6	a	80/11/03	9	F		3	6 5^F 4 3 2 1 1 2 C X X 6		0	6	0	6	X
							6^F X X 3 2 1 1 2 3 X X 6^F		0	0	3	3	✓
	b	"	"	"		"	6 5^F 4 3 2 1 1 2 C D^F X 6		0	5	1	6	X
							6^F X X 3 2 1 1 2 3 X X 6^F		0	0	3	3	✓
7	a	81/09/22	8	M		3	6 X X 3 1 1 4 X 6		3	4	0	7	X
							6 E X C 2 1 1 2 D^F E^C 6^C		1	0	0	1	✓
	b	"	"	"		"	6 X 4 X X 1 1 X 4 X 6		3	3	0	6	X
							6 E^C X C 2 1 1 2 D^F E^C 6^C		1	0	0	1	✓
8	a	81/07/13	8	M		3	6 X 4 C 2 1 1 2 C 4 X 6		4	2	0	6	✓
							6^C E^C D^C C 2 1 1 2 C D^C E^C 6		1	0	0	1	✓
	b	"	"	"		"	6 X 4 C 2 1 1 2 C 4 X 6		4	2	0	6	✓
							6^C E^C D^C C 2 1 1 2 C D^C E^C 6		1	0	0	1	✓
9	a	81/01/01	9	F		3	6^C X X C 2 1 1 2 C D^F X 6^C		1	3	4	8	✓
							6^C EF D^F C 2 1 1 2 C D^C EF 6^F		3	0	1	4	✓
	b	"	"	"		"	6^C X X C 2 1 1 2 C D^F X 6^C		1	3	4	8	✓
							6^C EF D^F C 2 1 1 2 C D^C EF 6^F		3	0	1	4	✓
10	a	81/08/06	8	F		3	6 EF D^F 2 1 1 C D^F EF 6		1	2	6	9	✓
							6 X X C^C 2 1 1 2. C D^F EF 6		0	0	0	0	✓
	b	"	"	"		"	6 EF D^F 2 1 1 C D^F EF 6		1	2	6	9	✓
							6 X X C^C 2 1 1 2 C D^F EF 6		0	0	0	0	✓

EXAMINER J.G. MESSER
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STUDENT NO		DOB	AGE	SEX	EO	GD	Dental Chart Right 7 6 5 4 3 2 1	Left 1 2 3 4 5 6 7	d D	e M	f F	t T	
11	a	76/01/04	14	M		6	7 6 5 4 3 2 1	1 2 3 4 5 6 7	0	0	0	0	✓
							7 6 5 4 3 2 1	1 2 3 4 5 6F 7	0	0	1	1	✓
	b	"	"	"		"	7 6 5 4 3 2 1	1 2 3 4 5 6 7	0	0	0	0	✓
							7 6 5 4 3 2 1	1 2 3 4 5 6F 7	0	0	1	1	✓
12	a	76/10/30	13	M		6	7 6F 5C 4C 3 2F 1	1 2 3 4 5 6F 7	0	0	0	0	✓
							7 X 5 4 3 2 1	1 2 3 4 5 6C 7	3	1	3	7	X
	b	"	"	"		"	7 6F 5C 4C 3C 2 1	1 2 3 4 5 6F 7	0	0	0	0	✓
							7 X 5 4 3 2 1	1 2 3 4 5 6C 7	4	1	2	7	X
13	a	78/09/10	11	M		6	7 6F X 4C 2 1	1 2 X 5 6 7	0	5	0	5	X
							7 6C X X 3 2 1	1 2 3 4 X 6 7	2	0	1	3	✓
	b	"	"	"		"	7 6F X 4C 2 1	1 2 4 X 6 7	0	4	0	4	X
							7 6C X X 3 2 1	1 2 3 4 5 6 7	2	0	1	3	
14	a	78/08/21	11	F		6	6F 5 4 2 1	1 2 3 4 X 6	0	1	0	1	✓
							6C 5 6 3 2 1	1 2 3 4 5 6C	2	0	1	3	X
	b	"	"	"		"	6F 5 4 2 1	1 2 3 4 X 6	0	1	0	1	✓
							6 5 4 3 2 1	1 2 3 4 5 6C	1	0	1	2	X
15	a	78/08/14	11	F		"	6F X 4 2F 1	1 2 4 5 6 7	0	3	0	3	✓
							6C X 4 3 2 1	1 2 3 4 X 6C	2	0	2	4	X
	b						6F X 4 2F 1	1 2 4 5 6C 7	0	3	0	3	✓
							6C X 4 3 2 1	1 2 3 4 X 6C	3	0	2	5	X
16	a	78/09/04	11	M		6	6 5 4 C 2 1	1 2 4 5 6	0	0	0	0	✓
							7 6 5 4 3 2 1	1 2 3 X X 6 7	0	0	0	0	✓
	b	"	"	"		"	6 5 4 C 2 1	1 2 4 5 6	0	0	0	0	✓
							7 6 5 4 3 2 1	1 2 3 4 X 6 7	0	0	0	0	✓
17	a	78/04/02	11	M		6	7 6F X 4 3 2F 1	1 2F 4F 5 6C 7	0	0	0	0	✓
							7F 6F X 4 3 2 1	1 2 3 4C X 6F 7F	2	0	8	10	X
	b	"	"	"		"	7 6F X 4 3 2F 1	1 2F 4F 5C 6C 7	0	0	0	0	✓
							7F 6F X 4 3 2 1	1 2 3 4C X 6F 7F	3	0	8	11	X
18	a	77/04/06	12	F		6	7 6C 5 4 3 2 1	1 2 3 4 5 6F 7	0	0	0	0	✓
							7 6F 5 4 3 2 1	1 2 3 4 5 6F 7	1	0	3	4	✓
	b	"	"	"		"	7 6C 5 4 3 2 1	1 2 3 4 5 6F 7	0	0	0	0	✓
							7 6F 5 4 3 2 1	1 2 3 4 5 6F 7	1	0	3	4	✓
19	a	78/01/04	12	F		6	6C 5 4 3 2 1	1 2 3 4 5 6	0	0	0	0	✓
							7 6F 5 4 3 2 1	1 2 3 4 5 6C 7	2	0	1	3	✓
	b	"	"	"		"	6C 5 4 3 2 1	1 2 3 4 5 6	0	0	0	0	✓
							7 6F 5 4 3 2 1	1 2 3 4 5 6C 7	2	0	1	3	✓
20	a	78/10/09	12	F		6	7 6 5 4 3 2 1	1 2F 3 4 5 6F 7	0	0	1	1	✓
							7 6F EF 4 3 2 1	1 2 3 4 5 X 7	0	1	3	4	✓
	b	"	"	"		"	7 6 5 4 3 2 1	1 2F 3 4 5 6F	0	0	1	1	✓
							7 6F EF 4 3 2 1	1 2 3 4 5 X 7	0	1	3	4	✓

