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PREVENTIVE DENTAL PROGRAMMES
IN THE ARMED SERVICES.

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1971.
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A. Panggabean, Doctor Gigi.

October, 1971
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INTRODUCTION.

Preventive dentistry in terms of early detection and prompt treatment has been routinely applied in the armed services.

On entering military service, the recruits teeth must be carefully examined, and through the years of his service, his dental condition must be regularly checked. The requirement of maintaining dental fitness is part of the compulsory high state of physical fitness to achieve maximum operational efficiency. Dental officers expend all their professional skill and time in an effort to maintain dental fitness yet thousands of decayed teeth remain unfilled each year.

The increment of new caries adds to the huge backlog that dentists have to face with inadequate clinical and manpower capabilities. It is apparent that this pattern of prevention is only a secondary prevention, to prevent further harmful progress of dental disease that has already developed.

True primary prevention, which is to protect the teeth against dental disease by methods which are now
available and are clinically effective is perhaps the only method of choice to reach the huge dental needs of military personnel.

It is the purpose of this thesis to review the application of primary preventive programmes in the armed services and to discuss the methods of measurement and evaluation of effectiveness not only from the armed service point of view, but also from the public health interests since military personnel form one selected group within the community.
PREVENTIVE PROGRAMMES.

1. CHANGING PATTERN OF DENTAL TREATMENT.

It was apparent from surveys made in the armed services of different countries that the prevalence of dental caries is high among the members.

The establishment of a dentist manpower ratio of one dentist to 500 in peacetime, and one to 1000 in war time; the utilisation of dental auxiliaries; the using of high speed cutting instruments and other therapeutic innovations have not noticeably increased dental treatment productivity to date when related to the dental needs in armed services.

A survey made by Samyd and McCall\(^{51}\) in 1958 showed that only 1,762,680 restorations were accomplished of the estimated 2,810,448 restorations needed by the U.S. Air Force personnel in that year. Helman and his associates\(^{29}\) survey on 183,000 recruits who entered the U.S. Navy in 1956 was based on dental needs and treatment in one calendar year showed an average of 616 fillings needed for every 100 recruits and only a fourth of this number actually provided. Bernier and McFall\(^{6}\) showed the total monthly increase in dental
treatment required for inductees prior to 1958 in the U.S. Army: restoration, 222,320; surgical procedures 19,600; complete dentures, 420; partial dentures 5,486. They estimated 8 million dental treatment manhours required for the whole Army personnel while dental officers manhours available was only 4 million and the annual increase in manhours required for caries alone was 4 million. There remained an annual 8 million manhours dental treatment deficit.

The figure in Australia's Armed Forces is similar to that in America 16,17 since the young personnel come from a community with high caries prevalence during their childhood.5

In developing countries this figure is not much different even with lower caries prevalence42. This, of course, is due to the shortage of dental manpower and the limited dental facilities.

These findings, represent an accumulated dental treatment deficit which can not be reduced by present conservative methods of treatment. There still will be a great disparity between dental needs and the capability of dental manpower through clinical means of treatment alone.
Perhaps it is that dental convention has necessarily emphasized the mechanics of repair and replacement and therefore the dentist has been taught to think of dentistry as a restorative or corrective service. In military dental practice these attitudes have been further ingrained. It was clear that reorientation of thinking is necessary to recognize that present conventional techniques do not meet dental health care needs.

Stanmeyer suggested the solution to the problems of dental caries in military dentistry\textsuperscript{49}; "If, through research, dental disease could be initially prevented or its progress inhibited, we would have taken a great step forward towards solving not only today's problem in the military but also problem facing the nation."

The achievement of scientific research has shown that dental disease particularly dental caries, the major oral disease in children and young adults, can be prevented. There are three essential parts to caries process\textsuperscript{41}:

2. fermentable dietary carbohydrates.
3. A susceptible tooth.

The efforts to prevent dental caries are based on these requirements for the caries process.
The work of Orland et al.\textsuperscript{40} shows that caries of the teeth must be primarily a bacterial disease. Fitzgerald and Keyes\textsuperscript{21} findings show that dental caries can occur only when specific stains of streptococci and lactobacilli are present in the oral flora. These cariogenic microorganisms have a peculiar metabolic ability to form polysaccharides of high molecular weight from sucrose. The cariogenicity of specific bacterial strains is directly related to their ability to produce an extracellular dextran and this substance has an ability to precipitate in human saliva and then to adhere to hydroxyapatite of the enamel and develop dental plaque\textsuperscript{24}. Dental plaque is colonised by 1. Cariogenic microorganisms which later on will produce a decalcifying process on the enamel; 2. toxin producing organisms; osteolytic or collagenose producing organisms which will destroy the periodontium of the tooth on its late stage.\textsuperscript{2, 32}

Stephan and Miller\textsuperscript{50} measured the pH of this bacterial plaque. They found that pH dropped to 5 or less within two to five minutes, enough to decalcify the enamel under plaque after a patient was given a 10 percent glucose rinse. The pH remained low for one half hour or longer before gradually returning to a normal level.
The Vipeholm caries study on the cariogenicity of carbohydrate foodstuffs showed that the amount, consistency and time and frequency of eating sugar-rich foodstuffs influence the dental caries rates. Caries experience increases with a frequency of eating between-meal food of high sugar content and sticky character.

Kite, Shaw and Sognnaes reported that caries did not develop in rats when substrate (sugars) was eliminated from the mouth by stomach feeding. By feeding a cariogenic diet to germ free rats, Orland found that these animals did not develop caries.

These findings contributed to our knowledge of the caries process. Therefore, the first objective in the prevention of dental caries must be to remove all dental plaque from all enamel surfaces. The second, is to reduce ingestion of highly sugar-containing foodstuffs.

In another field, Dean and his co-workers reported the relationship between natural fluoride in domestic water supply and the low incidence of dental caries. This report stimulated investigations of the relationship of fluoride ions to the tooth surface. It was also found that enamel fluorosis with which was association with a reduced dental caries incidence was not evident when water consumed during tooth development contained less than 1.8 p.p.m. of fluoride.
Based on these findings, artificial fluoridation of drinking water (1 p.p.m.) was instituted for the city of Brandford (Ontario); Newburgh (New York) and Grand Rapids (Michigan). During 15 years of controlled fluoridation, the caries incidence for children decreased by 40-60% \(^3\,^4\).

As the result of this knowledge, the fluoride ion is now recognised and utilised as the greatest single factor in the practical prevention of dental caries.

Muhler and his associates have made numerous studies of the effectiveness of stannous fluoride in the prevention of dental caries. The study in 1956 \(^3\) shows 41.6 per cent and 53.7 per cent reduction of DMFS and DMFT after one year of using stannous fluoride containing dentifrice for an adult population aged 17-36 years without previous instruction in the proper tooth brushing. In 1958 \(^3\) his study on the effect of a single topical application of 10 per cent SnF\(_2\) solution for adults showed the reduction of 24 per cent and 16 per cent of DMFS and DMFT after one year. Further, Gish and Muhler \(^2\) reported that the combined use of 3 agents containing stannous fluoride, a prophylactic paste, a solution and a dentifrice resulted in the reduction of DMFT and DMFS of 73% and 76% for children who live in a fluoridated area; and 72.5% DMFT and 74.6% DMFS reduction for children in non-fluoridated area. \(^8\)
Scola and Ostrom \(^{45}\) made a clinical evaluation of the effectiveness of multiple stannous fluoride applications: prophylactic paste (17.5\% SnF\(^2\)) topical solution (10\% SnF\(^2\)) and dentifrice (0.4\% SnF\(^2\)) for naval personnel aged 27-24 years. Without any attempt to change the oral hygiene habits of a subject (no toothbrushing instructions), they found after one year, the result was 42\% reduction of DMFT and DMFS.

Although fluoridation of communal water supply is the single most efficient and economic means of preventing dental caries on a mass basis, this benefit would not be effective for young adult persons who cannot receive the benefit of communal fluoridation, the clinical preventive techniques will reduce caries experience significantly. These findings also suggest that a considerable benefit can be obtained by using multiple fluoride agents treatment each agent has additional benefit to prevention.

Great emphasis is required on the acceptance of a philosophy of preventive measures that are presently available. The implication of this philosophy is the effort to prevent dental caries effectively and efficiently, thus to reduce dental treatment required with the minimum expenditure of time and effort.
The easiest way of measuring the efficiency of a treatment technique is by comparing its results with those of the technique that it may partially or wholly replace. That is by comparing the successor technique with its predecessor, especially by identifying all significant improvements, such as a reduction in the incidence or prevalence of the disease.

Martin raised the questions that should be analysed in evolving a plan of action to promote and maintain health in the military service:

1. "The prevalence of diseases is well established, but is enough being done about it.....?"

2. "Are the dental records sufficiently comprehensive?"

3. "What emphasis is being placed on dental health education in relation to treatment?"

In the light of the available preventive measures their application seems very practical and economical to help solve the problem of high prevalence of dental disease in the military personnel, to achieve and maintain them in the high dental health condition which was the goal that had to be reached through the corrective and restorative procedures.

The effort should be made to reduce new caries and
arrest instead of restoring the existing caries though restorative procedures alone.

"The need to inculcate the public health nature of the preventive phase of the programme is obvious. The dental officer cannot hope to treat all the men he sees. He could not do it under the old system. If he accepts that the cariostatic effect of the fluoride is in fact a treatment, holding the patients condition until time develops for comprehensive treatment, then the plan will work".19 Evans, the Director General of Canadian Dental Service gave this as a guide line to his dental officers. The basic change of treatment concept was accepted into their programme, and indeed, they found after 2 years 43% increase of preventive treatment, 14% reduction of restorative procedure, 4% reduction of Laboratory procedure and 37.53% of the total Servicemen had reached dental fitness condition.

This was only two years after the pattern of treatment had been changed. This level could never be met through restorative means alone during the same period of time.
2. **PREVENTIVE PROGRAMMES OPERATING.**

The overall aim of dental service in the armed forces is to arrange comprehensive dental treatment to achieve standard dental fitness to every member.

In general similar procedures and objectives applied in the field of:

1. **Initial Examination.**

   Initial Examination to be completed as soon as practicable after enlistment by dental units which are serving basic training for recruits. All members are to be treated as soon as possible to raise their dental health level to achieve dental fitness.

2. **Routine Examination.**

   All members prior to posting to ship, station, unit, different geographic area or overseas have to be examined. Members are to be made dentally fit before movement.

3. **Annual Examination.**

   All members have to be examined at least once a year.

   After examination, members are to be made dentally fit or if not possible, raised to a condition with minimal treatment needed to make dentally fit.
6. Final Examination.
Members approaching their due date for discharge have to be examined and have to be treated to make them dentally fit.

5. Cariostatic or anticariogenic agents are applied following each examination carried out.

6. Cariostatic or anticariogenic agent treatment is applied by auxiliary personnel under the supervision of dental officers.

7. Oral hygiene education is given individually in the chairside or through lecture, demonstration, pamphlets for groups of members.

The Royal Australian Navy\textsuperscript{36} gives priority for the new entries and members under 25 years of age to be brought into a preventive programme and treated with three cariostatic agents (prophylactic, topical solution, dentifrice).

