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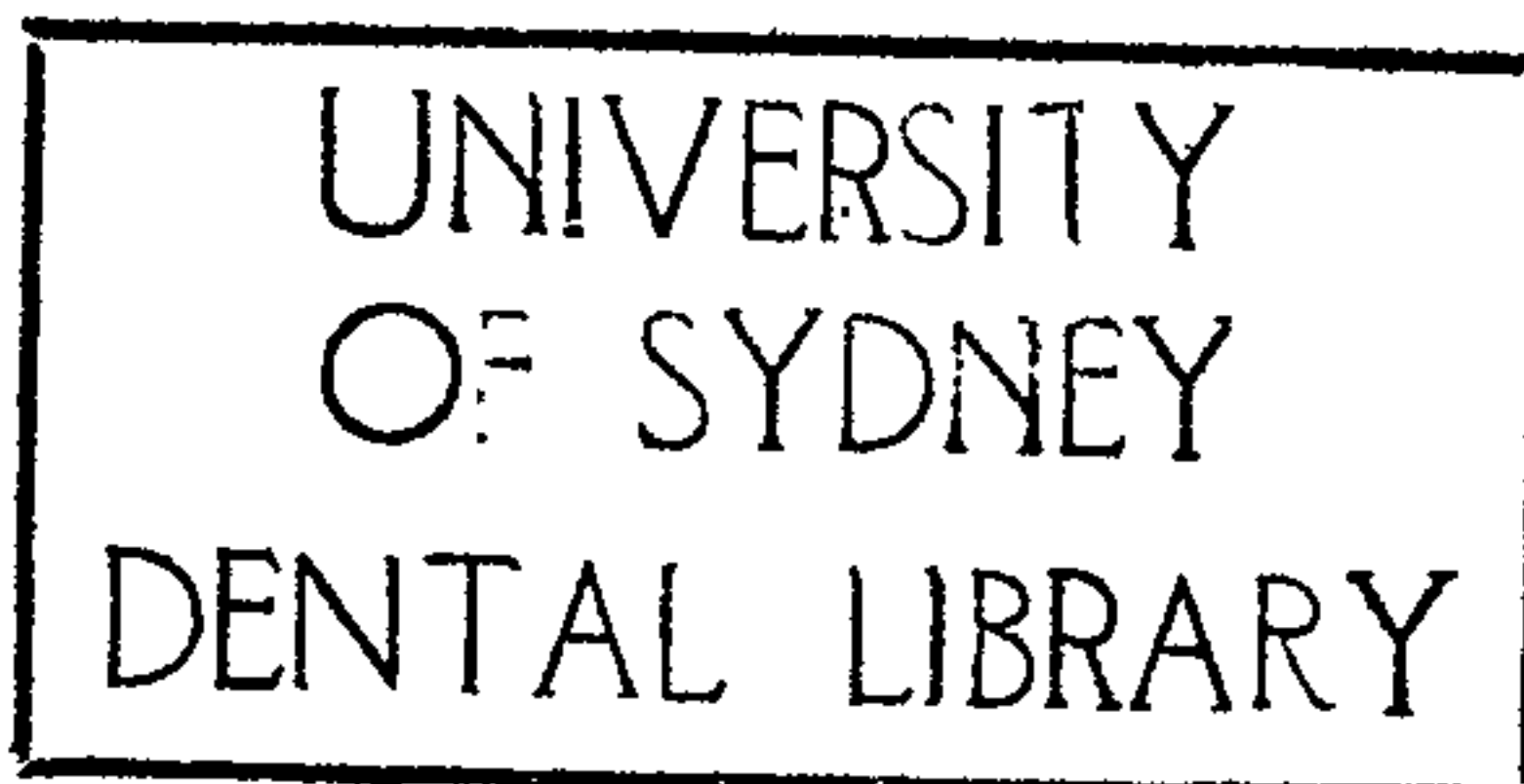
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DENTAL HEALTH EDUCATION
FOR SCHOOL CHILDREN IN
NEW SOUTH WALES



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A thesis submitted in partial requirement
for the Diploma in Public Health (Dentistry)



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1.

INTRODUCTION

Up to late 1979, dental services for the general public in Hong Kong had been taken care of by private practitioners on a direct fee-for-service basis. The lack of any insurance scheme, coupled with a shortage of dental manpower in this densely populated British colony which adopts a laissez-faire policy, has pushed up the fees for dental treatment to a high level beyond the means of most of the population.

During the past thirty years, the Medical and Health Department of the Hong Kong Government Service has been thoroughly taxed by the constant influx of refugees and immigrants entering the territory. It has spent vast sums of money to provide medical treatment and hospitalization for the people at token charges. Due to low priority within the Medical and Health Services, dental services have been reduced to emergency treatment for members of the public, simple dental treatment for the inmates of penal institutions and specialist treatment for patients in government hospitals.

In April 1961, water fluoridation was introduced, with fluoridation plants in four reservoirs. Progressively, more plants were installed until all the communal water supplies in Hong Kong were fluoridated in 1972. A caries survey ⁽⁷¹⁾ was carried out on a 3% sample of children aged 6-11 years in February/March 1960 as a pre-fluoridation dental survey, and a follow-up survey ⁽⁷²⁾ of a 1.5% sample was also conducted in February/March 1962. The 1962 survey showed that for children 6- 8years, dmf = 9.25; DMF = 2.70, and 9-11 years, dmf = 3.79; DMF = 4.36.

The latest survey conducted by the Medical and Health Department in 1979-1980 on primary school children revealed that dental caries has been considerably reduced when compared to the 1962 survey. The prevalence of dental caries

in the permanent dentition was low. The DMF rate was 0.33 at age 6 and 1.5 at age 11, with an average of 0.93 for the age group 6-11 years. The prevalence of dental caries in the primary dentition was moderately high, each child at age 6 having an average of 4.26 dmf teeth and 25% of the primary teeth ruptured were decayed. (70)

The reduction in dental caries prevalence can be said to be significant, but the survey also showed that the majority of children were found to have poor hygiene, 80% with soft debris on their teeth and 19.2% with intense gingivitis.

Although no surveys have been carried out to determine the relationship between periodontal disease and tooth loss in Hong Kong, there is a general recognition among the dental profession that periodontal disease is the main cause of tooth loss for people over the age of 30 years. Therefore, when planning a dental service, the Government bore this in mind and approached the issue sensibly. Having implemented water fluoridation first and having obtained its maximum potential (that is, upto 75-80% in caries reduction), the next step taken by the Hong Kong Government in the prevention programme was to establish the School Dental Service in 1979. The objective of the School Dental Service is to prevent dental decay among school children by providing a basic dental conservation service with dental health education at the primary school level.

The philosophy here is the belief that healthy oral structures are more likely to be found in young children and to practice prevention to the full one should begin at this stage. Furthermore, oral health education as a part and parcel of general health education should be taught to children early in life so that they can gain normal understanding of the value of health before they adopt unfavourable patterns of behaviour. School age children provided a natural captive population for the delivery of services.

They are dependent and vulnerable; it becomes socially and politically more acceptable to ease problems of access. Like other dependent groups, children are often regarded as a special case which can be indulged without casting aside the overriding principle of "user pays". (25)

The success story in Australia in reducing dental caries and creating dental awareness in children is well known in Hong Kong. Australia, by combining water fluoridation with a School Dental Service and dental health education programmes, has been able to reduce the DMFT rate to 2.55 for 12 year olds, a figure below the World Health Organization's target of 3.0 for the year 2000.

It would be appropriate to define dental health education here. Dental health education refers to the development of knowledge, attitudes, practices and values which lead an individual to optimal oral health. (14) Since the end result of education is behaviour, it is obvious that knowledge alone is not enough, but that knowledge must be tied in with attitudes, practices and values if changed behaviour is to result.

Minns (73) defines dental health education more simply and directly by saying that dental health education is preventive dentistry planned through the social sciences, practised through the techniques of education and evaluated through methods of social enquiry and epidemiology. Holloway and Swallow (52) said that dental health education embraces the whole concept of rendering a person more aware of the value of dental health and of placing him in a frame of mind where he is prepared to expend time and money to attain it.

The author has chosen the State of New South Wales in Australia for study and research in the field of dental health education. The aims are:

1. To examine dental health education for school children in New South Wales.
2. To determine what evaluation has been carried out and if there has been any changes in the behaviour and

clinical outcome.

3. To evaluate dental health education methods for adoption in Hong Kong.

For convenience, the following common abbreviations have been used in this thesis:

D.H.E. - Dental Health Education

A.D.A. - Australian Dental Association

S.D.S. - School Dental Service

D.H.E. & R.F. - Dental Health Education and Research Foundation (University of Sydney)

N.S.W. - New South Wales

2.

DESCRIPTION OF PROGRAMMES

Dental health education in N.S.W. mainly comes from three sources: the Government dental services, the Dental Health Education and Research Foundation (University of Sydney) and the Australia Dental Association. These three organizations are able to reach all corners of the State by virtue of the size and nature of their organizations.

Other organizations, such as the Education Department, commercial firms, the Aboriginal Medical Service, private dental clinics and friendly society dental clinics play a part in rendering D.H.E. services.

2.1 Government Dental Services

There are three dental services operated by the State Government of N.S.W. which carry out D.H.E. programmes for children. They are the School Dental Service, the United Dental Hospital of Sydney and the dental clinics in hospitals.

2.1.1. The School Dental Service in N.S.W.

The present S.D.S. in N.S.W. was established as a part of the nation-wide scheme in 1973 by the Federal and State governments to provide free dental services for all primary school children by 1980, and all individuals at age 15 and under by 1985. The original financial support from the Federal government was withdrawn in July 1981. Thus the scheme is now fully funded by the State government.

The present scheme was established for the long-term improvement of the dental health and dental awareness of the community. Therefore emphasis was given in the fields of D.H.E. and prevention, as well as the treatment programme.

At the outset of the scheme, it was announced that both dentists and dental therapists would be employed. Guidelines were set as follow: (20)

- the service is based on the training and employment of dental therapists working under the general direction and control of dentists;
- dental care is provided without cost to the parents;
- the provision of treatment by dental specialists is not included in the treatment programme;
- dental care is provided in clinics established either in, or close to, the primary schools wherever possible; and
- the scheme is subject to evaluation to assess its effectiveness in improving the dental health of children through treatment and prevention.

The New South Wales S.D.S. commenced by establishing training schools for dental therapists in 1973. It was considered that dental therapists must be properly selected and trained to a safe standard because they would be working on children at a tender age. They are responsible for creating the first and also lasting impression on the children.

A Curriculum Board designed a 2-year course for suitable training in theoretical and practical aspects of simple fillings, extractions, treatment planning and dental health education.

This training prepares student dental therapists to give D.H.E. talks to primary school children. Talks include 6 lessons lasting for about 30 minutes each session.

Towards 1977, female dental health educators were employed in the S.D.S. by the Northern Metropolitan Health Region of the Health Commission of N.S.W. to carry out brush-ins and D.H.E. lectures.

Originally the dental health educators were trained by the D.H.E. & R.F. for the purpose of carrying out D.H.E. programmes. The intensive course which they received included instruction in teaching techniques and subjects such as

diet, oral hygiene, plaque control, fluoridation and the need for regular dental check-ups. The present practice is for the Health Commission to train its own dental health educators in an in-service training course.

A subsequent agreement was reached between the Education and Health Departments to carry out D.H.E. in two complementary school programmes - the "brush-in" sessions and lectures in classrooms for primary school children.

2.1.1.1. "Brush-Ins"

New South Wales is divided into 13 health regions.

Only the Northern Metropolitan Health Region employs dental health educators. Each dental health educator rotates around schools in her assigned area, reaching each school approximately three times per year for brush-ins. The other health regions rely on dental therapists and trainee therapists to carry out brush-in sessions where time permits, with the result that it is not carried out as frequently or as regularly as the Northern Metropolitan Health Region.

Procedures for a "brush-in" are:

- a) The school is notified of intended date, and requests for permission and co-operation is made. The school distributes consent forms to parents for their children to participate in the "brush-in". Children are instructed by the teacher to bring their own toothbrush.
- b) On confirmation by the school, the dental health educator arrives at the school on the appointed date, armed with paper cups, tissues, stannous fluoride (10%) toothpaste (Floran), toothbrushes and a giant set of demonstration models of teeth and toothbrush.
- c) At the appointed time, the dental health educator (sometimes accompanied by a dental therapist from the dental clinic attached to the school) arrives to meet the principal of the school or a teacher in a classroom where the brush-in is to take place.

- d) The principal introduces the dental health educator who takes over at this stage. The dental health educator proceeds to demonstrate brushing technique on the demonstration set of teeth, calling it "Charlie", with a giant toothbrush. The children are told why gums must be brushed as well as the teeth, the correct type of toothbrush to use and why toothpaste with fluoride should be used. The children are encouraged to participate as much as possible. On subsequent visits the children are asked to give information already imparted during the previous visit.
- e) Immediately following the short talk, the children are told to sit on chairs placed around tables. Each helper (volunteer mothers) is assigned 3 or 4 children to supervise. A paper cup and tissue are distributed to each child and then a small amount of the 10% stannous fluoride toothpaste is placed on each toothbrush. Each toothbrush is examined, children with the wrong type of toothbrush are given the right type and instructed to show mother. Those without brushes use their index fingers as toothbrushes.
- f) The children then commence to brush their teeth, with the helpers ready to assist them. Meanwhile, the dental health educator moves from child to child, examining their teeth (using a wooden spatula) to detect whether there is any visual caries present. If so, the child is given a note to take home which informs the mother that her child may have dental decay and where free dental treatment may be obtained from nearby dental clinics. (Appendix I)
- g) Before leaving, the children are instructed not to rinse out for 1 or 2 hours, in order to keep the fluoride toothpaste on the teeth for as long as possible.

2.1.1.2. Dental Health Education Lectures

The agreement made between the Education Department and the Health Commission of N.S.W. to carry

out D.H.E. lessons in the classroom does not give the dental health educators and trainee dental therapists the automatic right to enter the classroom as lecturers unless requested by the teacher. Teachers are trained in giving information over to the children properly while the dental personnel has the knowledge, but are not necessarily equipped to teach. Therefore, the dental personnel can only act as resource-persons. However, since the beginning of this project, most of the teachers have requested dental health educators to act as both resource-persons and lecturers.

Lectures are given to primary school children and are graded to their class and standard. Each class usually has 6 to 8 lectures per year, each lecture lasting 25 minutes. Children participate as much as possible and class teachers are always encouraged to sit in while lessons are in progress. Brightly coloured, appealing aids are used throughout. These include large models of upper and lower jaws with teeth in the proper position and a large toothbrush, animated illustrations and posters made by the dental personnel, as well as teaching aids produced by the Health Commission of N.S.W. and the D.H.E. & R.F.. Among the pictures made by the dental personnel are different foods depicting which are suitable and unsuitable to eat, teeth in various stages of decay and the four rules for good teeth. In areas with a large migrant population, an especially prepared multi-lingual pamphlet is distributed.

Each child is given "A Message to My Parents" leaflet which summarises the lesson and which the child takes home. This is a device aimed at involving the parents and of securing their co-operation. After meals each day the child is encouraged to fill in the "Clean Teeth Chart" (Appendix II) on the reverse side of the leaflet and at the end of the week it is returned to the classroom when the regular teacher follows up with another dental health lesson.



Figure 1: Some of the dental literature available from the D.H.E. & R.F.

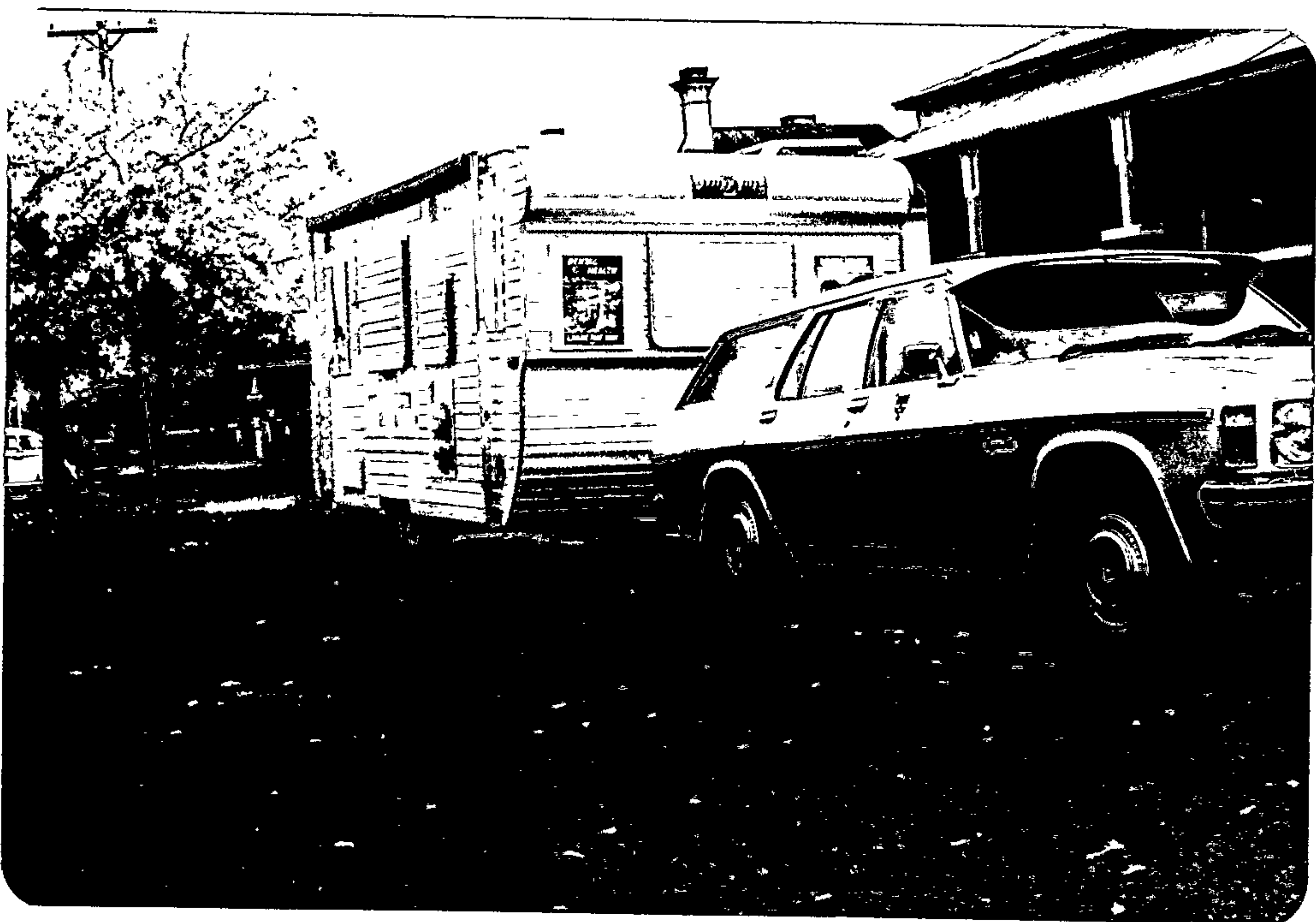


Figure 2: The mobile dental unit



Figure 3: Students entering the mobile dental unit



Figure 4: A dental therapist demonstrating toothbrushing technique to students beside the mobile dental unit

2.1.2. Dental Health Education for Secondary School Children

In 1978 the Health Commission of N.S.W. took over a D.H.E. mobile unit created by the D.H.E. & R.F. This mobile unit was especially designed to disseminate dental health messages to secondary school children and community groups. (Figures 2-4)

With the consent of the Department of Education and the school principals, the unit is parked in the school grounds. The unit is operated by 3-4 dental personnel (usually dental health educators and dental therapists). Pupils aged from 12 to 18 years systematically visit the unit. Initially pupils are taken to the audiovisual area on one side of the mobile unit where closed circuit television and daylight slide projection is used to aid the dental personnel in oral hygiene instruction. A plan of the unit is shown in Appendix III. The slide demonstrations can be aimed at a particular age group. Subjects covered include diet, plaque control, preventive dentistry, periodontal disease and the importance of wearing mouthguards.

