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UTILIZATION OF DENTAL AUXILIARIES IN PREVENTIVE PROGRAMMES

by

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A THESIS SUBMITTED IN PARTIAL REQUIREMENT FOR DIPLOMA IN

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Department of Preventive Dentistry
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ACKNOWLEDGEMENTS</th>
<th>(ii)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE OF CONTENTS</td>
<td>(iii)</td>
</tr>
<tr>
<td>LIST OF TABLES, FIGURES AND APPENDICES</td>
<td>(iv)</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2. PAST AND CURRENT EXPERIENCE OF USE OF AUXILIARY PERSONNEL</td>
<td>5</td>
</tr>
<tr>
<td>2.1. Dental Hygienist</td>
<td>7</td>
</tr>
<tr>
<td>2.2. Dental Therapist</td>
<td>12</td>
</tr>
<tr>
<td>2.3. Chairside Assistant</td>
<td>21</td>
</tr>
<tr>
<td>2.4. Dental Preventive Worker</td>
<td>24</td>
</tr>
<tr>
<td>2.5. Dental Technician</td>
<td>27</td>
</tr>
<tr>
<td>3. COMPONENTS OF PREVENTIVE PROGRAMMES</td>
<td>29</td>
</tr>
<tr>
<td>3.1. Clinical prevention for the individual</td>
<td>30</td>
</tr>
<tr>
<td>3.2. Group prevention for a section of the community</td>
<td>35</td>
</tr>
<tr>
<td>3.3. Dental health education for the community, group and self-care</td>
<td>48</td>
</tr>
<tr>
<td>4. ROLE AND UTILIZATION OF AUXILIARIES IN PREVENTIVE PROGRAMMES</td>
<td>54</td>
</tr>
<tr>
<td>4.1. Role and utilization of auxiliaries in clinical prevention</td>
<td>57</td>
</tr>
<tr>
<td>4.2. Role and utilization of auxiliaries in group prevention</td>
<td>66</td>
</tr>
<tr>
<td>4.3. Role and utilization of auxiliaries in dental health education</td>
<td>73</td>
</tr>
</tbody>
</table>
5. TRAINING OF APPROPRIATE AUXILIARY IN
   SOME BASIC PREVENTIVE METHODS  85
   5.1. Training of dental hygienist  86
   5.2. Training of dental therapist  87
   5.3. Training of chairside assistant 88

6. SUMMARY  93
7. CONCLUSION  97
8. BIBLIOGRAPHY  100
9. APPENDICES
LIST OF TABLES, FIGURES AND APPENDICES

TABLES

| Table I: | Dental hygiene education programme selected years (1946-1976) | 8 |
| Table II: | Reduction in DMF teeth after a lifetime exposure of fluoridated water | 38 |
| Table III: | Reduction in dental caries resulting from fluoride mouthwashes in schools | 43 |
| Table IV: | Summary of fluoride rinse and expectorate techniques | 44 |
| Table V: | Value of TEAM training in solving practical problems | 91 |
| Table VI: | Relevance of TEAM in private practice | 91 |

FIGURES

| Figure I: | Work specification dental preventive workers in 7 European countries | 26 |
| Figure II: | Indication for oral rinse supplements | 45 |

APPENDICES

Appendix I: Effectiveness of various methods of administering fluorides

Appendix II: Work specification of dental preventive worker
1. INTRODUCTION

Dental caries and periodontal disease are the two most prevalent oral conditions, affecting more than 95% of the people in civilized countries\textsuperscript{18}. The World Health Organization's Oral Data Bank indicates that the prevalence of caries is high mainly in industrialized countries and low in non-industrialized countries, and that periodontal disease is an important problem everywhere\textsuperscript{110}.

The majority of oral disease in various parts of the world remains untreated\textsuperscript{22}, and at the same time there is also a rapidly increasing demand for dental services\textsuperscript{58}. The traditional approach of concentrating on the treatment of dental disease alone will not provide the solution to the backlog in dental treatment needs. There is, therefore, an obvious need for more efficient and economical methods in controlling dental disease.

Due to the increasing scientific evidence in support of the preventability of dental disease\textsuperscript{117}, many countries had adopted the modern approach of redistributing efforts towards prevention of dental disease\textsuperscript{113}. Without effective preventive measure, it may not be possible to keep pace with the increasing need for treatment\textsuperscript{113}. The main reasons for dental health authorities changing to a preventive approach are the lack of manpower to cope with the demand and the high cost of treatment when utilizing top professional skills.
The measures currently used for the prevention of both dental caries and periodontal disease are described in section 3 of this thesis. These procedures deal with the prevention of onset of dental disease or prevent progression of the disease.

Different preventive programmes at present have advanced at different rates and are in different stages of development all over the world. The development of these programmes has been stimulated by government actions and by the efforts of the dental profession\textsuperscript{112}.

It is necessary to introduce preventive programmes to patients at an early age and on a continuing and regular basis so as to provide maximum benefits. Due to the present lack of manpower within the dental profession it is impossible to have treatment programmes that can cover the entire population. This present lack of manpower available to cope with the increasing demand for treatment, and the rapidly increasing cost for the individual and community when utilizing top professional skills and knowledge, have encouraged the training and utilization of auxiliaries as a solution to overcome these problems\textsuperscript{36}. The World Health Organization experts committee had suggested the training of two categories of auxiliaries and the efficient utilization of these personnel in an effort to solve the problems faced by many countries\textsuperscript{112}, particularly in underdeveloped countries.

Auxiliaries are categorized into 'operating' and 'non-operating'. An exploration of the scope, level of
training and role of each auxiliary will be carried out in section 2 of this thesis. Information on their educational background and training will perhaps be of value when looking into the utilization of auxiliary in some basic preventive methods.

Auxiliaries are utilized for different roles and functions, depending on their background training. The roles and utilization of auxiliaries in some basic preventive programmes will be discussed in section 4. Many of the tasks involved in preventive dentistry do not demand the services of highly skilled personnel, and with sufficient training and education, auxiliaries can perform as competently as any dentist. It is against this background that most countries are increasing utilization of auxiliaries for preventive and treatment programmes.

In all preventive programmes persisting results can only be achieved from a considerable and long lasting commitment by the individual. There is also a need to have frequent visits to the dental clinics, and only the utilization of auxiliary personnel can make this possible. Many of these clinical procedures are time consuming and some preventive programmes would require constant motivation and reinforcement by the dental personnel. The need and value of utilizing auxiliary personnel are very clear, but it is difficult to assess the number and types of auxiliaries to be trained in preventive programmes. This will depend on the kind of preventive programmes adopted by different countries.
The training of various auxiliaries in preventive programme is important and will be discussed in section 5. Basically, auxiliaries need to be trained in schools, and the period of training and curriculum depends on their intended roles. It is thought that her training in the auxiliary training school on preventive methods is rather limited and should therefore be supplemented according to the local needs of the people.

The purpose of this thesis is to review the past and current experience of utilizing dental auxiliary personnel in providing dental care, and to stress the importance of their role and utilization in some basic preventive programmes.
2. PAST AND CURRENT EXPERIENCE OF USE
OF AUXILIARY PERSONNEL

The term dental auxiliary personnel refers to those persons who are involved in the practice of dentistry but who are not qualified with a degree in dentistry\(^2\).

Dental auxiliaries are classified broadly into operating and non-operating categories. The classification and definitions adopted below are those recognized by WHO\(^2\):

Non-operating auxiliaries

Type I  "Dental technician: carries out technical procedures, usually in a dental laboratory\(^2\)."

Type II  "Chairside assistant: works within the clinical area in which dental care is provided, does not independently provide any part of this care but assists the operator (dentist or others) to do so\(^2\)."

Type III  "Dental preventive worker: basically teaches oral hygiene to patients and/or supervises the self application of preventive measures\(^2\)."

Operating auxiliary

Type IV  "Dental hygienist: is legally entitled to operate on patients, but her/his functions are limited to oral hygiene care and the preventive aspects of dental care\(^2\)."

Type V  "Dental therapist: is legally entitled to operate on patients but her/his functions
are limited to the restoration of simple carious lesions and simple extractions\(^2\). Both operating and non-operating auxiliaries have been utilized in some basic preventive programmes. It should also be noted that dental therapist functions include provision of preventive care to school children. A review of the auxiliaries' background and their traditional roles will be given in the following sections:

2.1 Dental Hygienist
2.2 Dental Therapist
2.3 Chairside assistant
2.4 Dental Preventive worker
2.5 Dental Technician
2.1 DENTAL HYGIENIST

2.1.1 Definition

'This is a person who is permitted to carry out to the prescription of a supervising dentist, certain specified preventive and treatment measures including some operating procedures in the treatment of periodontal disease. The dental hygienist is not permitted to carry out any operative procedures in the treatment of dental caries'.

2.1.2. Historical Background (U.S.A.)

The idea of dental hygiene is not new. An early indication of the need for a preventive rather than a therapeutic approach to dental disease was noted in the American Journal of Dental Science in 1845. The extreme importance of prophylactic care was soon realised by the dental profession. D.D. Smith of Philadelphia instituted a prophylactic programme for the patients in his dental practice. It was through his teaching that many dentists became aware of the merits of providing preventive services to their patients.

The idea that dentists should delegate some of their simpler duties to others came from C.M. Wright of Cincinnati, Ohio. He suggested the formation of a sub-specialty of the dental profession of persons with sufficient training and education to perform this preventive service. However, it was M.L. Rhein of New York who recommended to the Dental Section of the American
Medical Association, the utilization of women to perform this function\textsuperscript{18}.

The first dental hygienist was employed by Dr. Alfred Fones of Bridgeport, Connecticut in 1906. His interest in providing educational and preventive services for school children led him to establish such programmes in schools. The first formal training course for dental hygienists was developed in 1913 by Dr. Fones with the aim of utilizing these graduates in school programmes\textsuperscript{29, 18}.

The role of dental hygienists increases in importance as dentistry becomes more prevention - oriented, and with the growth of dental hygiene programmes, the demand for hygienists increases. Educational facilities were expanded to supply more graduates to meet the demand. Table I (below) shows the increase in the number of graduates and programs in the U.S.A. between 1946-1976\textsuperscript{18}.

Table I: Dental hygiene education programmes - selected years (1946-1976)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of programme</th>
<th>Graduates</th>
<th>Year</th>
<th>No. of programme</th>
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<tr>
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<td>17</td>
<td></td>
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<td>25</td>
<td>529</td>
<td>1970</td>
<td>123</td>
<td>2465</td>
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<td>1955</td>
<td>35</td>
<td>856</td>
<td>1973</td>
<td>133</td>
<td>4137</td>
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<tr>
<td>1960</td>
<td>38</td>
<td>992</td>
<td>1976</td>
<td>163</td>
<td>5250</td>
</tr>
<tr>
<td>1965</td>
<td>58</td>
<td>1492</td>
<td></td>
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</tbody>
</table>

By 1975 there were 52,000 licensed dental hygienists in the USA and the majority of them were employed in private practice\(^{18}\).

In United Kingdom, the first training course for dental hygienists was started in 1942 by the Royal Air Force. It was only in 1956 that the position of hygienists was confirmed by the Dentist Act and in 1957 hygienists were allowed to work with the general practitioner\(^{89}\).

2.1.3 Training (U.S.A.)

The training program for dental hygienists differs widely and may either follow the pattern of a 1 year course, or less, as in the United Kingdom, or the American pattern of 2 year program for an associate degree/certificate, or a 4 year program for a bachelor's degree\(^{69}\). One year training was thought to be appropriate by WHO for countries wishing to train hygienists to enter government health services.

Since the work of a hygienist involves contact with the patient, she is required to pass the licensing examination before she can practice her profession.

In Japan, two types of training program are conducted. Out of 23 hygienist schools, 16 provide a 1-year course and the rest provide a 2-year course\(^{69}\).

A one-year training course is conducted in South Australia and supplies hygienists to government and private dentist clinics. In the armed services, trained chairside assistant can receive a full time course for 17 weeks to
become a dental hygienist. These graduates will be employed in the Armed services only.  

The basic requirement for admission into the school of dental hygiene is a higher school certificate or its equivalent, and preferably women of 17 years of age.  

Types of educational programs in U.S.A.  
  a) Certificate program  
  b) Baccalaureate or Degree program  

2.1.4 Duties and traditional role  

Dental hygienists serve both as oral health clinicians and educators in developing and maintaining optimum oral health for the public. Their duties are essentially:  

- Scaling and polishing of teeth  
- Topical fluoride application  
- Screening and preliminary examination of patient before referring to the dentist for treatment  
- Instruction in oral hygiene  
- Provision of dental health education  

Different duties exist for hygienists in different countries. In some countries, in addition to the above duties they are also permitted to take radiographs and impressions for study models.  

In Manitoba (Canada), the duties of hygienists include taking impressions, recording jaw relationships and repair of dentures. In Denmark and Netherlands
preliminary examination and charting of teeth are allowed. But in Poland, due to lack of dental surgery assistants, dental hygienists are employed as chairside assistants\(^69\).