The Royal Australian Army\textsuperscript{30} has not carried preventive measures into their programme due to the shortage of dental hygienists. Only limited troops moving overseas are exposed to fluoride by using a "brush-in" technique employing 9 per cent stannous fluoride pastes, provided in individual tubes.

This situation gives proof to our knowledge that the utilisation of dental hygienists is of great value
in the preventive programme. As long as all recruits are not exposed to fluoride preventive treatment, the result will be the same as the experience found in other modern countries, tremendous treatment deficits each year.

Dental hygienists can play a major role in the preventive programme as the dentist can delegate part of his duty while he is concerned with the other members who need to be treated.

Dental health education and oral hygiene instructions for group application of fluoride preventive agent can be given by the dental hygienist and proved significant and economical in terms of dental effort saving.

However, the Australian Army dental service has established a time table of annual dental examination, in conjunction with treatment priority to enable them to raise dental condition from the lower conditions to standard dental fitness. Each month a group of members is listed for their annual examination.

The Royal Australian Air Force has applied preventive measures into practice. Oral prophylaxis and application of topical fluoride is given in special hygienist facilities comprising a treatment area and a
separate instruction room fitted with builtin wash basins permitting supervised tooth-brushing technique.

Lecture and discussion on oral hygiene is given to individual or groups of patients.

The Air Force utilises five classifications of dental fitness, the Army has four classifications while the Navy has no classification of treatment priority.

The Air Force Dental Corps Manual has detailed instructions in assessing dental fitness as follows:

a. Class 1. No treatment required

b. Class 2. Routine (but not early) treatment required for conditions:

1. moderate calculus
2. prosthetic cases not included in Class 4.
3. caries not extensive or advanced.
4. periodontal disease not extensive or advanced.
5. oral conditions requiring corrective or preventive measures.

c. Class 3. Early treatment required of conditions:

1. extensive or advanced periodontal disease
2. pulpal or apical infection.
3. chronic oral infections.
4. heavy calculus
5. cases requiring removal of one or more
teeth or other surgical procedures not included in Class 5.

d Class 4. Essential prosthetic treatment required, includes cases with insufficient teeth to maintain masticatory efficiency or those in need of prosthetic essential to their duty. Essential removal of teeth associated with this prosthetic requirement is also included in this classification.

e Class 5. Emergency treatment required for conditions which include.

1. injuries;
2. acute oral infections (acute periodontal and periapical abscess)
3. acute pulpitis;
4. acute gingivitis
5. acute stomatitis.

Further detailed instruction of examination are given in the Dental Manual as follows:-

a Type 1. (Idean Examination)

1. Mouth mirror and probe; exploration and palpation;
2. adequate artificial illumination;
3. full mouth intra oral periapical and posterior bite-wing radiographs; and
4. periodontal screening examination, dia-
grotic casts, transillumination, percussion and thermal, electrical or other tests when indicated.

b Type 2. (Routine Examination):
   1. Mouth mirror and probe exploration and palpation;
   2. adequate artificial illumination; and
   3. posterior bitewing radiograph and periodontal screening when indicated.

c Type 3. (Modified routine examination)
   1. mouth mirror and probe, exploration and palpation; and
   2. adequate natural or artificial illumination

d Type 4. (Screening examination):
   1. mouth mirror and probe, or tongue depressor examination; and
   2. available illumination.

Type 1. Initial examination and examination prior to posting to an overseas location.

Type 2. examinations are conducted for members:
   1. Prior to posting to a base without dental facilities.
   2. At six monthly intervals.

Type 3. examinations are conducted for annual examinations and on commencement of recruit training.
Air Cadets, Cadet AirCrew and apprentices are examined six monthly, other members are examined 12 monthly.

In the authors opinion, the procedure of standardization of examination is of utmost importance. Dental officers participate in the programme and need to be trained to give uniformity of interpretation of what is found in the examinations. It is important to define criteria for the assessment of dental disease to be recorded and these criteria should be written in Dental Manual.

Another important field is the classification of dental conditions as it is the most practical procedure to arrange comprehensive treatment to achieve dental fitness and to evaluate dental efforts provided. Military dental service is directed by the time table when treatment has to be completed. It depends on the particular Service into what levels dental condition should be grouped, but each category of classification must have clear definition and instruction of the assessment of level dental disease into each class group.

By this procedure evaluation results could be expressed as the percentage of persons having specific Class condition as well as the commonly used dental indices. Both professional and non-professional persons
would understand the evaluation.

The Canadian Forces make three classifications coded only by colour on the Dental Record. Preventive measures have been part of the programme in all the Forces. The colour codes used are:

1. **Red code** for those persons having dental fitness and received anticariogenic agent treatment.

2. **Blue code** for those requiring minimal treatment less than three hours chair-time to make the service member dentally fit.

3. **Yellow code** indicates those requiring extensive treatment more than three hours chair-time to make dentally fit.

Further definition of dental fitness is written in their Preventive Manual Book:

a. has received preventive treatment;

b. is free from pain;

c. is free from active carious lesions and has no significant periodontal involvement; and

d. is fit in the judgement of dental officer to carry out his military roles without need for other than emergency dental care for one year.

The Royal New Zealand Forces have incorporated
preventive measures into practice. Preventive treatment is routinely applied prior to any restorative treatment. Every member is treated with preventive agents once every twelve months. The target is all new entries and members posted overseas.

So far, preventive measures, in terms of primary prevention applied in the armed services are:

1. fluoride prophylaxis treatment
2. fluoride topical solution
3. fluoride dentifrice
4. dental health education

**Fluoride prophylaxis treatment.**

The Royal Australian Navy use 10 per cent of $\text{SnF}_2$ prophylactic paste while R.A.A.F. use 10% of $\text{SnF}_2$ - sirconium silicate as do the New Zealand Forces.

The Canadian Forces use "self preparation" paste consisting of acidulated fluoride phosphate (AFP) mixed with a 10 per cent of $\text{SnF}_2$ pumice in a ratio of 4 ml to 5 gm of $\text{SnF}_2$.

It depends on the evidence of dental research which component would be of choice. For military purposes, it
should be possible to apply preventive measures on a mass basis as the Canadian and United States Armed Forces have already shown as practical.

Muhler \(^{39}\) suggested the use of stannous fluoride zirconium silicate while the U.S. Navy used an ordinary stannous fluoride prophylactic paste and proved significant for adult persons by self-application technique.

The self-application technique is based on the Muhler experiment \(^{39}\). The teeth are divided into four quadrants and each quadrant and each quadrant is brushed using a new paste. The U.S. Navy experience \(^{46}\) is described as follows:

The teeth are divided into four quadrants by using the mid line of maxilla and mandible. Each quadrant is divided into facial, lingual and occlusal direction for one minute; then with new paste added to the toothbrush the same procedure is repeated for the lingual surfaces. For one minute: Then occlusal surface are brushed with new paste for 30 seconds.

Each time one quadrant is finished, the patient is allowed to rinse. Time for each quadrant needed is only \(\frac{2}{3}\) minutes and the total time for complete brushing is 10 minutes.
Fluoride topical solution.

Ten per cent of Stannous fluoride topical solution is mostly accepted and utilised in the armed forces.

Technical procedure is based on the Muhler\textsuperscript{14} suggestion. The U.S. Navy experience\textsuperscript{15} was that 15 second topical application was as effective as 4 minute application as proposed by Muhler.

After the teeth surfaces have been brushed by prophylactic paste and the patient allowed to rinse, the teeth are isolated with cotton rolls. The teeth are dried thoroughly, then the freshly prepared fluoride solution is applied continuously on the tooth surfaces. The teeth are kept wet for 15 seconds. The patient is not allowed to eat or drink for 30 minutes after the procedure.

The U.S. Navy applied this procedure each 6 months while Muhler suggests once a year for adults.

Fluoride dentifrice.

Stannous fluoride dentifrice is the most and widely used (\textasciitilde 4 per cent SnF\textsubscript{2} containing dentifrice). In this phase the point is the correct toothbrushing using fluoride based dentifrice. The instructions received and the experience by the patient in the self-application stage play
an important role in this stage.

**Dental Health Education.**

Dental Health education for individual at the chairside or for a group is stressed for good oral hygiene, to reduce sugar in the diet and the importance of having their teeth checked regularly. However, the education for the patient should emphasize what the patient should do for their benefit by themselves.

Preventive programme in the armed forces is prevention and treatment. Prevention in terms of the application of preventive measures into daily practice, and maintaining his dental fitness after he has been given fluoride preventive agents.

The Canadian Forces' Preventive Programme has objectives to:

1. give a degree of fluoride cariostatic prevention to all service members annually.

2. maintain dental fitness of those previously made fit;

3. expand the incremental dental care programme with the aim of achieving dental fitness for the maximum number of service members.
Second a half days of treatment time each week is used by all clinic officers in the maintenance care of those persons with dental fitness and those persons requiring minimal treatment to make them dentally fit.

The remaining portion of the work-week is directed to handling those persons with treatment requiring more than three hours of clinical time to make them dentally fit under voluntary appointments.

The new concept of dental service is preventive orientated programme in controlling the treatment needs of the service members.

The U.S. Army $^{7,48}$ has further implemented the preventive philosophy in the service. Nearly every installation in which fluoridation of water supply was considered to be feasible either had begun or had been approved for the fluoridation procedure. This is of course of benefit only to young dependents.

As a means of providing guidance for clinical practice in conformance with the preventive philosophy, 6 basic phases for treatment planning were developed $^{48}$:

1. Urgent: Treatment of an emergency nature or those deemed necessary to prevent early development of an emergency condition are performed first.
2. Periodontal therapy: No surgical, restorative or other than those deemed urgent are attempted until all soft tissue disease is controlled.

3. Prophylaxis: Stannous fluoride prophylaxis takes place at this phase.

4. Topical stannous fluoride.

5. Occlusion: All obvious discrepancies in occlusion are corrected. Surgery, restorative procedures and prosthetics are then performed.


Education of profession is included in the programme. A one week course each year for dental officers who then participate in the programme is concerned with preventive training.

One half day each week is for preventive treatment with the remaining work-week for treatment (restorative) and maintenance care purposes.

The U.S. Airforce 18 Preventive programme has been
developed as an integral element of the U.S.A.F. Dental Service. Five major phases of preventive practice have been:

1. Oral prophylaxis

9 per cent per month of assigned troops strength was provided oral prophylaxis. Each person then received prophylaxis annually.

2. Oral health education phase.

All servicemen were taught (individual or group) what they could do for themselves to protect their teeth, reduce intake of sugars and seek regular professional attention.

3. Public Health Phase.

Water fluoridation at Air Force Base, dietary supplements containing fluoride.

Fluoride topical solution was added to the phase 1 programme after Muhler's studies and analysis of the effectiveness of the topical application of stannous fluoride in the U.S.A.F. preventive programme.

4. Professional Service phase.

This phase includes periodic examination to ensure early discovery and arrange fast treatment to prevent pulpal and periodontal involvement. Advisory service is included in this phase.
5. Research phase.

The U.S.A.F. research project developed with a special responsibility to investigate more complete data relating to the effectiveness of stannous fluoride, other basic and clinical sciences.

Investigation of mouth guard protection for astronauts and pilots of high performance aircraft, oral hygiene techniques for astronauts in which a dry tooth brush was used; extensive study on ultra-speed tooth-cutting instruments.