While most of the pupils are watching the audiovisual demonstration, groups of 3 or 4 are taken to the other side of the unit where they are asked to swish their mouths out with a fluorescent dye which reveals the presence of tooth and soft tissue plaque by yellow-green fluorescence when viewed under the ultraviolet light. At the same time pupils are told about dental plaque by the therapist or educator and this prepares them for what they are about to see - their own teeth. The group then moves into the darkened room of the unit, called the Plaque Disclosing Tunnel, which is lit by ultraviolet light. They are then invited to smile facing a mirror to see for themselves the buildup of the plaque on their teeth.

In the Dental Health Instruction section, a dental personnel demonstrates the correct method of brushing and flossing teeth, using a large set of teeth and a large

toothbrush as models. After the pupils are put through the demonstration of brushing and flossing, they are invited to go away to clean their teeth (each participant receives a toothbrush, fluoride toothpaste and relevant dental health literature) and come back again to observe if the plaque has been removed.

A third section within the unit features a simple laboratory which facilitates the demonstration of certain characteristics of plaque and saliva. Microbiology and biochemistry facilities are included for helping high school science pupils.

Panels on all sides of the unit carry posters featuring the dental health messages. These colourful posters help to attract attention and to advertise the unit at the same time.

2.1.3 The United Dental Hospital of Sydney

The United Dental Hospital of Sydney came into being in 1904 as the result of an union between a dental hospital operated and financed by dentists providing dental treatment to underprivileged members of the community, and a training hospital for dental students.

Since 1978 the Inner Metropolitan Health Region of the Health Commission of N.S.W. has assumed the responsibility of funding the hospital. However, the control of the hospital lies with the Board of Directors of the hospital, the Chairman of the Board being appointed by the Minister for Health.

The objectives of the hospital are:

- a) To provide dental treatment to low income groups, pensioners and dependents who are eligible under the means test.
- b) To provide clinical facilities for undergraduate and postgraduate dental students who work within the clinics and laboratories of the Faculty of Dentistry, University

of Sydney.

The structure of the hospital therefore permits patients to be treated by hospital staff dentists and undergraduate and postgraduate dental students of the University of Sydney.

The Pedodontics Department of the hospital comprises the University Pedodontics Department and the Staff Pedodontics Department. These two departments have different daily routines and are quite independent of each other, although they utilize the same sterilizing facilities, dietician and waiting room.

2.1.3.1 Staff Pedodontics Clinic

In the Staff Pedodontics Clinic, children up to the age of 10 years are treated. Dental health education for these children begins when they enter the clinic. The waiting room has an adjoining play area, both areas are decorated with beautiful coloured posters on the walls bearing dental health messages. These posters are designed to convey the importance of oral hygiene, how to achieve it and what types of food to eat.

At the initial appointment, a child accompanied by a parent is seen by a dentist who will explain the work to be done after having examined the child. Toothbrushing instruction is demonstrated by the dentist or a dental therapist. Disclosing tablets or solution are sometimes used. The patient and parent are then referred to the dietician attached to the department for dietary advice. The dietician is told of the patient's oral health status.

Patients seen in this hospital are usually from the lower income and lower education families. At present the refugees and migrants are the problem group with high caries incidence. The local children under the age of 12 years would have benefitted by the communal water fluoridation which began in 1968. Therefore the dietician has to firstly overcome the language barrier with this problem group and

secondly to try and alter their eating habits, that is to swing away from the cariogenic food which some of them love. Pamphlets are given to patients to take home to assist and remind them what types of food to eat. Non-English speaking patients are given multi-lingual pamphlets.

After telling the patients what causes decay and the right types of food to eat for their general health and oral health, the dietician uses the following tactics to try and alter patients' eating habits:

- tells them not to eat cariogenic foods, hoping to get them to eat less of this type of food.
- entices them to eat less by creating a 'treat day'.
- gets them to buy icecream instead of ice-blocks.
- gets them to eat fresh fruit, dried fruits and nuts as substitutes.
- to eat savoury wholewheat biscuits instead of sweet ones.
- to eat cheese, fresh vegetables, currants between meals.
- chips, twisties, if eaten, should be restricted to one packet per week to reduce salt intake.
- if a child is addicted to biscuits, mother is to take biscuits out of the house for two weeks.
- coca-cola and like drinks should not be in the house.
- fruit juices are to be drunk at meals only with exceptions for birthdays and such.
- substitute common chewing gums with a sugarless gum (e.g. Orbit).
- refugees with a language problem are asked to drink water without attempting to explain the fluoride supplement.
- mothers breast feeding babies are told to wind them before they fall asleep with milk in their mouths.
- no artificially sweetened drinks in babies' bottles. "Security" bottle problem can be solved by substituting water for sweet drinks.
- infants should not be given sweet food, e.g. chocolate, honey, jam.

If a patient has more appointments with the dentist, the dietician will see him or her three more times. In this case, information is given a little bit at a time for easier absorption.

The dietician finds it extremely difficult to convince children and parents not to eat certain types of food as they are cariogenic and of no nutritional value. Her advice is usually ignored, largely due to the power of advertising on television and the availability of junk foods in school canteens.

2.1.3.2 University Pedodontics Clinic

This clinic does not usually get involved with community programmes but in 1972 and 1973 senior students participated in a dental health education programme. They conducted lectures, gave demonstrations and led group discussions on dental health at several high schools in the metropolitan area of Sydney.

In the University Pedodontics Clinic D.H.E. involves giving the usual chairside instructions on a one-to-one basis. This is a method which has been found to be of benefit in imparting knowledge and enabling dental students to gain practice in communication.

On a patient's first appointment and at each recall appointment, the dental undergraduate routinely uses disclosing solution and a mirror to show the patient where plaque is found on the patient's own teeth. Toothbrushing instruction on a model follows and then the patient is asked to brush his/her own teeth. Flossing demonstration on the patient's teeth follows: this is done so that the patient can be shown how dental floss can remove plaque on surfaces where toothbrushing is unable to reach. The patient follows each step with a hand mirror and is then asked to demonstrate his or her ability to carry out each step properly .

The patient is also told the cause of dental decay, how

fluoride helps, and the types of food which are cariogenic. Dietary advice is given to some patients with high caries incidence by the dietitian.

2.1.4 Hospital Dental Clinics in New South Wales

Public hospitals employ full time dentists to carry out comprehensive dental treatment for inpatients and the general public. A means test is applied. Indigent people receive free treatment while others must pay a fee on a scale set down by the Government. These hospitals include:

The Royal Prince Alfred Hospital
The Royal Alexandra Hospital for Children
The Prince of Wales Hospital
The Royal North Shore Hospital
The Hornsby and Ku-Ring-Gai Hospital
The Manly District Hospital
The Mona Vale Hospital
The Ryde-Hunters Hill Hospital
The Gosford Hospital
The Cessnock Hospital
The Maitland District Hospital
The Nepean District Hospital

Of these, the Hornsby and Ku-Ring-Gai Hospital provides orthodontic services while the Manly District, Ryde-Hunters Hill, Gosford and Royal North Shore Hospitals employ dental health educators to carry out dental health education in their districts.

In addition to giving instructions to children in 'brush-ins' and lessons at school, dental health educators also give talks free of charge to groups which may be responsible for the welfare of children such as school mothers' clubs, pre-schools, kindergartens, pre-natal groups and other appropriate groups. Dental health talks include the following subjects:

- functions of teeth and their eruption
- diet, including good and bad foods

- toothbrushing instruction including the use of dental floss and correct toothbrushes
- need for dental treatment.

Details of these services are printed in a pamphlet and distributed to community organisations or may be available on request.

The attempt made to involve parents and teachers has been quite deliberate. These are the people who are closely associated with children and can influence or control their oral health. After all, the mothers buy the food and give them pocket money. Teachers teach them what is good and what is bad for health. The constant contact between the children-teacher, and children-parents afford them plenty of opportunities to guide the children in the right direction towards good oral habits.

In the hospital dental clinics, oral hygiene instruction is given at the chairside by the dentist, with appropriate literature distributed as reinforcement, or aids.

2.2 The Dental Health Education and Research Foundation

The D.H.E. & R.F. was founded in Sydney in 1962 by the Dental Alumni Society of the University of Sydney and the Australian Dental Association, New South Wales Branch. (4) The Dental Health Committee of the A.D.A. which is elected annually, comprises the Advisory Committee of the Foundation.

The objectives of the Foundation are to:

- a) co-operate with the Faculty of Dentistry for the improvement of dental health of the community through public education, postgraduate education and research into the problems of dental health.
- b) assist dental graduates and undergraduates in obtaining further training to equip them better to undertake research.
- c) recommend the printing and issue of publications.

- d) arrange lectures, exhibitions and demonstrations or similar functions.
- e) enter into any arrangement with any institution or organisation which has objectives similar to those of the Foundation.

The organisation functions under:

(i) Council

The management and conduct of the Foundation is vested in the members of this Council, which comprises:

- 5 councillors from the University of Sydney.
- up to 5 representatives from the A.D.A. (N.S.W. Branch)
- up to 3 representatives from the Dental Alumni Society of the University of Sydney.
- up to 8 dental members elected at the Annual General Meeting.
- ex-officio members, e.g. the Chancellor of the University, the Vice-Chancellor of the University, the Dean of the Faculty of Dentistry and the Chairman of the Academic Board.
- co-opted members (President of the Sydney University Dental Undergraduates Association).

The Council meets four times each year.

(ii) Executive Committee

Members include the Chairman of the Advisory Committee and elected office bearers of the Council. The Committee moves recommendations to Council regarding priorities and policies as well as implementing the Council resolutions and Foundation activities. The Executive Director is responsible for all the administration and implementation. He is supported by 9 members of full-time and part-time staff.

(iii) Advisory Committee

Members comprise 12 representatives from the A.D.A. (N.S.W. Branch), 6 representatives from members of the Foundation, and 3 co-opted members of the Sydney University

Dental Undergraduates Association.

This committee assists the Director in the preparation of dental health education materials including talks, films, slides and radio and television broadcasts for the education of the community and members of the profession. Specific projects are undertaken by sub-committees (e.g. school canteens). A comprehensive panel of consultants is available to advise committees on a wide variety of subjects.

The Foundation is financed chiefly by donations from dentists, and receives support from the A.D.A. (N.S.W. Branch), the Health Commission of N.S.W., the Dental Board of N.S.W. and from firms in commerce and industry.

The overall aim of the Foundation is to improve the dental health standard of the public through the promotion of education and research relating to dental public health.

At the time the Foundation was formed, the dental health of Australians was generally regarded as being as bad as any other Western country. Children had been given little dental health instruction in schools. The great majority of parents were seemingly misinformed about the need for the preservation and care of their own or their children's teeth. Surveys conducted about this time showed a high rate of dental disease. ⁽⁵⁾ The need for dental health education, especially amongst young people, was enormous.

The Foundation realised that it was going to be very much involved in public relations. If it was to improve dental health standards, it would have to do something that would help change attitudes and habits.

Preliminary studies in 1965-1966 in Canowindra carried out by the Foundation ⁽¹⁶⁾ indicated that dental health literature of a handout nature was virtually useless unless it was used to supplement information on knowledge already passed on to the recipient by a dentist or some other authoritative person. Therefore it was decided that so far as

material for the public consumption was concerned, all books, pamphlets, posters, even slides and films, would play a secondary role to oral instruction in the surgery, as well as in community groups. This meant that a very close liason has to be made with members of the dental profession, the Education Department and the Health Commission.

New methods to educate the community had to be found. Health experts, social scientists and education experts came to the assistance of the dentists in creating new approaches in D.H.E. which were hoped would succeed.

It was decided that the following approaches to D.H.E. for children would be adopted:

(i) School programmes for primary level

In order to reach the community with accurate dental health information, a system of lecturing to school children, teachers and adult groups has been implemented. (29) The Foundation trained three dental health educators to visit schools. This idea was so successful that the Commonwealth Grant for Aboriginal Health requested and paid for the Foundation in 1974 to train two dental health educators of Aboriginal descent so that they could work amongst their own people.

A puppet theatre to take the dental care story to younger children was devised by the Foundation. (28) Norman Heatherington designed the child-orientated marionette show known as the "Good Teeth" puppet theatre which works in parallel with the dental health educator programme. The entertainment value of the puppet theatre is invariably high and it is hoped that this would assist in the dissemination of the dental health message.

The principal character of the puppet theatre is a boy called "Smiley" who is the hero of the plot - he is shown visiting his dentist because of a toothache, although he would rather go to the circus which has come to town. At

the dentist, Smiley is told that if he had come for his usual checkup he may not have had to have his tooth filled. Smiley's tooth is drilled and filled. He is then taught the proper way of brushing with the help of "Teeth" and "Toothbrush". Smiley is then reminded that he should brush his teeth after meals if possible with a fluoride toothpaste. The dentist then teaches Smiley the four "Good Teeth" rules which will keep "Danny Decay" away. At this point the audience participates with Smiley in defeating "Danny Decay", an ugly and fiendish looking character, when he appears.

The dentist then gives Smiley a surprise by showing him a magic screen. This part of the show depicts a shadow act on the screen and draws attention to all the right types of food which should be consumed. Smiley is then rewarded for coming to the dentist by having the "Good Teeth Circus" shown to him at the surgery. He is entertained by various circus performers, depicting fruit and vegetable jugglers and other good food characters including the Master of Ceremonies, "Bristles Toothbrush" who helps Smiley to maintain decay-free teeth. After this, Smiley and Bristles decide to start a "Smiley's Good Teeth Club". The show then ends.

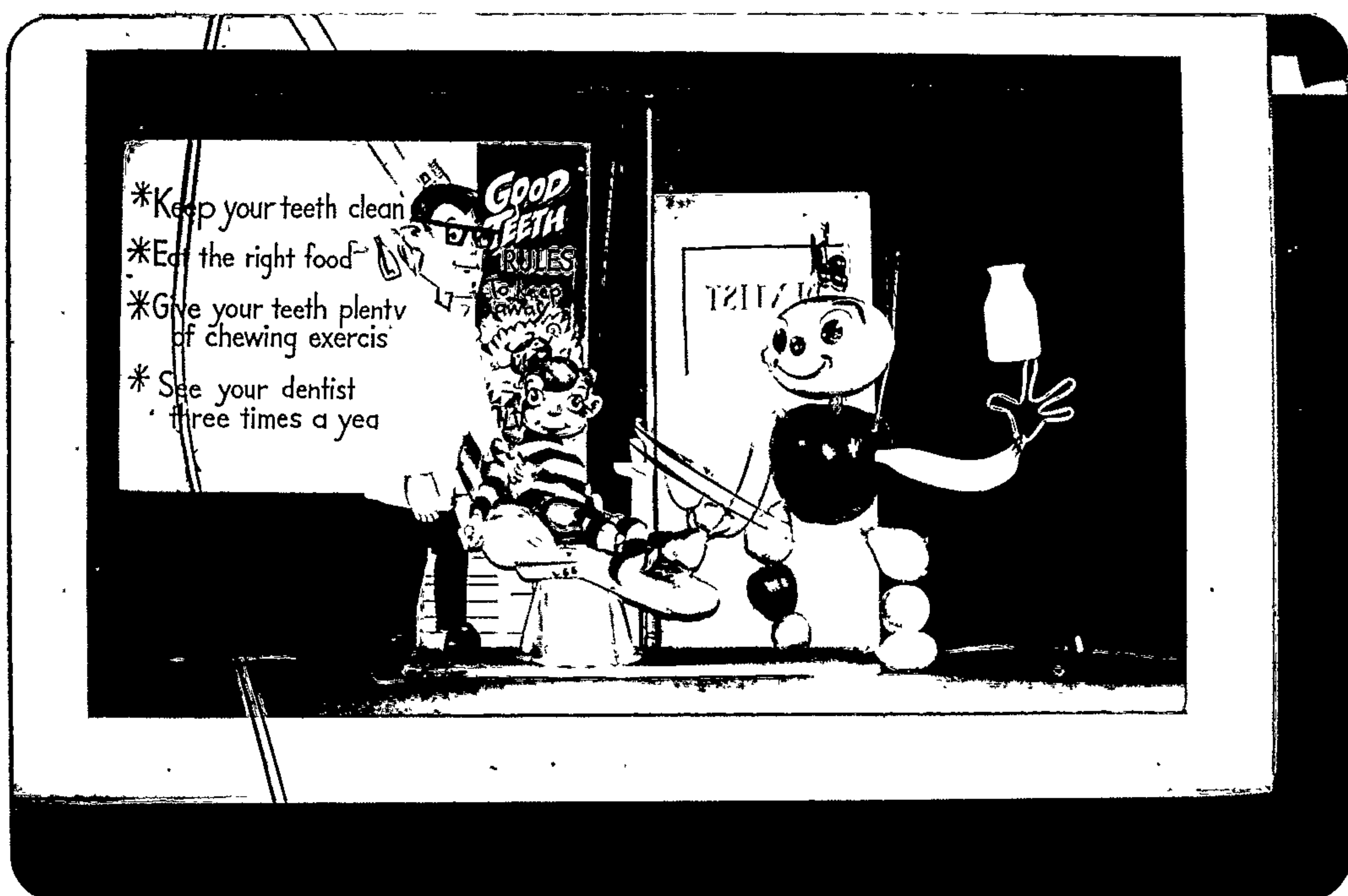


Figure 5: Puppet Theatre

One of the puppeteers tells the children that if they would like to be members of "Smiley's Good Teeth Club" they can either write a letter or draw something about the show and post it to Smiley through their teacher. Smiley would then send them a certificate of membership. When the children send in the letters or drawings about the show, the teachers would then give them a pamphlet which has a message to parents on one page and the certificate of membership to Smiley's Club on the other page. The teachers are left with pamphlets which would encourage and enable them to reinforce the D.H.E. given to the children by the puppet theatre.