According to Pelton, W.J. and Wisan, J.M.,\(^84\) dental hygienists are usually of 2 ranks:

1. Public Health dental hygienist
   
   "This group comprises women who are qualified beyond their dental hygiene degree in health education and public health methods and technics. They are considered to be valuable in the promotion of dental health, particularly with mothers and children".

2. Clinical dental hygienist
   
   "This worker performs clinical practice within her competence. She is particularly useful in topical fluoride programs and mass mouth inspections. In some instances she also acts as assistance to clinical dentist".

2.1.5. **Distribution**

In the U.S.A. dental hygienists are mainly employed in private dental practice. There are no current national statistics on the employment pattern but 3.6\% of those hygienists licensed in Michigan in 1975 were employed in the public health service. In Virginia, in 1976 the percentage was much lower\(^14\).
2.2. **DENTAL THERAPIST**

The following types of dental therapist will be described:

2.2.1 New Zealand school dental nurse
2.2.2 British new cross auxiliary
2.2.3 U.S. expanded duty auxiliary

2.2.1. New Zealand School Dental Nurse

2.2.1.1. **Definition**

'This is a person who is permitted to diagnose dental disease and to plan and carry out certain specified preventive and treatment measures, including some operative procedures in the treatment of dental caries and periodontal disease, in defined groups of people, usually school children'.

2.2.1.2. **Historical background (New Zealand)**

F.W. Thompson in his paper entitled 'The teeth of our children', presented at the annual general meeting of the New Zealand Dental Association in 1905, gave the first evidence of concern shown to improve the dental conditions of the children in New Zealand.

The dental conditions of children were found to be appalling as described in many of the articles in the New Zealand dental journal in 1906. In 1912, dental examinations were carried out in Auckland which revealed that about 98.5% of the children had one or more decayed teeth.

Richmond Dunn in 1915 proposed the training of auxiliary personnel to which he gave the term 'dental nurse'. These personnel would be used to provide solutions...
for improving dental conditions that were deteriorating, and which would not otherwise be improved due to a shortage of dentists.\textsuperscript{41}

With the advice of the New Zealand Dental Association and the concern for the children's decaying teeth, the government then established a scheme to train dental nurses.\textsuperscript{95}

In 1921, Sir Thomas Hunter implemented the government's plan and begun the training courses for dental nurses. The first group of 30 women was trained for 2 years to be 'school dental nurses'. The training allowed them to treat school children up to the age of 13 years. After graduation they were employed by the government and based in school dental clinics. As the scheme developed, the scope for treatment was expanded to include children of up to about 17 years of age.\textsuperscript{95} In 1972, the coverage for school children was 95\% and for pre-school children a 60\% coverage was achieved.\textsuperscript{71}

2.2.1.3 Training (N.Z.)

The course of training extends over a period of 2 years. Women of about 17 years of age who possess a school certificate are recruited into the scheme.\textsuperscript{71}

The school dental nurses are trained to provide comprehensive dental treatment to pre-school and school children. The qualified nurses are based in the school dental clinics and work under the supervision of a dental officer.\textsuperscript{95}
Similar schemes have been introduced by many other countries. Among the earlier countries to establish such schemes were Malaysia (1949), Indonesia (1953), Singapore (1961) and Tasmania, Australia (1966). The period of training, conditions of employment and specific duties vary from country to country.

Saskatchewan in Canada was the first region in the Western Hemisphere to start a school-based program employing school dental nurses and is notable because of its unusual use of portable equipment in semi-clinics.

In Australia, the term 'dental therapist' is used for the type of auxiliary whose curriculum training and range of duties are very similar to the dental nurses of New Zealand. In addition to the above duties, the therapists are also trained to take X-rays, give nerve block anaesthesia, perform pulpotomies and extract permanent teeth. Apart from operative techniques, there is also emphasis on the preventive role of the therapist. The degree of supervision over dental therapists in Australia lies midway between the extreme of the New Zealand school dental nurse and the New Cross auxiliary in United Kingdom.

2.2.1.4 Segmented Training

Segmented training refers to the adoption of a 'field-ladder' for careers in dental practice with flexibility in vertical and lateral advancement.

One example is the training programme conducted in the Territory of Papua New Guinea which is designed to
provide training for two categories of personnel. The course consists of the integration of dental officer and dental nurse courses. Initially, the courses are identical for the first six months after which the dental officer students will receive more background training in basic sciences and less practical training. Such a programme prepares the dental officer students to progress to the 3rd year of the dental officers' course. In the case of failure beyond the 2nd year, a trainee will certainly have the necessary qualifications of a dental nurse. A qualified dental nurse is always given a chance to improve his or her qualifications to that of a dental officer. The integration of this course has made it possible to commence dental officers training with economy as the tertiary of Papua New Guinea cannot afford to train students at a tertiary level with failure as the final results.

In other countries e.g., Norway and Australia (Armed Services only) chairside assistance are trained to be dental hygienists.

2.2.1.5 Duties and traditional role

The duties of school dental nurses have not changed very much over the years. Some of their functions would include:

i) Examination and diagnosis of children's teeth

ii) Prophylaxis

iii) Inserting filling materials in permanent and primary teeth
iv) Extraction of deciduous teeth under local anaesthesia
v) Topical fluoride application
vi) Referring cases that are beyond her scope of treatment to the dentist
vii) Teaching the principles of oral hygiene and the prevention of dental disease to individuals and groups

The above functions are performed under the supervision of a dental officer but the degree of supervision varies in different countries\(^\text{29}\).

In some countries school dental nurses work only with children but in other countries they also provide emergency and palliative care for adults e.g. relief of pain by extractions, treatment of abscesses and temporary dressings\(^\text{15}\).

The role of a school dental nurse is to provide treatment to pre-school and school children and is therefore based in the school dental clinic. Her duties include both treatment and preventive services.
2.2.2 **British New Cross Dental Auxiliary**

2.2.2.1 **Definition**

'This is a person who is permitted to carry out to the prescription of a supervising dentist, certain specified preventive and treatment measures including some operative procedures in the treatment of dental caries and periodontal disease'\(^{114}\).

2.2.2.2 **Historical Background (United Kingdom)**

The first training program for this type of auxiliary commenced in 1960 at the New Cross General Hospital, London, and followed a revision of the Dentist Act in 1957\(^{44}\). The 2 year training program is based on the New Zealand school dental nurse. On certification, the auxiliaries are allowed to work only under the direction of the dentist in local authority or hospital service\(^2\). The regulations also specify that treatment plans are to be devised by the dentist and that auxiliaries are not entitled to diagnose or plan dental care, eventhough the operative techniques they perform are equivalent to that of the New Zealand school dental nurse. After completing the treatment their work will be examined by the supervising dentist.

2.2.2.3 **Duties and roles**

The duties of New Cross dental auxiliaries are\(^2\):

i) Cavity preparation and placing of simple restorations

ii) Extraction of deciduous teeth

iii) Infiltration of anaesthesia
iv) Prophylaxis of children's teeth

v) Oral hygiene instruction

Evaluation studies were carried out on the New Cross graduates of 1963-1965. The results showed that most of the work of dental auxiliaries was of high quality and that 95% of those examined were given ratings of good or better clinical performance.\(^{71}\)

As a result of the delegation of duties to auxiliaries in the U.K. the number of patients examined in a day had increased by 64%\(^{71,2}\). The services of these auxiliaries were considered invaluable both in treatment and preventive services. These have been well accepted by children, parents and dentists who recognised their valuable services especially in introducing dentistry to young children.

2.2.3 U.S. Expanded Duty Dental Auxiliary

2.2.3.1 Definition

'This is a person who is permitted to carry out certain specified preventive and treatment measures including parts of some operative procedures in the treatment of dental caries\(^{114}\).'

2.2.3.2 Background

This group of expanded duty auxiliaries was initially introduced in Canada and in the U.S.A in late 1960's\(^2\). The duties of chairside assistants or dental hygienists were further expanded to include limited and clearly defined
procedures. Hence, the term 'expanded function' was used.\textsuperscript{95}

The duties normally delegated are\textsuperscript{112}:

i) Placing rubber dam

ii) Placing matrix bands

iii) Inserting temporary restorations

iv) Condensing, contouring and finishing of amalgam/silicate restorations prepared by the dentist

v) Taking of radiographs

vi) Taking of impressions

The expanded function dental auxiliaries are delegated procedures that are reversible so that the work could be repeated if necessary without harming the patient.\textsuperscript{95}

The first such program was started in Washington in 1969 at the College of Dentistry at Howard University in Washington D.C. A two year expanded dental hygiene curriculum was developed to train auxiliaries called 'dental therapists'.\textsuperscript{71}

In Sweden, expanded function dental surgery assistants are allowed to conduct mouth rinsing programs. In Costa Rica they are permitted to polish teeth and to apply topical fluoride.\textsuperscript{95}

2.2.3.3 Experimental Studies

The study of expanded duty auxiliaries had attracted many research workers. A research study was undertaken by the Royal Canadian Dental Corps in 1962-1963 on the use of expanded function dental auxiliaries. The study showed
that there is an increase by 61.5\% of the dentist's productivity when utilizing expanded duty auxiliaries\textsuperscript{10}.

Similar results were also obtained from a study undertaken by the U.S. Navy Dental Corps at Great Lake, Illinois, in 1966 in which the duties of dental surgery assistants were expanded\textsuperscript{73}. The restorations placed by an expanded duty auxiliary were found to be of a quality comparable to that of a dentist\textsuperscript{41}.

Three basic conclusions into the use of expanded duty dental assistants were cited by Silberman from a study in 1974\textsuperscript{93}:

"i) Dental assistants can be trained to perform restorative duties

ii) The quality of the specific procedures involved is not reduced below the standard expected of a dentist

iii) Such auxiliaries can increase the productivity of a dentist substantially"

The utilization of dental hygienists in expanded functions was experimented with at Howard University, 1969; the University of Iowa, 1972; Forsyth Dental Centre, 1974 and the University of Kentucky, 1975. The experiments concluded that expanded functions could be delegated to dental hygienists. There is also an increase in the productivity of delivery of dental care with the delegation of duties to expanded duty auxiliaries\textsuperscript{108}.
2.3 **CHAIRSIDE ASSISTANT**

2.3.1 **Definition**

'This is a person who assists the dentist with his clinical work but does not independently carry out any procedures in the mouth.'

Other titles used are dental assistant, dental surgery assistant and dental nurse.

2.3.2 **Functions and Duties**

The function of a chairside assistant is to assist the dentist in providing dental care to the patients in a close co-ordinated manner of working.

The range of duties that dental assistants may perform has increased over the years. The Expert committee on Auxiliary Dental Personnel of the World Health Organization, after surveying the current utilization of chairside assistants, listed the following duties:

1) Reception of the patient
2) Preparation of the patient for any treatment he or she may need
3) Preparation and provision of all necessary facilities, such as mouth washes, napkins, receivers etc.
4) Sterilization, care and preparation of instruments
5) Preparation and mixing of restorative materials, including both filling and impression materials.
vi) Care of the patient after treatment until he or she leaves and clearing away of instruments and preparation of instruments for reuse

vii) Preparation of the surgery for the next patient

viii) Preliminary filing of documents and presenting them to the surgeon for completion

ix) Provide assistance with x-ray work including the processing and mounting of x-rays

x) Instruction to the patients, where necessary, in the correct use of a toothbrush

xi) Aftercare of patients who have had general anaesthesia

2.3.3 Training

The training of chairside assistants in many countries is through in-service training provided by the dentists who employ them. In some countries, part-time courses are conducted at an educational institution to supplement the knowledge and training of chairside assistants. Formal training courses of 2 years duration have also been conducted in a number of countries. Due to the variability in their functions there is no definite rule that has been laid down concerning their training.29

The effect of utilizing chairside assistants was studied by Klein in 1944 and a 33 percent increase in the number of patients treated was associated with the utilization of chairside assistants65.
Chairside assistants are also trained in four-handed dentistry techniques to improve productivity of the dentist or hygienist in providing care.
2.4 DENTAL PREVENTIVE WORKER

2.4.1 Background

In Puerto Rico, 'preventive dentistry technicians' were trained to educate children in preventive methods. A research program was undertaken in 1968 to determine whether a new type of paradental auxiliary can be trained to provide preventive and educational programs for children. The training lasted for 16 weeks and the auxiliaries were trained for the following duties:

i) Self application of stannous fluoride
ii) Prophylaxis using rubber cup
iii) Dental health education to school children

The conclusion derived from the study is that personnel with limited local training can be recruited to apply topical fluoride in schools and also recommended that this short training may be a solution to the manpower problem. Similar auxiliaries also exist in Switzerland.

In Singapore, chairside assistants are trained to produce teaching aids for preventive dentistry. They arrange community education projects and supervise children in carrying out compulsory toothbrushing.