Components of preventive measures have already been applied into daily practice in the armed service applicable to each level of prevention as was suggested in a W.H.O. publication 54. These levels suggested are:

**Primary Prevention:**

1. Health Promotion: - dental health education
   - education for periodic dental examination good standards of nutrition, adjusted to developmental phases of life.
   - attention to personality development.
   - genetic counselling
provision of optimum living conditions.

2. Specific protection:

- attention to personal oral hygiene
- use of environmental controls such as water fluoridation topical application of fluorides and other preventive measures.
- protection against occupational and recreational hazards, e.g. use of mouth guard.
- use of specific essential nutrients (of which fluorine is one)
- protection from carcinogens, e.g. anti-smoking measures.

Secondary Prevention:

1. Early diagnosis and treatment:

- care finding measures, such as radiographs.
- screening surveys, such as oral cancer screening programmes.
- dental recall systems
- treatment of decayed teeth.
- professional cleaning of teeth.
- elimination of infections
- provision of orthodontic appliances and space maintainers.

Tertiary Protection:

1. Disability limitation:
   - treatment to control dental caries and periodontal disease
   - and to prevent further consequences and sequels.
   - provision of appliances to restore function and appearance.
   - treatment of other oral disease and conditions.

2. Rehabilitation:
   - education of individuals for appropriate use of dentures.
   - pre-surgery and post surgery education for oral surgery patients.

Attention to oral hygiene and specific protections is nowadays brought into its programme by the U.S. Navy\textsuperscript{28}. This is combined with health education to promote a good attitude and habits of oral hygiene care by the members.
The U.S. Navy programme is known as "plaque control" as part of their preventive programme. Obviously, by controlling dental plaque caries and periodontal disease can be controlled.

Prior to self application of prophylactic paste, the patient chews a disclosing tablet so that the patient can have a picture of his condition. For evaluation purpose the Navy Plaque index was established. Six teeth are examined. In the maxillary teeth: first right molar, first left central incisor, first left bicuspid.

Mandibular teeth: first left molar, right central incisor, first right molar.

The most posterior tooth is substituted for any missing tooth, except the nearest adjacent tooth for central incisor. Numeric scores of six different areas of each tooth examined on facial and lingual surface are:

1. Mesial proximal surface is scored 3 when plaque is found in contact with the gingiva.

2. The gingival area is scored 2 when plaque is found in contact with the gingival tissue.

3. Distal proximal surface is scored 3 when the plaque is found in contact with the gingival tissue.
4. Score 1 when plaque is found on any tooth surface which is not in contact with gingival tissue. (The mesial and distal area are measured at the facial and lingual angles)

The highest total score of one tooth is the Navy plaque index for the individual examined.

After completion of self application prophylactic paste another disclosing tablet is chewed to make a comparison with the previous picture. These procedures and experience are preceded at home by using stannous fluoride dentifrice.

It is the author's opinion that self application technique is of much importance and applicable in military service. By this procedure large numbers of persons can be treated at once. Essential benefit of this method is the direct involvement of the patient in the self care as they are educated and asked to do things for themselves.

This is a good technique to educate patients to develop habits and attitudes of oral health care. And also the self application procedure is a more economical effort in terms of time and dental manpower. The U.S. Navy experience shows that only 5 minutes was allocated
to instruction in self application prophylactic paste. Ten minutes was allocated for accomplishment of the procedure.

Then 15 seconds was provided for each man to have a 10 per cent topical solution of SnF$_2$ application following self application. Ten minutes for each group of four men to be instructed in good oral hygiene. Total expenditure of time for four men to get a three agent SnF$_2$ treatment was 26 minutes. All procedures are carried by dental hygienists under the supervision of dental officers. In one year 6,220 men could be treated by one dental hygienist, versus 2000 by conventional methods. The study shows that the increments of caries averaged 2 + DMFS per year, by the new technique they can prevent at least 1 lesion per year. By this method one auxiliary can prevent six times as many as carious lesions per year as a dentist can correct in one year, if the lesions are allowed to develop. This study shows the effectiveness of preventive programme in terms of time and effort provided to maintain dentally fit condition.
METHODS OF MEASUREMENT AND EVALUATION.

To measure and evaluate effectiveness of preventive programmes, one must conduct surveys. Surveys are part of the evaluation and the measurements are determined by the indices utilised.

Prior to planning or introduction of any dental programme, we measure the extent and severity of dental diseases in the community. For this purpose, we make a cross section survey as our initial base line data. Based on initial data, we plan a programme, carry it into action, and later check the result by means of an evaluation survey.

Data from any survey can only be shown in statistical form. Therefore they are called statistical data. The measurement of data we are surveying must follow statistical procedures and concepts and the survey itself must have a standard procedure so the level of comparability between the results of surveys may be attained.

The full cycle of planning, execution, evaluation in dental programmes can be described as follows\(^9\).

1. We make a prevalence survey (So), verify a need (N) and make the eliminations of this need our long range objective (L.O.), if we cannot accomplish this on a short term basis.
3. We select a short term objective under the assumption that it will be a significant step towards the elimination of N. (Need)

4. We choose a procedure - X to attain our short term objective.

5. We devise a plan whereby this procedure can be applied to the extent desired to attain this short term objective.

6. We put the plan into action.

7. We verify if the plan is properly carried out.

8. We verify if the procedure is effective in attaining the short term objectives.

9. We verify if significant progress is made towards our larger objective.

Thus, in a preventive programme where preventive measures known and available nowadays are to be used the procedure will be:

1. Base line prevalence survey (So)

The evidence of dental research shows that fluoride ions can prevent the teeth against caries attack and if they are used as a prophylactic, topical application and dentifrice can reduce caries attack up to 75% DMFT per person. We apply this preventive fluoride agent to a pilot group of people.

2. We make an evaluation survey for a pilot group treated (S₁)
3. If there is significant change in the pilot group the procedure is not put into a programme for the whole community.

4. We make another evaluation survey ($S_1$) survey to verify the programme effectiveness in our efforts to eliminate the needs in our $S_0$ survey.

The first evaluation survey ($S_1$) is actually only the survey of a small population selected and treated. The impact of the preventive programme on the community picture ($S_0$) will depend on how closely the number of individuals in the selected group ($n$) approaches the total number of population under our responsibility ($N$). Ideally, the ratio $n/N$ should be equal to one.

The second evaluation survey ($S_2$) is the survey on the random sample of the whole population in the community. If the programme had already been applied on the whole community basis then the effectiveness should be shown as the difference between $S_0$ and $S_2$ survey data.

In caries prevention programmes, the DMF (T) index is the most valuable measurement unit. A comparison of the age-specific (DMF (T) index in the base line and evaluation surveys reveals the effectiveness of preventive programmes.
1. **SURVEY.**

Survey means collecting facts or data, while evaluation is the interpretation of facts once they have been collected, comparison being made between the current survey data and comparable data from other times or places. The aims of dental surveys are:

1. To determine the type and extent and severity of dental disease and conditions relative to other health problems;
2. To obtain objective data which can be used in evaluating the effectiveness of dental health programmes;
3. To stimulate and maintain public awareness of the importance of dental health.
4. To assess the extent to which a community or nation can and will support an effective curative and preventive programme;
5. To determine for epidemiological research purpose the prevalence and incidence of dental diseases and conditions in different groups of people and to elucidate the factors responsible for or associated with the differences manifested between groups.

To get an accurate estimation of data for these aims
the survey is standardised and the assessment of dental
diseases is clearly defined and should be easily understood
by dentists with different attitudes, scientific concepts,
training and experience.

In other words, general descriptions of the survey
should be clearly stated, what is the purpose of the
survey and material covered, methods of examination,
method of sampling, the assessment of dental disease,
date and duration.

Survey could be designed for the purposes of:

1. evaluation of dental health status of the population
2. evaluation of the effectiveness of a mass control
   preventive of a dental disease
3. Clinical evaluation of a preventive or therapeutic
   measure
4. evaluation of the effect of a single variable in
   the epidemiology of a specific dental disease or
   abnormality.

Survey designed for the second purpose utilise
   technique the same as or refined from that employed in the
   first group.

Surveys designed for this third group are part of the
clinical trial. The $S_1$ survey mentioned above could be designed as the third group while the $S_2$ survey is the same as the second group. The $S_0$ survey is the first group. Thus, $S_0$, $S_1$ and $S_2$ surveys utilize the same technique, unless the $S_1$ survey is specially designed for clinical trial.

Material covered.

In any survey, material covered should be clearly stated. The location of the survey taken, population covered, persons examined, age, sex, ethnic group etc.

Method of examination.

Methods of examination stated is determined by the purpose of the Survey$^{53}$;

1. Complete examination:

Using mouth mirror and explorer, adequate illumination, thorough roentgenographic survey, and, when indicated, percussion, pulp vitality tests transillumination, study models and laboratory tests.

This method is suitable for clinical evaluation where clinical trial will be tested, can seldom be used in public health surveys.

2. Limited examination:

Using mouth mirror and explorer, adequate illumination, posterior bite wing roentgenograms;
when indicated, periapical roentgenograms. This method is of great value where public health programmes combine services to individual patients with population work survey, and gives superior results for pure survey work where time and money permit.

3. Inspection:
Using mouth mirror and explorer, adequate illumination. This method is the most used in public health surveying.

4. Screening:
Using tongue depressor, available illumination. This method is too unreliable for most public health surveys.

Thus, for $S_0$ surveys and $S_2$ surveys, the type 2 or type 3 examination method should be used. Type 1 examination should be used for $S_1$ survey if it is designed for a clinical trial.

Further, W.H.O. recommended that for dental health survey to be internationally reported, examination should be carried under the following conditions:

(a) lighting, artificial or natural, of the oral cavity be not less than that provided by a 100 watt source at a distance of between 18 and 24 inches from the patient's mouth.
(b) gauze and hand air syringes only be used for removal of debris and saliva.

(c) plane dental mirrors be utilized.

(d) dental probes equivalent to Cleve-Dent explorer No. 5 be utilised and for no more than 50 examinations and be discarded previously if obviously blunted or otherwise damaged.

It is appreciated that by this method, caries recorded may underestimate that which would be diagnosed by radiographs. Since this bias may be considered approximately constant, it may be ignored when establishing rates for comparative purposes.

For a survey where treatment needs is the aim and the evaluation purpose is for this aim, then the examination should provide the roentgenograms which need to be standardised too.

Clearly defined clinical criteria for all observations are essential. Prior to the carrying out of any survey, the examining dentist and their assistants should receive training to ensure accurate observations and accurate interpretations and recording.

Standardisation of examining dentists is not
practicable for comparison of dental health surveys carried out before and after a period of time or for comparisons of surveys in different places. Only for longitudinal surveys where it is part of clinical trials such standardisation is recommended. It is best to have several examiners share in each survey.

A practical number of examiners within one community survey should not be less than 12 and preferable 20 regardless of numbers of subjects examined. The reduction in the diagnostic variations affecting the total results is suggested as likely to be approximately proportionate to the square root of the number of examiners. In other words, the average estimate of a large number of examiners is likely to be nearer the truth than one made by an individual examiner.