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= Unerupted
* = Extracted

STUDENT NO		DOB	AGE	SEX	EO	GD	Dental Chart Right	Left	d D	e M	f F	t T	
21	a	84/05/31	5	M		K	E^c D^c C^c B^c A^c	A^c B^c C^c D^c E^c	9	0	0	9	✓
							E D^c C B A	A B C D^c E^c	0	0	0	0	✓
	b	"	"	"		"	E^c D^c C^c B^c A^c	A^c B^c C^c D^c E^c	9	0	0	9	✓
							E D^c C B A	A B C D^c E^c	0	0	0	0	/
22	a	84/01/09	5	F		K	6 E 0 C B A	B C D E^c 6	1	2	2	5	X
							6 X X C 1 1	B C D^F E^F 6	0	0	0	0	✓
	b	"	"	"		"	6 E D C B A	B C D E 6	0	2	2	4	X
							6 X X C 1 1	B C D^F E^F 6	0	0	0	0	✓
23	a	84/04/12	5	M		K	6 E D C B A	A B C D E	0	0	0	0	✓
							6 E D C B 1/A	A B C D E 6	0	0	0	0	✓
	b	"	"	"		"	6 E D C B A	A B C D E 6	0	0	0	0	✓
							6 E D C B 1/A	A B C D E 6	0	0	0	0	✓
24	a	81/11/25	8	F		3	6 E D C 2 1	1 2 C D E 6	4	0	0	4	✓
							6 E^c D^c X 2 1	1 2 C D^c E^c 6	0	0	0	0	/
	b	"	"	"		"	6 E D C 2 1	1 2 C D E 6	4	0	0	4	✓
							6 E^c D^c X 2 1	1 2 C D^c E^c 6	0	0	0	0	✓
25	a	81/05/15	8	F		3	6^c E^c D C 2 1	1 2 C^c D E^c 6^c	6	0	0	6	X
							6^c E^c D^c X 2 1	1 2 C D^c E^c 6^c	4	0	0	4	✓
	b	"	"	"		"	6^c E^c D C 2 1	1 2 C^c D E^c 6^c	5	0	0	5	X
							6^c E^c D X 2 1	1 2 C D^c E^c 6^c	4	0	0	4	✓
26	a	81/11/05	8	M		3	6^c E^c D C 2 1	1 2 C D^c E^c 6^c	6	1	0	7	✓
							6 X D^c C 2 1	1 2 C D^c E^c 6	2	0	0	2	x
	b	"	"	"		"	6^c E^c 0 C 2 1	1 2 C D^c E^c 6^c	6	1	0	7	✓
							6 X D^c C 2 1	1 2 C D^c E^c 6	3	0	0	3	x
27	a	81/03/14	9	F		3	6 E^c 4 C 2 1	1 2 C 4 5 6	1	1	0	2	✓
							6 E X X 2 1	1 2 C D E 6	0	0	0	0	✓
	b	"	"	"		"	6 E^c 4 C 2 1	1 2 C 4 5 6	1	1	0	2	✓
							6 E X X 2 1	1 2 C D E 6	0	0	0	0	✓
28	a	89/09/01	8	F		3	6 E D^c C^c B 1 A	B C D E 6	4	2	0	6	✓
							6 X D^c C 1 1	2 C D^c X 6	0	0	0	0	✓
	b	"		"		"	6 E D^c C^c B 1 A	B C D E 6	4	2	0	6	✓
							6 X D^c C 1 1	2 C D^c X 6	0	0	0	0	✓
29	a	81/02/10	9	M		3	6 X D^c C 2 1	1 2 C D X 6	3	3	0	6	✓
							6 X D C 2 1	1 2 C D^c E^c 6	0	0	0	0	✓
	b	"	"	"		"	6 X D^c C 2 1	1 2 C D X 6	3	3	0	6	✓
							6 X D C 2 1	1 2 C D^F E^c 6	0	0	0	0	✓
30	a	81/03/04	9	M		3	6 E^F D^F C 2 1	1 2 C D^F E^F 6	0	1	6	7	✓
							6 E^F 4 C 2 1	1 2 C X E^F 6	0	0	0	0	✓
	b	"	"	"		"	6 E^F D^F C 2 1	1 2 C D^F E^F 6	0	1	6	7	✓
							6 E^F 4 C 2 1	1 2 C X E^F 6	0	0	0	0	✓