In Bulgaria, Israel, Rumania and Poland dental health education is given by dental assistants.

2.4.2 Duties and Scope of activities

There is a lot of variation in the duties of this category or worker. Figure 1 (Page 26) illustrate the
job specification of dental preventive workers in 7 European countries. (Refer Appendix II for the items of work).

Netherlands limits the use of dental preventive workers to teaching oral hygiene and prevention to groups.

Switzerland combines preventive education with some administrative responsibility.

In Czechoslovakia, the preventive worker also carries out the duties of a hygienist and performs dental and radiographic examination.
Fig. 1. Work specification: dental preventive workers in
7 European countries

Key to countries:
1. Czechoslovakia
2. Finland
3. Sweden
4. Denmark
5. Switzerland
6. Norway
7. Netherlands

Source: Allred H. The training and use of dental auxiliary personnel,
Copenhagen, WHO, 1977².
2.5 DENTAL TECHNICIAN

2.5.1 Definition

'This is a person who assists the dentist by carrying out certain technical procedures in the laboratory'.

2.5.2 Background

In the early days dentists employed technicians for the construction of prostheses. Traditionally, technicians were trained as an apprentice but with increasing demands made by the profession and with increasing specialization the traditional situation became unrealistic. There was then a tendency for commercial laboratories to provide technical services but as the organizations expanded they were not able to offer the expertise demanded. Training courses were then conducted for dental technicians who receive a certificate or diploma upon graduation.

2.5.3 Duties

The specific duties for dental technicians include:

i) Casting of models

ii) Fabrication of dentures, splints, orthodontic appliances, inlays, crowns and special trays for the topical application of fluoride agents to the teeth.

2.5.4 Training

Formal training in academic and practical subjects is carried out in dental schools or technical colleges.
The training programs offered allow a wide range in the role of technicians, from laboratory-based auxiliaries to auxiliaries with limited clinical responsibilities\textsuperscript{2}.

In the United Kingdom, the training lasts from 3 to 5 years on a part-time basis\textsuperscript{95}.

In Tasmania, Australia, dental technicians, after receiving further defined training, are permitted to deal directly with patients without supervision by a dentist\textsuperscript{2}. 
3. COMPONENTS OF PREVENTIVE PROGRAMMES

The aim of a preventive programme is to prevent the onset of dental and oral diseases for the whole community or a specified segment of the community. Where there is obviously insufficient manpower to render restorative care, primary preventive measures (i.e. prevention of onset of dental disease) and dental health education should receive more attention.

A variety of preventive programmes have been introduced to prevent occurrence of dental disease and hopefully to achieve the long term objective of dental health for all. These are discussed under the following three sections:

3.1 Clinical prevention for the individual
3.2 Group prevention for a section of the community
3.3 Dental health education for the community, group and self-care.
3.1 CLINICAL PREVENTION FOR THE INDIVIDUAL

This involves the use of preventive techniques that fall within the field of clinical dentistry. The methods currently used are for the prevention of two major dental caries or periodontal disease. The relative value of each method has not been clearly established. The methods for clinical prevention are:

3.1.1 Topical application of fluoride
3.1.2 Fissure sealants
3.1.3 Oral Scaling and Prophylaxis
3.1.4 Multiple fluoride therapy

3.1.1 Topical application of fluoride

The benefits of topical application of fluoride using various solutions i.e sodium fluoride, stannous fluoride and acidulated phosphate fluoride have been tested both in fluoridated and in non-fluoridated areas. There is a reduction of between 20% - 67% in incidence of dental caries following topical fluoride application in children who were born and lived in a fluoridated community\textsuperscript{54}. Those children who reside in areas with insufficient fluoride in their drinking water, the reduction in caries following topical fluoride application was about 40%\textsuperscript{56}.

This method of applying fluoride directly on to erupted teeth can be done clinically by dentists or auxiliaries or by self application at home or at school.
3.1.1.1 Professionally applied topical fluoride

Acidulated phosphate fluoride is currently the topical fluoride agent most widely used by the dental profession. It has several advantages over other agents in that its benefits last for at least 2-3 years after application has ceased\textsuperscript{56}, the agent is non-irritating to the gingivae, has an acceptable taste, does not discolor enamel or silicate restorations and is stable when placed in a plastic container\textsuperscript{50}.

The application of topical fluoride agents by professionals has been shown to reduce the incidence of caries by 40% in children who reside in low fluoride areas\textsuperscript{55}. This preventive measure should therefore be included as a part of caries preventive programmes for all children and adolescents. In the case of adults, those who demonstrate high caries susceptibility should also be given topical fluoride. Children who are highly susceptible to dental decay, should be given professional applications of concentrated fluoride agents, plus other forms of fluoride therapy\textsuperscript{50}.

Fluoride containing prophylaxis paste is effective for replenishing the fluoride that is abraded from the enamel as a result of prophylaxis procedures\textsuperscript{104}. Polishing of teeth with fluoride containing prophylaxis paste has resulted in reducing caries incidence in some early studies\textsuperscript{85, 39}. The paste is therefore suitable for use in the clinic for some preventive benefits.
Topical fluoride application as a clinical preventive measure has several drawbacks in public health programmes due to\textsuperscript{95, 104}:

- Current lack of trained dental personnel
- High cost of treatment
- The procedure is expensive and would require a one to one relationship between the provider and the recipient.
- The programme is not as effective as water fluoridation

To overcome these drawbacks several methods of self application of fluoride have been developed. These methods will be described in the following section on group prevention.

3.1.2 **Fissure sealants**

In this method of prevention, the fissures of newly erupted teeth are sealed with resin to protect them from areas of potential plaque accumulation.

The attempts to seal or occlude pits and fissures have used organic polymers that bond to enamel. The most widely used resin is Bis-GMA. Two currently recognized Bis-GMA sealants are Nuva Seal which requires the use of ultraviolet light for polymerization, and Delton which is self polymerizing\textsuperscript{4}.

The application of the sealant requires a lot of meticulous attention as effectiveness depends on good bonding between the sealant and enamel. It should also
be used in conjunction with topically applied fluoride. The combination of both fissure sealants and topical fluorides has a great potential in protecting teeth against decay\(^{50}\).

Application of sealants on a large scale will depend on its cost-effectiveness. The cost is relatively high when compared to other preventive measures\(^{50}\). This measure is a good introduction for children to dentistry since the procedure takes minimal time and no cavity preparation is required\(^{50}\).

3.1.3 Oral Scaling and Prophylaxis

Prophylaxis is a method currently used for prevention of periodontal disease. The removal of plaque and calculus is essential for the improvement of gingival health\(^{95}\). The effect is, however, related to the frequency of treatment as shown in the study carried out in Sweden which concludes that frequent prophylaxis leads to better oral health status\(^{51}\).

A programme for prophylaxis is both time consuming and requires trained personnel to carry out the procedure. Thus, it is rather difficult to implement this programme widely without employing more trained personnel.

3.1.4 Multiple fluoride therapy

Although fluoridation is the single most efficient and effective means of caries prevention, combinations with other preventive measures can extend the preventive benefits. Multiple fluoride therapy using stannous fluoride prophylactic
paste, stannous fluoride topically applied solutions and stannous fluoride-calcium pyrophosphate dentrifice used on children raised in a fluoride area have been shown to have additional benefits$^{39}$. Multiple fluoride therapy can extend benefits to:

i) People living in non-fluoridated areas

ii) Adults who have lived in areas with suboptimal amounts of fluoride during childhood

iii) Individuals living in areas with a fluoridated water supply.
3.2 GROUP PREVENTION FOR A SECTION OF THE COMMUNITY

The majority of the population does not seek dental services regularly and therefore should be approached through community programmes. Many preventive programmes are developed and directed towards a larger section of the population either for groups or on a mass basis. These programmes supplement the efforts of the dentist in the clinics\textsuperscript{116}.

Water fluoridation has been the most effective method of prevention on a community basis\textsuperscript{55}. (Refer Appendix I). Unlike other programmes, its effectiveness does not depend on patient co-operation, income or educational level and has equal benefits to all those who consume fluoridated water\textsuperscript{116}.

Other preventive programmes, can be applied on a group basis as it is not practical to conduct them on a mass basis. These measures have been widely used in many countries in school based programmes.

Preventive programmes for group prevention can be classified into:

3.2.1 Water fluoridation
3.2.2 Self application of fluoride
   3.2.2.1 Solutions or gels applied with a toothbrush
   3.2.2.2 Prophylaxis pastes applied with a toothbrush
   3.2.2.3 Gels applied in trays
   3.2.2.4 Dentrifrices
   3.2.2.5 Mouth rinsing
   3.2.2.6 Dietary supplements
3.2.3 Oral hygiene-measures

3.2.1 Water fluoridation

Fluoridation of a communal water supply has a rank comparable to vaccination, pasteurization of milk and chlorination of water supplies in promoting public health. This measure is applicable to a large section of the population on a mass basis. The success of this programme does not require the conscious effort of the individual.

The effectiveness of controlled water fluoridation in reducing caries has been shown in a few studies illustrated in Table II (Page 38). The reduction in caries ranges from 50% - 70%.

The number of decayed, missing and filled teeth is reduced following water fluoridation. There is also a reduction in interproximal caries. In countries with a high prevalence of dental disease and shortage of manpower, fluoridation of water supplies will definitely be a solution to reduce the problem.

In addition to reduction of tooth decay, there is also a dramatic drop in tooth mortality. For example, the number of missing tooth in communities with 1.0 p.p.m fluoride is 75 to 95 per cent less than those communities with 0.1 p.p.m fluoride. Studies carried out in the U.S.A. in 1977 and 1978 showed a reduction in mortality rate after the introduction of fluoride.
The safety of water fluoridation has been carefully examined. The observations in Newburgh, New York in 1965 revealed no adverse systemic effect. It has also been widely accepted by the health community as safe and effective in reducing dental decay. The annual cost per person in the U.S.A in communities with more than 50,000 population, ranges from 13-18 cents. The approximate cost benefit ratio is 1:50, which means that for every dollar spent on fluoridation, 50 dollars are saved in treatment.  

Thus, water fluoridation remains the safest, most economical and most effective method of reducing caries and should be recommended as the foundation of any national programme.
### TABLE II: REDUCTION IN DMF TEETH AFTER A LIFETIME'S EXPOSURE TO FLUORIDATED WATER

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of years of water fluoridation</th>
<th>0</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hastings (NZ)</td>
<td>10</td>
<td>1.18</td>
<td>2.01</td>
<td>2.49</td>
<td>2.37</td>
<td>3.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Grand Rapids (USA)</td>
<td>15</td>
<td>0.59</td>
<td>1.20</td>
<td>1.68</td>
<td>1.93</td>
<td>2.58</td>
<td>3.43</td>
<td>4.60</td>
<td>6.15</td>
<td>5.57</td>
<td>6.26</td>
</tr>
<tr>
<td>Newburgh (USA)</td>
<td>10</td>
<td>-</td>
<td>0.30</td>
<td>0.70</td>
<td>1.60</td>
<td>1.80</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Watford (United Kingdom)</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>1.30</td>
<td>1.60</td>
<td>1.60</td>
<td>1.60</td>
<td>2.10</td>
<td>2.20</td>
<td>2.60</td>
<td>-</td>
</tr>
<tr>
<td>Holyhead (United Kingdom)</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>0.80</td>
<td>1.30</td>
<td>1.30</td>
<td>0.80</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tiel (Netherlands)</td>
<td>18</td>
<td>-</td>
<td>1.20</td>
<td>-</td>
<td>2.30</td>
<td>-</td>
<td>3.50</td>
<td>-</td>
<td>6.10</td>
<td>-</td>
<td>7.10</td>
</tr>
<tr>
<td>Tabor (Czechoslovakia)</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.35</td>
<td>1.93</td>
<td>2.51</td>
<td>3.14</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Percentage reductions in DMF teeth

<table>
<thead>
<tr>
<th>Locality</th>
<th>No. of years of water fluoridation</th>
<th>0</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hastings (NZ)</td>
<td>10</td>
<td>83.7</td>
<td>73.1</td>
<td>66.8</td>
<td>53.3</td>
<td>55.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Grand Rapids (USA)</td>
<td>15</td>
<td>75.6</td>
<td>63.5</td>
<td>56.9</td>
<td>49.5</td>
<td>52.4</td>
<td>53.3</td>
<td>59.0</td>
<td>63.2</td>
<td>50.9</td>
<td>50.2</td>
</tr>
<tr>
<td>Newburgh (USA)</td>
<td>10</td>
<td>-</td>
<td>30.0</td>
<td>36.8</td>
<td>49.5</td>
<td>45.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Watford (United Kingdom)</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>30.0</td>
<td>36.8</td>
<td>51.6</td>
<td>45.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Holyhead (United Kingdom)</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>45.0</td>
<td>48.1</td>
<td>37.1</td>
<td>22.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tiel (Netherlands)</td>
<td>18</td>
<td>-</td>
<td>56.0</td>
<td>-</td>
<td>57.8</td>
<td>-</td>
<td>52.5</td>
<td>-</td>
<td>56.8</td>
<td>-</td>
<td>51.5</td>
</tr>
<tr>
<td>Tabor (Czechoslovakia)</td>
<td>13</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>57.7</td>
<td>49.3</td>
<td>60.2</td>
<td>51.2</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3.2.2 Self application of fluoride

Self application of fluoride may be carried out at home but in many cases the procedure is more suitable for school based programmes where the effectiveness of the procedure can be improved through supervision by dental personnel.