For evaluation of effectiveness of preventive programme combined services to individual patients type 2 (limited examination is the best technique. The point here is, the method of examination in any survey should always be stated to ensure that data collected are reliable.
2. **INDICES.**

Clinical criteria in any survey should be clearly defined and easily understood by dentists so the interpretation of different examiners will give more uniform results. Indices are required to reveal the conditions in the areas:

1. dental caries.
2. periodontal disease.
3. oral hygiene
4. handicapping dentofacial anomalies.
5. treatment level.

Indices utilised for each of these areas should be

1. simple
2. reproducible
3. be capable of being expressed numerically
4. be suitable for statistical analysis
5. be meaningful when interpreted both to professional and to non-dental groups.

Dental Caries.

Dental caries is defined as a localised, post-eruptive, pathological process of external origina involving softening of the hard tooth tissue and proceeding to the formation of a cavity.
Further, for recording purposes, clinical caries is defined as a cavity diagnosed by mouth mirror and probe examination.

White and/or chalky spots; disclosed or rough spots; hard stained pits of fissures in enamel which catch an explorer but not a detectably softened cavity floor, undermined enamel, or a breakdown in the walls of the pit or fissure is excluded.

Life caries experience is the past caries and existing clinical caries together. This is expressed as the sum of the number of decayed, missing and filled teeth (D+M+F).

Further W.H.O. has defined the following criteria:\textsuperscript{54}:
Decayed teeth (D) is the existing teeth with clinical caries.
Missing teeth (M) is teeth which are lost due to dental caries.
Filled teeth (F) is teeth which are decayed but have been treated and filled.

Past caries is manifested either by a filling or by loss of the teeth due to dental caries. Care needs to be exercised in discriminating between teeth missing because of caries and those missing due to other causes such as
periodontal diseases.

Prevalence: is the term used to express the frequency of clinical dental caries in existence at a particular point of time.

Incidence: is the term used to express the frequency with which new cavities appear during a stated period of time.

Indices of dental caries:

1. Point prevalence rates.
   
   This index indicates the percentage of the population affected.

   Measurement: Number of persons with one or more cavities (clinical caries) with one, or more teeth missing because of caries or with one or more teeth filled, divided by the number of persons examined and multiplied by 100.

   The rates should be expressed specifically for age groups.

2. DMF index:

   This index indicates the average number of teeth affected per person. It is a quantitative expression of permanent teeth which are affected per person.

   Measurement: \[
   \frac{D + M + F}{\text{Number of persons examined}}
   \]

   For a more detailed study DMF surface is used. DMF(S)
indicates the average number of permanent teeth surfaces affected per person.

Measurement: Total surfaces which are decayed, missing and filled divided by the number of persons examined.

Rules for recording:

1. No tooth or surface should be counted more than once. If a tooth is both filled and decayed it is counted as decayed.

2. Unerupted teeth or teeth not present due to reasons other than caries are not counted as a missing.

3. D.M.F. teeth or surfaces should be listed separately first since the components of DMF count are of great interest.

Prevalence rates will provide answers to the questions:

What proportion of the people require treatment for clinical caries?

What proportion of the people have teeth missing because of caries?

What proportion of people have teeth filled?

DMF index will provide the answer to the questions:

How intensively has dental caries affected the teeth per person?
3. Incidence:

The incidence of dental caries is the difference between the mean of DMF teeth in two different specified periods of time (usually one year). It indicates the mean number of newly decayed permanent teeth per person per year.

Measurement: By conducting two surveys separated by one year interval of time.

The incidence would also approximate the difference between the mean age-specific DMF index of successive age groups.

Periodontal disease.

Periodontal disease is defined as a pathological process of an inflammatory and degenerative type that involves the periodontium. They are generally characterised clinically by gingivitis, pocket formation, loss of alveolar bone.

Thereby periodontal disease is classified into superficial lesions, and deeper lesions. That is, the lesion of gingiva and the formation of periodontal pockets.

Gingiva: inflammation of the gingiva is recorded when there is evidence of any one or more of the following signs around one or more teeth:
- redness
- swelling
- ulceration
- bleeding

Periodontal pocket: Pocket formation is recorded if it is more than 3 mm in depth. No specific attempt is made to differentiate between true pockets and false pockets.

Indices of Periodontal disease:

1. Prevalence rates.
   Indicates:
   (a) the percentage of persons with one or more signs of periodontal disease – either inflammation of the gingiva or pockets or both.
   (b) the percentage of persons with one or more signs of inflammation of the gingiva around one or more teeth;
   (c) the percentage of persons with one or more pocket

2. Periodontal Index.
   This index indicates the average intensity of periodontal disease per person.\(^4\)
<table>
<thead>
<tr>
<th>SCORE</th>
<th>CRITERIA AND SCORING FOR FIELD STUDIES</th>
<th>ADDITIONAL X-RAY CRITERIA FOLLOWED IN THE CLINICAL TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NEGATIVE. There is neither overt inflammation in the investing tissues nor loss of function due to destruction of supporting tissues</td>
<td>Radiographic appearance is essentially normal.</td>
</tr>
<tr>
<td>1</td>
<td>MILD GINGIVITIS. There is an overt area of inflammation in the free gingivae, but this area does not circumscribe the tooth.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GINGIVITIS. Inflammation completely circumscribes the tooth, but there is no apparent break in the epithelial attachment.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>(Not used in the field study)</td>
<td>There is early, notchlike resorption of the alveolar crest.</td>
</tr>
<tr>
<td>6</td>
<td>GINGIVITIS WITH POCKET FORMATION The epithelial attachment has been broken and there is a pocket (not merely a deepened gingivae). crevice due to swelling in the free gingivae). There is no interference with normal masticatory function, the tooth is firm in its socket, and has not drifted.</td>
<td>There is horizontal bone loss involving the entire alveolar crest, up to half of the length of the tooth root (distance from apex to cementoenamel junction)</td>
</tr>
<tr>
<td>8</td>
<td>ADVANCED DESTRUCTION WITH LOSS OF MASTICATORY FUNCTION. The tooth may be loose; may have drifted; may sound dull to percussion with a metallic instrument; may be depressible in its socket.</td>
<td>There is advanced bone loss, involving more than one-half of the length of the tooth root; or a definite intrabony pocket with definite widening of the periodontal membrane. There may be root</td>
</tr>
</tbody>
</table>
resorption, or rare-fraction at the apex.

RULE: WHEN IN DOUBT, ASSIGN THE LESSER SCORE

In application the most difficult decision required of the examiner would seem to be that of distinguishing between negative gingivae and gingivae with mild gingivitis. Comparability at this point is enhanced if a score for gingivitis is assigned only when the inflammation is clearly evident at first glance in good light and the effect of disagreement here is minimized by the manner in which scoring is weighted. Throughout the scale, the problem of the questionable diagnosis is avoided by the rule which instructs the examiner to assign the lesser score whenever he finds himself in doubt.

The P.I. index is the total score divided by the number of persons examined.

Oral hygiene.

Since the relation between certain types of periodontal disease and oral hygiene is so marked and uniform, it is important to include the assessment of oral hygiene in the survey. An index of oral hygiene is the simplified Oral Hygiene Index (OHI-S)
The O.H.I-S27 has two components:

1. Debris index (D.1)
2. Calculus index (C.1)

Tooth examined

1. the buccal surfaces of the upper molars distal to the second bicuspid.
2. Lingual surfaces of the lower molars distal to the second molars.
3. the labial surfaces of the upper right and lower left central incisors.

(in the absence of mentioned molars, the posterior molar is substituted).

The absence of antior teeth, the adjacent tooth is substituted.

D.1. Scorings: 0 - no debris or stain present

1 - soft debris covering nor more than one third of tooth surface being examined or the presence of extrinsic stains without debris regardless of surface area covered.

2 - soft debris covering more than one third but not more than two thirds of the exposed tooth surface.

3 - soft debris covering more than two thirds of the exposed tooth surface.
C.1. Scorings: 0 - no calculus present

1 - Supragingival calculus covering not more than one third of the exposed tooth surface being examined

2 - Supragingival calculus covering more than one third but not more than of the exposed tooth surface, or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth.

3 - Supragingival calculus covering more than two thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth.

O.H. index = \( \frac{D.1 + C.1}{6} \)

Average O.H. index = total O.H.I. persons examined

2. Percentage of people with:

1. supragingival calculus

2. subgingival calculus.

3. Plague Index.

There is no accepted international index for plaque
but a classification is widely used and suggested. to estimate the oral hygiene of individual. The tooth is painted with basic fuchsine then the plaque is scored as follows:

0 = no plaque
1 = plaque covering not more than gingival third.
2 = plaque covering more than one third but not more than two third.
3 = plaque covering more than two third.

Both facial and lingual surfaces of the teeth present are scored.

The total scores for individual examined is the plaque index.

Dentofacial anomalies.

No attempt is made to classify these anomalies other than on the basis of whether or not they require treatment.

Index: The age, specific percentage of persons, who have a handicapping dentofacial anomaly which requires treatment.
The reason for treatment required is grouped into:

1. prognathism
2. retrognathism
3. deep overbite
4. open bite
5. crowding
6. spacing
7. other

The assessment of needs for dental prosthesis.

The age specific percentage of persons need or wearing:

1. full dentures
2. partial dentures

This percentage can also be expressed separately for the upper and lower jaws if the information is recorded as follows:

<table>
<thead>
<tr>
<th>Upper</th>
<th>Lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requiring full dentures</td>
<td>Requiring partial dentures</td>
</tr>
<tr>
<td>Wearing full dentures</td>
<td>Wearing partial dentures</td>
</tr>
</tbody>
</table>
3. METHODS OF SAMPLING

A sample is a limited number of individuals from the population we are surveying. The population is a specific group and must be defined dependent on the concern of the investigator or on the purpose of the survey.

A sample is used for convenience and economy. There are two types of samples of the community:

1. Random sample, is a group of the population chosen by chance, where every individual in the population has an equal chance of being selected as part of the sample.

2. Stratified sample, is a sample from the population after first divided into more or less homogenous subgroups or strata, then random samples are taken from this subgroup (strata).

In order to get a representative sample of the population, stratified sample often gives a most satisfactory result where we can divide first into typical age, economic and other groups which are meaningful.

The importance of sampling method here is to give proper weight of each different characteristic group of the population into our sample. Random sample can be made from a complete list of names we are surveying.
In a dental survey, the population is usually divided into ago specific group then random sample is taken from each group.

Error derives from the random sample can be eliminated if more individuals from the population are brought into the sample. However, it has been recommended that 200 persons from each specific age group will give a satisfactory result\textsuperscript{10,15}.

For a longitudinal survey, which is part of the clinical trial, the size of the sample cannot be estimated unless the magnitude of increments and the variation between individuals to be expected, can be derived from a pilot study or a similar study reported in the literature. In this case, the same individuals are examined. For example, in a clinical trial of the effectiveness of \textit{SnF}2 two groups of individuals serve as a test and control group are examined before and after a period of time.

However, in a preventive programme, a cross-section survey will show the age-specific prevalence of dental caries, and the difference of this figure obtained at a stated period of time (usually one year), will show the effectiveness of the programme.
Random sample for a cross section study could be made from the charts where an annual detailed charting of dental conditions is carried out as part of an intensive diagnostic and follow-up programme.

Tabulation and computation of data:

For tabulation of data to be internationally accepted, dental indices should be computed in age-group as 15-19 years, 20-24, 25-29, 30-34, 35-39 years and so forth.

