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ORAL PROBLEMS
AND
THEIR MANAGEMENT IN THE AGED

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I INTRODUCTION

The increasing life expectancy has caused a rapidly increasing proportion of old people in the general population. Aside from physiological processes, being aged is not necessarily a problem insofar as the dental profession is concerned; however, the aged do contract chronic illness or suffer physical incapacities and they tend to have socio-economic and psychological difficulties. These imply that the providing of dental care for aged patients is much more complicated than merely setting up a clinic to treat them as we treat the general population.²⁹

The oral cavity plays an important part in the satisfaction to be achieved from life; all its functional activities whether concerned with food intake, communication or emotional expression contribute to the general health and well-being of the aged people just as to the remainder of the population. With present scientific advances, widespread concern on every level has resulted, and the dental profession, as an integral member of the health team, is beginning to receive its share of the problems and challenges in this expanding science.

However, as DAVIDOFF and DAVIDOFF (1972) have pointed out,

the delivery of dental care for the aged does have common problems as follows:

- i. medical conditions which deter effective dental care;
- ii. physical disabilities which limit the patient's capacity to benefit from dental care;
- iii. absence of, or limited, motivation;
- iv. inability to adapt to essential routines or to use prescribed appliances;
- v. difficulties in communication arising from many causes.

With the problems mentioned above, aged people may react abnormally in the dental situation. This requires a modified adjustment from the dentist. The dentist must prepare for that work by mastering the necessary equipment, by learning new techniques and by teaching others in his profession. He must also handle the problem in its fullest dimensions by finding out what is needed in his own community and what resources are available and by telling others what he has discovered.⁹⁷ Furthermore, the pattern of the problem is such that the dental practitioner alone would not be able to cope with the resolution of the problem. In implementation of dental services to this particular population group, the dentist must be aware of what principles apply to the patient who has dental problems in addition to various degrees of mental and physical illness and socio-economic difficulties. This also requires an

organized programme involving coordination of community facilities which includes social workers, general medical personnel, and voluntary service workers.⁴⁸

In this thesis, a review of articles in the literature and a correlation of many of their salient points is provided, in an attempt to find a reasonable avenue leading to a pragmatic approach, including coordinated, cooperative effort, interrelationships with the activities of public health, resolution of problems of procedure at the community levels, derivation of specialization (dental management for the aged) and trends for future improvement. All these are the keynotes of success in implementation of effective dental care for the aged.

II BACKGROUND OF ORAL PROBLEMS IN THE AGED

1. Definition of the Aged

There is still a controversy as to when a person can be called aged. The use of the word 'aged' is also a point of disagreement. Amongst holders of different points of view, some prefer to use 'aging' or 'elderly' and others refer to 'senescence' or to 'senior citizens'.

STIEGLITZ (1949) divided human life into three periods—evolution, maturity and involution. He made several subdivisions of these periods, but showed no sharp demarcation between them. The following table shows the details:

BIOLOGIC LANDMARKS	AVERAGE CHRONOLOGIC AGE AT ONSET PERIOD	PERIOD
Conception		Embryonic
		Foetal
Birth	9 mos $\pm$ 2 wks	New born
		Infantile
		Childhood
Puberty	12 yrs $\pm$ 2 yrs	Adolescent
		Youth
Fertility	16 yrs $\pm$ 3 yrs	Young adult
		Maturity
Climacterium (Female)	47 yrs $\pm$ 5 yrs	Later maturity
		Senescent
Old age	70 yrs $\pm$ 10 yrs	Senile

From STIEGLITZ (1949) P.9

CLEMENTS and ROGERS (1966) classified their subjects as elderly from 65 to 75 years and old beyond 75.

HENRY and SHELDON (1967) stated that a person as young as 35 years chronologically, may exhibit many signs of aging, and others 65 years of age and older may show few or no readily detectable symptoms of aging. This same idea was also seen in the statement of JAMIESON (1958). He said: "Biological age is not the same as physiologic time and chronologic age is not the same as biologic age."

WATKIN (1961) defined aging as "a progression of changes in biochemical processes which determine structural and functional alteration with age in cells and non-cellular tissue and hence the whole organism."

BOUCHER (1964) set out the conception that old age beginning at 65 years for man and 60 for woman is based on the selection of these ages for eligibility for retirement pension. He suggested that "the onset of age is that point at which there is a state of physical and mental deterioration, without evidence of disease." and further stated that from this time "independence cannot be maintained without further help---a point that is often reached in the middle seventies."

BIRREN (1960) presented abstract concepts of aging related to biological psychological and social aspects of living. He set up the following criteria:

i. Biological age will be correlated with chronological age, but also to some extent it will be independent of itself, since it must also correlate with the life span of the individual. Such a measure of biological age must be able to predict with a smaller error the residual life-span of the individual than prediction based upon chronological age alone.

ii. Psychological age can be used to refer to the age-related adaptive capacities of the individual. Presumably a measure of psychological age would correlate highly with chronological age and also, but to a lesser extent, with residual life span or biological age. From a measure of psychological age it should be possible to predict, within some error, the capacity of the individual to adapt to familiar as well as unfamiliar environments.

iii. Social age would also be related to chronological age, somewhat to psychological age, and to a lesser degree to biological age. Social age would refer to acquired social habits and status--to the individual's filling the many social roles or expectancies of a person of his age in his culture and social group. A social age measure would be a composite index to the individual's performance of social roles.

Thus to summarize, the elderly are not just old people, they are structurally, functionally and mentally different men and women than they were in the days of their youth and early maturity. No exact measure is possible by chronological age alone.