3.2.2.1 Solutions and gels applied with a toothbrush

This procedure of applying solutions or gels of fluoride about five times a year has been shown to reduce caries by about 25 percent\textsuperscript{24, 51}. Brushing with a fluoride solution was introduced in an attempt to increase the effectiveness of fluoride rinses. The effectiveness however, depends on the type and concentration of solution used and also on the frequency of brushing\textsuperscript{25}. It does not has an advantage over mouth rinsing with a fluoride solution\textsuperscript{94}.

For the method to be effective, it necessitates supervision of a group of participants of no more than 15. This method has been poorly accepted by the participants and has not been shown to improve their toothbrushing technique. Although it has been accepted as a method for topical fluoride application very few programmes are being conducted\textsuperscript{104}.

3.2.2.2 Prophylaxis paste applied with a toothbrush

This programme of self-applied concentrated stannous fluoride zirconium silicate prophylactic paste has been shown to reduce caries incidence in school children both in fluoridated and in non-fluoridated areas\textsuperscript{107}. 
Toothbrushing with fluoride-containing prophylaxis paste ("Brush-in Programs") was designed mainly for rural communities. The procedure is appealing because it is practical, requires minimal frequency of application (as infrequent as once per year), promises efficacy, has low cost per application and the effect can be achieved without increasing dental manpower to supervise a large number of children at any one time.\(^{104}\)

3.2.2.3 Gels applied in trays

Daily use of a concentrated fluoride gel in trays was found to reduce caries incidence by 75% to 80%\(^{30}\). The gels have been developed to replace the solutions, but it has been found that caries reduction is less when compared to the aqueous solution\(^{54}, 26\).

This method, however, demands much time since it requires the gel to be held in intimate contact with the teeth and is expensive if carried out as a public health programme.\(^{104}\)

3.2.2.4 Dentifrices

Unsupervised toothbrushing with fluoride toothpaste has been shown to reduce caries by 20%. But, supervised regular toothbrushing using toothpaste containing fluoride is more efficient in reducing caries\(^{95}\). Muhler J.C. 1962\(^{52}\) in his study on the effects of a stannous fluoride dentifrice on caries reduction in children found that the caries experience ranged from 9.8% to 35% less in the study group than in the control group.
There is ample evidence to show the anti-caries benefits of a fluoride containing dentrifice in an optimally-fluoridated community, but the percentage reduction has been smaller than in non-fluoridated areas\textsuperscript{23}.

The value and effect of toothbrushing with a fluoride dentrifice are clear but this programme is most often regarded as a home-based rather than a school-based procedures because of the widespread use of fluoride dentrifices by children at home, and it is unlikely that toothbrushing programmes in schools would give additional benefit\textsuperscript{51}.

3.2.2.5 \textbf{Fluoride mouth-rinsing programmes}

This programme can be recommended as part of a school based or home based caries preventive programme. Rinsing is simple and is a relatively inexpensive method of reducing caries\textsuperscript{33, 87}. There are two methods of fluoride rinsing. In one, the solution is swished and expectorated and in the other it is swished and swallowed.

The effectiveness of fluoride mouthrinses in reducing dental caries incidence has been well documented\textsuperscript{33}. Table III shows the reductions in dental caries resulting from fluoride mouthwashes in schools\textsuperscript{27}. The classical study was reported by Torrell and Ericson, 1965 from the results of a large clinical trial using different fluoride treatments. Two groups were studied. In one group, the children rinsed once daily at home without strict supervision using 0.05% sodium fluoride solution. In the other group, the children rinsed once every 2 weeks at school.
under supervision with 0.2% sodium fluoride solution. After 2 years of rinsing, caries reduction was considered to be statistically significant for both groups when compared to the caries activity of children who did not receive fluoride treatment. Since then, rinsing programmes adopted by other countries in Scandinavia and the United States have been based on those tested by Torell and Ericson.\textsuperscript{102}
<table>
<thead>
<tr>
<th>Authors</th>
<th>Initial age (years)</th>
<th>Length of study (years)</th>
<th>Agent</th>
<th>Frequency</th>
<th>Absolute reductions per person</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DMFT (Mean)</td>
</tr>
<tr>
<td>Torell &amp; Ericsson</td>
<td>10</td>
<td>2</td>
<td>0.5% NaF</td>
<td>Once a day</td>
<td>4.92</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>2</td>
<td>0.2% NaF</td>
<td>Once a fortnight</td>
<td></td>
</tr>
<tr>
<td>De Paola et al.</td>
<td>6-8</td>
<td>3</td>
<td>1.0% NaF (APF)</td>
<td>Three times a year</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.25% NaF (APF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerdin &amp; Torell</td>
<td>10-11\textsuperscript{a}</td>
<td>4</td>
<td>0.2% KF + MnCl\textsubscript{2}</td>
<td>2 min per week</td>
<td>2.44</td>
</tr>
<tr>
<td></td>
<td>10-11\textsuperscript{a}</td>
<td>4</td>
<td>0.2% NaF + MnCl\textsubscript{2}</td>
<td>2 min per week</td>
<td>0.26</td>
</tr>
<tr>
<td>Koch</td>
<td>10</td>
<td>3</td>
<td>0.5% NaF</td>
<td>Once a fortnight</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>5</td>
<td>0.5% NaF</td>
<td>Once a fortnight for 3 years only</td>
<td>0.93</td>
</tr>
<tr>
<td>Swerdlow &amp; Shannon</td>
<td>11-15</td>
<td>1/2</td>
<td>0.1% SnF\textsubscript{2}</td>
<td>Once a day</td>
<td>0.19</td>
</tr>
<tr>
<td>Horowitz et al.</td>
<td>6</td>
<td>2</td>
<td>0.2% NaF</td>
<td>Once a week</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>1G</td>
<td>2</td>
<td>0.2% NaF</td>
<td>Once a week</td>
<td>0.84</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Comparisons with 0.2% NaF as Control
\textsuperscript{b} Not significant

The study by Laswell, Packer and others in 1975, compared the effectiveness of the programme in fluoridated and non-fluoridated areas, using acidulated phosphate fluoride solution containing 1000 p.p.m fluoride ion. The reduction in caries incidence was found to be 41% in non-fluoridated area and 46% in fluoridated area. More than a dozen fluoride concentrations have been clinically tested ranging from 45 p.p.m fluoride (0.01% NaF) to 3,000 p.p.m (0.66% NaF). The frequency of rinsing also varies ranging from twice a day to 3-4 times a year.

Table IV (below) summarizes fluoride mouthrinse and expectorate techniques at home and in school.

Table IV: Summary of fluoride rinse and expectorate techniques

<table>
<thead>
<tr>
<th>Rinsing method</th>
<th>Program</th>
<th>Fluoride concentration</th>
<th>Usual dose</th>
<th>Volume</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low potency /</td>
<td>Individual</td>
<td>% NaF</td>
<td>% F</td>
<td>ppm F</td>
<td>Type of fluoride</td>
</tr>
<tr>
<td>high frequency</td>
<td>home-based</td>
<td>.044</td>
<td>.0108</td>
<td>125</td>
<td>APF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.05</td>
<td>.0252</td>
<td>225</td>
<td>NaF</td>
</tr>
<tr>
<td>High potency /</td>
<td>Group</td>
<td>.2</td>
<td>.0000</td>
<td>900</td>
<td>NaF</td>
</tr>
<tr>
<td>low frequency</td>
<td>school-based</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*APF indicates acidulated phosphate fluoride; NaF indicates sodium fluoride.

Low potency/high frequency is recommended for home use but this technique is not suitable for children below the age of 5 years. In school based programmes a high potency/low frequency technique is recommended. The effectiveness was found to be 30% - 40%, after participation for more than 2 years.\(^7\)

3.2.2.6 Oral fluoride rinse supplements

Oral fluoride rinse supplements are available. The solution is rinsed daily for 1 minute and swallowed. It is intended to produce a topical effect on erupted teeth, and then when swallowed to produce a systemic effect on non-erupted teeth. The need and dosage of oral rinse supplements are determined by the age of the patient and concentration of fluoride in drinking water, as indicated in Figure II below:

Figure II: Indication for oral rinse supplements

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Less than 0.3</th>
<th>0.3-0.7</th>
<th>Greater than 0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>Use another method of systematic supplementation</td>
<td>Systematic fluoride supplements not indicated</td>
<td></td>
</tr>
<tr>
<td>3-13</td>
<td>Can use oral rinse supplement Dose: 1 teaspoon provides 1 mg F</td>
<td>Can use oral rinse supplement Dose: ½ teaspoon provides ½ mg F</td>
<td></td>
</tr>
</tbody>
</table>

3.2.2.6 Dietary supplements

Dietary fluoride supplements include:

i) Fluoride tablets/solutions

ii) Fluoride milk, salt and flour

Fluoride tablets are most effective when consumed after birth up to the age of 18-20 years\textsuperscript{109}. The use should be supplemental and intended to increase fluoride uptake. Fluoride tablets have been shown to reduce caries of the permanent teeth by approximately 50\%-65\% (refer Appendix I)\textsuperscript{55}. For greatest protection of deciduous dentition the supplement must be started prenatally in the 2nd trimester.

Tablet distribution is often carried out as school-based programmes in which more successful results can be achieved through supervision. The dosage varies with age and levels of fluoride in the community water supplies.

Milk, salt and flour, have been suggested as carriers for fluoride but these forms are less common than tablet form.
3.2.3 **Oral hygiene measures**

The phrase 'oral hygiene measures' refers to plaque control programmes. Dental plaque is recognised as the initiating agent of both periodontal disease and dental caries and plaque control programmes are designed to prevent these diseases.

Plaque can be removed mechanically by prophylaxis in the clinic or by efficient brushing and flossing at home or in schools. There is evidence to show that brushing and flossing in schools reduces gingival inflammation but is not effective in reducing caries\(^5^1\).

Brushing and flossing have been carried out as preventive programmes in schools. The effect in reducing gingival inflammation was shown in a few studies in which children were made to brush daily under supervision using a non-fluoride dentrifice, dental floss and a disclosing agent. The results showed a reduction in gingivitis of between 17-40% but no significant reduction in caries was observed\(^9^4, 4^7\).

For effective results, toothbrushing and flossing should be carried out daily under supervision. The programme, therefore, requires trained supervisory personnel for adequate training and supervision of the children, as the value of the procedure depends very much on the children's ability to brush properly. In addition to supervision this programme also requires the use of materials which are quite expensive. Therefore, this activity should not be used as the major school-based preventive programme\(^5^0\).
3.3. DENTAL HEALTH EDUCATION FOR THE COMMUNITY, GROUP AND SELF CARE

The increasing realization that individuals should themselves take steps to prevent dental disease led to increased interest in an educational approach to prevention\textsuperscript{20}. Health education is a process of transmitting knowledge to a learner with the hope of influencing their attitude and behaviour\textsuperscript{29}. Young, in 1971 stated that for health education to be effective it should be able to activate the behaviour of the person and by merely disseminating knowledge to the person may not bring about the desired behavioural change\textsuperscript{20}.

More research is required to plan out programmes for health education which will change behaviour successfully. Prevention depends to a large extent on the way in which a person conducts his lifestyle, and health education should be aimed at influencing this lifestyle\textsuperscript{17}.

3.3.1 Community

There are two ways in which dental health information can be made available to the public. That is, either by making available planned dental health education material, through pamphlets, posters, newspapers, brochures or by the incidental learning of the individual\textsuperscript{35}.

Planned dental health education materials is aimed to educate the public on dental health. This programme to educate the community on dental health and the prevention of dental disease has been carried out widely in many countries, and especially directed to those who do not seek
dental services, to make them aware of their needs, and the types of services available for them. The mass media used in transmitting knowledge to the public to achieve a change in behaviour or attitude should be effective and thus it has to be attractive as well as informative. The impersonal nature of the mass media seldom brings about attitude and behavioural change and is effective only when messages reach specific targets of the population\textsuperscript{29,35}.

The major barrier has been the incidental learning by the individual and the amount of exposure he has through repetitive stimuli which may have brought misleading and inaccurate messages\textsuperscript{35}.

Besides changing the attitudes and behaviour of the community efforts should also be made to counteract the misleading messages and there should be new ways of reaching the public with accurate health information.