Record form into which data from any survey are charted is determined by the dental indices to be estimated and should have a facility for tabulation of the result of individuals examined.

From this form, data are then transferred into tabulation form in age specific groups, to make a figure of that particular age-group examined.

For computation, the data, if it is expressed as a rates the denominator is always the total persons examined (sample size)

Figure 1: is an example form recommended by V.H.O. for tabulation of a survey result.
## Example of a Dental-Health-Survey Report Form

### DENTAL HEALTH SURVEY REPORT FORM

<table>
<thead>
<tr>
<th>NUMBER OF PERSONS EXAMINED</th>
<th>TOTALS</th>
<th>AGE GROUP</th>
<th>M/F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>15-19</td>
<td>20-24</td>
<td>25-29</td>
</tr>
<tr>
<td></td>
<td>30-34</td>
<td>35-44</td>
<td>45-54</td>
</tr>
<tr>
<td></td>
<td>55-64</td>
<td>65-74</td>
<td>75+</td>
</tr>
<tr>
<td># NUMBER OF TEETH PRESENT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>primary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>permanent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DENTAL CAVITIES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ns. of persons with one or more teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average no. of teeth per person</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no. of persons with one or more DMF teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average DMF teeth per person</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERIODONTAL DISEASES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>clinical signs of periodontal diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inflammation of gingiva only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pockets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CALCULUS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>supragingival</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>subgingival</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HANDICAPPING DENTOFACIAL ANOMALIES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total persons requiring treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>because of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cleft palate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cleft lip</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>peg incisor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>retrognathism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>deep overbite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>open bite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>crowding of teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spacing of teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NUMBER OF PERSONS WITH NEED FOR DENTAL PROSTHESES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>all natural teeth absent</td>
<td>upper jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>all remaining natural teeth indicated for extraction</td>
<td>upper jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wearing full dentures</td>
<td>upper jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>lower jaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>lower jaw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

*Optional*

**Date of reporting**

**Signature**
Some statistical criteria must be understood for presentation of a survey result.

Mean: is the statistical name for the arithmetic average which tells something of the general level of performance for a particular group or a particular measure at the particular time.

Measurement: add all the measures or score in the group and divide by the number of measurements.

Standard deviation: is a measure of dispersion which indicates how much variability is present within a particular group of scores which tend to cluster around the mean.

Measurement: \[ S.D. = \sqrt{\frac{\sum d^2}{N}} \]

\begin{align*}
S.D. & = \text{standard deviation} \\
\sigma & = \text{deviation from the mean} \\
N & = \text{number of measurements}
\end{align*}

Standard error: is a measure which tells approximately how much the statistic derived from a sample could be expected to deviate from the value which would be obtained if the entire population had been measured.
There are three measurements of standard error:

1. Standard error of mean, is a measure that would estimate the limits within which the mean score would probably be found if every individual were measured.

   Measurement:
   \[
   \text{S.E. mean} = \frac{S\cdot D}{N}
   \]

2. Standard error of rate or percentage, is a measure that would estimate the limits within which other rate or percentage would probably be found from the same universe, or from other similar samples.

   Measurement:
   \[
   \text{S.E.}_p = \sqrt{\frac{P'Q'}{N}}
   \]

   \(P'\) = percentage of (probability) of event occurring.
   \(Q'\) = percentage (probability) of event failing to occur.

3. Standard error of difference, is a measure which indicates the limits within which the observed difference between two means or rates or percentage would occur from similar samples.

   Measurement:
   \[
   \text{S.E.}_{A-B} = \sqrt{(SE_A)^2 + (SE_B)^2}
   \]

   \(SE_A\) = standard error of mean, or rate or percentage of a series of measurements A
$SE_B = \text{standard error of mean, or rate or percentage of a series of measurements B.}$

**Evaluation**

In preventive programme, the base line data obtained from the So survey mentioned previously, will be required for the prevalence, incidence and severity of dental disease in the community, which is the members of the armed forces.

All data should be collected and dealt with by approved statistical methods. Once the programme is launched, it is necessary to ensure that information is available to allow for a continuing evaluation of the programme. For instance, the time spent by the staff, the people served and the cost involved. Information of this kind should be collected in the form of a day-to-day service records that at weekly or monthly intervals are made available for evaluation purposes. This method of evaluation is known as a continuing evaluation.

Periodic evaluation in terms of a survey made similar to the base line survey can either be done by direct or indirect methods.
The Direct method is a survey conducted directly on the population to whom the programme is applied. This can either be by surveying the records or by examining the population individually. Then the result of measuring the prevalence and DMF index can be related to the baseline data.

The Indirect method is used when the results of a particular action may not always be immediately apparent or easily measured. For example, a dental health education programme which is part of the preventive programme would be considered successful if in the community there was a change in behaviour (a change for better in its attitude towards early dental treatment), a lowering of incidence of dental disease, a marked improvement in standards of oral hygiene or a lower consumption of cariogenic food.

It is recommended that both direct and indirect methods be used so that evaluation can be as thoroughly done as possible.

The effectiveness of preventive programmes can be shown in the reduction of mean DMF teeth person in the evaluation survey, or the increase of persons with no treatment needed.
The difference between the means or percentage in baseline and evaluation surveys is to be statistically significant if it is large when compared to the standard error of the difference.

\[
t = \frac{\text{difference between mean or percentage}}{\text{S.E. of difference.}}
\]

\(t = \) is significant if the value is 3 or more.

The probability of the difference observed being due to chance alone can be determined from tables of "t"

In the presentation of the mean or percentage measurement it should always be accompanied by the standard error of that measurement of rate.
2. EVALUATION METHODS USED IN THE ARMED FORCES.

From the general review of preventive programmes in the armed forces, evaluation is made in terms of the increase in the number of persons receiving dental care or who achieved dental fitness, or evaluation of treatments such as the number of fillings, extractions and other operations related to the number of patients treated. Obviously, weekly, monthly or quarterly dental returns were designated for evaluation purposes.

Every dental officer in dental service must report the total treatment provided related to the total attendance in dental returns. Those are the summation of daily treatments which are recorded in detail on dental records. Each treatment provided by dental officers or his auxiliary under his supervision is recorded in the Personal Dental Record, and this type of operation is reported to the Director of Dental Services in terms of weekly/monthly/quarterly returns.

The original dental records of each member of the Service are kept in the Headquarters, and are obtained from the Initial dental examination at the time a member enlists to enter the Service. Each member has his own duplicate Personal Dental Record which he keeps with his wherever he is posted.
Any changes of his dental condition as the result of the evidence of dental disease or of treatments he received are recorded in his duplicate Personal Record. These changes are reported to the Headquarters attached to quarterly or annual dental returns.

This day to day or continuous evaluation was mentioned as a means to evaluate dental conditions of every member, the services provided, the costs of service and the dental manpower employed.

The measurement of dental conditions of a member, (and thus the group indices) depends on how well the personal dental record is designed and on how clearly the dental fitness is defined. If dental record already has facilities to record the dental indices internationally suggested, then the measurement of indices on dental return can be done by each dental officer since every member is examined initially and annually.

Thus, the base line data can be obtained from the initial examination or from annual examination prior to introduction of a new programme or technique.

The base line initial examination is always conducted in the Armed Service. Unless specially designed to measure the indices, as was done by Helman 28 in the U.S.
Navy Recruits, Bernier and McFall of the U.S. Army; Dale or Duncan of the Australian Army the initial examination was only made for the military purposes of identification and to arrange treatments.

As the annual examination, as for the initial examination, the indices used are only designed to up date Personal Dental Records and arrange treatment.

Some of these indices consist of classification of dental conditions of the members. This classification ranging from "treatment not required" to "emergency treatment required" was designed to arrange treatment by grouping personnel in priority of treatment to make them dentally fit.

The "treatment not required" or "dentally fit" category was utilised as a measurement of the effectiveness of preventive programmes.

For example, a survey made by Simaha from dental records of 3,863 records at the Bergstrom U.S. Air Force Base, Texas, in 1955/56 was compared to the data prior to initiation of a preventive programme in 1952. Based on the dental classification system, which is up-dated at each annual dental examination, he found 30 per cent increase in Class 1 (no dental treatment required).
Elwell[^1] Chief, Department of the U.S.A.A.F. Dental Service, made a survey in 1967. About 42.7 percent of the officers and 36.9 percent of the airmen had received topical fluoride preventive treatment (topical fluoride treatment applied for those members with dental fitness Class 1) Bernier[^2] evaluated the effectiveness of preventive programmes at the U.S. Army Headquarters by surveying quarterly dental returns. He found persons receiving topical SnF₂ applications in the period:

April - December, 1961 42,455
January - September, 1962 95,214.

However, the component of evaluation procedure was already there. The direct evaluation by means of annual examination compared to the base line "data" prior to initiation of preventive programme is conducted routinely. The continuing evaluation is also made routinely in terms of dental returns.

If the measurement of "indices" dental classification could be accompanied with the measurement of internationally known indices particularly the measurement of DMF index, then "data" from initial or annual examination could be better interpreted as statistical data.
Each examination could be regarded as a survey after all conditions and procedures had been standardised.

A survey from the records was also made by the Canadian Forces Dental Service 19. From all dental records in 137 full time and 49 part time clinics existing in 1966, serving the total service population of 102,027 servicemen, 9352 charts with service members ending in 3 years were chosen. They foundDMF teeth score of 17.93 per person age 18-52 years, ranging from 10 DMF teeth for age 18 to 21 DMF teeth for age 48. The DMF score increased with age. Then, in 1968 they launched a preventive programme. By continuous evaluation they found that 15,816 members were dentally fit after one year; about 1.99% reduction total treatments provided (6% reduction in extractions, 2% reduction in filling, 10% reduction in bridgework) In 1970, 51% of Service strength are in a dentally fit condition.

To summarize, the evaluation is made by measuring dental fitness and treatments provided.

We are interested in measurement, not only of dental fitness, but also DMF teeth index for comparison purposes, so the effectiveness is not only shown in the increase of persons with dental fitness, but also in the decreasing of incidence of dental caries, thus related to the decreasing of treatments provided.
Dental Records.

In general, dental records used in the Armed Services are:

1. Personal Dental Records or Dental History Envelope
2. Dental Health records or Dental History Cards.
3. Dental Treatment records
4. Other records for specific purposes.

In the Royal Australian Navy Dental Service and New Zealand Forces, dental treatment forms serve also as a dental health history record. The R.A.M.F. used dental records as a dental history envelope. The R.A.A.F used a separate form for dental treatment, dental history envelope and dental health records.