The acceptance of the "Good Teeth" puppet theatre and the dental health educator in primary schools by the education and health authorities, teachers and dental profession has been of prime importance in allowing the message of prevention in dental health to be spread to the school children and to opinion leaders within the State of N.S.W.

The School Dental Health Education programme described above formed the basis of the Foundation entry that shared first prize in the 1977 Federation Dentaire Internationale's Prevention Dentistry Community Programme Awards, presented at the 65th World Dental Congress held in Toronto, Canada in October 1977.

ii) School programmes for secondary level

The Foundation constructed a dental health education mobile unit which was taken over by the Health Commission of N.S.W. in 1978.

The set up and usage have been described in section 2.1.1.

iii) The many pamphlets and posters which are available for a small fee are always given to children who write to the Foundation directly.

iv) Next year there will be a repeated campaign on mouthguards.

Prevention would be directed at the importance for sportsmen to wear mouthguards to protect their teeth and how to save a knocked-out tooth. Promotional programmes with television, radio and talks hope to demonstrate to sportsmen, adults and children how to act quickly to save a knocked-out tooth.

v) School Canteen sub-Committee advises on the correct type of food to be sold at school canteens.

2.3 Australian Dental Association

2.3.1 Federal

The Dental Health Education Standing Committee comprises five members with liason officers in each State. Its function is one of policy making and liason.

In 1973, the Federal Council of the A.D.A. passed the following resolutions:

- i) That the design of an overall Oral Health Programme to prevent diseases and abnormalities of the oral region should be a major project of the Dental Health Education Committee.
- ii) That, initially, sub-programmes be developed within the Oral Health Programme in the following priorities:
 - a) Dental Caries
 - b) Periodontal Disease
 - c) Oral Cancer
 - d) Injuries to Oral and Facial Tissues

The Chairman of the D.H.E. subcommittee from each State is usually the liason officer on this Committee.

As the Committee is basically a reviewing body it does not carry out any D.H.E. programmes but it has supported the development of a pilot scheme for use in secondary schools to teach high school students the principles of dental health education, particularly with respect to the causes of dental

caries and the nature of dental plaque. As the basis of health education is to encourage people to understand the true nature of diseases and their prevention, it is felt that no better way can be established than to incorporate the teaching of the principles of preventive dentistry within a formal school curriculum.

2.3.2 New South Wales Branch

The A.D.A. (N.S.W. Branch) does not carry out D.H.E. programmes on its own. It works closely with the D.H.E. & R.F. for this purpose. Five members serving on the D.H.E. sub-committee sit on the Council of the Foundation. Twelve representatives from the A.D.A. (N.S.W. Branch) serve on the Advisory Committee of the Foundation which is responsible for creating educational material.

Many members of the N.S.W. Branch of the A.D.A. take part in the activities and programmes in dental health education and prevention. The University of Sydney has always provided considerable assistance and advice to the Foundation, especially through the Department of Preventive Dentistry. A number of excellent publications for use by the dentist to further his education in the field of preventive dentistry and for his use in the surgery and distribution to patients have been produced. (27, 30, 31, 32, 33, 34)

Dr. R. Woods, a private dental practitioner, has interest in community work and in the promotion of preventive dentistry and D.H.E. He is presently making a videotape on "diets in the school canteen" in the Hunter Health Region for the Education Department. This videotape will be used for all schools in the Region to advise school canteens on the correct types of food to sell. The focus is on the quantity of sugar and salt used in manufactured food. Mothers and teachers who work in the canteens are helping and taking part in the making of this videotape.

Many private practices in N.S.W. give D.H.E. to children

and adult patients on a one-to-one basis, as well as carrying out preventive measures such as removal of plaque and fluoride applications. (46) Oral hygiene instructions are given to patients and are evaluated on recall visits. A few well-established practices refuse to continue treatment on patients if they do not comply with oral hygiene care. Private practitioners often use publications by the Foundation to supplement instructions and to act as a reminder to the patient at home. Audiovisual aids are sometimes used in the surgery.

2.4 Commercial Organisations in N.S.W.

Since the inception of the D.H.E. & R.F., the attitudes of commercial firms dealing in dental care products have altered. Although the dental profession in Australia has not so far endorsed any dental health care product similar to that given by the Council on Dental Therapeutics of the American Dental Association, these commercial firms have taken great interest in the field of D.H.E.

Commercial firms participate in:

- a) Direct contributions in cash to the Foundation (Colgate-Palmolive Pty. Ltd., Johnson & Johnson Pty. Ltd., Stafford-Miller and Cooper Laboratories donate \$3,000 annually, enabling them to have representatives on the Council of the Foundation as Governors).
- b) Assist the Foundation by printing some of their publications.
- c) Meet the cost of mailing certain publications.
- d) Supply materials to the S.D.S. programmes. For example, Oral-B (Cooper Laboratories) supplies toothbrushes for brush-ins and Creighton Pharmaceuticals Pty. Ltd. donates 10% stannous fluoride toothpaste for "brush-ins".

Commercial firms contributing to the Foundation are not restricted to firms connected with dentistry. For example, banks, accounting firms and law firms are interested in the work of the Foundation and contribute towards it as an encouragement. There are now over 60 commercial contributors in the 1981 list.

More and more manufacturers are learning to reinforce the D.H.E. messages by adding in the advertisements phrases such as "no added sugar" (from the 'SPC canned fruit) and "only your dentist can give a better fluoride treatment than Cogate Fluorigard" (from Cogate-Palmolive Pty. Ltd.).

Informative advertising, as opposed to persuasive advertising, can provide educative roles, e.g. there is a difference between VITA-BRITS and WEET-BIX

VITA-BRITS Don't add sugar

Could your kids do with a little less sugar?

The influence exerted by advertising is greatest on the younger population. Even the consumer organisations and marketing establishment agreed that advertising is one of the most influential forces in society today.

Australia is one of the most intensely advertised societies in the world. Expenditure overall for advertising per capita for a small population of 14.5 million is double that of the U.K. and studies show that Australian children watch more minutes of advertising per hour during children's programmes than is permitted in Canada and the United States of America. (57) The persuasive advertising is manipulative and has the power to influence consumers to adopt certain habits. Therefore, the more the dental profession can persuade manufacturers to co-operate, the more successful the D.H.E. will be.

2.5 Schools - Department of Education - N.S.W.

D.H.E. is treated as a component of general health education by the Education Department. There has been a growing concern for the nutritional health of children and how to help pupils develop good attitudes towards food.

No policy is laid down by the Education Department on D.H.E. to be carried out by schools but there is a strong belief that nutrition and D.H.E. should be taught together.

The open-programme approach adopted by the infant-primary schools in the early seventies mean that a broader approach can be taken by the teacher-in-charge of a certain class. He or she can perhaps do a theme on food and include D.H.E. in it. There is a syllabus for secondary schools in which nutrition and dental health are associated. Some schools have a full health education programme of 20 periods a year from form I to form IV. D.H.E. is fitted in.

Dental caries, probably the most common public health problem in this country, is well known to have a large dietary component. To successfully prevent tooth decay, we need sufficient motivation to practise the necessary dietary control, especially in the period of high risk that extends from infancy through adolescence. This control principally involves the intake of an adequate daily diet, the substitution of fruit, milk, protein and savoury nutritious food in place of sugary snacks between meals and a reduction in the amount of sugar added to food at meal times. (40)

It is fortuitous that the cause of obesity and dental decay have a common factor, as it enables a powerful two-pronged approach to encouraging dietary reform. Children who are sensitive to being overweight would no doubt listen very closely to methods which would reduce their weights. The education aims to prevent illnesses including dental caries in life by establishing favourable dietary patterns in infancy, childhood and adolescence in the hope that they will be carried through to adult life.

Research has shown that it is important to establish sound dietary practices in the infant because a high sugar intake in the infant and toddler damages the balance of taste receptors and establishes a life-long pattern that is difficult to change. (8) It has been shown that one or another of the four primary taste senses may be overwhelmed early in life so that sweetness is programmed in such a way that a sugar appetite develops. This demand for sweet tasting food persists throughout life if counter measures are not taken to re-educate the individual's taste senses.

Methods to convey D.H.E. messages have not been laid down by the Education Department. The main aim is to present students with knowledge and encourage them to make decisions which will lead to good oral health. The Department recognises that it is attitudes and behaviour that are important in health education.

The Education Department is divided up with different regions going different directions in educating the children in their regions. There is very little communication between each region. Therefore each region has different methods and attitudes towards D.H.E. The D.H.E. given would very much depend on the interest and knowledge of the teachers concerned. Teachers over 30 years of age received little college training in nutrition and D.H.E. The younger teachers have had some training in this field but this is still limited.

The Western Metropolitan Health Region has set up a dental health programme for infants and primary school children. (9) This programme is based on coupling cognitive, affective and motor objectives. In addition, incorporating dental health into the ordinary school curriculum achieves other ends. It could save the Health Commission thousands of dollars expense which would be necessary if Health Commission staff actually lead all sessions, and concomitantly, frees staff for meeting other demands and priorities. Thirdly, and most importantly, armed with the knowledge students should have teachers can reinforce concepts throughout the school years in a variety of different contexts.

The composition of the programme planned includes a minimum of 6 sessions per year of approximately twenty minutes per session for school children from kindergarten to sixth class, including short-term objectives, suggested activities and basic materials.

The programme has been developed for implementation by school teachers with the support of, and in conjunction with, the Health Commission staff. Accordingly, only normal

school facilities and the specially designed kit are necessary to commence sessions.

The kit includes:

- i) statement of need
- ii) programme goals
- iii) short-term objectives
- iv) planned sessions, including
 - a) relevant objectives
 - b) suggested activities
 - c) necessary material: handouts
tests
equipment
- d) references
- e) suggestions for follow-up sessions
- f) posters
- v) evaluation.

The Northern Metropolitan Health Region has six dental health educators visiting schools in this region, lecturing to primary school children. (See Section 2.1.1) Other health regions utilize trainee dental therapists and dental therapists for this purpose.

The "Good Teeth Puppet Theatre" of the D.H.E. & R.F. visits primary schools throughout the State. (See Section 2.2) This is a most entertaining way of bringing dental health messages to children and is quite a revolutionary method.

Mr. Peter Cooper, commissioned by the Education Department in 1978 to look into Nutrition Education in schools with a view to implementing changes in canteens in disadvantaged schools, has designed a programme to suit such a purpose.

(21) The aim is to provide information about foods, particularly processed foods, for parents, teachers and children. Programmes for schools include:

- i) Seminar on "Food: The Canteen: You".
- ii) Staff meetings in all schools
(films, discussion, presentation of resources)

- iii) Films and discussion for all pupils from 3-12 years
- iv) P and C meetings (films and discussion)
- v) Aids in implementation of individual school nutrition policy. Objectives are set for canteen, parents and school, staff and children.

There has been strong lobbying from the parents to get rid of rubbish food being sold at schools. People feel that the increased attention to health education and home economics is counteracted by the exposure of foods at school canteens providing foods that are non-nutritious and highly detrimental for health and teeth. The inconsistency of teaching one doctrine in the classroom and practising an entirely different one in the official food service unit of the school is wrong.

Mr. Landa, the presiding Minister for Education, showed full support for this movement early in 1981 by making it public that junk food will be banned from school canteens unless schools voluntarily prohibit the sale of soft drinks, sweets and cakes by the end of 1981.

2.6 Health Commission - health education through the Nutrition Section

The Nutrition Section of the Health Commission promotes good health through nutrition and a good balanced diet.

The D.H.E. programme is built into the health programme which aims at lessening sugar intake and building up good nutrition with the belief that good nutrition and diet leads to good oral health. Guidelines are lacking. The thirteen health regions undertake programmes independently but interact region-by-region, as situations dictate.

Due to the shortage of manpower, the Nutrition Section is unable to promote good nutrition by directly involving nutritionists or dieticians in public talks and other programmes.

The Department has mainly an advisory role.

Pamphlets and booklets produced by the Nutrition Section usually incorporate what foods are good for general health and dental caries together: for example, "A Guide for School Food Service Units". As the D.H.E. & R.F. has produced numerous excellent publications on D.H.E., the Health Commission does not consider it necessary to duplicate this effort of producing similar D.H.E. materials. (Figure 1)

"A Guide for School Food Service Units" is a booklet aiming at giving the organisers of school canteens some guidelines. It includes the role of the canteen, importance of nutritious food in the canteen, food not recommended for sale, dental hygiene, sandwich making, canteen operations and management, and good general hygiene.

2.7 Aboriginal Medical Service

In 1973, the Commonwealth Government initiated a scheme in which Aborigines, the indigenous Australians, could obtain dental treatment in any private practice of their choice. Government supported the cost in order to combat the massive dental caries brought about by the cheap diets of flour and sugar and inadequate dental treatment.

The scheme stopped after two years because it was not considered constructive. The scheme improved the condition of oral health of the Aborigines who sought dental care but it did not create an awareness of dental health. Some patients who attended private practices had such sophisticated and intensive work done that the annual budget was used up long before the year was out. Only a small percentage of the Aboriginal people benefitted from the scheme.

The Aboriginal Medical Service was founded in 1971 by a group of Aborigines and doctors working on a voluntary basis. At that time, the Aborigines complained of the inadequate treatment offered by private health practitioners

and hospitals to them. The dental clinic was established in 1978 in redfern.

By nature the Aborigines are shy and prefer to mix with their own kind. They are more at ease seeking medical and dental treatment at a place where they feel that they are not discriminated against. The Aboriginal Medical Service, being staffed and managed by Aborigines except for the professionals, allows ready acceptance by the Aborigines so that they can utilize it with ease. The Commonwealth Government is now financing 70% of the running costs of the medical service, and 100% of the dental service.

Having overcome the problem of acceptance by the Aborigines, this Service is experimenting with new approaches to convey the health messages to them. It is hoped to educate them about nutrition and how to change their present dietary habits which mostly consist of sugar and flour. This is done by giving the women talks at their sewing circles or luncheons and reinforcing the talk by including the five essential food groups in the food parcels given to pregnant and nursing mothers by this medical service. It is hoped that by actually showing them what they should include in their diet, the recipients would follow up by buying these types of food, or their children would urge their mothers to buy them. The Director of the Service believes that the health (including dental health) of the Aborigines can be improved through their children.

D.H.E. for children is given in the dental clinic by the Aboriginal dental surgery assistant to those who do not have good oral hygiene before or after dental treatment. The dental therapist gives D.H.E. instruction occasionally, but it has been found that it is better for an Aborigine to give advice to an Aborigine. This way the patients ask questions more readily and give better co-operation; they feel freer with people of similar background to themselves.

Instruction is given in the following fields:

- i) toothbrushing technique

- ii) right type of toothbrush to use
- iii) the use of fluoride toothpaste
- iv) how to eliminate sugar from the diet.

Aids in the form of pamphlets and brochures from the D.H.E. & R.F. are used during the talk and given to patients to take home.

2.8 Other Dental Clinics

Throughout N.S.W., a number of organised communities, friendly societies and groups provide dental services for special groups in the community. (6) Of these dental clinics, the friendly societies' dental clinics are more widely utilized by the general public and are situated in accessible urban areas. There are three friendly societies with dental clinics in Sydney. These societies are non-profit organisations registered under the Friendly Society Act of 1912. These dental clinics provide dental treatment for their members and dependents. Membership is open to everyone for a small fee. These clinics are:

- i) Hibernian Dental Surgeries
- ii) Manchester Unity Dental Centre
- iii) Grand United Order of Oddfellows

The clinics are well utilized because members receive up to 40% rebate based on the A.D.A. (N.S.W. Branch) scale of fees for their dental bills.

In the Hibernian Dental Surgeries D.H.E. for children is given by the dentists if necessary. Patients showing obvious plaque are given a toothbrush and 10% stannous fluoride toothpaste and asked to clean their own teeth. Then disclosing solution is used to show patients and mothers where plaque still remains and then professional cleaning is done to remove remaining plaque. This procedure is repeated on six-monthly recall. Patients are also told about the importance of reducing sugar intake. Topical fluoride is given routinely following prophylaxis. There is no charge for D.H.E.

Patients are permitted to book with dentists of their choice. The operation is very much the same as a private practice so that better rapport can be established between dentist and patient.

3.

EVALUATION OF PROGRAMMES

Any community-based or national programme with objectives to prevent or control oral diseases and to promote oral health usually involves public funds. Before public finance is committed to a particular measure it is essential that the project should be analytically evaluated. An initial analysis of cost-benefit relations would reveal whether it is economical, and an on-going evaluation while the programme is being carried out would check the progress in meeting goals and on the effectiveness of approaches used. Without evaluation, efforts and money by the promoters may be wasted.

Cost-benefit analysis is a formal and systemic way to choose among alternative investments in public projects. (61,79) It is an essential component of public financing: by guiding decision making, cost-benefit analysis aims to do in the public sector what supply and demand analysis accomplishes in the private sector. (62) Nowadays the administrations of health services all over the world stress more and more on the importance of cost-benefit analysis for decision making in the allocation of resources to or within the health field.