3.3.2 Group

The difference in educational level, social groupings, age, and needs are the reasons for grouping the community so that dental health education can be directed in a more effective manner. As started by Dunning, 'learning occurs best in response to a recognized need'. Realizing the various needs of each group, different methods and media can be applied in the process of educating them\textsuperscript{29}.

Basically there are two ways of communicating with the group. In the first, the didactic method, the flow of knowledge is from the expert to the layman in a one way
manner. This method was used in many countries for reaching target groups such as school children, parent/teacher associations, ante-natal mothers etc. In the second, the two way conceptual model, there is a co-operation of the professional with the client. This is the preferred method and can make a significant contribution to improvement in dental health, as students may participate in the learning process and at the same time take part in some oral hygiene practices.  

Many school systems throughout the world have incorporated dental health education as part of the school curriculum because of the rationale that 'prevention is the key to controlling dental disease', and that it is better to instill the knowledge and dental health practices from a younger age. The educational environment of the school is a logical place to teach dental health education and practices, as they can be directed to different age groups of children and corresponding variations in learning abilities.

School-based preventive programmes relating to primary prevention are being carried out widely in many schools throughout the world. The most common programme involving the participation of school children deals with toothbrushing, flossing and mouth rinsing with fluoride solutions. It is important that there should be an educational component attached to each programme to ensure that those involved understand and appreciate the effects and value of dental health practices. In this way, the
children will be able to accept the programmes that are directed to them – this is very essential for the success of any programme.

In India, a country with a high incidence of periodontal disease, poor oral hygiene and a high population to dentist ratio, oral hygiene practices become an important part of any programme to prevent periodontal disease and therefore, dental health education was recognized as a valuable aid.\(^{56}\)

Willford et al., 1967 undertook a study to determine the effect of dental health education on the oral hygiene of the group under study, and showed that there is some improvement in the oral hygiene index, debris score and periodontal condition.\(^{106}\)

In another study by Gravelle et al., 1967, health education had improved the children's knowledge on oral hygiene but their practice in oral care had not changed very much. With intensive educational effort and constant exposure to dental health education a better effect on oral care was demonstrated.\(^{40}\)

Robinson et al., 1967,\(^{88}\) from the results of their study, stressed that there should be a need to consider the attitudes and the factors that influence the acceptance or rejection of dental health education, so as to bring about a significant change in the habits of oral health practice. Thus, in educating a group, factors such as attitudes and behaviour are to be highly considered.
Besides educating the school children, the adult groups are also important objects for dental health education. Of particular importance are the ante-natal mothers and parent-teacher associations, who have a special role in influencing their children. Different systems and approaches are used in educating the adult groups depending on their needs and requirements. Basically, the methods and media used in this programme are similar to those used for school children but, unlike the school system, the opportunity for group health practices is more limited.

3.3.3 Self-care

An essential part of any preventive programme is to provide adequate information to the patient, and to be able to motivate him to carry out dental health practices for self-care. These practices should be carried out regularly by the patient at home as a part of overall preventive measures. The techniques of toothbrushing and other oral hygiene practices should be taught on an individual basis in the clinic or during group practices in schools. This should be followed by regular recalls and constant reminder and encouragement from the professionals.

It has been shown in studies by Lightner et al., 1968, Suomi et. al, 1969 that a well motivated patient who has been instructed in effective oral hygiene technique, can keep his mouth almost free from plaque and bacteria. Hence, correct technique in toothbrushing
and flossing is necessary to achieve a desired effect on the oral hygiene status of those patient carrying out oral hygiene practices at home. The use of disclosing tablets to demonstrate areas of plaque is useful for the patient to monitor his effectiveness.

Fluoride dentrifies should be routinely recommended to the patient because of their value in reducing caries. Most studies cited by Slack 95 have shown an average reduction of 20% in unsupervised toothbrushing programmes.

In educating for self-care, there should also be proper guidance and advice on the type of food to be consumed by the patient. Good nutrition should be encouraged and the consumption of cariogenic foodstuffs should be reduced 95.

To reduce dental caries, the following should be recommended to the patients 37:

"i) Avoid foods containing sugar if not......
ii) Avoid sticky, sweetened foods if not......
iii) Avoid between-meal snacks of sticky, sweetened foods. Eat them only at regular meal times
iv) Clean your teeth immediately after eating sticky, sweetened foods, or rinse your mouth vigorously with water or any available beverage if tooth cleaning is impractical
v) Use fluoridated water, or fluoride tablets, have regular topical fluoride applications and use a toothpaste containing fluoride"
4. **ROLE AND UTILIZATION OF AUXILIARY PERSONNEL IN PREVENTIVE PROGRAMMES**

The delegation of certain professional duties has been accomplished through the utilization of adequately trained auxiliaries. Duties are delegated so as to increase the effectiveness of the dentist in providing more care to more people, at reduced costs, while maintaining the quality of work\(^{100}\).

It is of the opinion that with sufficient training and education, auxiliaries can be of value in providing preventive services since the procedures involved do not require highly skilled personnel. Optimal use of auxiliaries frees the dentist from many routine chores and enables him to concentrate on duties that he is specially trained for\(^{100}\).

Utilization of auxiliary personnel in providing dental treatment was recommended as a solution in overcoming the shortage of manpower and high cost of utilizing more skilled personnel\(^{95}\). Different kinds of auxiliaries may be utilized for the functions and responsibilities that they are trained for, to supplement the services of the highly trained and qualified professionals.

A study by Tappan W. and Fitch M.A., 1977, reported the experience with the use of auxiliary personnel for preventive services. The study was conducted in the U.S.A. in 1972 and it was found that auxiliaries can be trained to perform specific preventive procedures with a quality comparable to that of professionals, and at a reduced cost\(^{100}\).
Utilization of auxiliaries in expanded functions, four-handed dentistry and in team concepts are methods for improving the quality of dental care and productivity in delivering care.

Each auxiliary has a different role and function depending on her educational background and training\textsuperscript{112}. For example, operating auxiliaries can treat patients clinically while non-operating auxiliaries are not permitted to perform procedures in the mouth.

Dental hygienists play a major role in providing preventive services in that they are both a clinician and an educator. Their role as a clinician, entitles them to perform a number of preventive procedures in the mouth.

The role of the dental therapist is to provide comprehensive dental treatment to school children. She is normally based in school dental clinics and is responsible for both treatment and preventive care for the school children.

The chairside assistant is not permitted to work directly on patients. Her main function is to provide assistance which is valuable in improving productivity for the clinic. Although her duties are not standardized, with sufficient training she can be utilized in providing some simple preventive measures. In some countries, chairside assistants have been trained and employed for the supervision of mouth rinsing programmes in schools\textsuperscript{95} and in giving basic oral hygiene instructions to the patients.
The dental preventive worker is basically an educator. Her role is to educate the public on dental health, but she may be involved in the supervision of self application of preventive measures.

The scope of service in the mouth is limited by law but dental health education may be carried out without legal restraints.

The role and utilization of auxiliaries are discussed under the following headings:

4.1 Role and utilization of auxiliaries in clinical prevention

4.2 Role and utilization of auxiliaries in group prevention

4.3 Role and utilization of auxiliaries in dental health education for the community, group and self-care.
4.1 ROLE AND UTILIZATION OF AUXILIARIES IN CLINICAL PREVENTION

The introduction of preventive measures for the individual at an early age may help to reduce the incidence of dental disease. Utilization of auxiliary personnel in carrying out some of the early preventive measures in the clinic is valuable in diagnosing and preventing the progression of dental caries which could not be achieved otherwise by a dentist working alone.

The preventive procedures carried out normally in the clinic are:

4.1.1. Topical fluoride application
4.1.2 Use of pits and fissure sealants
4.1.3 Scaling and Polishing
4.1.4 Multiple fluoride therapy

The auxiliaries while performing their duties, should at the same time, observe the following philosophy of prevention\(^6\) i.e.

i) To consider the patient as a whole and not just to treat the disease

ii) Try to maintain the patients with a healthy mouth i.e. disease-free for as long as possible

iii) To treat any active dental disease as quickly and perfectly as possible (note - if within scope of duties)

iv) To educate and motivate the patient to maintain his oral health.
4.1.1 **Topical fluoride application**

Although topical fluoride application has been the method of choice in the prevention of caries, especially in fluoride deficient areas, its use has a major barrier in that the procedure is time consuming and would require more trained personnel.\(^{116}\) The utilization of dental auxiliaries in this field has been encouraged and the delegation of these duties which were once performed by the dentist has relieved him of this time consuming task and has allowed him to concentrate on cases that require more attention.\(^{116}\)

In most countries, these procedures have been delegated to dental hygienists and dental therapists. Their role would be to ensure that this procedure is carried out in the manner that will be of optimum benefit to the patients.

Basically, topical fluoride application refers to the procedure of applying a solution of fluoride, or fluoride gel, to the surfaces of the teeth. Prophylaxis is recommended prior to fluoride application\(^{34}\) but some studies indicated that this is not necessary as there was no measurable difference in the fluoride uptake by enamel regardless of whether there was prior prophylaxis.\(^{101}\) The tooth surfaces should be thoroughly dried before topical fluoride is applied. Thus, the technique involved is rather tedious and would require trained personnel.

Ideally, fluoride application should begin at the age of 2½-3 years when the teeth are newly erupted\(^{34}\).
Pre-school and school children should, therefore, benefit most from programmes conducted in schools by the school dental nurses or dental therapists.

This method would only reduce the incidence of caries by approximately 40%, therefore, other forms of prevention must be encouraged for patients.

4.1.2 Pit and fissure sealants

The use of pit and fissure sealants as a method of prevention has been very promising and thus, has gained much publicity.

The procedure involves the application of an adhesive material to the pits and fissures of newly erupted premolars and molars which have been previously etched by acid. The material is then polymerized. Studies have shown that auxiliary dental personnel are just as competent as dentists in applying pit and fissure sealants.

One concern of placing sealants is the possible danger of applying over incipient carious lesions. But some studies have shown that, provided the sealant is intact over the pits and fissures, the carious process will not progress. Therefore, the personnel involved in application of fissure sealants should ensure that there is an effective seal.

The impact of using fissure sealants as a preventive method on a large scale will depend ultimately on their cost-effectiveness. When compared to other forms of preventive methods, the estimated cost of fissure sealants
is relatively high. But it must be remembered that pit and fissure sealants are mainly designed to prevent caries in occlusal surfaces which account for about 50-60 per cent of all decay. The overall reduction of dental caries is in the range of 87% - 99% following use of bis-GMA sealants after two years.

4.1.3 Scaling and Polishing

Dentists from all the world have been so preoccupied with the treatment of dental caries that they have neglected the treatment of periodontal disease.

The education and training of dental hygienists have been centred mainly on preventive measures and therefore, the hygienist should be the most suitable auxiliary in practical prophylactic dental programmes. Certainly, her employment in this program would be a great help in reducing the advancement of gingival inflammation which otherwise would progress to periodontal disease.

The most important etiological factor causing periodontal disease is the bacterial plaque, which would calcify into calculus. Dental hygienists can play an important role in the control and prevention of periodontal disease by performing thorough scaling and prophylaxis. Dental therapists have also been employed in performing prophylaxis for school children.

Although thorough scaling and prophylaxis are essential for every case of periodontal disease, their value lies not only in the technique but on the frequency
of treatment as well. The findings by Poulsen et. al 1976\textsuperscript{83} and Lindhe et. al, 1975\textsuperscript{76} emphasized the importance of regular prophylaxis in reducing dental caries and periodontal disease. The exact frequency has not been well established\textsuperscript{5}. Utilization of auxiliaries enables prophylaxis to be done on a frequent basis.

Besides providing treatment, the role of dental hygienists should include informing the patient on the presence and extent of periodontal disease. The patients' response and participation are of great help only when they are aware of the seriousness and extent of the problem\textsuperscript{34}. The patients' co-operation should be reassessed as this may reveal their interest in keeping their dentition, thus no time is wasted unnecessarily in performing procedure that are not appreciated by the patient.

4.1.4 Multiple Fluoride Therapy

Multiple fluoride therapy involves the use of more than two methods of fluoride treatment. The additional benefit can be extended to more people with the utilization of auxiliaries in the provision of multiple fluoride therapy.

Besides topical fluoride application, prophylaxis, use of fissure sealants and multiple fluoride therapy which are specific measures carried out clinically for the control of dental disease, other efforts are also needed and should be carried out.

In clinical dental practice, the following routine preventive and control measures should be included\textsuperscript{116}: 
i) Examination and assessment of patient

ii) Prophylaxis at regular intervals

iii) Topical application of fluoride

iv) Recommendation of the use of other fluoride supplements in non-fluoridated areas

v) Oral hygiene instruction and proper dietary regime

vi) Provision of referral for orthodontic procedures

vii) Referral to dental or medical specialists for specialized treatment.

viii) Adequate methods of sterilization of dental instruments

ix) Treatment of dental and oral lesions, including replacement of missing teeth

x) Provision of recall to ensure regular prophylaxis, examination and treatment of dental diseases.