Personal Dental Records or Dental health history envelope consist of:

1. dental condition record on entry
2. dental health history
3. dental condition on discharge

Dental health history on the evidence of dental condition during one's duty in the Service. The history is taken from periodic or annual examination.
## DENTAL HISTORY ENVELOPE

**DATE ISSUED:**

### PERSONAL NUMBER

### ALLERGY OR DRUG REACTION (USE RED INK)

### RANK (PENCIL)

### SURNAME

### GIVEN NAMES

### ABBREVIATIONS

### DENTURES

- F.U.D. - FULL UPPER
- F.L.D. - FULL LOWER
- P.U.D. - PART UPPER
- P.L.D. - PART LOWER

### PERIODONTAL SCORE (UPPER)

### PERIODONTAL SCORE (LOWER)

### ABBREVIATIONS

- A.F. - AMALGAM
- S.F. - SILICATE
- G.I. - GOLD INLAY
- J. - JACKET CROWN
- P. - POST CROWN
- M. - METAL CROWN

### X.L.A. - EXTRACTION

### EXAMINING DENTAL OFFICER

### H.M.A.S.

### DENTAL CONDITION ON ENTRY (USE BLUE OR BLACK INK)

### DATE OF ENTRY

### DATE OF DISCHARGE

### DATE MADE DENTALLY FIT

### PARTICULARS OF DENTAL TREATMENT SUBSEQUENT TO ENTRY (PENCIL)

### TOOTH

### PERIODONTAL SCORE (UPPER)

### PERIODONTAL SCORE (LOWER)

### ABBREVIATIONS

- LINGUAL

### METAL DENTURES

- P.U.M.D. - PART UPPER
- P.L.M.D. - PART LOWER

### TOOTH

### * ORIGINAL

### * DUPLICATE

### * DELETE ONE
Figure (2) is the example of Personal Dental record use in the R.A.N. Dental Service.

FIGURE 2.

Personal Dental Record used in RAN Dental Service.
### D.M.F Index =

### Periodontal Index = Total Periodontal Score
Number of Teeth
On Entry =
On Discharge =

### ORAL HYGIENE INDEX

#### O.H.1

#### ON ENTRY

<table>
<thead>
<tr>
<th>Debris Score</th>
<th>Right</th>
<th>Ant</th>
<th>Left</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculus Score</th>
<th>Right</th>
<th>Ant</th>
<th>Left</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### ON DISCHARGE

<table>
<thead>
<tr>
<th>Debris Score</th>
<th>Right</th>
<th>Ant</th>
<th>Left</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculus Score</th>
<th>Right</th>
<th>Ant</th>
<th>Left</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower B/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DENTO-FACIAL ANOMALIES ON ENTRY
(Place a tick in appropriate box)

<table>
<thead>
<tr>
<th>Prognathism</th>
<th>Retrognathism</th>
<th>Open Bite</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deep Overbite</th>
<th>Crowding</th>
<th>Other (Specify)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ASSESSMENT OF NEEDS FOR DENTAL PROSTHESIS ON ENTRY
(Place a tick in appropriate box)

<table>
<thead>
<tr>
<th>Wearing Full Dentures</th>
<th>Lower Jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requiring Full Dentures</th>
<th>Upper Jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wearing Partial Dentures</th>
<th>Lower Jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Requiring Partial Dentures</th>
<th>Upper Jaw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dental Return Forms:

In general dental return forms used in the armed service:

1. Daily treatment form
2. Weekly form
4. Other forms for specific purpose (for instance, laboratory data returns).

The monthly/quarterly/annual return including Laboratory return and dental personnel returns.

The Weekly or monthly return is the summation of Daily treatments.

The Quarterly or annual dental return could be taken from a direct examination carried out or the total monthly treatments provided. The same form is always used for quarterly or annual return or even for monthly return.

This return form was designed to evaluate persons with dental fitness related to the total treatments provided.

Examples of dental returns are shown in Figures, 3, 4 and 5.
# Quarterly/Annual Dental Return

**M.A.S.**

**Quarter Ending**

**Year Ending, 31st December, 19...

## Operative Treatments

<table>
<thead>
<tr>
<th>Malgams</th>
<th>Inlays</th>
<th>Silicates</th>
<th>Sevriton</th>
<th>Cement Linings</th>
<th>Temporary Fillings</th>
<th>Root Fillings</th>
<th>Pulps</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Compound</td>
<td>Gold</td>
<td>Metal</td>
<td>Non-Metal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crowns</th>
<th>Bridges</th>
<th>Recemented</th>
<th>Dental Examinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Surgical Treatments

<table>
<thead>
<tr>
<th>Esthetics</th>
<th>Abscesses</th>
<th>Apicoectomy</th>
<th>Alveolectomy</th>
<th>Cysts</th>
<th>Fractures</th>
<th>Gingivectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Alveolar</td>
<td>Periapical</td>
<td>Periodontal</td>
<td></td>
<td>Max</td>
<td>Mand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extractions</th>
<th>Surgical Removals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ple</td>
<td>Surgical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minor Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titis</td>
</tr>
<tr>
<td>Pyorrhoea</td>
</tr>
<tr>
<td>Dry Socket</td>
</tr>
<tr>
<td>Post Operative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prosthetic Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
</tr>
<tr>
<td>Acrical Realizations</td>
</tr>
</tbody>
</table>

### X-rays

- Intra-oral
- Bite Wing
- Occlusal
Figure 3. Example of Dental Return used in the Royal Australian Navy Dental Services.
### PART I - DENTAL PROCEDURES

#### A. OPERATIVE AND CROWN AND BRIDGE

<table>
<thead>
<tr>
<th>Army</th>
<th>Navy-Marine</th>
<th>Air Force</th>
<th>Dependents</th>
<th>All Other</th>
<th>Total</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>AMALGAM (One surface)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>AMALGAM (Two or more surfaces)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>BASE INTERMEDIATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>RESIN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>ROOT CANAL FILLING (Teeth)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>SILICATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>TEMPORARY OR SEDATIVE FILLING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>GOLD (Inlay, onlay)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9.</td>
<td>BRIDGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>GOLD CROWN (All types)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>11.</td>
<td>RESIN CROWN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>RESIN CROWN WITH METAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>OTHER CROWNS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>CROWN OR BRIDGE REPAIR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### B. PROSTHODONTICS

<table>
<thead>
<tr>
<th>Army</th>
<th>Navy-Marine</th>
<th>Air Force</th>
<th>Dependents</th>
<th>All Other</th>
<th>Total</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>DENTURE, RECONSTR., RELINE, REPAIR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>FULL DENTURE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>PARTIAL DENTURE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>OTHER MAXILLOFACIAL APPLIANCES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### C. ORAL SURGERY

<table>
<thead>
<tr>
<th>Army</th>
<th>Navy-Marine</th>
<th>Air Force</th>
<th>Dependents</th>
<th>All Other</th>
<th>Total</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.</td>
<td>ABSCESS, INCISION AND DRAINAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>ALVEOLECTOMY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>APICOECTOMY</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>25.</td>
<td>BIOPSY</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>CYSTECTOMY</td>
<td></td>
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</tr>
<tr>
<td>27.</td>
<td>FRACTURE MANDIBLE REDUCTION</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>28.</td>
<td>FRACTURE MAXILLA REDUCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>FRACTURE (Other) REDUCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>ROOT RESIDUAL REMOVAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>TOOTH REMOVAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>TUMORS (All types) EXCISION</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>33.</td>
<td></td>
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<tr>
<td>34.</td>
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<td>35.</td>
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<td>36.</td>
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</tr>
</tbody>
</table>

#### D. PERIODONTICS AND ORAL HYGIENE

<table>
<thead>
<tr>
<th>Army</th>
<th>Navy-Marine</th>
<th>Air Force</th>
<th>Dependents</th>
<th>All Other</th>
<th>Total</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.</td>
<td>EQUIBRATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>38.</td>
<td>GINGIVECTOMY</td>
<td></td>
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<tr>
<td>39.</td>
<td>GINGIVITIS OR STOMATITIS TREATMENT</td>
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<tr>
<td>40.</td>
<td>PROPHYLAXIS</td>
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<tr>
<td>41.</td>
<td>SCALING (Periodontal)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>42.</td>
<td>CARIES PREVENTION TREATMENT</td>
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<tr>
<td>43.</td>
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</table>
Figure 4 - Example of Dental Return used in the United States Armed Forces Dental Services (front page)
### PART I - DENTAL PROCEDURES (Continued)

<table>
<thead>
<tr>
<th></th>
<th>ARMY</th>
<th>NAVY-MARINE</th>
<th>AIR FORCE</th>
<th>DEPENDENTS</th>
<th>ALL OTHER</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. RADIOODONTICS</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>44. INTRA-ORAL ROENTGENOGRAM</td>
<td></td>
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</tr>
<tr>
<td>45. EXTRA-ORAL ROENTGENOGRAM</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>F. OTHER</td>
<td></td>
<td></td>
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<tr>
<td>46. EXAMINATIONS (Types 1, 2, and 3)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>47. ORTHODONTIC TREATMENT</td>
<td></td>
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</tr>
<tr>
<td>48. POST OPERATIVE TREATMENT</td>
<td></td>
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<tr>
<td>49.</td>
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<td>50.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>51. TOTAL PROCEDURES LINES 1 - 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52. TOTAL PATIENTS TREATED</td>
<td></td>
<td></td>
<td></td>
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</tr>
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</table>

### PART II - LABORATORY DATA

<table>
<thead>
<tr>
<th></th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. TEETH REPLACED IN ITEMS 10 AND 19, PART I</td>
<td></td>
</tr>
<tr>
<td>B. PROSTHETIC APPLIANCES PROCESSED (Items under Part I, Section B)</td>
<td></td>
</tr>
<tr>
<td>1. ENTIRELY IN REPORTING FACILITY</td>
<td></td>
</tr>
<tr>
<td>2. PARTLY IN OTHER FACILITY (Name)</td>
<td></td>
</tr>
<tr>
<td>3. ENTIRELY IN OTHER FACILITY (Name)</td>
<td></td>
</tr>
<tr>
<td>C. CHROME-COBALT OR OTHER NON-PRECIOUS METAL APPLIANCES</td>
<td></td>
</tr>
<tr>
<td>1. CAST LOCALLY DURING REPORTING PERIOD</td>
<td></td>
</tr>
<tr>
<td>2. MAXIMUM MONTHLY POTENTIAL OUTPUT</td>
<td></td>
</tr>
</tbody>
</table>

### PART III - CLASSIFICATION OF ACTIVE DUTY PERSONNEL (At end of month)

<table>
<thead>
<tr>
<th>MILITARY STRENGTH SERVED</th>
<th>NUMBER CLASSIFIED</th>
<th>CL. 1</th>
<th>CL. 2</th>
<th>CL. 3</th>
<th>CL. 4</th>
<th>CL. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPORTING FACILITY</td>
<td>OTHER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. ARMY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. NAVY-MARINE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. AIR FORCE</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. GRAND TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PART IV - REMARKS

<table>
<thead>
<tr>
<th>DATE</th>
<th>TYPED OR PRINTED NAME AND GRADE</th>
<th>SIGNATURE</th>
</tr>
</thead>
</table>

*U.S. GOVERNMENT PRINTING OFFICE: 1961 O - 579432*
Figure 5 - Example of Dental Return used in the United States Armed Forces Dental Services (back page).
If Dental Record was designed so that indices of persons examined could be recorded then the calculation of this indices for the group could be made on Dental Returns form to complement the dental fitness measurement.

In this case calculations could be made directly from each examination from daily treatment forms, or from the records at any time needed.

The point is, to be internationally accepted, the method of examining and recording, the utilisation of indices and the measurement of indices and the technique of examination must be standardised.

For this purpose the Dental Record itself should have space to record the following items, so a survey from the records or the computation of information found by the examination could be accepted.