Cost-benefit analysis attempts to measure the benefits of a programme strictly in monetary terms and to relate the benefits to the cost of achieving them. Both the costs and benefits are measured in monetary terms but many benefits are difficult, if not impossible, to value monetarily. For example, it is not a simple matter to measure the monetary benefit to a child or a school system if that child makes fewer trips from school to a dentist for emergency dental service, or the monetary benefit to the child of not having a toothache.

Simple cost-benefit analysis often ignores the immeasurable, intangible or indirect benefits. When an item cannot easily be assigned a market price, it is likely to

be omitted from calculations of cost-benefit, even though it may be important. For this reason, a programme with valuable indirect or intangible benefits may be eliminated from consideration among competing programmes because its total benefits have been understated. (43, 62) A list of some indirect or intangible benefits are listed below:

- i) Freedom from pain;
- ii) A dentition completely free of decay;
- iii) Improved occlusion;
- iv) Social acceptability;
- v) Psychological value of retaining teeth;
- vi) Fewer unsightly restorations;
- vii) Less time missed from school or work;
- viii) Avoidance of extractions or operative dentistry.

Oswald (78) summed up cost-benefit analysis by saying that cost-benefit analysis compares the estimated financial returns and outlays of competing projects. The chosen project is the one with the greatest difference between returns and outlays, allowance having been made for the lapse of time before the benefit occurs and that "health is of course difficult if not impossible to evaluate in monetary terms".

Cost-effectiveness analysis is used to determine the least expensive ways of achieving a stated objective. (47, 62) In this analysis, benefits may be measured in physical terms and need not be assigned a monetary value. For example, the objective of a programme may be to decrease the incidence of dental caries in children by an average of one tooth surface per year. A cost-effectiveness analysis could be used to determine the most efficient way to achieve the objective of reducing the prevalence of dental caries among a certain group of children by a certain percentage. Thus, cost-effectiveness analysis is the procedure of greatest interest in deciding among caries-preventive regimens such as those in D.H.E.

Data for the analysis of cost-effectiveness are usually derived from studies conducted to determine the clinical effectiveness of caries preventives. The unit for measuring caries experience is the increment of decayed, missing or filled (DMF) surfaces; DMF data collected in a similar way in different studies may be used to compare alternative preventive procedures.

The computation of tangible costs for preventive dental programmes is not difficult. Obvious costs are those for facilities, dental equipment, supplies and salaries of personnel, but other costs are difficult to determine, for example indirect costs for programme management and transportation.

Horowitz and Heifetz ⁽⁵⁴⁾ in their article on cost-effectiveness of caries prevention emphasised that in the application of cost-effectiveness concepts to preventive programmes against dental caries, distinction must be made between the effectiveness of preventive measures during controlled clinical trials on limited numbers of subjects and their value when applied under field conditions to the whole community. They concluded that while completely accurate and valid analysis of cost-effectiveness is not possible, it does enable dentistry to identify the real issues which should affect future decisions.

Although D.H.E. has been carried out for many decades in many developed countries, evaluative studies are very rare compared to such studies of other preventive methods, such as fissure sealants, and so on. In the literature the studies by Davis in 1974, ⁽²⁴⁾ Children's Dental Health Research Project in 1975, ⁽¹⁸⁾ Nelson and Swint in 1976, ⁽¹⁸⁾ and Dossel in 1977 ⁽³⁵⁾ lamented that there have been few bona fide analyses of cost-benefit of dental procedures. Except for studies of community water fluoridation, few, if any, community clinical trials have been conducted for cost-effectiveness analysis.

The difficulties in evaluating programmes have long been recognised. However, it is possible to carry out evaluation of one D.H.E. programme or action, or to survey the effect of a whole series of programmes, and it is possible to say that each method of D.H.E. application should or could have a special method of evaluation. Ideally, while designing an education programme, its evaluation and its method should be worked out at the same time.

In N.S.W., Mr. N. Wright, the Dental Advisor to the Health Commission regretted that evaluation of the D.H.E. programmes has not been carried out by the Government. He attributed this state of affairs to the problems of insufficient finance and too few staff, coupled with the long period of time required to detect any measureable change in oral status. Recent evaluation of D.H.E. programmes in Australia is presented below.

3.1 Recent Evaluation of D.H.E. Programmes in Australia:

3.1.1 Howe, ⁽⁵⁶⁾ who was commissioned by the D.H.E. & R.F. of Sydney, carried out a study in 1974 to investigate the effectiveness of three methods of D.H.E. currently in use in N.S.W., in meeting the objectives of dental health educators. The objectives evaluated in this study were:

- (i) that D.H.E. will increase knowledge of dental health information presented;
- (ii) that D.H.E. will improve toothbrushing techniques (one measure of oral hygiene);
- (iii) that D.H.E. will improve attitudes to dentists in relation to dental treatment;
- (iv) that D.H.E. will decrease anxiety concerning dental treatment. Since dental anxiety is regarded as one of the barriers against acceptance of preventive treatment, it would be expected that a decrease in anxiety would be concomitant with an increase in compliance and co-operation;

- (v) that changes predicted for each of the above variables will be maintained for a twelve month period.

This study was carried out on 117 children in the 9-10 year age group in Sydney. The children were randomly assigned to one of four groups:

- Group 1 : disclosure
- Group 2 : film
- Group 3 : puppet theatre
- Group 4 : control.

The children were re-tested on knowledge, attitudes, anxiety and oral hygiene behaviour immediately following presentation of the experimental treatment, and again twelve months later.

Results:

- (i) Preventive dental health knowledge.

No differences were found between any of the experimental groups on the pre-test and post-test measures of dental health knowledge. This indicates that none of the education techniques used was successful in increasing children's knowledge of preventive dental health.

- (ii) Oral hygiene behaviour (toothbrushing).

There was no significant difference between toothbrushing efficiency in either the puppet theatre or control groups on post-test assessment. The disclosure and film group demonstrated a significant improvement in toothbrushing efficiency. The disclosure group was superior to the film group.

- (iii) Anxiety.

None of the groups showed a change in dental anxiety.

- (iv) Attitudes.

The results indicate no change in attitude to dentists in either a positive or a negative direction.

The results showed that three different educational techniques did not effect a change in children's knowledge of preventive dental health behaviour. It must be noted

that only one exposure to each education technique was tested. Nevertheless the failure to effect a change has important implications for D.H.E. programmes for primary school children.

According to Howe, the assumption that dental knowledge is a necessary pre-requisite for acquisition of motor skills, such as toothbrushing behaviour, is not borne out by the disclosure and film groups. These groups demonstrated an improvement in toothbrushing skill without a concomitant improvement in dental health knowledge. The plaque disclosure and personalized instruction methods are the most likely variables accounting for the superiority of the disclosure group. The improvement of the film group in toothbrushing skill implies it is possible to produce a behavioural change using a medium. Personal contact is not necessary provided the demonstration is visually adequate.

Howe also concluded that it was most unlikely that the failure of the puppet theatre technique to produce a behavioural change was caused by a lack of attention or any negative attitude induced by the programme. In fact, the theatre is notable for the rapt attention induced in the children and for their enthusiastic participation and obvious enjoyment of the experience. However, although they are able to recite the "Rules for Good Teeth" as a group, they are not able to answer items on the knowledge questionnaire involving application of these rules. This indicates that any apparent learning, assessed by the children's capacity to recite these rules, does not constitute comprehension of the material presented. The failure of the puppet theatre to produce any improvement in toothbrushing technique must be attributed to lack of clarity in the visual presentation of the technique by the puppets. On these grounds, the puppet theatre does not meet any of the teaching objectives investigated in this study and does not appear to be an effective educational method. Whether it may enhance the effectiveness of other methods of health education is a matter for research. Also, the effectiveness of the puppet theatre as a public relations exercise in improving the

relationship between the dental profession and the teaching profession should be investigated.

3.1.2 Blaikie, (10) in an evaluation of the effects of D.H.E. as part of the S.D.S. in South Australia, revealed major reductions in active disease following dental care. Although restorative treatment was the major factor explaining such reductions, there is some evidence that oral hygiene practices have improved.

This review centres around the role of D.H.E. as part of the S.D.S. Activities which promote D.H.E. and which involve school children, their parents, and dental therapists are also reviewed. This evaluation gives an effect of the programme in total and does not define the impact of the specific activities of combinations thereof.

Past evaluation of patients attending the clinic under evaluation indicates that school dental care has reduced the average number of teeth with untreated decay from approximately 7.5 to 1.8 per child and that caries rates are being reduced. (83) Blaikie commented that the changes may be the result of topical fluoride therapy only, but improvements in oral hygiene and gingival scores suggests that oral hygiene practices have improved. Longer term benefits, however, have not been demonstrated conclusively in this review.

3.1.3 Sundram and Kingston, (91) assessed the attitudes of patients towards the S.D.S. and obtained some indication through a mail questionnaire survey. In general, parents expressed favourable attitudes to the school dental programme. Although parents in general felt they were given adequate information about their children's dental health, over a third apparently did not recall having been invited to visit the school dental clinic.

With the extension of school dental care to schools without clinics on their grounds, there has been reduced

participation in the programme, apparently because of difficulties faced by parents transporting children for care.

Despite the widespread introduction of dental health insurance, it seems that few children will be withdrawn from the S.D.S. Parents generally expressed their intention to seek private care after their children leave the school dental programme.

Although parents with children participating in the school dental programme clearly expressed favourable attitudes to the programme, further research, of the parents of non-participating children and those parents who had withdrawn their consent for school dental care was not done.

3.1.4 Fanning and Leppard, (41) studied the influence of the oral hygiene home care kits on the dental behaviour of kindergarten children. The effects of issuing an oral hygiene home care kit on the dental care behaviour of these children were investigated by identical questionnaires issued to a control and an experimental group and completed both before and after the direct issue of a kit to the experimental group. The kits contained a clinically proven monofluorophosphate toothpaste, a junior size flat-trimmed toothbrush with soft bristles, four disclosing tablets and an instruction leaflet. Prior to receiving the kit, approximately 30% of the children were using the type of toothpaste contained in the kit, 40% were using an approved type of brush, while only 0.5% were using disclosing tablets. The effect of the kit was to increase significantly the percentages of children who changed to the use of the above aids. These increases were approximately 14%, 20% and 12% respectively.

Fanning and Leppard concluded that the issue of the oral hygiene home kit was successful in that it positively influenced dental care behaviour. However, they question whether the magnitude of the change towards better dental health practices obtained justifies the considerable effort

involved in this type of exercise. Furthermore, it was not possible to determine whether the changes in dental care behaviour would persist.

3.1.5 Roder et al, (84) studied the effect of a pilot D.H.E. programme on high school students in South Australia. In this pilot programme, 15 to 17 year old high school students acted as chairside assistants and explored various aspects of dental care and provided D.H.E. to children at local primary schools. The effect of the programme on the high school students' dental health and behaviour was evaluated by comparing them with matched control subjects. There were significantly reduced levels of debris and periodontal disease and an increase in the use of recommended toothbrushes and fluoride paste. The demand for professional care was greater in the control group than in the D.H.E. group.

The results of the programme showed that the students evaluated the programme positively, and the activities regarded as most worthwhile were:

- i) Providing D.H.E. to school children;
- ii) Assisting at the chairside; and
- iii) Placing restorations in plaster teeth.

As the programme was designed to involve the students in a number of activities which would provide them with a practical understanding of the nature and aetiology of dental diseases and their control, it can be assumed that it also helped to change the students' behaviour patterns relating to dental health.

3.1.6 Roder (85) surveyed over 2000 second year high school students at 13 South Australian schools and found that those who had received school dental care at primary school had fewer carious teeth, and, in some respects, better oral hygiene habits than those who had not attended for dental care. While they were better informed on dental subjects than were control students fewer had attended a private dentist since leaving primary school.

Roder considered that the major problem revealed by this survey was the extent of discontinuance of routine professional care once students left primary school and no longer were eligible for school dental care. The proportion in the Test Group who had visited a private dentist while attending high school was approximately 40% as opposed to about two-thirds in the Control Group. Consequently, Roder concluded that it is evident from the knowledge and hygiene habits in the Test Group that school dental staff have endeavoured, with some success, in D.H.E. However, the traditional method of instructing primary school-children with minimal parental participation and without reinforcement at high school level has had only a limited effect.

3.1.7 Brown,⁽¹³⁾ supported by a grant from the Australian Dental Research and Education Trust, concluded that a comprehensive programme of treatment and home care was effective in greatly reducing dental caries, improving oral cleanliness and controlling gingivitis in handicapped patients. Maintenance required less than half the time and approximately one-third of the cost of initial restoration.

This is the only report I have been able to find on the economics of comprehensive and regular dental treatment and prevention in a group of handicapped children and young adults. As a supplementary conclusion to his report Brown expressed his opinions on cost-benefit analysis in health service planning handicapped patients in the following quote:

Cost-benefit analysis are economic indices which facilitates a choice between health care programmes competing for limited funds. They do not indicate the major, or even the most important benefit to be gained by a particular programme. A monetary value cannot be placed on health itself. What is the financial benefit of a sound dentition to a cerebral palsy patient who will not be able to manage dentures? What is the price of maintenance of self-esteem that goes with normal facial appearance to a mentally sub-

normal child ? Of what financial benefit to the patient with a congenital heart disorder is a lack of oral infection ? It is because of the impossibility of answering these questions, plus the need to rationally plan health services with the resources available, that cost-benefits are increasingly being sought as justifications for expenditure.

The results of this study are considered to be of value for two particular groups of dentists. In the Implementation of the Australia S.D.S., most of the types of handicapped patients will not be suitable for treatment by dental therapists. Thus they will become the responsibility of either supervising dentists of the S.D.S., or of private practitioners. Administrators of this service may well find the data of this study useful in planning provision for the care of handicapped children. More private practitioners maybe encouraged by these results to provide comprehensive dental treatment and preventive services.

Brown cautioned that this cost-benefit analysis cannot be considered as definitive but rather as guidelines to encourage further development of dental care for special patients.

3.1.8 Jago and King ⁽⁵⁸⁾ evaluated the influence of dental advice given regularly to the parents of "normal" children enrolled in the Melbourne University Child Growth Study. It was found that the dental advice given had little effect on the incidence of caries in the children. The dietary advice given regularly to the mothers of these same children also had little influence. ⁽¹⁵⁾ Apparently, any changes in oral hygiene achieved as a result of the dental advice were insufficient to alter the incidence of caries.

However, extractions of both deciduous and permanent teeth were much less common in the study children than

in other Australian children. The authors surmised that this would not be due to the small differences in the incidence of caries, and that it must be attributed to the effectiveness of the advice given to the mothers.

3.2 Selected Evaluations of D.H.E. Programmes in other Countries

3.2.1 Claudia and Muhler (19) investigated the reduction of loss of permanent teeth in children in Bloomington, Indiana. Several factors were thought responsible: the introduction of topical and systemic fluorides, anti-cariogenic prophylactic pastes and stannous fluoride dentifrices; a more favourable dentist -to- population ratio; earlier examination of young patients; and increased use of assistants and hygienists, and the institution of a D.H.E. programme. The educational programme requires the dentist to teach the child in a series of grade and high school lectures. It also necessitates educating the parent to the practical importance of dental health via office visits and a health education book.

Findings from the D.H.E. lectures given the school revealed that before D.H.E. could be meaningful to the child, the parents had to be taught the practical importance of dental health, and that it is immaterial how much a dentist or high school teacher knows about dentistry. What is significant is the question of who can most effectively impress on children and parents the importance of dental health. The authors even went so far as to suggest that the best way of impressing on children the importance of dental health is to have the dentist himself being a person of authority in this field provide the D.H.E. lectures as part of the school curriculum.

3.2.2 Williford et al (97) used a group of high school students for their study. These students were given six lectures on dental education and were compared with control

subjects to see whether a dentist could motivate students to improve oral hygiene through dental education. The findings after three and six months indicated that the study group when compared with the control group showed significant improvements in the oral debris, calculus, Oral Hygiene Index score, Periodontal Index, toothbrushing frequency, and in the dental IQ score.

The investigators concluded that from the results after six months, or three months after the education phase of the study, there was an indication of a continuation of the motivating effects of the three-month D.H.E. lectures and the use of the correct methods taught in caring for oral tissues. The students in this study were motivated by the dentist to improve their oral hygiene habits in spite of opposing environmental factors that usually cause poorer hygiene habits in busy teenage students. In this way, it was shown how an improved dental education programme may have a significant influence in improving various aspects of dental health.

3.2.3 Keith et al ⁽⁶⁰⁾ made a three-year study on the effectiveness of a behaviour-based programme of oral hygiene for elementary school children. The primary focus of the programme was a daily "brush-in", managed by teachers and parent volunteers. Emphasis was placed on plaque removal in lieu of conceptual-informational content, and the role of consultants was to maintain the behaviour of participants through occasional visits and evaluation. Analysis suggested that the programme was economical and effective when judged on the basis of typical oral hygiene measures.

The authors of this study consider their study noteworthy for two reasons. First, it is a behaviour-based undertaking that directly attacks the problems of establishing and maintaining preventive oral health skills. There are broad discrepancies between what is known and what is predicated on the assumption that behaviour change must be achieved before (or concurrent with) changes in attitudes

or verbal behaviour. Second, the programme tends to confirm the importance of a systematic consultation role as a useful application of professional time. An equivalent (or larger) investment of time could easily be made in addressing groups or showing films during Dental Health Week, but without an accompanying change in consumer behaviour. When the consultant adopts the goal of effecting productive teacher (or parent or principal) behavioural change, some resultant changes in the practices of children are virtually inevitable.

3.2.4 Dennison et al (26) did a study on Ball State University students to evaluate the effects of dental health instruction. A dental health motivational teaching model was developed and evaluated. The teaching model included controlled laboratory instruction, classroom instruction, and informal participatory instruction. The amount of dental plaque on tooth surfaces and the gingival status were assessed to evaluate the effect of the experimental dental health teaching model on student behaviour. After instruction, greater reductions in plaque and gingival scores were found for the experimental group than for the control group. However, at the final follow up examination which took place nineteen months after the commencement of the study, no significant difference between study groups was apparent.