The employment of all measures as described above is necessary to achieve and maintain an optimum level of health. Auxiliaries besides providing treatment for primary prevention may also be employed in preventing the progression of dental disease.

Utilization of auxiliaries in:

i) Four-handed dentistry

ii) Team concept

i) **Four-handed dentistry**

The concepts of four-handed dentistry and utilizing a team of auxiliaries in dental practice, have been developed
in an attempt to improve the quality and efficiency of professionals and paraprofessionals as well as improving the delivery system of dental care.\textsuperscript{18}

Utilization of chairside assistants in the practice of four-handed sit-down dentistry is encouraged. The primary objective of this procedure is to permit improved delivery of dental services through better methods of practice management. The advantages gained through dentist-assistant or hygienist-assistants partnerships are:\textsuperscript{18}

i) Establishment of easier working procedures

ii) Better management of time

iii) Greater comfort to the patient

The chairside duties delegated to the assistant can therefore, establish an easier working procedure for the operator. Constant evacuation of water by the assistant will keep the working area clear and dry and would also eliminate time wasted by the patient who has to continuously rinse his mouth. The assistant can also assist by retracting the lips, cheek and tongue to provide better vision for the operator to work so that operating time could be used more effectively. The operator must develop a standard of work sequence such that the correct instrument is delivered at the appropriate time and would enable the assistant to work more efficiently when she can anticipate the operator's needs.\textsuperscript{18}

Better management of time could be achieved by the hygienist who delegates simpler duties to the expanded duty chairside assistant. For example, the chairside assistant
can demonstrate to the patient, by using disclosing tablets, the areas in which plaque is still present, and if possible instruct him in simple oral hygiene procedures. The amount of time saved allows the hygienist to devote more time to thorough examination and care for the patient. In addition to having better preventive measures it also allows time for health education and nutrition counselling.

Four-handed dental hygiene procedures allow patients to relax more readily. The presence of a chairside assistant will create an atmosphere in which the patient need not be left alone and also allows better opportunity for discussion of preventive concepts.

ii) Team concept

The team concept is a measure of improving the efficiency of utilizing auxiliary personnel. One of the earliest studies by Klein observed that increased productivity can be achieved by using multiple chairs and by employing dental assistants.

The team approach has been shown to increase the availability of dental services.

Teamwork not only leads to better standards of achievement but would also influence the quality of work. Utilization of auxiliaries in the provision of dental health education to the patient would relieve a lot of responsibilities of the dentist leaving more time for oral health measures. The word "team" refers to a specific group of individuals. The members in the team work closely
together. Different modes of operation may affect the productivity of the team\cite{1}. For example, dental hygienists may be utilized in removing calculus, and polishing of teeth. After the patient is given instructions in oral hygiene, it will be easier for the dentist to inspect the patient's mouth and then to formulate a treatment plan. Thus, working together in a team will certainly raise the standard of work. Such co-operation will allow more attention on dental health education and other preventive measures\cite{7}.
4.2 ROLE AND UTILIZATION OF AUXILIARY PERSONNEL IN GROUP PREVENTION

There are other preventive measures that can be directed to the community, on a mass basis, or in group prevention. The effectiveness and benefits of these preventive measures have been discussed in the previous chapter.

In group preventive programmes, the major task involved is supervision. This task is not difficult to perform and could be carried out by adequately trained chairside assistants. In some countries the school teaching staff have been trained to supervise the school children.

Some of the basic programmes outlined for group prevention are:

4.2.1 Water fluoridation/School water fluoridation
4.2.2 Tooth brushing programmes using fluoride solutions, gels or pastes
4.2.3 Mouth-rinsing with fluoride solutions
4.2.4 Dietary supplements
4.2.5 Oral hygiene measures

Toothbrushing and mouth-rinsing programmes are carried out mainly in schools by the dental nurses or dental therapists, who are based in school dental clinics. Since the children belong to the group most susceptible to caries, they remain the focus of most community programmes. The adults on the other hand, do not belong to a well defined group and are therefore more difficult to reach.
4.2.1 Water fluoridation/School water fluoridation

Water fluoridation is currently the simplest, cheapest and most effective method available by which caries rate may be reduced\textsuperscript{27}, and thus, is widely implemented in many countries even though there is some persistent opposition which has prevented fluoride from being fully implemented. The effectiveness, as seen in the reduction of caries incidence has been shown to reduce the amount of dental treatment needed.

Dental auxiliaries are not involved directly in the implementation of water fluoridation procedures. However, their role may be in educating the children as well as the public on the benefits of such measures.

When community water fluoridation is not possible, fluoridation of school water supply, where feasible should be considered as a method of choice for a school programme. Although auxiliaries are not involved in the implementation of school fluoridation procedures, they can be of value in maintaining the equipment, controlling the fluoridation process and monitoring the fluoride levels.

4.2.2 Toothbrushing programmes using fluoride solutions, gels or paste

Schools are logical places for administering self-applied fluorides to children as most children attend school regularly. Toothbrushing with fluoride solutions or gels necessitates supervision of participants for more effective results. Dental therapists, whose main function
is to provide dental care to the school children, can supervise toothbrushing programmes. For efficient results, the group under supervision should be no larger than 15 children.

Toothbrushing with fluoride-containing prophylactic paste is more appealing because of its low cost per application, its efficacy and minimal frequency of application, of at least once a year. The principal agent used was 8.9 percent stannous fluoride with a zirconium silicate abrasive. The effectiveness of this agent has been shown in the study reported by Muhler in 1970\textsuperscript{78} and effectiveness was increased with more frequent application\textsuperscript{38}.

Besides the effect of fluoride on the children's teeth, toothbrushing helps in the development of dexterity and encourages the use of the toothbrush as an initial step in plaque removal.

4.2.3 **Mouth-rinsing with fluoride solutions**

There are many studies regarding the effectiveness of fluoride mouth rinses. This technique is simpler than toothbrushing, but the beneficial effect depends on the frequency of use and concentration of fluoride in the rinse solutions\textsuperscript{102}. The feasibility of this programme in schools has been studied. It is possible to introduce a mouth-rinsing programme as an integral part of school dental services which can use auxiliaries as the supervisory personnel in this type of programme.

The most commonly used solution is sodium fluoride
ranging from a concentration of 0.05%\textsuperscript{102} for daily use, to 0.2% or 0.5% for weekly or fortnightly application. Stannous fluoride and acidulated phosphate fluoride solutions may be used but they do not have any advantage over sodium fluoride\textsuperscript{27}.

The procedure involves very little time and as the technique is simple, each supervising dental nurse or dental therapist can take charge of a larger group than that required for adequate supervision of toothbrushing, in which correct technique must be emphasized. Other advantages of mouth rinsing when compared to toothbrushing programmes include - the use of fewer treatment materials; non-dental personnel with minimal training may be employed as supervisors; and frequent treatments are possible with minimal interruption of the school academic programmes\textsuperscript{53}.

This programme of improving the oral care of the children receives a lot of support from dental health personnel\textsuperscript{33}. They are in favour of utilizing auxiliary personnel to implement mouth rinsing programmes in schools where school personnel may also be employed.

4.2.4 Dietary Supplements

Dietary fluoride supplements are indicated only in non-fluoridated areas deficient in fluoride. Fluoride tablets have been increasingly used in school-based programme because of their several advantages\textsuperscript{104}:

i) They confer systemic fluoride exposure to unerupted teeth

ii) They may be used safely by pre-school children
iii) Cost per child can be as low as 20¢ per school year

The benefits derived from fluoride tablets are so striking that when fluoridation of water is impracticable, distribution of tablets through child-health centres, schools or prescription by doctors should be encouraged\textsuperscript{27}. In schools or child-health centres, responsibility for the daily distribution of tablets may be placed in the hands of dental auxiliaries. The role of auxiliaries is to supervise the distribution and consumption of the tablets thus ensuring that the tablets are used properly\textsuperscript{109}.

Combination of a number of procedures may produce additive benefits, and combination of procedures for school-based programmes should be encouraged in the future. A study reported in 1979 by Horowitz et. al showed that the prevalence of DMF surfaces among children was lowered by 45 percent after 6 years of taking a fluoride tablet daily, weekly rinsing with 0.2 percent sodium fluoride in school and use of fluoride dentrifice at home\textsuperscript{49}.

4.2.5 Oral hygiene measures

Dental caries and periodontal disease can be largely prevented by the efficient removal of dental plaque. This is confirmed by Axelson et. al, 1976\textsuperscript{8} from the study carried out in Sweden. Prophylaxis is essential\textsuperscript{47} but the value of toothbrushing and flossing is also equally important.
Toothbrushing either with fluoride dentifrice or fluoride solution has 2 benefits. Firstly, toothbrushing techniques removes plaque, and improves oral hygiene which is important for gingival health. Secondly, the fluoride used in a dentifrice or solution has an effect, by reducing dental caries\textsuperscript{55} and therefore its use should be strongly recommended.

Supervised regular toothbrushing can motivate children to brush their teeth effectively\textsuperscript{75} and 72\% reduction in gingivitis was obtained after 2 years of daily supervision by auxiliary personnel. The role of auxiliaries in this programme involves supervising the children on the correct technique of toothbrushing as well as encouraging and motivating the children to brush effectively. The presence of auxiliaries in schools is mainly to provide continued reinforcement throughout the children's schooling period. Dental auxiliaries who are based in school dental clinics are best suited for this programme. Utilization of these personnel, would enable toothbrushing to be carried out regularly and on a continuous basis for maximum effect.

The results from a 10 year study in Ryge, Norway in which auxiliaries were used as supervisors in a fluoride toothbrushing programme concluded that supervision is necessary if a toothbrushing programme is to remain effective\textsuperscript{45}.

This is because toothbrushing involves manual dexterity that is not easily learned and therefore, the
children have to be adequately trained and supervised.

Toothbrushing alone will not remove plaque effectively as the bristles could not get into the interproximal areas. Flossing could remove plaque from these areas effectively. A study by Wright et. al, 1977\textsuperscript{115}, indicated that flossing by trained assistants could significantly reduce caries. Thus, the combination of both toothbrushing and flossing will be a more efficient method in removing plaque, but this level of efficiency can only be acquired by highly motivated and well instructed individuals.
4.3 ROLE AND UTILIZATION OF AUXILIARY PERSONNEL IN DENTAL HEALTH EDUCATION

Dental health education has been defined by Young & Striffler as 'The provision of dental health information to a total population in such a way that people will apply it in everyday living'.

Furthermore, Young & Striffler also support the statement of Kirschct et. al, 1966, which states that a person will only take action if he feels that he is susceptible to the disease as well as to the consequences affected by it. Also, the action that he undertakes should be effective and long lasting.

Therefore, the role of a dental health educator is to see that the requirements for these health actions are satisfied. She should inform the person that:

- Prevention should be taken at an early age, otherwise susceptibility, regardless of socio-economic status is 100%.
- Consequences are serious if prevention is delayed and may cause disfigurement and discomfort.
- Artificial replacement is not a good substitute for natural teeth.
- Dental treatment is more tolerable due to technological advancement.

The message put across by dental auxiliaries is to bring about change in attitude of a person towards
dental health and hopefully to stimulate him to take action for early prevention.

The scope of dental health education is not limited for any auxiliary personnel. The dental hygienist occupies a responsible position in dental health education because of her background knowledge, her association with the patient in the clinic and her work with groups in the community.

It was stated by Alfred C. Fones that 'true prevention of disease is in its broader conception a matter of education rather than an operative or therapeutic procedure'. Health education is therefore an important aspect of preventive programmes and should be widely advocated. The Indian Health Service from their experience had stressed the importance of dental health education programmes in improving the dental health needs of the Indian people, but the effects will depend very much on the training, knowledge and interest of the dental personnel.

The school dental nurse and dental therapist are involved in educating the school children as well as in clinical prevention and group preventive programmes. Many countries employ the preventive worker i.e. Type III auxiliary, to assist in educating school children, and for supervision of some preventive programmes.

Dental health education can be directed to the individuals, group or community utilizing auxiliary
personnel for this purpose. Their role and utilization in dental health education programmes will be discussed under the following headings:

4.3.1 Community prevention
4.3.2 Small group prevention
4.3.3 Self-care

4.3.1 Community prevention

There are two ways of educating the community. Firstly, via the mass media which may be directed to a large section of the population and secondly, by directing programmes to groups in the community utilizing dental health personnel.

Mass communication such as radio, television, newspapers etc., has some weakness in contrast to personal face to face efforts, since groups of different educational and social background respond and react differently. This method therefore, is useful in providing information but not in influencing behaviour in a significant manner.