EXAMINER J.G. MESSER
RECORDER SCHOOL A M. HARRIS
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STUDENT NO		DOB	AGE	SEX	EO	GD	Dental Chart Right							Left							d D	e M	f F	t T	
31	a	81/05/23	8	m		3	6	E^c	D^c	C	B^c	1	1	2	C	D^c	E^c	6			6	0	0	6	✓
							6	E^c	4	C	2	1	1	2	C	D	E^c	6			0	0	0	0	✓
	b	"	"	"		"	6	E^c	D^c	C	B^c	1	1	2	C	D^c	E^c	6			6	0	0	6	✓
							6	E^c	4	C	2	1	1	2	C	D	E^c	6			0	0	0	0	✓
32	a	81/11/24	8	M		3	6	E	D	C	B	1	1		C	D	E	6			2	1	0	3	✓
							6	E^c	D^c	C	2	1	1	2	C	D	X	6			0	0	0	0	✓
	b	"	"	"		"	6	E	D	C	B	1	1		C	D	E	6			2	1	0	3	✓
							6	E^c	D^c	C	2	1	1	2	C	D	X	6			0	0	0	0	✓
33	a	81/08/28	8	m		3	6	E	X	C		1	1		C	X	E	6			1	3	0	4	✓
							6	E	D^c		2	1	1	2	C	X	E	6			0	0	0	0	✓
	b	"	"	"		"	6	E	X	C		1	1		C	X	E	6			1	3	0	4	✓
							6	E	D^c	X	2	1	1	2	C	X	E	6			0	0	0	0	✓
34	a	81/07/11	8	F		3	6	X	D^F	C^F	2	1	1	2	C^F	D	X	6			0	2	3	5	✓
							6	E	D^F	3	2	1	1	2	C	X	E^F	6			0	0	0	0	✓
	b	"				"	6	X	D^F	C^F	2	1	1	2	C^F	D	X	6			0	2	3	5	✓
							6	E	D^F	3	2	1	1	2	C	X	E^F	6			0	0	0	0	✓
35	a	81/12/03	8	F		3	6	E^c	D^F	3	2	1	1	2	C	4	E^c	6			2	1	4	7	✓
							6	E^F	D^F	3	2	1	1	2	3	X	E^F	6			0	0	0	0	✓
	b	"	"	"		"	6	E^c	D^F	3	2	1	1	2	C	4	E^c	6			2	1	4	7	✓
							6	E^F	D^F	3	2	1	1	2	3	X	E^F	6			0	0	0	0	✓

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