1. A. Identification:
   1. Name
   2. Age (last birthday)
   3. Rank and personal number
   4. sex

B. Diagram of teeth.

2. Indices Caries:
   1. Decayed teeth (D)
2. Missing teeth (M)
3. Filled teeth (F)
4. Total DMF teeth

Periodontal:
1. Plaque count
2. Periodontal index
3. Missing teeth (specify)

Dentofacial anomalies:
1. Prognathism
2. Retrognathism
3. Deep overbite
4. Openbite
5. Crowding

Denture required:
1. Full dentures - upper lower
2. Partial dentures - upper, lower
3. Wearing full dentures - upper, lower
4. Wearing partial dentures - upper, lower

3. Treatment level:
1. Class 1: no treatment required
2. Class 2: treatment required at earliest convenience.
3. Class 3: immediate treatment required.

4. Type of examination

5. Purpose of the examination.
Since the measurement of dental classification has not been internationally considered as the definition differs from one Service to another. This measurement must be accompanied by the indices mentioned.

It is interesting to note that dental plaque plays a decisive role in the initiation and development of marginal periodontal disease.\(^3\)\(^1\)

Any gingival inflammation associated with a deposit of supra-gingival calculus is believed to be initiated by bacterial plaque covering the calculus and not by the calculus itself.\(^3\)\(^2\),\(^3\)\(^3\),\(^5\)\(^2\)

The evidence of dental research suggested it is more important to control plaque which serves as a "barometer" for both oral hygiene and periodontal diseases rather than to control calculus itself which derives from dental plaque.

The plaque control was put into a programme in the U.S. Navy\(^2\)\(^8\) prior to measuring periodontal disease, plaque index was also measured.

It is important to note also the type of examination. A standard procedure should be established first so any result of the examination carried could be accepted as
source of data for particular purpose designed.
DISCUSSION

1. COMPARISON METHODS OF EVALUATION.

Internationally accepted:

1. The effectiveness of preventive programmes is measured and evaluated by means of:
   1. Base line survey
   2. Evaluation survey
      (a) Continuing evaluation
      (b) Periodic evaluation

2. Standardisation is made in areas:
   1. Indices
   2. Method of examination
   3. Sampling procedure

3. Unit of measurement: DMF teeth index

4. Significantly effective on the basis of the community needs. It is said to be effective when there is a decrease of the prevalence and incidence of dental disease.

5. Method of measurement is determined by the indices utilised for the purpose of the programme.
In the Armed Service:

1. Unless it is specially designed, the effectiveness of preventive programme is measured and evaluated by means of:
   1. Initial dental examination on entry
   2. Dental return
   3. Annual dental examination.

2. Standardisation has not been uniformly established in the field:
   1. Indices
   2. Method of examination
   3. Sampling procedure

3. Unit of measurement: dental fitness has not been standardised among services.

4. Significantly effective on the basis of the entire service figure: It is said to be effective when there is an increase of persons with the condition of dental fitness related to the dental treatment provided.

5. Method of measurement by calculating total persons with dentally fit condition and total treatments provided during a stated period of time.

It is evident that standardization of indices
utilised, method of examination and sampling procedure has not been established.

For evaluation purposes, three major procedures should be established first so data obtained in the annual examination could be compared to the base line initial examination data, particularly in the measurement of indices.

**METHOD OF MEASUREMENT AND EVALUATION WHICH COULD BE USED BY THE ARMED SERVICE.**

Preventive programme in the armed forces is prevention and treatment of dental diseases. The aims are evident:

1. to decrease the incidence and prevalence of dental disease;
2. to increase persons with dentally fit condition.

The evaluation should be done for these two aims by measuring dental indices and dental fitness.

The application of fluoride prophylaxis, fluoride topical solution, dentifrice have been clinically tested and reduce caries attack. It was suggested in the literature that the application of three stannous fluoride
treatment can reduce the incidence of dental caries by 73% per person.

This technique must be part of a programme as well as the provision of maintenance care to achieve dental fitness.

Verification to check if the programme is properly carried out by administrative control in terms of monthly or quarterly return.

From this return, one can make evaluation of:
1. total treatments provided; all kinds of treatments including preventive treatments.
2. total persons treated.

By this procedure we are evaluating the progress of the preventive programme, thus evaluating the number of persons with dental fitness.

If we assume that indices as internationally suggested (page 21) are already utilised, method of examination for the purpose of the examination (page ) was already established; and details of definition and instruction was already written in the Dental Manual (so every dental officer can perform the suggested procedures ) then the
base line data and evaluation data can be obtained from the initial or annual examination.

Attention should be placed in the sampling procedure if the examination cannot be done to all personnel. Or if the survey is made from dental records a sample is needed for simplification of computation of the data obtained.

Since Dental Services consist of several dental units spaced in different areas, to make the Service figure by combining units figure, each unit must produce data in the same level and the same procedure. In other words, once the sample (from individual to be examined or from the records) is made, the same method of sampling must be conducted in each unit, so data can be combined automatically to make the Service figure.

Error derived from the examiner can be eliminated by training dental officers participating in the programme.

These standardisations of procedures is intended:

1. to produce (obtain) statistical data in "comparable level"
2. to simplify the pooling procedure to make the Service figure.
Comparable level data means the same utilisation and measurement of defined indices; the same interpretation of criteria, the same technique of examination, the same experience of dental caries in terms of age groups.

For simplification of procedures in pooling data if it is designed to survey the records, then all dental units in the entire Service must conduct examination from the records. Or if it is designed to survey all personnel then each dental unit examines all persons under his responsibility.

If it is desired to make a random sample, each dental unit must examine persons or records selected to our sample. In this case, a random sample ratio must be established first. Then each dental unit has the same random sample ration.

For example if the total recruits with 17 years of age are 832, we need minimal 200 names (person or record) for our sample, then the sample ratio is 832:200 = 4.1 Every fourth name is taken to our sample. The random sample ratio has to be maintained the same in all dental units until the examination is accomplished.

List of names is available from the Personnel Department or Pay officer in any service. We assume that the
objective of the programme is to control dental caries, then the measurement of dental caries is DMF teeth index.

The method of evaluation will be DMF index contrasted to the base line data prior to initiation of preventive programme.

The point here is, the evaluation is made without conducting special survey since all procedure has been standardised and written in Dental Manual so each examination is regarded as a survey.

Following a mass examination for which the type examination had already been established, a tabulation and compilation of data for such examinations should be done and forwarded with monthly or quarterly dental return.

**Tabulation of data:**

After random sample ratio has been established, data recorded from examination, or from the record in the file, should be tabulated in age group on a standard form designed for this purpose. In other words, the same kind (type) of form for tabulation data is used for each age group, for all age groups, for one dental unit and for all combined unit data.
For example, this kind of form:

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Rank</th>
<th>Personal Number</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
<th>D</th>
<th>M</th>
<th>F</th>
<th>Diff</th>
<th>Other Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<tr>
<td>2.</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**TOTAL:**

**Per cent or mean:**

**Standard error:**

\[
(1) \% = \frac{\text{Total person with Class 1}}{n} \times 100
\]

\[
S.E. = \sqrt{\frac{\% (100-\%)}{n}}
\]

\[
(2) \% = \frac{\text{Total person with Class 2}}{n} \times 100
\]

\[
S.E. = \sqrt{\frac{\% (100-\%)}{n}}
\]

\[
(3) \% = \frac{\text{Total persons with Class 3}}{n} \times 100
\]

\[
S.E. = \sqrt{\frac{\% (100-\%)}{n}}
\]
(4) \[ \text{MEAN} = \frac{\text{Total D Column}}{n} \]

(5) \[ \text{MEAN} = \frac{\text{Total M Column}}{n} \]

(6) \[ \text{MEAN} = \frac{\text{Total F Column}}{n} \]

(7) \[ \text{MEAN} = \frac{\text{Total D+M+F Column}}{n} \]

\[ \text{S.E.} = \frac{d^2}{n} \quad d = \text{deviation from the mean of each score.} \]

Detailed instruction has to be written in each form of this kind.

Note in interpretation of:

1. Dental unit.
   This could be one dental unit only, or a combined unit, or the total service unit.

2. Unit Strength
   The total members of one unit, several combined units or the total strength of the Service as determined by dental unit.

3. Persons examined
   The total persons examined in one unit, several units combined, or in the entire Service.

4. Age: could be 17; 18; 19 or 15 - 19; or 20 - 24 etc.

5. Date of Examination
   Month or year. This indicates whether it is a 6 monthly or annual assessment.
When it is used as a combined unit figure, then the NAME column will be all the unit name and the indices of column will be the percentage or mean of each unit figure for the concerned age.

The same presentation and procedure of other age group, or for combined age figure.

For combined age groups, the figure obtained in each age group is computed to make the total figure. For instance, in Recruitment Centre, the age of recruits ranges from 16 to 19, and it is more valuable to examine each age group first then the figure (data) obtained is computed to make the age group of 16-19 figure.

The computation is possible by using weights equal to the ratio each age-population makes the whole. In this case we have 4 age populations \((16, 17, 18, 19)\) simply using code \(N_1, N_2, N_3,\) and \(N_4\).

The weights will be: 

\[
W_1 = \frac{N_1}{(N_1 + N_2 + N_3 + N_4)}
\]

\[
W_2 = \frac{N_2}{(N_1 + N_2 + N_3 + N_4)}
\]

The population size of each age group.

Then the combined Mean DMF will be \((W \times DMF)\).
The S.E. will be \[ \sqrt{\frac{(SE)^2}{(\text{number of group})^2}} \]

The combined percentages are similar. The formula will be:

\[
\text{Combined } \% = \frac{\left( P_1 \frac{N_1}{n} + P_2 \frac{N_2}{n} + \ldots \right)}{\left( \frac{N_1}{n} + \frac{N_2}{n} + \ldots \right)}
\]

\[
\text{S.E.} = \sqrt{\frac{P_1 (100 - P_1) \frac{N_1^2}{n} + P_2 (100 - P_2) \frac{N_2^2}{n}}{(N_1 + N_2 + \ldots)^2}}
\]

where \( p \) is the percentage in each age group

\( n \) is the number of sample in each age group

\( \Gamma \) is the actual combined population

Crude percentage for combined ages based on pooled data of each age may fail to reflect true conditions when sampling ratio is not constant over the ages or when sample sizes are reduced in older ages.

If periodontal care (control) had been included in the preventive programme, a column for tabulating periodontal indices can be added to this form, and so forth for other indices.

By the method described above, each dental unit can make his own evaluation of the population under his responsibility by comparing the result to the previous year, or to another unit which has not conducted preventive programme since the method of examination proceeding...
tabulation procedure are uniform in the entire service.

Collation and Computation of Data.

Another form needs to be designed for compilation of data. This form should be designed so that the indices which had been measured can be used to make a combined unit figure for the concerned age group. As long as sample ratio is maintained the same for the concerned age in all units the computations of data to make combined unit figure can be done simply by adding all totals divided by the total number of persons examined.

For instance, if Dental Service covers 5 States, each State has 2 or 3 establishments, each establishment has 3 or 4 dental units the same type of form is used at establishment state and Headquarter levels.