Educating groups of the community requires personal face to face interaction. People learn best in a two way communication process. Therefore, utilizing auxiliaries for this purpose is recommended as professionals may not be able to devote the time required. The auxiliaries should be well equipped with knowledge regarding oral health measures and allay any fears that the individuals in groups may have.
The community can be classified into two convenient groups i.e. adults and school children. The role of auxiliaries depends upon the requirements and needs of the particular group. Health knowledge can only contribute to good health if the desired attitudes and habits are cultivated and practiced\(^96\). Thus, the utilization of auxiliaries should assist the dental profession in developing attitudes and habits for better oral health.

4.3.1.1 **Community prevention for school children**

The change in behaviour and attitude of an individual would be more effective if it is developed through a long-range educational process\(^{116}\). Dietary practice, periodic visits to the dentist and learning effective personal hygiene habits can be developed into the children's pattern of life only after a period of time\(^{116}\).

The school setting offers a good potential for effective dental health education where the habit patterns of the children are still in the process of being formed\(^{116}\).

Jorden & Pugner, 1967\(^{61}\) and Bratthal, 1966\(^{19}\) indicated in their studies that exposing children to and increasing their knowledge on dental health, may not be sufficient to motivate them to practice the habit. The role of dental health educators would thus include constant reinforcement in as many different ways as possible to develop good oral habits.

In schools, the school dental nurses and dental therapists operating in the clinical facilities located
within the school site, have a major role in teaching to the children knowledge of dental diseases and possible disease reduction through prevention. To be effective, health information, habits and attitudes must be acquired through meaningful experiences. With dental inspection, a patient will learn more about his oral condition and regular visits should be emphasized to prevent pain and loss of teeth.

In giving direct classroom instructions to children, it is best for dental health educators to work closely with teachers in order to plan out each session. By co-operating with teachers educators will learn to use less technical language and they should not underestimate the children's knowledge.

The ability of a child to learn depends on his age of development. Health education should be planned according to the needs of different stages of age development. Kasey has suggested some age specific dental subject material for educating children. These may serve as a guide for dental health educators and other auxiliaries involved in providing dental health education to the children.

1) Kindergarten - 1st grade

Simple basic methods of keeping the mouth clean by brushing, washing or rinsing should be taught. The importance of deciduous teeth should also be stressed to the parents who will then influence and encourage their children to brush teeth at home.
The role of the dentist should be emphasized to the children.

ii) Grade 2-4

There should be emphasis on the importance of preserving teeth through proper care. Thus, the importance of regular visits to the dentist, simple facts on diet, effects of candy and rinsing after food must be emphasized.

iii) Grade 5-6

The importance of good dental health to overall physical health must be stressed. The children should be introduced to tooth structure and the importance of correct tooth brushing technique. The seriousness of dental disease and the importance of dental care and good oral hygiene must be stressed.

iv) Junior high

The importance of preventive measures should be taught. Knowledge of nutrition is important. There should be emphasis on health care and prevention of periodontal disease.

v) Senior high

Scientific causes of dental diseases, periodontal diseases, oral cancer and preventive measures should be taught. The importance of adult attitudes towards dental care and of nutrition during pregnancy are therefore stressed. Also, the children do need to know the development of teeth from embryo and
their importance in later life. The interpretation of research findings and simple evaluation of mass media should be taught.

Constant exposure to dental health education in schools would have a better impact with respect to behavioural change. The results from World Health Organization, International Collaborative study have indicated that gingival health is better among children with long-standing school dental treatment programmes. It is possible that the constant presence of auxiliaries within the school or in proximity to it, imparts more credibility to dental health education than when it is carried out as separate programme.

The dental health education role of auxiliaries in schools should include:

i) Dietary nutritional guidance

ii) Reduction of harmful foods available through vending machines.

iii) Advice on hazards to dental safety

iv) Advice on the use of mouthguards for contact sports.

In some schools, teachers are also trained to educate the children on oral health. The auxiliary could act as resource personnel working in close association with the school staff. She may also guide the teacher in providing accurate information and use of appropriate teaching aids.
In transmitting knowledge to the children, the method of fear arousal should never be used. The classical study by Janis and Feshback, 1953 showed that the use of strong fear and anxiety can block attentiveness and may even cause rejection\(^{60}\). In fact, auxiliaries should encourage group decision which can induce people to decide for themselves that a change in health habits is needed\(^ {116}\).

4.3.1.2 **Community prevention for adult group**

Motivation in adults' education has two goals. Firstly, to bring about change in attitude in the adults themselves and secondly, they may be motivated in an attempt to reach the children\(^ {41}\). Ante-natal mothers and parent teacher association have great influence on children and should therefore be an important object for dental health education\(^ {29}\). The best opportunity for instituting good oral health habits is to direct efforts towards parents with young children\(^ {116}\). The study by Kiresberg and Treiman, 1962 has indicated that the attitude of parents in preventive dentistry can influence their children\(^ {64}\).

Dental hygienists may have other responsibilities and roles besides providing dental health education and clinical prevention. Their role in public health programmes as approved by the subcommittee on Professional Education of the American Public Health Association are as follows\(^ {96}\):

i) To assist in community dental surveys, including inspection, recording, analysis and interpretation of the data to the community.
ii) To assist the community in planning, organizing and conducting a dental health program suitable to the needs and resources of the community.

iii) To assist in planning and conducting pre-service and in-service training programmes in dental health for other public health personnel, school personnel and civic groups interested in dental health.

iv) To assist voluntary health agencies, civics groups and dental or allied professional groups, in carrying out special dental health activities.

The expansion of her duties may permit her to contribute more to the public\textsuperscript{96}.

4.3.2 Small group prevention

The following activities are carried out for group prevention in schools:

- Supervision of fluoride-mouth rinsing programmes
- Toothbrushing programmes

The purpose is to reduce incidence of dental caries and at the same time to teach effective methods of brushing. Brushing improves gingival health, retards formation of calculus and plaque and thereby reduces the number of cavities\textsuperscript{96}.

Routine exercise does not motivate children to carry out better home care but the inclusion of an
instructional programme by the auxiliaries whereby children take an active part is more effective. It is necessary to remotivate the children so as to maintain a long lasting effect\textsuperscript{6}.

The auxiliaries should lay emphasis on the correct technique of brushing as it was claimed that one thorough cleaning is better than 2 or more ineffective brushings\textsuperscript{96}. When to brush and frequency of brushing should also be stressed. The reason for brushing must be made known to the patient as it is only through education that patients will understand the procedure and would participate more efficiently. The auxiliaries should also guide the children on the selection of toothbrushes, dentrifices and mouth-washes. The importance of brushing after eating must be stressed and that proper brushing involves both effort and time. The use of disclosing solutions or tablets and flossing is to be recommended.

Although the technique of fluoride rinsing is simple, its effect and benefits should be clearly explained to the patient in order to encourage better participation.

4.3.3 Self-care

The following are the few regimens for home dental hygiene:

i) Toothbrushing

ii) Use of fluoride dentrifice

iii) Use of dental cleansing tapes and floss

iv) Oral rinsing

v) Tongue and palate cleansing
Clinical patients should benefit most from instructions given at the chairside. The role of auxiliaries is to educate patients on simple facts of toothbrush selection in which emphasis is placed on the type, size and nature of bristles. In general, a good toothbrush should have a straight handle, firm soft bristles and a head that would permit access to all surfaces of teeth. In demonstrating techniques of toothbrushing simple visual aids may be used. The use of a disclosing solution to demonstrate areas of plaque will encourage patients to brush more effectively. Regular brushing after every meal is important and must be stressed to the patients.

Toothbrushing can be made more pleasant and effective by using a dentrifice. The use of a fluoride dentrifice should be strongly encouraged.

Generally speaking the use of toothbrush alone is not efficient in removing interproximal plaque. Dental floss can be used to improve the cleaning interproximally. The injudicious use of dental floss can damage the tissues therefore, emphasis should be given to the correct technique of flossing.

When it is not possible for patients to brush teeth immediately after eating, oral rinsing should be advocated. The purpose is to remove food debris and sugars from the tooth surfaces.

Cleaning the tongue and palate can significantly reduce oral debris and retard initial plaque accumulations
on the teeth. Oral cleanliness contributes to overall mouth hygiene. This procedure may be an addition to other methods of mouth cleaning and may be introduced to the patients.

The attitudes and behaviour of the patient at home are the final proof of the success of these home regimens. The auxiliaries should record at every visit of the patient the success or failure of such regimens and provide the patient with further instructions.

It is essential to provide adequate information to the patients and thus, diet, nutrition and the need for frequent regular visits to the dentist must be emphasized.
5. TRAINING OF APPROPRIATE AUXILIARY IN BASIC PREVENTIVE METHODS

The training of auxiliaries will vary greatly depending on their intended role and functions. Ideally, training should be in an Auxiliary school where they may receive formal training. In most instances emphasis on preventive methods is rather limited and even with well trained auxiliaries, there is a need to supplement her knowledge. Her training should be adapted in relation to the specific needs of the local situation.

Dental hygienists, dental therapists and chairside assistants are more often utilized in preventive programmes and their training will be discussed under the headings:

5.1 Training of dental hygienist
5.2 Training of dental therapist
5.3 Training of chairside assistant

There are three basic qualifications which are required for a dental auxiliary to succeed in a preventive dentistry programme and therefore these should be built upon during her training course.

i) The auxiliary should not doubt the value of prevention. She should have a profound belief in the preventive philosophy and daily practice of what it teaches.

ii) She should have the knowledge and skills necessary to teach the patient.
iii) Her personality, attitude and ability to communicate with people are also important.

5.1 TRAINING OF DENTAL HYGIENISTS

Dental hygienists are trained to serve as oral health clinicians as well as educators to the public. She performs duties delegated to her by the dentist, thereby increasing the productivity of the clinic. Her role and functions would require a high level of responsibility which should be stressed during the recruitment, training and educating of these personnel.

A two year course is sufficient to train dental hygienists to undertake certain responsibilities. Her first year training should be concentrated on basic sciences with some clinical experience. There should be specific emphasis on knowledge of those organs and tissues that are directly concerned with the dental hygienist's activity. In the second year of her training, clinical prevention and dental health education should be stressed. Her training in clinical prevention should have a wider scope than that of other auxiliaries. In the clinic she is in a better position to teach the patient about oral hygiene or home care, whereas the dentist often could not afford the time for these essential services, which are the basis of prevention.91

The admission requirements necessary are a high school certificate or completion of a full secondary school
education, a pleasant personality, an adequate level of intelligence, manual ability and a good character.  

5.2 **TRAINING OF DENTAL THERAPISTS**

The primary aim of dental therapist training is to provide adequate staff to serve the school dental service.

In general, dental therapists should receive training for two or three years. The training should improve her knowledge, skills and attitudes and should enable her to perform the following duties.

i) **Educational**

To organize and to provide oral health education to individuals and groups - adapted to age, cultural and socio-economic factors. The education should include oral hygiene practices, preventive and oral health measures, nutrition, accident prevention, and oral health as part of total health.

ii) **Diagnostics**

To differentiate dental needs, between those that she can treat and those that she should refer to the dentists.

- To diagnose caries and resulting conditions.
- To diagnose periodontal diseases
- To make preliminary diagnosis of abscesses
- To make preliminary diagnosis of traumatic injuries to structures of the oral cavity.
- To take, process and interpret radiographs

iii) Preventive and Curative
- To scale and polish teeth
- To apply topical preventive agents
- To administer local anaesthetics, and specified medicaments for treatment of oral disease
- To perform single extraction of teeth
- To perform simple cavity preparations and fillings
- To perform intra-oral incision and drainage of dental abscess and to place and remove sutures
- To provide emergency dental treatment with the scope of training and initial treatment of traumatic injuries.

iv) Administrative
- To chart diagnosed conditions and record a patient's treatment plan indicating current and complete dental treatment
- To clean and sterilize dental instruments and equipment
- To maintain dental supplies
- To perform simple repairs of dental equipment
- To submit periodic summaries for monitoring the prevalence of dental disease and other changes in disease experience.
- To prepare and submit through channels, periodic reports on services performed.
- To complete administrative procedures for patients requiring referral dental care.
In some countries these auxiliaries work only with children and virtually provide complete national dental health protection up to 17 years of age. Her responsibility is, therefore, to provide curative as well as preventive treatment to the schoolchildren.

In other countries, dental therapists do provide treatment for the adults. This includes emergency and palliative care - the relief of pain by extraction, simple periodontal care, treatment of abscesses, temporary dressings, scalings, oral hygiene instruction, local anaesthesia and the recognition of other serious oral pathological conditions.

The training of dental therapists is also dictated by the local conditions and disease pattern of the country.

5.3 TRAINING OF CHAIRSIDE ASSISTANTS

Chairside assistants are trained to assist dentists or dental hygienists in clinical procedures. Training of chairside assistants in four-handed dentistry is encouraged as this will increase efficiency of work, better management of time and providing greater comfort to the patient.

The scope of training of chairside assistants involves handling and manipulation of all standard materials used in dental clinics, day to day maintenance of instruments and equipment, sterilization techniques, chairside assistance in terms of requirements for specific tasks carried out by the operator, as well as in the processing of x-rays. Her learning experience should be related to the tasks
that she will be expected to perform\textsuperscript{91}.