Dennison et al partially attributed the lack of a significant difference between groups in terms of the reduction in plaque and gingival scores at the final examination to an inherent inability of the motivational model to prolong the behavioural improvement of the experimental group that existed at the end of the instructional period. Another possible reason raised was that many students began their student teaching almost immediately after the end of the instructional course. Because of possible pressures created by this new experience, recently established habit patterns may have been disrupted. In any event, for the experimental group, the instructional phase was not considered to be successful in prolonging a behavioural change in the magnitude noted at the time of completion of the experimental health course.

3.2.5 McAllan et al (68) investigated the benefits received after six months of oral hygiene instruction in children using manual and electric toothbrushes. 123 children aged 9 to 15 years were divided into four groups. Group 1 acted as a control; groups 2 and 3 used manual toothbrushes and received instruction; and group 4 used electric toothbrushes and also received instruction.

For all children modified Gingival and Plaque Indexes were scored, a disclosing agent applied and a prophylaxis completed. Children in groups 2, 3, and 4 were also shown the disclosed plaque and its importance was discussed. Their attempts to 'get the stain off' were checked and their own brushing techniques modified. Re-examinations took place after one, three, and six months. In the control group, no detectable improvement in gingival health or oral cleanliness occurred over the six-month study period. However, both Gingival Index and Plaque Index scores decreased by 35 to 50% in all instructed groups within one month, and this improvement was maintained two months later, although at the final examination the gingival condition in each of the three instructed groups of children had regressed somewhat over the last three months of the trial.

The results of this study showed that merely carrying out a prophylaxis on a child and giving him or her a toothbrush without ensuring that the child knows how to brush the teeth efficiently will produce little or no improvement in gingival health or oral hygiene. The chairside education technique used in this study, involving instruction, participation and reinforcement, was effective in reducing the Plaque Index scores by 40-50% and this degree of improvement was still evident at the six-month examination.

The investigators noted that although the Gingival Index scores also decreased markedly at first, the gingival condition in each of the three instructed groups regressed somewhat during the last three months of the trial. These findings suggested that the children had slackened a little

in their efforts between the third and fourth examinations and this had resulted in an increase in gingivitis. Perhaps, when they received their fourth appointment, they might have given their teeth 'special' attention just before coming to the hospital; this would have reduced the amount of plaque in their mouths but insufficient to improve their gingival condition.

The investigators concluded that it would seem, therefore, that children must be instructed and encouraged at least every six months, special emphasis being placed on their gingival health as well as on the amount of disclosing agent remaining on their teeth. The benefit that efficient toothbrushing has in reducing gingivitis should also be stressed to parents, so that they become more aware of the importance of good gingival health. As no difference was observed between those children who were given a manual toothbrush and those who used an electric one, it was concluded that, in normal children who have been instructed, manual and electric toothbrushes are equally effective.

3.2.6 Beal et al (7) carried out a longitudinal study to find out the relationship between dental cleanliness, dental caries incidence and gingival health. In this study the caries incidence and gingival health of children aged 11 to 12 years at baseline were studied in relation to their dental cleanliness at yearly examinations over a three-year period. It was found that the children whose dental cleanliness was consistently good had lower caries increments than those whose dental cleanliness was consistently bad. The differences were most marked on the buccal/palatal surfaces (46.7%) and least on the occlusal surfaces (7.0%). The difference between mesial/distal surfaces of posterior teeth was intermediately placed (29.7%). It was also concluded that a strong relationship was found between good dental cleanliness and good gingival health.

In this study, the incremental method of studying a possible relationship between caries and dental cleanliness

was used. The investigators claimed that it would be more meaningful than the prevalence method which compares a lifetime of caries experience with the standard of dental cleanliness at a moment in time when it may not be representative of previous standards. The reason for this is that in an incidence of study there is a greater possibility of the standards being representative, especially of those with variable standards are eliminated from the study, which allows comparison between those whose teeth have been consistently clean or consistently unclean over a three-year period.

The investigators concluded that it is difficult to demonstrate clear-cut associations in human beings, subject to so many uncontrolled and often unknown variables. It seems likely that effective toothbrushing will prevent caries from occurring on those surfaces that are readily accessible for cleaning, and that, if the toothpaste contains fluoride in an available form, the advantage is increased and includes surfaces, such as the approximal, which can derive only smaller benefit from a mechanical effect alone.

This study has confirmed the results of previous investigators (65) by showing a strong relationship between dental cleanliness and gingival health. Four out of every five children with 'clean teeth' were found to have good gingival health, while less than 10% of those with teeth classified as 'not clean' had healthy gums.

3.2.7 Tucker et al (95) used the data from a three-year clinical trial to study the relationship between oral hygiene status and dental caries incidence, and between toothbrushing frequency and caries incidence. The findings showed that dental caries increments were less in the children with 'good' oral hygiene and in those who brushed their teeth more frequently. The differences were small, but the results provided evidence to support the view that toothbrushing can reduce the incidence of dental caries.

Although the efficiency of toothbrushing was not investigated, the researchers said that it was probable that those who brushed more efficiently had lower oral debris scores. It was further assumed that it is possible that the reduction in dental caries would have been greater if the efficiency of toothbrushing, even in those rated as having 'good' oral hygiene, had been higher.

Here, a direct relationship was found between toothbrushing frequency and oral hygiene status. Children who brushed their teeth more frequently tended to have cleaner teeth. Although this apparently logical relationship has been found in some studies, (48, 66, 69) it has not been demonstrated in others. (12, 23)

3.2.8 Sutcliffe et al (93) showed in a study that it was possible to teach three and four year-old nursery school children how to clean their teeth at school and that the nursery school staff were able to maintain the brushing habit. Each child received an average of forty-five minutes of professional supervision during the first month of the study and nine minutes during the second month.

The special features of this study can be summarized as follow:

- (i) The study has shown that over the limited period of two months, it was possible to teach a small group of three and four year old children how to improve their standard of oral cleanliness by brushing their own teeth at school.
- (ii) The school staff could maintain the regime with the help of a limited amount of professional supervision.
- (iii) No difficulty was experienced in equipping the school with toothbrushes and mugs or in maintaining them in a clean state.
- (iv) Although the number of children taking part in the study was small (thirty) and the duration of the study was short (two months), the results were sufficiently encouraging to stimulate further study.

- (v) In public health terms, the total time of fifty-four minutes taken to supervise each child is considered to be a considerable expenditure of professional or ancillary time. In a similar programme of longer duration, it is likely that the amount of professional supervision could be reduced.
- (vi) A striking feature was the very happy relationship which developed between the children and the dental personnel.
- (vii) The children enjoyed their toothbrushing sessions, the school staff were pleased to take part in what they felt to be a useful project and the children's parents were pleased to see someone taking a personal interest in their children.
- (viii) The investigators commented that although the aim of the study was to teach the children how to improve their own oral cleanliness, it is clear that they gained in other ways. For many of them this was their first contact with dentistry and the children became used to having their mouths examined. It is almost certain that, if continued, it would have led to an increased demand for dental care. (58)

3.2.9 Downer (36) carried out a controlled evaluation of an eight-week, unsupervised oral hygiene programme at a London infant school. It was based on the home use of dental hygiene packs. An initial dental health education session was provided in school, preceded by an assessment of the oral hygiene and gingival condition of the children. A further examination at the conclusion of the programme showed that greater improvements in both oral hygiene and gingival health occurred in the experimental group than in the control, and that for 6 and 7-year olds, the improvement in oral hygiene was statistically significant.

The investigators said that since the experimental and control groups were drawn from the population of a single institution, it is probable that the control group children were influenced to an extent by their close daily contact with those in the experimental group. This might

have contributed to the improvement in oral hygiene status observed in the control group. Although the interaction between the groups might have reduced their differences, the inter-mingling of the subjects during examinations served to minimise the possibility of examiner bias. The children were unaware during the investigation that a follow-up examination was to take place. This helped to ensure that the packs were used as they should be under everyday conditions.

The conclusion of this study noted that younger children in the school seemed to gain less than the older children from the educational presentation and the issue of the packs. This may have been due to the inability of some to brush their teeth effectively, or to the unsuitability of the educational presentation, resulting in its failure to influence them. Younger children would tend also to be dependent on parental support and encouragement rather than on their own initiative, and the leaflets and letters to parents may have had little effect.

A number of practical measures designed for the most effective use of the packs and of D.H.E. resources are worthwhile noting. They are:

- (i) For maximum benefit, the issue of packs should be combined with a dental examination and educational presentation efforts should be concentrated in schools in the poorer socio-economic areas.
- (ii) To maintain a high level of dental awareness, an educational presentation should probably be given once a term in these priority schools.
- (iii) Before a teaching session, children might be asked to bring their toothbrushes to class so that they could practise brushing under the supervision of the instructor.
- (iv) Before giving out the packs, the instructor could explain the importance of regularly replacing worn brushes.

3.2.10 Craig et al (22) undertook a study to test the effectiveness of a preventive programme, under realistic conditions within the New Zealand School Dental Service. The two-year study involved 164 children aged 11-12 years divided into a control group, a test group which received a fortnightly oral hygiene instruction and professional prophylaxis, and a third group which received the same instruction and professional prophylaxis as the test group plus a two-minute mouthrinse with 10 ml of 0.2% neutral sodium fluoride solution every two weeks. Dental nurses carried out prophylaxis and dental health instruction to the children.

This trial failed to demonstrate any significant decrease in either the caries increment or the plaque score which could be attributed to regular professional tooth cleaning and instruction in oral hygiene. The only reduction in the rate of decay was due to fluoride mouthrinsing.

It seems that meticulous oral hygiene is required to achieve optimal results. This is largely dependent upon the dedication and expertise of the operator, both in practical ability and ability to motivate the participants and their parents. Because this trial was undertaken to test the feasibility of the use of the preventive methods in a public service, it was carried out under normal clinical conditions. The nurse was not specially selected or closely supervised. She had to care for an additional 250 children not participating in the trial. Hence, the investigators said that the lack of time may have prevented the attainment of the high standard required, a problem which will always be present in a field situation.

It was also found that although the dental nurses strove to motivate the children, their efforts produced only a moderate improvement in oral hygiene. The second examination took place after the long summer vacation and it was evident that the majority of children in the experimental groups had not maintained thorough plaque removal.

3.2.11 Horowitz et al (53) studied the effects of supervised daily dental plaque removal by children after three years in East Hampton, Connecticut with a negligible fluoride concentration of 0.02 parts/million in the public water supply. The objective of the study was to determine the effect on dental caries and gingival inflammation of removing dental plaque by supervised toothbrushing and flossing each day in school during a three-year period. At the beginning of the study, participating children ranged in age from 10 to 13 years. A fluoride free dentifrice was used. Controls did not receive instruction in plaque removal procedures nor did they engage in plaque removal activities at school. For three years the students in the treatment group practiced daily plaque removal, supervised by trained personnel.

Results showed that girls in the treatment group showed a significant reduction (28%) in mean plaque scores and, for boys and girls, the mean changes in gingivitis scores were significantly reduced by 40% and 17% respectively. The adjusted mean increment DMF surface scores were 13% lower in the treatment group than in the control group. The difference between groups was not statistically significant and was accounted for entirely by the findings in mesial and distal surfaces.

The investigators found that the only justifiable conclusion that could be drawn from this report was that a school-based and supervised daily regimen of plaque removal as measured by plaque and gingivitis indexes was of limited effectiveness. An important observation made was that the differences in plaque and gingivitis scores that occurred between groups during each academic year virtually disappeared during vacation. Although the changes in gingivitis in the children in the treatment groups were statistically significant from the beginning to the end of each school year, from a clinical or practical standpoint, the value of the changes must be questioned because they disappeared during the summer. It is obvious that no permanent

change in oral hygiene practices that can be linked to the school programme took place in the treatment group during the summer months.

It is worthwhile to note here some of the day-to-day experiences in this report:

- (i) It was evident that this preventive programme demands a strong measure of self-discipline by the participants and extreme endurance and fortitude on the part of the supervising personnel.
- (ii) After the first few sessions, most of the students found the deplaquing regimen to be very boring, and, the school personnel became increasingly less co-operative as the study progressed.
- (iii) A school-based deplaquing programme is expensive.

3.2.12 Reece and Swallow (80) carried out a study on 150 children between four and nine years of age to investigate the effects of carrots on dental health. These children were encouraged to eat pieces of raw carrot after their mid-day meal over a two-year period. Caries and gingival disease rate and the amount of food debris in these children recorded at six-monthly intervals and compared with the findings in 191 children of a similar age attending schools in the same area as the experimental children. The study has failed to demonstrated any marked differences in incidence of dental disease in the two groups of children, but there would appear to be an increased awareness in the schools of the importance of D.H.E.

Previous studies (89, 90) with apple slices and sialogenous tablets (similar dental detergent foods as carrot) were more encouraging on caries which perhaps indicate the importance of an increased salivary flow. However, gingival disease and food debris results in previous studies and in the present trial are very similar: that is, none of the methods is of appreciable benefit in this respect.

The investigators recorded two important factors which

became apparent during the trial. First, both experimental and control schools became particularly enthusiastic about D.H.E., and one pair of schools began a campaign to restrict sweet eating. Secondly, the study has demonstrated that trials conducted by the staff of the public dental health services are feasible. They can be carried out with little disturbance to routine and without any marked diminution of therapeutic services, and the increased contact between teachers, children and dental officers is of mutual benefit.

3.2.13 Weiss and Lee (96) developed a programme to introduce teenagers to dentistry and to teach elementary school children oral health. Teenage health education teaching assistants (THETA) are high school students in a work experience programme. First, the THETA students and elementary school teachers are trained in preventive care. Then the THETA students develop a classroom plan of instruction and work with the children. It was found that elementary school children in Ukiah, California, who were instructed by the THETA students became more knowledgeable and skilled in oral hygiene procedures both in regard to brushing and flossing. THETA students reacted enthusiastically to the programme, as did elementary school children and their parents. The students thought the programme helped them in their care planning and in learning to accept responsibility.

The THETA programme provides new motivation for learning about specific oral health problems to both high school students and to the elementary school children they instruct.

3.2.14 Duriak and Levine (38) carried out an oral health control programme using groups to motivate and train patients. A systematic evaluation of the programme over a five-month follow-up period indicated that patients significantly improved their dental health. Positive changes in health were reflected by decreased gingival bleeding and reduction of pocket depth measurements.

was primarily attributable to the emphasis on group oriented instruction and training. They listed the special advantages of seeing oral health patients in groups as follows:

- (i) The use of groups can alleviate anxiety towards dental treatment, dentists and dental clinic since psychological findings have established that people want to be with and feel more comfortable being with others, rather than being alone when facing a potentially threatening or anxiety-arousing situation. (86)
- (ii) Social norms can be developed through group discussions and interaction directed toward promoting better health care and encouraging active participation by group members in acquiring those behaviours necessarily related to better oral health practices (namely, brushing and flossing appropriately).
- (iii) A group setting takes maximum advantage of similarities and differences of individual group members.
- (iv) The use of groups maximizes the efficient use of the oral health instructor's time.
- (v) Positive effects of peer instruction and mutual support during the group appointments can be very strong and effective.

The evaluation on preventive programmes carried out in Australia and elsewhere in the world listed in this chapter have been selected for the following reasons:

- (i) They were conducted recently, that is, in the past twenty years.
- (ii) They are related to this thesis.

The findings and conclusions drawn from these evaluations will be discussed in the next chapter. However, it should be noted here that reported results are difficult to compare due to variations in methods.

4.

DISCUSSION

As previously defined, D.H.E. is the development of knowledge, attitudes, practices and values which lead an individual to optimal oral health. (14)

The main measures for maintenance of oral health are the thorough cleaning of the teeth at least once a day, the restriction of sucrose consumption and the use of fluorides and adhesives to enhance the resistance of teeth to caries. Although all of these preventive measures are well understood by members of the dental profession, there seems to be much confusion among the general public as to what the individual himself can do to actually prevent dental decay and periodontal disorders. (1) Consequently, the dental profession has taken on the responsibility for educating the public so that they will adopt the positive strategy of primary prevention in the fight for better dental health, and thus participate in their own dental care.

The presence of dental plaque on the teeth and oral tissues is recognised as being a requirement for the initiation of dental caries (42, 75) and periodontal disease. (63, 65, 92) Thus, the frequent removal of plaque or the prevention of its formation have been considered as effective methods for the prevention of these two most prevalent oral diseases. Therefore, mechanical plaque removal is relied upon extensively to remove or control dental plaque; toothbrushes and dental floss are the devices most frequently recommended for this purpose. Although there is evidence to show that the mechanical removal of plaque with toothbrush and dental floss can reduce inflammation, (63) its effectiveness against caries is equivocal. (22, 42, 75) Nevertheless, state-wide programmes in many countries have been implemented in schools and clinicians have initiated programmes in their offices and clinics designed to convince children and adults to practice daily mechanical plaque removal.

Despite the efforts in educating the public individually

or in groups in the past, the effectiveness of many preventive methods is still in question because they require a level of compliance by individuals which is difficult to obtain. (55)

Although the efficacy of many mechanical and chemical approaches to the prevention of tooth decay and gingivitis has been established, their effectiveness is almost totally dependent on the individual's willingness to take appropriate preventive health actions. This clearly suggests that educational and other techniques which influence personal health behaviour are of paramount importance in the control of dental disease.

The complex nature of reasons which hinder individuals from being motivated by various efforts to be self-reliant in mechanical plaque control and to maintain oral hygiene should be examined. Sociology and psychology, the two major components of behavioural sciences play a big part in helping to understand the attitudes and behaviour of individuals towards preventive methods such as those promulgated in D.H.E.

The goal of an oral health education service is to develop in patients a self-maintaining habit of daily mechanical disruption of plaque. In order to achieve this, patients must be given proper toothbrushing and flossing instructions and motivated to carry out these instructions faithfully in order to obtain the necessary results.

Motivation of patients towards effective plaque removal are governed by many factors. (50) From the start, it must be recognised that no single motivational or instructional technique works with every patient. Rather, the techniques to be used should be individualized to each patient's unique needs. (50, 17) Motivation of persons who were previously lax about their oral hygiene necessitates a behavioural change. Hausmann and Hausmann (50) outlined the factors affecting this behavioural change, based on the work done on the psychology of learning by

Johnson (58a) and their own clinical experience:

- (i) The dentist or dental health educator,
- (ii) The patient,
- (iii) Dentist/patient relationship.