For example, of the suggested form:
DENTAL UNIT:
UNIT STRENGTH (N):
PERSONS EXAMINED (n):
RATIO:

AGE:
AGE GROUP:
DATE OF EXAMINATION:

INDEX: UNIT/ESTABLISHMENT
STATE
"A"
"B"
"C"
TOTAL

PERSON EXAMINED:

\[ \begin{array}{cccc}
\text{n}_1 & \text{n}_2 & \text{n}_3 & \text{n}_4 \\
\text{TOTAL} & \% & \text{S.E.} & \text{Total} & \% \text{S.E.(1)} \\
1. Class 1 & & & & \\
2. Class 2 & & & & \\
3. Class 3 & & & & \\
4 DMF & & & & \\
5. & & & & \\
6. & & & & \\
\end{array} \]

\[(1) \% = \frac{\text{Total persons examined with Class 1}}{n} \times 100\]

\[(2) \% = \frac{\text{Total persons examined with Class 2}}{n} \times 100\]

\[(3) \% = \frac{\text{Total persons examined with Class 3}}{N} \times 100\]

\[(4) \text{MEAN} = \frac{\text{Total DMF}}{n}\]

\[\text{S.E. of (1), (2), (3)} = \sqrt{\frac{\% \times (100-\%)}{n}}\]
S.E. of (4) = \sqrt{\frac{(S.E.)^2}{n^2}}

**Instruction Note.**

1. **Dental Unit.**
   
   If the form is used in establishment level then column "A" "B", etc. will be the unit concerned belonging to that particular establishment.

   So in level depends how many establishments belong to one State, how many to induce the active Service in the Headquarter level.

2. **Unit Strength.**

   Total personnel in an Establishment level, state level, Headquarter level.

3. **Persons Examined.**

   \[ \text{Total Sample} = \text{column } n_1 + n_2 + n_3 \ldots \]

4. **Ration.**

   Should be the same as in column "A"? "B", "C"

   If the ratio differs in each column, it should be adjusted (weighted) first to make a combined figure.

5. **Age.**

   Age groups 15 - 19 or 20 - 24, 25 - 29 etc.

   In Recruitment Centre it is best to compile in each age
range from 15 to 19, the age which is more susceptible
to dental caries and usually they study in the same place
for several years.

6. Date of examination.
Month and year should always be stated.

This instruction should always accompany or written
in this kind of form.

The procedure should be written in the Dental Manual
particularly the fixed time table of dental checking
at least must be conducted in the entire service or in
one s or in particular establishment, such as
Recruitment Centre.

The uniformity of this form is intended to have the
same presentation and processing data at all units level
at all times. If it is used in States level then the
Unit Strength will be the total manpower of the force
in the State; the Person Examined will be the total sample
size taken in all units.

The point is, the calculation and computation of
data from all units to make establishments level, or
from all establishments to make a State level figure, and
so forth to make the Service figure, must always be:
1. in age group
2. accompanied by standard error of the result of observation.
3. accompanied by the sample size and random sample ratio
4. accompanied by the total strength of the population from which the data is drawn.

Sometimes it is difficult to establish the same sample ratio in one unit to another, or in one establishment to another establishment or even in one State to another State. In this case, the indices obtained to make a pooled data figure, indices should be weighted by the total strength of combined Dental Units, all ages.

For instance, data from one examination for 19 year group of members taken in different sample ratio at three different places to make a combined figure. The indices should be weighted by a measure of total persons strength (population) in one place divided by the total combined population, all ages. By this procedure, data obtained is still in comparable level and indeed is the true estimation of the population examined.
DENTAL UNIT: RECRUITMENT CENTRE  
AGE: 19  
UNIT STRENGTHS: (RECRUIT ALL AGES)  
DATE OF EXAMINATION  
PERSON EXAMINED:

<table>
<thead>
<tr>
<th>INDEX</th>
<th>NOWRA</th>
<th>NIRIMBA</th>
<th>LEEUVIN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RATIO: 1 in 5</td>
<td>1 in 4</td>
<td>1 in 7</td>
</tr>
<tr>
<td>1.</td>
<td>Class 1</td>
<td>$p_1 \pm s.e.$</td>
<td>$p_2 \pm s.e.$</td>
</tr>
<tr>
<td>2.</td>
<td>DM.F.</td>
<td>Mean $\pm s.e.$</td>
<td>Mean $\pm s.e.$</td>
</tr>
</tbody>
</table>

Recruitment centre figure will be:

1. Class 1: 
$$\frac{N_1}{N} p_1 + \frac{N_2}{N} p_2 + \frac{N_3}{N} p_3 \%$$

S.E. = $\sqrt{(\frac{N^2}{N} x s.e.)^2}$

$V = N_1 = N_2 = N_3$

$N$ = Total recruits all ages.

$N_1, N_2, N_3$ = recruits all ages in each establishment.

2. Mean DMF:
$$\frac{V \times DMF}{N}$$

S.E. = $\sqrt{(\frac{N^2}{N} x s.e.)^2}$

The same procedure in State level to make the Service figure if the sample ratio is not the same.

By the same method, conducted each time examination is taken, the evaluation can be easily done by comparing data from two different periods of time, or by comparing data from one place to another.
The effectiveness of preventive programmes must be shown and projected to a population for whom the programme is subjected. If the programme is initiated in Recruitment Centres, then the population is all the recruits in the Centres including those Centres which have not applied preventive programmes. Since the method of examination sampling procedure and computation of data has been established throughout in the entire Service the Recruitment Centres figure can be made by pooling data obtained in each of the 5 States, in age groups. If recruits from Centres which have not slacked preventive programme go to the same state this data can be compared to other states or areas with preventive programmes.

If the programme is subjected to the persons under 30 years of age, then the population is all persons under 30 years in the entire service including those persons in places where the programme has not yet started.

By this method, data from Annual Examination can be compared to the Initial Examination or to previous Annual Examinations prior to the initiation of the programme.

For example, the compilation of data done in unit, establishment or State Level or even in the Service level:
In unit level, this compilation can be done directly from the tabulation form (Page )

In upper level to make a combined figure, the compilation is taken from the second form (page 94)

By this procedure, one can make his evaluation of his programme and the evaluation of the entire Service is the compilation of data made in lower levels. The lower levels figure is the component for the higher level figure.

If preventive programmes commenced in 1970 then Class 1 index should be greater in 1971, while DMF index should be decreased in the 1971 figure.

To test whether the difference of the result in 1971 and 1970 is significant, it can be checked by the formula:

\[ t = \text{difference} \]

\[ t = \frac{\text{difference}}{\sqrt{SE_{70}^2 + SE_{71}^2}} \]

\( t \) is the number of probability, and it is said statistically significant when the difference compared to standard error is greater than 3.
Other Assessments.

Maintenance Care.

Those members found dentally fit that have been treated with fluoride preventive agent as prescribed in an Annual Examination are re-examined after twelve months. Since the evidence of dental disease and treatment received are recorded in detail on their Personal Dental Records, on the following Examination (thus evaluations survey) the total treatment received during the year plus the requirement at the end of that year can be calculated.

Calculation can be made from random sample records on re-examination after dental fitness had been established in the previous examination.

For instance, the treatment procedures received and required are grouped into five main headings:

1. Preventive dent (included examination, radiographs, prophylaxis, topical fluoride oral hygiene, instruction, plaque control)
2. Periodontic (including missing teeth due to periodontal disease).
3. Restorative
4. Surgery
5. Prosthetic
Then total chairside hours (appointment) can be compared for each heading.

The maintenance care can be measured and shown as:
1. Percentage of procedure devoted for each group by calculating total procedures in each groups divided by the number of persons (records) examined, multiplied by ion.
2. Average accrual chairside hours to maintain in dental fitness by calculating the total chairside hours for the whole procedures divided by the number of persons (records) examined.

By this method the effectiveness can be compared to the figure in the area where preventive programme has not been improved. In the percentage distribution of procedures the decrease in the percentage of restorative periodontic and prosthetic procedures can be measured. In this case definition of each being (the assessment of dental disease into each group) and the chairside hours for each procedure need to be standardised first.

Dental Return

From dental return (figure ) we can calculate the total service provided during that year in one Dental
Unit, or combined Units to make State/Headquarters figures.

The sum of services relate to the total persons treated related to dental personnel in duty during that year.

The cost of Service can be estimated by calculating total procedure in each column multiply by the cost of procedure for that particular procedure (if already established).

By this method the cost of each group of procedures as mentioned above (5 groups) and the total cost of service in one dental unit can be computed. This figure related to the total persons treated.

Then, with a constant number of dental personnel, the effectiveness of preventive programme can be shown in:

1. Total persons treated as related to dental fitness category.
2. The cost of Service compared to the area where preventive programme has not been improved.
3. The Cost of each five group procedures.

One can expect that there will be an increase in the total persons treated; a decrease in the cost of
service compared to the previous year before the introduction of preventive programme on to the other area. Where preventive philosophy has not been improved since the main procedures are devoted, as one's expected, to preventive procedures.
SUMMARY

1. The changing patterns of dental treatment in the Armed Services has been described. The treatment concept has been combined with prevention philosophy. More preventive and less restorative procedures are being used to achieve and maintain dental fitness.

2. Preventive programmes operating nowadays are the application of preventive measures to the Recruits and personnel members aged under 30 years. The treatment with three fluoride agents, prophylaxis, topical application and dentifrice followed by periodic annual examinations has been introduced into a number of Armed Services. Dental Health education is given in the chairside or for groups of members.

3. The evaluation of the effectiveness of preventive programmes for dental caries is measured by the DMF index per person in periodic evaluations compared to the base line data. For periodontal disease measurement should be the percentage of persons with one or more pocket more than 3mm in depth and P.1. index per person

In the Armed Forces it is measured by the percentage
of persons with dental fitness in the annual examination, compared to the initial or previous annual examination.

4. The method of evaluation in the Armed Forces compared to the internationally accepted method has been discussed. Methods which could be used in the Armed Services routinely, at the periodic examination already carried out, and which would give international acceptance have been discussed.
CONCLUSION.

The type of examination to be conducted to assess the dental conditions of the Service members occasionally, six monthly or annually, has to be standardised.

The assessment of dental disease has to be an internationally accepted procedure and the dental record form is determined by the indices to be recorded.

Annual or periodic examination is regarded as a survey. A survey from the random sample of records can also be done. Measurement of indices should be done in age groups, so the periodic examination result could be compared to the base line examination, prior to the initiation of the preventive programme.

Data obtained in the lower unit or units level is the component of the combined higher level, therefore the procedures of examination, the method of sampling, computation and presentation of data should be uniform throughout the entire service.

The continuous evaluation in terms of total treatments provided, related to the total persons treated, the costs of service, the dental manpower is already established in the Dental Treatment Returns.
The effectiveness of the preventive programme must be shown in DMF index and prevalence; then for military purposes as "dental fitness", related to the costs of service, dental manpower for a given period of time (usually one year).
BIBLIOGRAPHY.


Martin, Captain; Deputy Medical Director - General (Dental Royal Australian Navy. Personal communication.


47. Sharp, R.G., Group Captain. Director of Dental Services, Department of Air, Royal Australian Air Force. Personal communication.


APPENDIX I. List of Personal Communications.


2. Fuller, J.F., Brigadier. Director of Defence Dental Service, New Zealand Armed Forces.


4. Martin, C.S., Captain. Deputy Medical Director General (Dental), Royal Australian Navy.

5. Sharpt, R.G., Group Captain.