Being a non-operating auxiliary, her scope in preventive work is limited. She may be trained to instruct patients in oral hygiene and in the supervision of mouth rinsing programmes.

There is no formal training for chairside assistants in almost all countries. A full one year course may be taught, appropriate for her to be equipped with sufficient knowledge and training. At least four years of secondary school education should be the minimum admission requirements. Other qualities required would be a general level of intelligence, a sense of discipline, an interest in people and a great deal of patience\textsuperscript{91}.

An integrated training programme with the objective of attacking the main problem should also be considered, as this would avoid wasteful overlap of duties and better utilization of personnel. The training programme should also be dynamic and constantly matched to the changing requirements. Sufficient and regular co-ordination among the staff to discuss the concern of their patients' health must be maintained\textsuperscript{86}.

The training and effective use of dental auxiliaries can provide expanded care, allowing the dentist to extend his service in preventive aspects. This is the conclusion drawn from a series of surveys, carried out to determine the usefulness of TEAM (Training in expanded auxiliary management) training\textsuperscript{86}.
The tables below summarize the results on the opinion of dentists in New Jersey who had participated in TEAM training.

Table V: Value of TEAM Training in Solving Practical Problems

<table>
<thead>
<tr>
<th>YEAR OF GRADUATION</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>% utilizing multiples operators</td>
<td>86%</td>
</tr>
<tr>
<td>% utilizing multiple auxiliaries</td>
<td>76%</td>
</tr>
</tbody>
</table>


Table V indicates the extent to which the respondents were using multiple operators and multiple auxiliaries, and the results showed that more respondents used multiple operators than used multiple auxiliaries.

Table VI: Relevance of TEAM in Private Practice

<table>
<thead>
<tr>
<th>Item</th>
<th>No of subjects</th>
<th>Mean Score</th>
<th>Interquartile range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilization of EPDA's</td>
<td>47 34 29 19</td>
<td>2.02</td>
<td>1.86</td>
</tr>
<tr>
<td>Four-handed dentistry</td>
<td>7 11 37 74</td>
<td>3.61</td>
<td>1.18</td>
</tr>
<tr>
<td>Personnel administration</td>
<td>12 27 46 44</td>
<td>3.04</td>
<td>1.49</td>
</tr>
<tr>
<td>Item</td>
<td>No. of subjects</td>
<td>Mean Score</td>
<td>Interquartile range</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------</td>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Delegation of duties</td>
<td>12, 27, 40, 50</td>
<td>3.14</td>
<td>1.61</td>
</tr>
<tr>
<td>Facility and equipment design</td>
<td>22, 31, 38, 38</td>
<td>2.81</td>
<td>1.83</td>
</tr>
<tr>
<td>Communication</td>
<td>10, 22, 45, 52</td>
<td>3.22</td>
<td>1.42</td>
</tr>
</tbody>
</table>

1=not relevant; 2=slightly relevant; 3=moderately relevant; 4=highly relevant


Table VI summarizes the responses regarding the degree of relevancy of TEAM practice. The aspects of TEAM participation that were found to be most helpful are:

- personal management
- four handed dentistry
- delegation of duties to auxiliaries
- scheduling of patients

Most aspects of the TEAM program were found to be relevant. The TEAM experience also provided preparation for solving some management problems encountered from time to time in the clinic. Thus, the improved practice management and efficient use of dental auxiliaries can enable more time to be spent on preventive efforts.
6. SUMMARY

Due to a lot of unmet dental needs, and even with new and improved methods of dental treatment, there has been increasing concern for the development of more efficient and economical methods of reducing the widespread incidence of dental disease. Preventive measures which have been proven to be more effective are now emphasized in many countries. This led to the establishment of a variety of preventive programmes aimed at reducing the occurrence of dental diseases but the relative value of each has not been clearly established.

Several preventive measures and programmes that have been implemented to bring about a reduction in dental disease were discussed. There are programmes for clinical prevention, group prevention and dental health education. Water fluoridation is recommended as the foundation of any national programme because it is the safest, cheapest and most economical method for preventing caries.

Topical fluoride application, whether professionally applied or self applied, produces added benefits. This measure should therefore be indicated for use in both fluoridated and non-fluoridated areas. Disadvantages of professionally-applied fluoride include the need for trained dental personnel and high cost of treatment. These drawbacks are met by several methods of self-applied fluoride, and amongst those discussed were fluoride mouth rinses which are simple and relatively inexpensive. They are recommended to be a part of a school based or home based...
preventive programme.

The use of fissure sealants in reducing occlusal caries is effective. However, application of sealants on a large scale depends on its cost-effectiveness. The current cost is very high.

Prophylaxis is currently used for the prevention of periodontal disease. But the programme is both time-consuming and requires trained personnel. Other methods of plaque removal are brushing and flossing which can be done individually at home or in toothbrushing programmes in schools. The effectiveness depends on adequate training and supervision of the children.

In addition to the preventive measures, it was realized that individuals must be educated to take the necessary steps to prevent dental disease. The aim of dental health education is therefore to motivate individuals to change behaviour. Dental health education can be directed to the community, groups or individuals.

It is necessary to introduce prevention at an earlier age and on a continuing basis for the individual. The World Health Organizations expert committee had recommended the training and utilization of auxiliaries in these preventive programs as a means to overcome the backlog of dental treatment needs and the present shortage of manpower 78.

A review of the various types of auxiliary personnel was made. Their background training and traditional role
are presented with a view to discussion of their utilization in some basic preventive programmes.

Each category and type of auxiliary described has different functions and responsibilities. The degree of responsibility depends upon legal requirements and amount of education and experience they have had, as well as the amount of responsibility the dentist is prepared to assume for the work of the auxiliary. Each country has its own accepted definition and description of their functions and responsibilities. Auxiliaries are categorized into operating and non-operating, depending on whether they are permitted to work in the patient's mouth or not.

Most countries have already appreciated the value of utilizing dental personnel in preventive programmes, and have co-ordinated their activities in a team to improve productivity. The utilization of auxiliaries in preventive programs depends upon their roles and functions. The role of a dental hygienist is to serve as a clinician and an educator. Thus, she may be employed to provide preventive treatment in the clinic as well as educating the people. Dental Therapists are trained to provide comprehensive treatment to school children and are therefore based in school dental clinics. They supervise school preventive programs and provide preventive care clinically. Although their role as a clinician is limited by law, dental health education may be carried out without limit.
Chairside assistants are trained for the purpose of providing assistance in the clinic. They have also been utilized in four-handed dentistry thereby increasing productivity of the services. With sufficient training they could be employed in the supervision of school based programs and in oral hygiene instruction at the chairside. The dental preventive worker basically gives oral hygiene instruction and supervises self application of fluoride.

It was considered that preventive treatment and supervision of preventive programs do not require highly skilled personnel and that with adequate training auxiliaries can perform just as well as a dentist. Countries with relatively advanced programmes have found that with the help of auxiliaries significant gains can be achieved. Utilization of auxiliaries in four-handed dentistry and in the team concept increases productivity of the dentist and hygienist in providing services.

For efficient utilization, there is a need to have appropriate training for the auxiliaries in various preventive methods. Training should start in Auxiliary-training schools but most often training on prevention is rather limited and should be supplemented by the dentist, according to the needs of the local situation.
7. CONCLUSION

The introduction of preventive programmes to reduce the incidence of dental disease has been well received by many countries. Treatment of dental disease by the traditional approach of increasing the supply of dentists is no longer possible. A better approach would be through the efficient utilization of auxiliaries in preventive programmes.

This thesis has examined the various categories and types of auxiliaries. Their roles and utilization of them in various preventive programmes have also been considered. The purpose was to provide information on the utilization of auxiliaries with the ultimate aim of improving the dental services in the country.

Personnel that could be trained for preventive programmes are:

i) Dental hygienists

ii) Dental therapists

iii) Dental preventive workers

iv) Chairside assistants

Different auxiliaries may be utilized for different purposes based on the countries' own accepted definitions and descriptions of functions and responsibilities. However, countries with periodontal disease as the major dental problem should employ dental hygienists and utilize them more effectively. The scope of duties for dental hygienists in the clinic allows them to perform prophylaxis
for adults. Removal of plaque and calculus is the most effective treatment for periodontal disease. Countries with a high incidence of dental caries would need dental therapists, whose main role is in the provision of treatment for pre-school and school children. Chairside assistants employed in supervising preventive programs and in simple oral hygiene instruction will supplement the services of dentists. The employment of dental preventive workers to teach oral hygiene to patients, supervise preventive programs and provide dental health education will certainly relieve the dentist of some simple preventive work.

The utilization of auxiliaries in preventive programmes will provide more services to the people at a much reduced cost and still maintain a standard of quality. Utilization of auxiliaries in four-handed dentistry and in a team concept is strongly encouraged.

Preventive programmes that will certainly be more successful with utilization of trained auxiliary personnel are:

i) Application of topical fluoride agents
   - professionally applied
   - self-applied

ii) Prophylaxis

iii) Oral hygiene measures

iv) Dental health education

It was noted that auxiliaries could perform the above tasks competently and therefore their employment
should be encouraged. A proper training programme in auxiliary training schools is recognized to be of important value in preparing the auxiliaries for their future duties and responsibilities. Training in preventive aspects should be emphasized.

Some basic qualifications necessary for auxiliaries to succeed in preventive programmes are:

i) She should have a profound belief in the preventive philosophy and daily practice of what it teaches.

ii) She should have the required knowledge and skills necessary to teach the patient.

iii) She should have the ability to communicate with people.

There should be more studies to evaluate the benefits of utilizing auxiliary personnel in preventive programmes, so that utilization can be made more effective and more productive.

The dental profession should provide support to the acceptance of auxiliaries as valuable members to the dental team. Dentists must be trained on the efficient utilization of auxiliaries such that better effectiveness and efficiency of dental services can be achieved.


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EFFECTIVENESS OF VARIOUS METHODS OF ADMINISTERING FLUORIDES

<table>
<thead>
<tr>
<th>METHOD</th>
<th>CONCENTRATION OR DOSE</th>
<th>% REDUCTION IN DENTAL CARIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community water fluoridation</td>
<td>0.7 - 1.2 ppm</td>
<td>50-65</td>
</tr>
<tr>
<td>School water fluoridation</td>
<td>4.5 x's optimum</td>
<td>40</td>
</tr>
<tr>
<td>Dietary Fluoride supplements</td>
<td>Depends on age of child and F concentration of water.</td>
<td>50-65</td>
</tr>
<tr>
<td>. Home</td>
<td>2.2 mg NaF (daily)</td>
<td>30-35</td>
</tr>
<tr>
<td>. School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouthrinses</td>
<td>0.05% NaF (daily)</td>
<td>20-50</td>
</tr>
<tr>
<td></td>
<td>0.20% NaF (weekly)</td>
<td></td>
</tr>
<tr>
<td>Dentifrices</td>
<td>0.40% SnF₂</td>
<td>20-30</td>
</tr>
<tr>
<td></td>
<td>0.76% MFP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.22% NaF</td>
<td></td>
</tr>
<tr>
<td>Professionally applied</td>
<td>2.0% NaF</td>
<td>30-40</td>
</tr>
<tr>
<td>applications</td>
<td>8.0% SnF₂</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APF (1.2%F)</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Horowitz, H. - 1980
Established methods of prevention.
Appendix II

Work specifications of dental preventive worker

Items of work

1. Housekeeping duties
2. Patient appointment and reception
3. Administrative commitments
4. Organization, preparation, and running of the clinical area
5. Sterilization of instruments
6. Mixing dental materials
7. X-ray film developing
8. Assisting the operator at the chairside
9. Assisting the operator in a close support role (e.g., 4-handed)
10. Simple technical procedures (e.g., model casting)
11. Individual patient education in oral hygiene and prevention
12. Group education in oral hygiene and prevention in schools or elsewhere
13. Supervision of self-application of preventive measures
14. Application of caries-preventing agents to teeth
15. Taking impressions for study models
16. Supragingival scaling and polishing
17. Subgingival scaling
18. Recording patients' histories
19. Partial dental examination
20. Complete dental examination
21. Taking intra-oral radiographs
22. Treatment planning
23. Application of curative agents to gingivae
24. Minor gingival surgery
25. Removal of gingival packs
26. Placement of gingival packs
27. Removal of sutures
28. Topical application of local analgesic agents
29. Infiltration injection anaesthesia
30. Inserting and finishing dental restorations
31. Simple cavity preparation
32. Extraction of deciduous teeth
33. Extraction of permanent teeth
34. Direct treatment of dental pulp
35. Root canal treatment (endodontics)
36. Selected technical procedures in the dental laboratory
37. All dental laboratory procedures
38. Preparatory work for removable denture
39. Preparatory work for any type of crown or bridge work
40. Insertion of removable denture
41. Insertion of crown or bridge work
42-47. Additional items