(i) The dentist or dental health educator

Like an effective psychotherapist, an effective educator should possess three suitable characteristics and be familiar with factors in instruction and know the appropriate motivators to use on various patients.

The factors in instruction were listed as:

a) Modelling

People tend to model themselves after someone they respect, small children tend to emulate their parents and adolescents their peers.

b) Learning the instructions

Demonstrating to the patient what the dentist wants him to do (teaching) is not enough. For successful therapy, the patient must demonstrate his ability to carry out the procedure as an indication that he has learned what he has been taught. It has been demonstrated that people learn best by experiencing previous successes rather than failures. (11) These findings suggest that a task to be mastered should be divided into small enough steps (incremental learning) so that the person has a good chance of succeeding at each step toward the final goal. This principle can be used in teaching patients plaque control.

c) Defining goals

It is desirable that the dentist clearly define for the patient the goal of a preventive programme. A significant help in this is the use of any one of several disclosing systems, erythrosin tablets, solutions, or fluorescent dyes.

Motivators are often necessary to instill in the patient the desire to carry out the prescribed programme. These motivators can come either in the form of rewards or cost

to the patient.

In turn the rewards can take two forms: either they are simply prizes or awards, or they make use of avoidance learning whereby learning is facilitated by the withholding of punishment. This principle of rewards might be applied in the case of individuals of various age groups and personality types. For example, small children respond to a prize or award; some adolescents respond to a type of reinforcement showing the effect of plaque control on their appearance, no breakdown of tooth structures, nice smile, or pleasant breath; many middle-age individuals fear the loss of teeth (avoidance learning); and most senior citizens fear the loss of mandibular teeth because they have heard of the difficulty involved in wearing lower dentures.

Personality characteristics of patients also influence the type of reinforcements (rewards) the dentist may use. Those with compulsive personalities are meticulous in everything they do and, in general, may be the easiest type of patient to treat. Rewarding them for excellent plaque control tends to fit right into their personality structure. Hysterical personalities are usually dressed to emphasize youthfulness; they usually relate easily to others and have a great deal of charm. For these patients, a satisfactory reward for plaque control is to stress its effect on their appearance - such as their smile, youthfulness, or sex appeal. Individuals with overdependent personalities may show an extreme need to be cared for. For this type of patient, a contract giving the patient's responsibility for his oral hygiene, made at the initiation of therapy, is particularly important. In making realistic demands at the start, the dentist demonstrates his confidence in the patient's ability to care for himself and thereby encourages responsibility and self-esteem. Self-esteem motivates individuals to do what is good for them.

The cost of the preventive service may also be a motivator. However, the question of an appropriate fee for

D.H.E. as preventive services is one for which no categorical answer exists. Programmes carried out by government institutions or organisations to promote oral health are free while some dentists in their private practices do not charge at all for prevention services; they throw them in as an extra. Hausmann and Hausmann ⁽⁵⁰⁾ believe that this is a mistake for two reasons. Firstly, people do not tend to value a service that is free and, therefore, they do not do their part in adequate plaque control. Secondly, dentists are also human beings. Very few human beings will do their best job if they are not remunerated for their services. Hausmann and Hausmann suggest that the fee for preventive care not be fixed, but rather that it should be levied on the time the dentist or his auxiliary spends with the patient. The cost will be related to the time the patient needs to maintain good oral hygiene. This will not only work as an effective incentive for some patients in mastering techniques as quickly as possible but will also serve as adequate remuneration for the service rendered by the dental health educator. Unfortunately, cost as a motivator can only be applied in private practices. In public programmes where D.H.E. is given free to patients and dental health educators are on fixed salaries, the two reasons given by Hausmann and Hausmann do not come into play at all. Furthermore, in these types of programmes there has never been any precedent to justify charging the public for such services. However, stress on the long-term financial saving from proper preventive care by the dentist and maintenance of an oral hygiene regimen by the patient might be useful in inducing people to practice good oral hygiene measures.

(ii) The patient

There are people who need to learn how to control plaque build up in their mouths but who are incapable, for a variety of reasons, of developing such habits. Some patients have tried preventive programmes, but have derived marginal benefits from these because they are not susceptible to such treatment. Once these facts are realized and accepted, the next question to ask is: how many people are susceptible

to prevention? Chambers (17) estimated that only 15% to 20% of the people in the United States are susceptible to prevention. Considering the fact that most D.H.E. programmes conducted by the government and the dental profession are aimed to reach the whole of the population without knowing who is susceptible and who is not, one would tend to ask whether this practice is a waste of both resources and time.

Who is susceptible to prevention? The hypothesis being expressed is that sound dental health behaviour is not an isolated set of skills that is easily manipulated by the dentist but rather part of a general preventive health orientation that is supported by values and attitudes that make up the life-style of the patient. (49, 59, 64) A powerful determinant of success in preventive D.H.E. programmes is the patient's pre-existing susceptibility to such a treatment, and this susceptibility in turn appears to be part of a global life-style, a set of values about prevention and health in general. (2, 64, 77, 81) Lower status individuals show less concern for their teeth; they consider them to be less important, and often believe that their loss is inevitable. In the future, whoever tries to motivate such people with a view to saving their teeth years is likely to be frustrated by the inertia of these pessimistic values. Socio-economic status per se should not be regarded as synonymous with or as the cause of susceptibility to preventive D.H.E. Studies are available that show dental utilization to be independent of ability to pay. (76)

How does the genetic factor affect caries susceptibility? This should be examined because there are a number of caries-free subjects whose enamel apparently maintains its integrity in spite of a normal or potentially cariogenic diet and without their practising oral hygiene measures. Shaw and Murray (87) showed in a study that there were marked clinically and statistically significant differences in the caries experience of the parents and siblings of a group of caries-resistant children compared with the parents and siblings of a group of caries-susceptible children. The two groups

had a similar intake of carbohydrates, similar toothbrushing habits, and both regularly attended dentists. The conclusion reached by the study was that in caries-immune and caries-susceptible individuals genetic and environmental factors may play a significant role in the caries process.

The similarities in caries experience of parents and their offspring found by Shaw and Murray confirm the observations of earlier investigations. (44, 67) It has been suggested that parent-child similarities in caries experience may be related to sharing a common diet and other environmental factors. (45) Evidence from published studies on the role of diet on high and low caries prevalence is somewhat conflicting. (37, 67, 82) Although the effects of genetic and environmental factors on dental caries in man cannot readily be separated for analytical purposes, several investigators have had the clinical impression that caries was a familial disorder. But it is possible that characteristics may be familial due to environmental influences rather than a strong genetic component.

(iii) Dentist/patient relationship

A positive relationship between the dentist (or dental educator) and patient - good rapport - must exist in order to bring about any change in behaviour. An essential ingredient of such a relationship is the feeling by the patient that he is respected and accepted by his dentist. A sense of trust must be established between them. Factors that affect the dentist/patient relationship are:

a) Communication

In a positive dentist/patient relationship, the dentist is able to effectively communicate his instruction to the patient.

b) Prejudice

It is difficult, if not impossible, to have a positive dentist/patient relationship if the dentist dislikes the patient. Prejudice may be at a subconscious level, the dentist might not be aware of it.

c) Expectations and demands

Plaque control therapy is unique in dentistry in that

success requires active participation by the patient. The initial communication could include a clearly spelled out contract, it should state what the patient may expect from the dentist and what the dentist demands of the patient. The degree to which a patient complies in carrying out instruction on oral hygiene is related to the dentist's expectations of the patient.

How successful can D.H.E. be? Plaque control programmes probably make few converts to dental health. When they do succeed, they represent the newest expression of the patient's existing attitudes and values centred around prevention and total health. (17) "Home-care" prevention is not for everyone; its limited applicability must be recognised, and increasing attention should be focussed on the individual characteristics of the patient. As a general rule, the less mechanical the treatment and the more complex the expected patient response, the less predictable the result will be, since differential patient susceptibility assumes greater importance. This is certainly true in regard to D.H.E.

The problem of an oral health programme based on daily plaque control is that it must become a habit on the part of the patient and not just a skill. Home care regimens must be maintained by the patient for long periods with no other reward than the absence of bleeding or gingival irritation. Research in operant conditions has shown that such habits are among the most difficult to maintain. (88) A common failing is the belief that the development of preventive health habits can be intervened. Most frequently this is expressed in terms of motivating the patient. The disappointing truth of the matter is that motivation is at best a short-term situation-specific aid to learning a skill such as flossing, and that lasting health-related behaviour, is largely incapable of being produced as proven by studies done by Roder (section 3.1.6), Dennison et al (section 3.2.4) and Craig et al (section 3.2.10).

Chambers (17) believes that two mechanisms account

for the anchoring of dental health skills in a patient's daily routine. First is the phenomenon of psychomotor skills maintaining themselves by 'growing' supporting values by 'cognitive dissonance' is rare in the case of preventive oral health habits. The second alternative is more likely to account for observed success. Skills such as flossing will mature into habits only in patients who already have a value structure to support this kind of behaviour.

In conclusion, the ideal in motivating patients to become more self-reliant in mechanical plaque control is to strive to help patients maintain good oral hygiene almost instinctively. For maximum effectiveness and ease of training, the younger the patients are when they start on an effective oral hygiene programme, in general the greater their rate of success will be. For learned behaviour to be maintained, periodic reinforcement seems to be necessary.

At present it is not known which teaching methods are best. Various oral health programmes display a great diversity of opinions, styles, and techniques on how to achieve health goals, and investigators are still struggling to uncover specific programme variables related to maximum success rates.

The present movement in holistic health has been well supported by the dental profession ⁽³⁹⁾ because of its philosophy of treating an individual as a whole. In practice, the individual is to assume the responsibility for avoiding disease and become an active participant in promoting personal health, even to the point of self-healing when disease does strike. This philosophy is synonymous with the emphasis on the prevention of oral diseases aiming at individual responsibility for oral hygiene measures with regular dental care, and the necessity of altering frequent intake of foods containing sugars.

A report published in 1979 by the Health Education Council in England simplified the D.H.E. information which

should be presented to the public. (51) It recommended that:

(i) Insist in fluoridation

It is clear that fluoridation of the water supplies will have a profound influence on the dental health of the community and all citizens should call for its implementation at the earliest possible time. Fluoride tablets or drops are an alternative for intelligent and motivated parents who wish to protect their child's future dental health.

(ii) Restrict sugar-containing foods and drinks to mealtimes.

The number of times sugar enters the mouth is the most important factor in determining the rate of dental decay. If confined to mealtimes, the harmful effects of sugar will be reduced. Foods and drinks not containing sugar may be consumed between meals with little adverse effect on the teeth.

(iii) Clean the teeth and gums thoroughly everyday with a fluoride toothpaste. The removal of dental plaque is essential for the prevention of periodontal disease. The toothbrush is the only means of plaque removal that should be recommended to the public, other oral hygiene aids being a matter for personal professional advice. Thorough brushing, everyday, is of more value than more frequent cursory brushing, and a sensible scrub technique should be advised. The toothbrush size and design should allow the user to reach all tooth surfaces and gum margins easily and comfortably. Regular toothbrushing will, by itself, have only a small effect on dental decay, but an additional benefit will be gained by the use of a fluoride dentifrice.

Messages of D.H.E., popular in the past, which have little or no evidence to support them include:

- a) Eat a nutritious diet to increase tooth resistance.
- b) Eat hard deterrentive foods to fight decay.
- c) Brush the teeth after meals to fight decay.

It is hoped that by removing these and others from

future D.H.E., the public can become more aware of the real causes of dental disease - the frequent ingestion of sugar and the presence of plaque at the gum margins.

Although it has been shown that preventive home-care regimens are among the most difficult to maintain and social scientists have reasoned that only a minority of the population would be susceptible to them, the author believes that it is worthwhile to continue to promote D.H.E. in the hope of influencing more people to practice daily oral hygiene measures. Up to date, proper toothbrushing and flossing techniques have only been brought to the notice of people in the wealthy, industrialized countries of the world. In most developing and underdeveloped countries where widespread ignorance, superstition and traditional misconceptions about dental health still persist, oral hygiene measures have not been introduced. These are the people who need them most to counteract their beliefs. As periodontal disease poses the major threat to lifetime dental health in these people, D.H.E. will not only benefit their periodontal condition but will concurrently educate them to avoid the mistake made by the people in industrialized countries, in consuming sucrose and sweets, as the standard of living gradually improves in these countries.

4.1 Discussion of N.S.W. Programmes

Taking the social science perspective, influencing the "behaviour" of the social and political organisations which exert influence over individuals is just as important as influencing the behaviour of individuals. (55)

In N.S.W., the dental profession has directed D.H.E. at individuals as well as organisations, for example schools, government and big corporations. The result has been a dramatic increase in D.H.E. activities in the past ten years with the public becoming more knowledgeable in dental health procedures and learning how to take care of their teeth.

It is difficult to determine whether the reduction in DMF teeth in children is partly due to D.H.E. activities and not solely due to the fluoridated communal water. However, it is hard to believe that children who have been constantly fed with information on good oral hygiene practices and having undergone toothbrushing drills would not be influenced even slightly by the regimens.

D.H.E. programmes for school children in N.S.W. can be classified into the following categories:-

- A) Public programmes include:
 - (i) S.D.S.- 'brush-ins'
 - classroom lectures with teaching aids, e.g. films, posters and cutouts.
 - (ii) Puppet theatre
 - (iii) Mobile dental unit
 - (iv) Dental exhibitions
 - (v) Radio and television shows
 - (vi) Commercials
- B) Private programmes such as:
 - (i) Talks in private dental surgeries
 - (ii) Audiovisual aids in waiting rooms in private dental surgeries.

What effects have these programmes had on the dental health of the population in N.S.W.? As stated before, due to various problems, only a few evaluation programmes have been carried out in this state. Therefore, studies produced in other states of Australia and other countries will be used in this discussion.

Howe's study (section 3.1.1) found that by giving children one exposure to toothbrushing techniques together with other dental information and using disclosing solutions, or giving this information by film or the puppet theatre did not increase their knowledge of preventive dental health. Toothbrushing efficiency increased the most with the disclosure group; the film group comes next in efficiency; while the puppet theatre and control groups made no improvement. None of the groups

showed a change in dental anxiety; there was no change in attitude to dentists in either a positive or negative direction.

The obvious conclusion from this study is that the puppet theatre is of no value as an educational method, the film can be used to produce a behaviour change while the personalized guided instruction method in the film group is the most effective method.

The "brush-ins" carried out in the S.D.S. by the dental health educators and dental therapists give the same instructions and supervision to the children as those given to the disclosure group as in Howe's study. The only difference is that in Howe's study only one exposure was given to the experimental group with no reinforcement in oral health information whatsoever, while the children under the S.D.S. scheme receive reinforcement in their classes and approximately one "brush-in" session every six months. Consequently it could be surmised that the combined effects of the D.H.E. programmes under the S.D.S. will be better than those obtained by the Howe Study. The studies undertaken by McAllan et al (section 3.2.5) and Blaikie (section 3.1.2) support this view. However, Craig et al (3.2.10) refuted this in their study done under realistic normal operative conditions in the New Zealand School Dental Service. The conclusion of this study indicated that there had only been a moderate improvement in oral hygiene.

Under the S.D.S. programme, parents are often brought in to be involved and they seem to have favourable attitudes towards the S.D.S. scheme (section 3.1.3). Generally, children's D.H.E. programmes have a part in which parents can participate. However, a study done by Jago and King (3.1.8) indicated that there had been no improvement in the incidence of caries in children whose parents were given D.H.E. informations, but, there have been fewer extractions carried out on children of these parents. On the other hand, Claudia

and Muhler (section (3.2.1) insist that before D.H.E. could become meaningful for the child, the parents had to be taught the practical importance of dental health.

The value of the classroom D.H.E. lectures carried out by the dental health educators and teachers has been evaluated by several researchers. Williford et al (section 3.2.2) concluded after their study that an improved dental health programme of classroom lectures may have a significant influence in improving various aspects of dental health among high school students, while Dennison et al (section 3.2.4) found that D.H.E. lectures produced disappointing results among University students. It had no effect at all on this age group. Claudia and Muhler (section 3.2.1) suggested that it is immaterial how much a dental health educator knows about dentistry in order to teach D.H.E., but of significance is who can most effectively impress on children and parents the importance of dental health.

The power of radio, television and commercials should not be underestimated. The continual repetition of advertisements makes them one of the most influential forces in society to-day (section 2.4). They can be both persuasive devices and a means of education.

It is interesting to note that up to date N.S.W. has not conducted daily "brush-in" programmes in schools like those being carried out in Singapore and the Scandinavian countries. These "brush-in" drills have been evaluated as being economical and effective by Keith et al (section 3.2.3), but are described as having limited effectiveness in plaque removal by Horowitz et al (section 3.2.11). Sutcliffe et al favoured such preventive programmes because they were able to demonstrate that even three and four year olds can be taught to clean their teeth properly.

Whether daily "brush-in" programmes can cause permanent changes in oral hygiene habits is still inconclusive. But, a "brush-in" programme would be a good training programme

to establish a behavioural change before (or concurrent with) changes in attitudes or verbal behaviour can be expected.

The modes of disseminating D.H.E. to school children in N.S.W. are rather traditional. Group therapy such as that described by Duriak and Levine (section 3.2.14) has not been tried, and using high school children to give dental health informations to elementary school children (sections 3.1.5, 3.2.13) as motivation for both groups of children has not been explored.

The handicapped children in N.S.W. are a neglected lot dentally. Some charitable organisations such as the Spastic Centre has their own dental clinics to take care of their dental needs but handicapped children (population not recorded) who are not institutionalized mainly attend dental surgeries for emergency treatments only. Brown (section 3.1.7) compiled a report on a comprehensive programme of treatment and home care. It indicated that it was effective in greatly reducing dental caries, improving oral cleanliness and controlling gingivitis in handicapped patients; maintenance required less than half the time and approximately a third of the cost of the initial restorations. The findings of the programme should act as an incentive to dentists to use preventive dental treatment, including D.H.E. on patients as much as possible.

4.2 Methods Worthy of Adoption in Hong Kong

The latest dentist/population ratio in Hong Kong was reported to be 1:8,500 at the end of 1978. This still falls short of the ratio of 1:6,000 recommended for Hong Kong by the Medical and Dental Advisory Committee. With the introduction of the S.D.S. in 1979 to provide dental services for primary school children, a major step has been taken towards improving the dental health of the community. There has been no significant decrease in the number of dentists since the implementation of the scheme as dental

therapists are used to carry out routine preventive dental services under the supervision of dental officers.

To complement the treatment functions of the S.D.S., more emphasis was given to preventive dentistry. Dental health education was established as part of the service so that children could be educated early in life to take care of their own teeth. All dental therapists and hygienists give instruction in dental health when treating patients. Mass education is conducted by a team of hygienists under the supervision of dental officers. It is intended that a small unit specialising in D.H.E. be established. This unit will make use of the expertise and resources available at the Central Health Education Unit.

Before recommending D.H.E. methods for adoption it is appropriate here to recognise the oral health status of the children as shown by results of the 1979-1980 survey on children aged 6-11 years. Major conclusions are: (26)

- (i) Oral hygiene was generally poor: 84.5% of children examined had soft debris on their teeth.
- (ii) The prevalence and severity of periodontal disease was limited to intense gingivitis: 19.2% of children were effected.
- (iii) 9.8% of children examined required treatment for one or more types of dento-facial anomalies.
- (iv) Un-met treatment needs were high. Over 90% of the decayed teeth were untreated.
- (v) The prevalence of dental caries in the permanent dentitions was low. The DMF rate was 0.33 at age 6 and 1.5 at age 11, with an average of 0.93 for the age group 6-11 years.
- (vi) The prevalence of dental caries in the primary dentition was moderately high. Each child at age 6 had an average of 4.25 dmf teeth and 25% of the primary teeth erupted were decayed.

The implications here are that there is considerable neglect in oral hygiene and a negative attitude towards

dental treatment for the age group 6-11 years in Hong Kong. Consequently, D.H.E. programmes should concentrate more on informing the population about the general origins of oral diseases and making it clear that such diseases can be prevented and treated. Parents should be educated as well because they control the younger children's diets and are in a position to influence their habits.

Unfortunately in many cases both parents work in order to support their families. This circumstance creates a situation where the children aged 6 and over have to survive on their own during working hours with no parental supervision. Food habits and oral hygiene habits are therefore developed freely and in most cases result in high consumption of sugar and refined carbohydrates with no oral hygiene procedures. However, it is compulsory for children to remain at school until the age of fourteen. This would provide a good opportunity for children to receive guidance and instruction in practices that would lead to good health and good oral health if these were available.

Some of the D.H.E. programmes held in Hong Kong have been:

- (i) Dental Health Week under the sponsorship of the Hong Kong Dental Association. This is held once every two years.
- (ii) Dental Health Exhibits in Health Exhibition in connection with agricultural shows, fishery exhibitions, Kai Fong Educational Exhibitions organised by the Medical and Health Department.
- (iii) Programmes organised and/or participated in the Dental Therapist Training School:
 - An oral hygiene promotion campaign by the Girls' and Boys' Club and the Hong Kong Dental Association in International Year of the Child, 1979.
 - A series of dental health talks over Radio Hong Kong in 1979.
 - 11th Dental Health Week, 1980.

- Student, dental therapists and hygienists' lectures on dental health topics to various primary schools.
- From early 1981, D.H.E. talks/sessions on Saturday mornings once every 3-4 weeks at the Macle hose Dental Centre (children participating in the S.D.S. and their parents are invited to attend).

Although none of the D.H.E. methods used so far has been proven to have a lasting effect, the author believes that in addition to the above programmes, the following campaigns could be adopted to reinforce the dental health messages given by dental personnel to school children:

- (i) The sale of "rubbish foods" to be banned at schools through legislation. As the canteens in local schools are not run by schools or parents, the proprietors of the canteens should be prohibited from selling non-nutritious and cariogenic foods. They should be given recommended menus and guidelines to replace foods that bring in the most profit without any thought being given to the children's health. It does not seem logical to use public money to treat cavities in the S.D.S. caused by the sugary rubbish sold in the school canteens in the same compounds where dental health lessons are being taught.
- (ii) Daily toothbrushing drills at school. Instructional programmes in which children take an active part will result in a reduction of plaque and gingival indices (3.2.3, 3.2.6, 3.2.7 and 3.2.11). Daily toothbrushing drills at school will help the children to establish good oral habits. The cost would be minimal. Teachers could be used for supervising toothbrushing after receiving proper toothbrushing instruction from dental personnel. A therapeutic fluoride toothpaste should be used to help to reduce caries. Toothbrushes can be kept at school to eliminate waste. Commercial firms can donate dental health products on the condition that there will be no obligation on the Government's part.

- (iii) Dental Health competitions: games, colouring books, timetables with dental health messages are fun ways to gain the interest of children in D.H.E. These activities should be encouraged at school and at home. Student dental therapists can design materials which can then be printed by the Government Printing Department to minimize the costs of such projects.
- (iv) Television and radio programmes: these talks should be conducted regularly and be of practical value to the target groups. They should be in a language easy to understand.
- (v) Puppet theatre: the puppet theatre created by the D.H.E. & R.F. could easily be adapted to suit the local children in Hong Kong. Puppets are popular as a form of entertainment with the children there, and there are many skillful puppeteers available. The initial costs would only involve the puppets and the theatre setup. The running costs consist of a driver, two puppeteers and follow-up literature. It is true that in Howe's evaluation (3.1.1), the puppet theatre has no educational value but its highly entertaining merit should help to make D.H.E. an amusing session for the children.
- (vi) Mobile dental unit: this unit can be very useful in introducing dental health to the school children and the public in Hong Kong as it is mobile and can be towed to any locality accessible by road or rail. It could be converted from one of the unused mobile dental clinics which are of similar dimensions to the one in use by the Health Department in N.S.W. The initial cost of the unit and equipment can be donated by one of the philanthropists in Hong Kong, as many other special projects are set up in this manner. Running costs would comprise three or four dental therapists.

If the above-mentioned D.H.E. programmes are adopted for school children in conjunction with the existing D.H.E.

programmes, the author believes that the outlook for improving oral hygiene habits in school children and subsequently in the adult population of the community is bright. With the anticipated improvement in oral hygiene habits, the reduction in gingival diseases can be slowly achieved. On the whole, the oral health of the people in Hong Kong can benefit by the implementation of D.H.E. measures, but progress towards better oral health will be slow. Evaluation of each aspect and method of D.H.E. should be carried out periodically so that necessary changes can be made.

5.

SUMMARY

Hong Kong, with its fluoridated communal water supply and recently established S.D.S. is on the verge of tackling their D.H.E. problem. D.H.E. was incorporated as part of the S.D.S. in 1979, but due to the small number of children involved in the s.d.s., D.H.E. programmes of only a limited scale have been carried out. N.S.W. has been chosen for study by the author in order to review its D.H.E. activities for school children and the methods appropriate for adoption in Hong Kong.

D.H.E. for children in N.S.W. mainly comes from three sources: the Government dental services, the Dental Health Education and Research Foundation (University of Sydney) and the Australian Dental Association. Other organisations, such as the Education Department, commercial firms, the Aboriginal Medical Service, private dental clinics and friendly society dental clinics play a part in rendering services.

There are three dental services operated by the State Government of N.S.W. which carry out D.H.E. programmes for children. They are the S.D.S., the United Dental Hospital of Sydney and the dental clinics in hospitals.

The S.D.S. was established for the long-term improvement of the dental health and dental awareness of the community. Therefore, emphasis was given to the fields of D.H.E. and prevention, as well as to the treatment programme. Both dentists and dental therapists were employed in this service at the onset; female dental health educators were additionally employed by the Northern-Metropolitan Health Region in 1977 to carry out D.H.E..

In the S.D.S. primary school children receive D.H.E. in two complementary school programmes- the "brush-in" sessions and lectures in the classroom. The secondary school children receive dental health informations through a mobile unit.

The United Dental Hospital of Sydney provides D.H.E. to children through the Staff Pedodontics Clinic and the University Pedodontics Clinic. This is usually done on a one-to-one basis. In addition, the patient and parent are often referred to the dietician for dietary advice.

Hospital dental clinics in N.S.W. provide comprehensive dental treatment for in-patients and the general public who are subjected to a means test. The Manly District, Ryde-Hunters Hill, Gosford and Royal North Shore Hospitals employ dental health educators. In addition to giving instructions to children, dental health educators also give talks free of charge to groups which may be responsible for the welfare of children.

The D.H.E. & R.F. was founded in 1962 and has since been the centre of D.H.E. activities in N.S.W.. With the help of health experts, sovial scientists and education experts, the following approaches to D.H.E. were initiated to educate the community:

- (i) School programmes for primary level:
 - Dental health educators to give accurate dental health informations to school children, teachers and adult groups.
 - A puppet theatre to take dental care story to younger children.
- (ii) School programmes for secondary level - Dental Health Education Mobile Unit.
- (iii) Pamphlets and posters.
- (iv) Campaigns to promote mouth guards.
- (v) School Canteen Sub-Committee to advice on the correct type of food to be sold at school canteens.

The A.D.A. (N.S.W.Branch) does not carry out D.H.E. programmes on its own. It works closely with the D.H.E. & R.F. for this purpose. Five of the members serving on the D.H.E. subcommittee sit on the Council of the Foundation. Twelve representatives from the A.D.A. (N.S.W. Branch) serve on the

Advisory Committee of the Foundation which is responsible for creating educational materials. Many members of the N.S.W. Branch of the A.D.A. take part in the activities and programmes in D.H.E. and prevention.

Commercial organisations in N.S.W. have taken great interest in the field of D.H.E. since the inception of the D.H.E. & R.F.. They participate by contributing monetary donations or dental health aids to the Foundation and other D.H.E. projects. More and more commercial organisations are co-operating with the dental profession by reinforcing the D.H.E. messages in their advertisements. The advertising messages are educative in nature, teaching the public about plaque, fluoride, correct ways of toothbrushing and eating less sugar. As advertising is one of the most influential forces in society to-day, informative advertising can provide an educative role and persuasive advertising can influence consumers to adopt certain habits. Therefore, the more the commercial firms co-operate with the dental profession, the more successful D.H.E. will be.

In the schools of the N.S.W. Department of Education, D.H.E. is treated as a component of general health education. There has been a growing concern for the nutritional health of children and on how to help pupils develop good attitudes towards food. No policy is laid down by the Education Department on D.H.E. but there is a strong belief that nutrition and D.H.E. should be taught together. The Education Department has not laid down specific methods to be used to convey D.H.E. messages. The main aim is to present students with knowledge and to encourage them to make decisions which will lead to good oral health.

The Nutrition Section of the Health Commission promotes good health through nutrition and a good diet. The D.H.E. programme is built into the health programmes which aim at lessening sugar intake and building up good nutrition and diet in the belief that good nutrition and diet leads to good oral health. The thirteen health regions undertake

programmes independently. "A Guide for School Food Service Units" is a booklet produced by the Nutrition Section of the Health Commission to give the organisers of school canteens some guidelines.

The Aboriginal Medical Service was founded in 1971 and its dental clinic was established in 1978. This dental clinic provides dental treatment and D.H.E. to the Aborigines. Having overcome the problem of acceptance by the Aborigines, this service is experimenting with new approaches designed to convey the health messages to them. Oral hygiene instruction is carried out in the dental surgery by Aboriginal dental surgery assistants, and dietary talks are given at sewing circles, luncheons or other gatherings. Dietary talks are reinforced by including the five essential food groups in the food parcels distributed to pregnant and nursing women by this medical service.

The other dental clinics throughout N.S.W. carry out D.H.E. by the chairside in dental surgeries, frequently using printed materials as reinforcements for home use.

Evaluation, being an essential part of any community-based programme, was discussed. Cost-benefit analysis is one method of choosing between alternative programmes. Cost-effectiveness analysis is an alternative method which enables one to determine the least expensive of several alternative methods of achieving a stated objective. A distinction must be made between the effectiveness of preventive measures during controlled clinical trials on limited numbers of subjects and their value when applied under field conditions to the whole community.

Recent evaluations of D.H.E. programmes in Australia and other countries were then reviewed to find out the effects of various D.H.E. programmes. However, due to variations in evaluative methods, it is difficult to compare the findings of one method with those of another.

In discussing the reviews of the evaluations of D.H.E. programmes, the reasons for the poor rate of success in many of the preventive methods tried in the past were brought forward. The effectiveness of mechanical and chemical approaches to the prevention of tooth decay and gingivitis is almost totally dependent on the individual's willingness to take appropriate preventive actions. Motivation of patients towards effective plaque removal is therefore of prime importance in any D.H.E. programme.

Details from a report published in 1979 by the Health Education Council in England containing simplified D.H.E. information aimed at the public was presented.

D.H.E. programmes in N.S.W. were discussed. It was noted that due to the effort of the dental profession in the past ten years, there has been a dramatic increase in D.H.E. activities.

The effects of the various D.H.E. programmes on the dental health of the population in N.S.W. were analysed. The results were inconclusive but the total effect of D.H.E. and fluoridation has been a reduction in DMF teeth in the children in N.S.W.

Methods worthy of adoption in Hong Kong were presented. The background of Hong Kong, and the past and present D.H.E. programmes undertaken in Hong Kong were summarized.

6.

CONCLUSION

Three bodies have provided the main thrust to D.H.E. for school children in N.S.W.: the Government dental services, the D.H.E. & R.F. (University of Sydney) and the A.D.A. These three organisations are able to reach all corners of the State by virtue of their size and nature. Other organisations, such as the Education Department, commercial firms, the Aboriginal Medical Service, private dental clinics and friendly society dental clinics play a part in rendering D.H.E. services.

D.H.E. programmes for school children are as follow:

- (A) Public programmes include:
 - (i) S.D.S.- 'brush-ins'
 - classroom lectures with teaching aids.
 - (ii) Puppet theatre
 - (iii) Mobile dental unit
 - (iv) Dental exhibitions
 - (v) Radio and television shows
 - (vi) Commercials
- (B) Private programmes such as:
 - (i) Talks in private dental surgeries
 - (ii) Audiovisual aids in waiting rooms in private dental surgeries.

Due to the problems of finance and shortage of staff together with the fact that it may require a long period of time to detect a measurable change in oral status, evaluation on D.H.E. programmes under field condition has not been carried out in N.S.W. by the Government. The only evaluation done was by Howe in 1974. This evaluation found that the disclosure, film and puppet theatre educational techniques did not effect a change in children's knowledge of preventive dental health behaviour; that the disclosure and film techniques demonstrated a significant improvement in toothbrushing efficiency (the disclosure group was

superior to the film group); that none of the groups showed a change in dental anxiety; and that there was no change in attitudes to dentists in either a positive or a negative direction. This evaluation does not reflect the assumption that dental knowledge is a necessary pre-requisite for acquisition of motor skills, such as toothbrushing. The puppet theatre was assessed to be an ineffective educational method but one having high entertainment value.

Conclusions drawn from other evaluations are:-

- (i) Regular "brush-ins" carried out in the S.D.S. with classroom reinforcement lectures are ineffective as a dental preventive programme when evaluated under realistic normal operative conditions.
- (ii) Some studies found that giving parents D.H.E. information has no effect on the incidence of caries in their children, while one study concluded that before D.H.E. could be meaningful to the child, the parents had to be taught the practical importance of dental health.
- (iii) The value of the classroom D.H.E. lectures was found to be conflicting. One study found that classroom D.H.E. lectures may have a significant influence in improving various aspects of dental health, while another study found that D.H.E. lectures produced disappointing results.
- (iv) In order to successfully teach D.H.E., it is less important how much a dental health educator knows about dentistry, but it is very much to the point that he or she be able to impress upon the children and their parents the importance of dental health.
- (v) None of the D.H.E. methods can produce a lasting effect. It is extremely difficult to effect a permanent behavioural change in people in oral hygiene habits.

Despite the lack of evidence of any really effective method in D.H.E., daily toothbrushing drills and other methods were recommended for Hong Kong school children because any

programme which would establish a behavioural change before changes in attitudes or verbal behaviour is commendable. The puppet theatre was recommended for entertaining purposes in order to keep the younger children interested in "teeth".

At present, ignorance and misconceptions are the enemies of oral health in Hong Kong. The high incidence of gingivitis in children indicates that education in dental health should be pursued vigorously. For maximum effectiveness and ease of training, the younger the patients are when they start on an effective oral hygiene programme, in general the greater their rate of success will be.

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8.

APPENDIX

(I) A note to mother from the School Dental Service.

HEALTH COMMISSION OF NEW SOUTH WALES
School Dental Service

As a result of the BRUSH IN conducted at school today,
it was noticed that your child may need dental treatment.

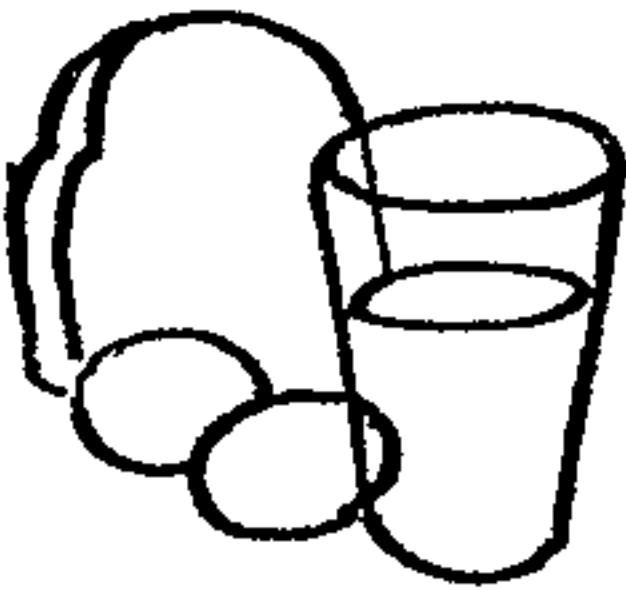
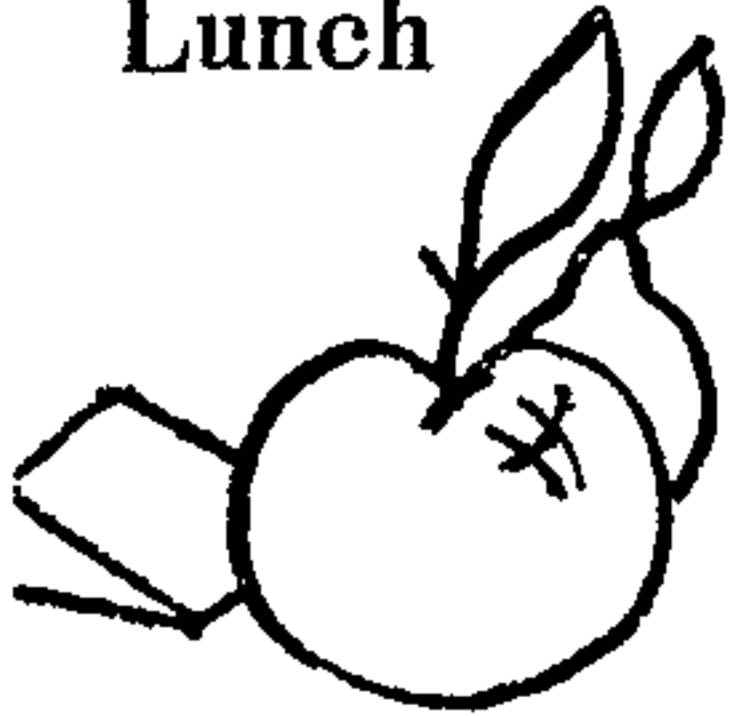
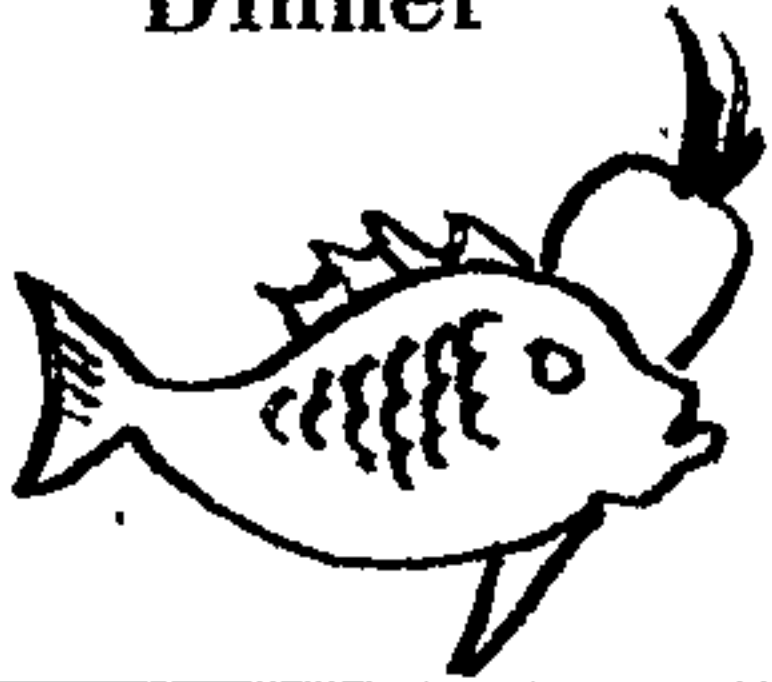
It is suggested that you contact your own dentist or the
Ryde East Dental Clinic which is available free of charge
for infant and primary children.

The Clinic's number is 887-2035.

MY WEEKLY CLEAN TEETH CHART

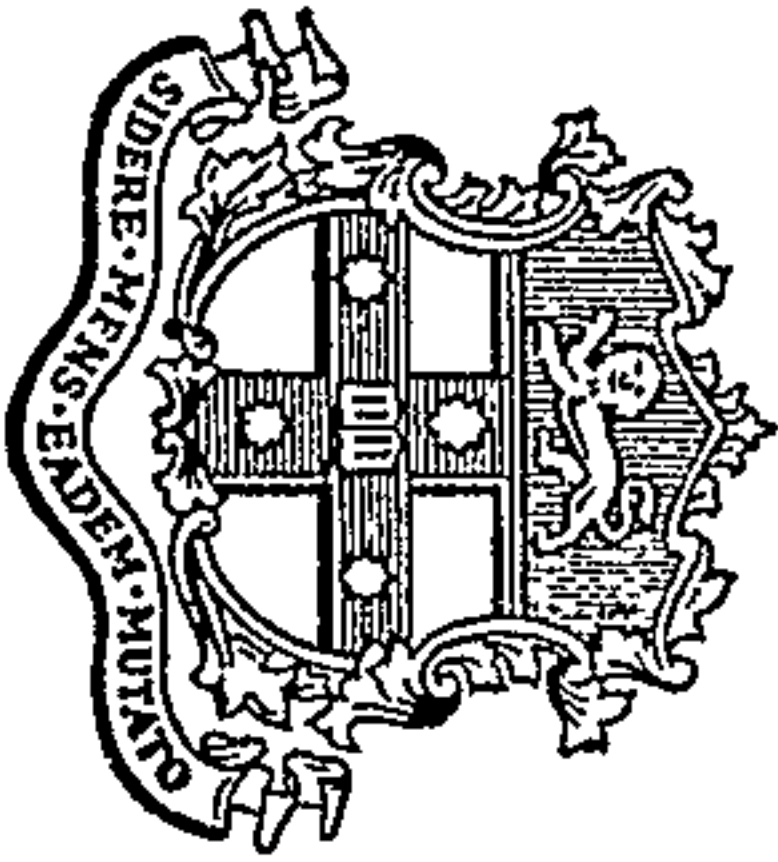
4 Rules for Good Teeth

- 1 Clean my teeth immediately after eating
- 2 Eat nourishing meals, avoid sweet, sticky snacks
- 3 Use a stannous fluoride toothpaste
- 4 Visit my Dentist at least twice each year

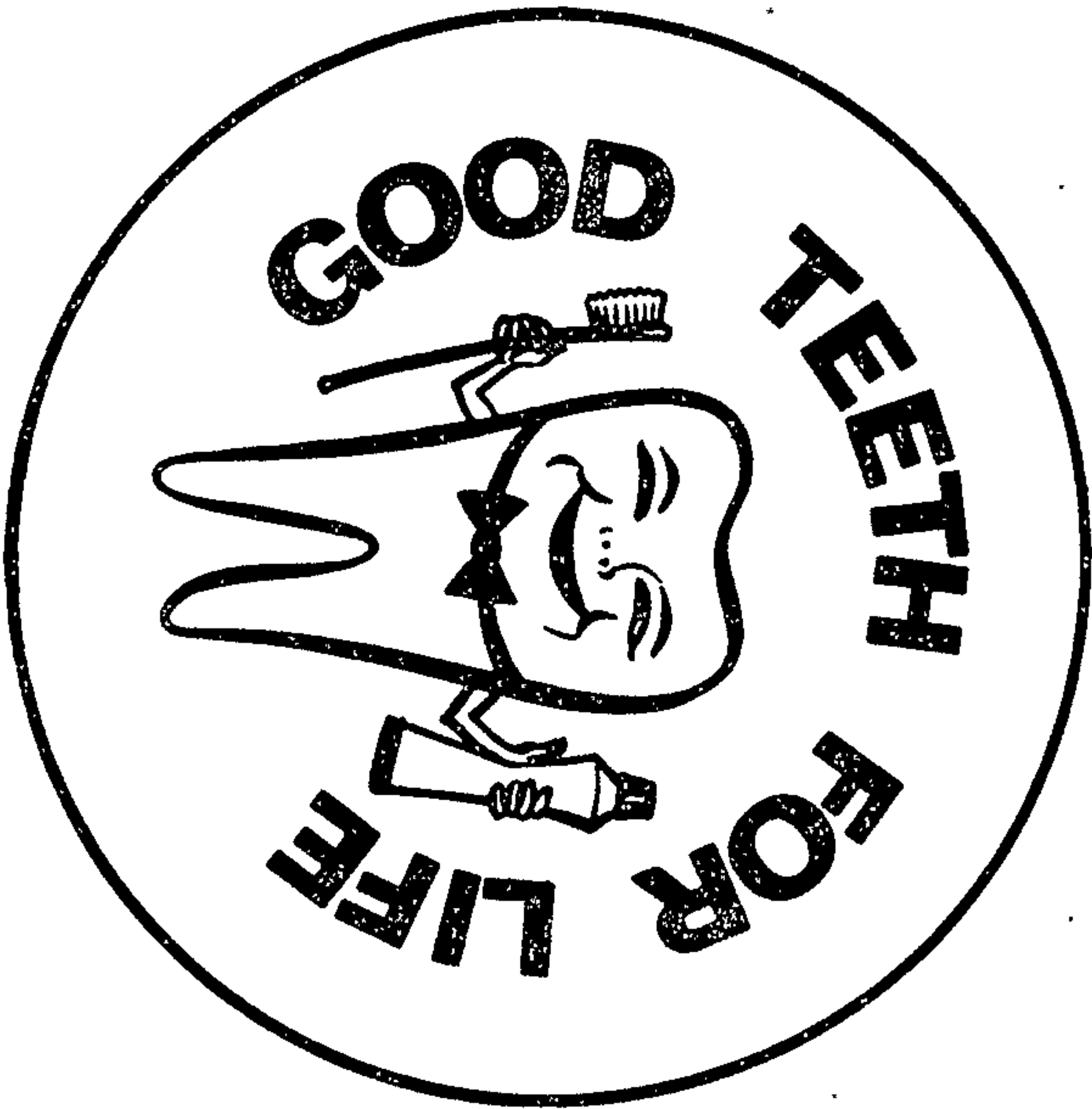
	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Breakfast 							
Play-Lunch - We eat an apple or swish and swallow with water							
Lunch 							
Afternoon Tea - We eat an apple or swish and swallow with water							
Dinner 							

I am to colour in the Stars when I have remembered to clean my teeth -
I must score 21 Stars to be a Sparkler.

By courtesy of the
DENTAL HEALTH EDUCATION AND RESEARCH FOUNDATION,
University of Sydney



THIS MESSAGE IS ISSUED BY THE
DENTAL HEALTH EDUCATION AND
RESEARCH FOUNDATION,
The University of Sydney



A Message to my Parents
from

Dear Mum and Dad,

Today a Dental Health Educator came to my school and showed me how to use my toothbrush properly.

I was also taught the right foods to eat and the importance of eating an apple or a piece of celery or swishing and swallowing with water after play-lunch and lunch. This helps to remove from around my teeth pieces of food which help cause tooth decay.

The Dental Health Educator told me that the best toothbrush for me to use is one with a small head with lots of soft fine bristles trimmed flat. A small toothbrush is able to reach more easily, for example, in between the teeth and in the ridge or margin where each tooth meets the gum.

I now know I should change my toothbrush as soon as it becomes "shaggy".

The best toothpaste for me to use is one containing stannous fluoride.

I was taught that sugar is known to be the biggest cause of tooth decay. Therefore, if I eat sweets, I should do so ONLY at meal times. For snacks between meals please give me some fruit, nuts, cheese or potato chips as all of these foods are free from sugar.

My class was told that fluoride in the water helps to build strong teeth and reduces tooth decay by up to 66%. Where the water supply does not have enough fluoride, children should be given tablets as follows:

Expectant mothers	1½ tablets daily
Children to 1 year	½ a tablet daily
Children 1-14 years	1 tablet daily

In our area the water supply is / is not yet fluoridated.

It is most important for me to visit the dentist at least twice each year.

I now know that tooth decay is a preventable disease.

As I want to keep my teeth for life, I promise to carry out the simple rules the Dental Health Educator has taught me today.

Please, Mum and Dad, check that I clean my teeth every day and help me to carry out this, my pledge!

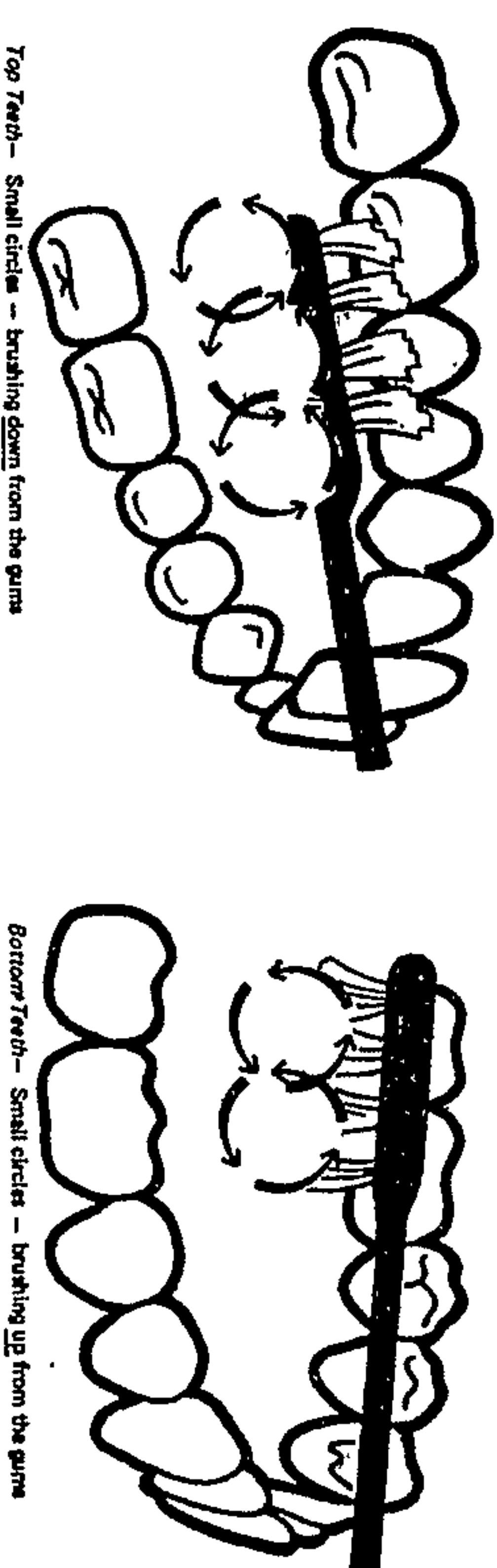
.....
Parent's Signature

.....
Child's Signature

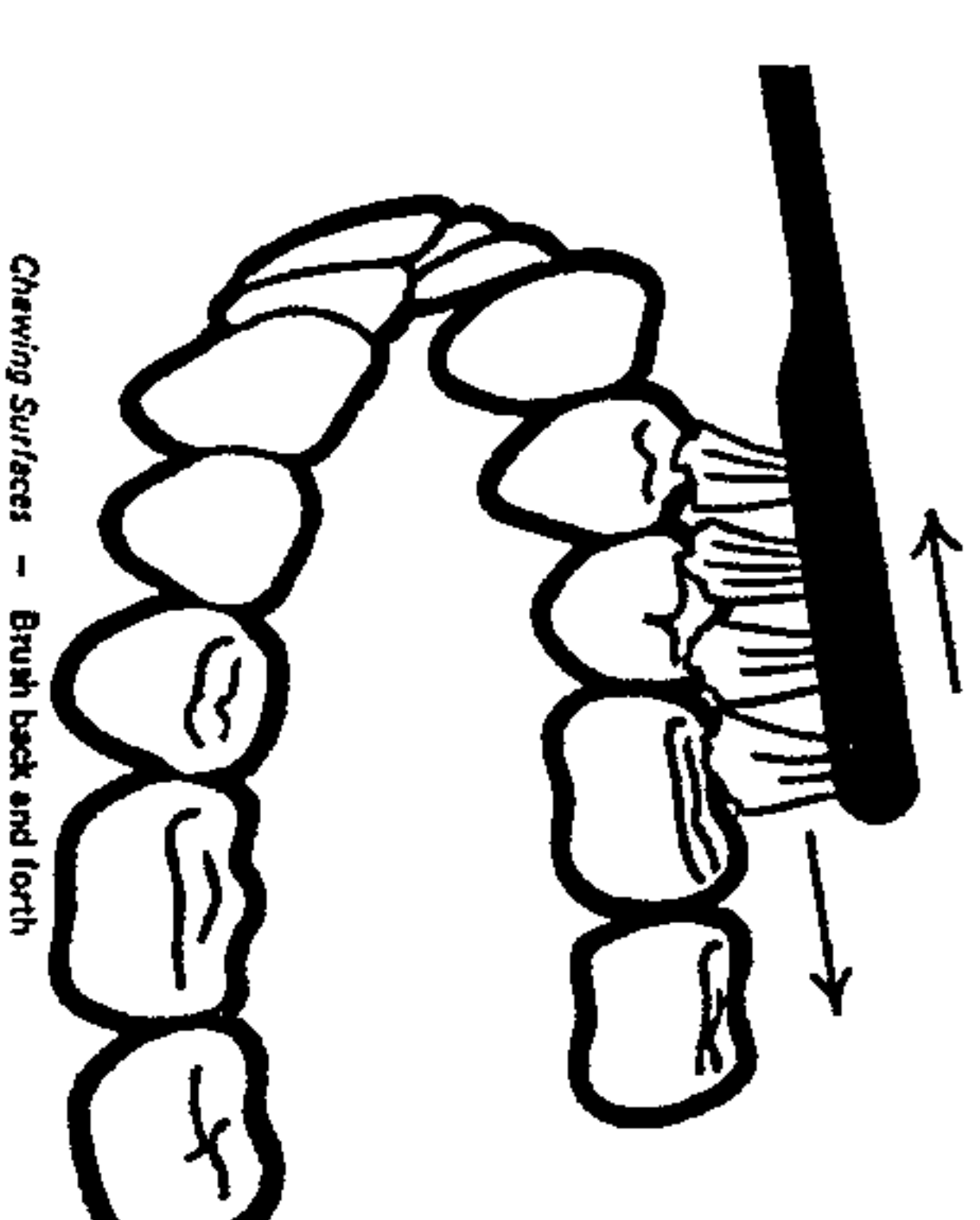
SO, MUM AND DAD, AS FROM TODAY, I'LL ALWAYS CLEAN MY TEETH THIS WAY.

Using a soft toothbrush, clean the teeth immediately after meals, taking at least two minutes for each effort. Practise brushing from the gums the way the teeth grow.

1. Brush the inside and outside surfaces with small circles.



2. Brush the flat chewing surfaces of the teeth backwards and forwards.



3. Thoroughly rinse the mouth with water.

REGULAR, CAREFUL TOOTHBRUSHING CUTS DOWN TOOTH DECAY AND PREVENTS BLEEDING AND INFLAMED GUMS BY REMOVING THE BACTERIAL PLAQUE AND FOOD DEBRIS FROM THE TOOTH SURFACES.

(III) A lay-out plan of the mobile unit.