2. Social and Psychological Aspects of the Aged

A. Demographic background:

Because of a rising birth rate and a falling death rate, there have been demographic developments: a population explosion, in terms of the Malthusian approach. KROGMAN (1958) estimated that the world population will be 3,400 million in 1975. By 2050, this explosion will produce a world population of 13,000 million people.

An expert committee of W.H.O. (1959) indicated that the economic burden imposed by the aged in certain countries would rapidly become more serious and asserted that the social and medical effects of aging are felt more acutely in rural areas because the relative proportion of the aged begins to rise steeply as young people migrate towards urban districts. The committee further went on to state that population growth passes through a number of stages:

i. The first stage: a high birth rate is more or less balanced by a high death-rate. A large part of the African Continent as well as Indonesia, Iran and parts of South America are at this phase.

ii. The second stage begins when the death-rate starts to

decline while the birth-rate remains high; as a result the population expands. This is the pattern now manifest in a number of Asian countries.

iii. The third stage: the birth-rate also begins to fall but remains in excess of the death-rate and the population continues to expand. The populations that have reached this phase include those of USSR, of much of Eastern Europe and of Japan.

v. Finally a low mortality rate is in equilibrium with a low birth-rate, and the population remains stationary.

LOTZKAR (1963) asserted that there were 70 million people in the United States afflicted with some kind of chronic disease and 17 million of them were restricted in their activity. Approximately two million of the people afflicted with chronic disease were homebound, either in their own homes or in welfare homes or special nursing homes.⁵⁶ Those people represent a problem and a challenge to the dental profession. They need and will continue to need dental care.

SPIRO (1970) stated: "In 1900, which is less than one life time ago, there were only three million people in the U.S. who were 65 years of age and over, and they constituted 3 per cent of the total population. By 1965, they had increased to almost

19 million and there was one of them in every ten of the population. This number is increasing as the population 'explodes', and it has been extrapolated by statisticians that there will always be about 12 percent of the population who have reached and passed the arbitrary compulsory retirement age of 65 years."

In England and Wales, STORER (1966) indicated that there were 84,000 persons over the age of 65 in council homes and homes organised by voluntary organisation; 34,000 were in hospital geriatric units, 44,000 were in mental hospitals; making a total 162,000 elderly persons who were confined in institutions of one sort or another. He said the precise number of house-bound elderly persons is not known.

Editorials of the British Dental Journal (1971) referred to the fact that the number of people in Great Britain over 60 years of age has risen rapidly, from 2.9 million in 1901 to 10.5 million for 1971, representing about 16 percent of the total population.

BOUCHER (1964) described the dramatic change in the shape of the population of England and Wales. He said: "At the beginning of the century about one in every twenty-one persons was aged sixty-five or more; now the proportion is one in every eight

persons, and it is anticipated that at the end of another two decades the population will rise to one in seven."

The statistical informations of aged population for other countries are scanty. Judging from the fact of demographic developments in the United States and Great Britain, it is imaginable that populations are increasing undifferentially in other countries.

B. Socio-economic factors:

(a) Involuntary retirement:

The attitudes towards retirement vary from one to another. Some people enjoy their retirement years whereas others find frustration or boredom in this period of their lives.

HAVIGHURST (1960) stated that at least a third of people feel the economic pinch after they retire. He also listed the disadvantage of retirement in term of moral and spiritual meaning:

- (1) loss of basis for sense of worth;
- (2) loss of locus of social participation;
- (3) loss of source of prestige;
- (4) loss of chance to be creative and to achieve;
- (5) loss of chance to be of service to others;
- (6) loss of way of making time pass.

These six unfavorable effects of retirement are experienced to some degree by every person. Thus retirement means a feeling of isolation and loss of dignity and status. This separation of a person from the enterprise of work in society attracted the concern of STUMPF (1960). He called this group of people as 'second-story people'.

Accompanying this change in status, the older person

may give up all of his outside interest that have served to support and maintain his self-esteem. Instead, he becomes more preoccupied with himself and effects a complete social and emotional withdrawal.⁴⁵

(b) Change in family concept:

It has been claimed that the nuclear family is better adjusted to social and economic needs. This is the essential reason for the disorganization of the extended family. Social changes which disrupt the traditional patriarchal extended family would destroy the main form of social support which is enjoyed by the aged. STUMPF (1960) expressed this point of view: "Today we define the family chiefly in terms of mother, father and children. Grandparents are not included in the usual definition of the family; they are related to the family, but they no longer form the same integral part of the family as they once did. Grandparents are visited or they come for a visit; they are not incorporated intimately into the life of the family. For this reason, their funded wisdom has no normal channel of expression, nor does this wisdom have any authority, nor, finally, is it considered wisdom."

The effects of change on the aged are as follows:

(1) Increasing the sense of isolation: Industrial and urban development increase social and geographical mobility. A proportion of the aged are, as a result, left with few human contacts. BROWN (1960) has pointed out that "these factors tend to isolate the older patient from loved ones as well as from society. This feeling of isolation, however, is apparently not universal among the aged. It appears to be more related to social class and is primarily dependent on the expectations of the elderly persons; that is, only in the upper classes where they have high expectations of care and concern by their family, do they feel neglected and isolated when their expectations are not met."

(2) Decline in authority: With increased dependence upon others for sustenance, old people lose the right to order the affairs of family members and the curse of most aged persons is a feeling of uselessness and insignificance.⁵⁸

(c) Industrialisation:

Industrial development has been prone in the past to exacerbate the problem of the aged. With the development of urbanization, the traditional extended family tends to be dissolved. Meanwhile as a result of this draining-off of the young men to the cities, certain rural areas are left to the aged.

In the large cities, more work has been created due to rapid growth of industry. The most apparent serious consequence of full employment is that the mass of people from 15 to 60 (female) and 65 (male) years are out working and away from morning until night. This is in strong contrast to former generations when there was usually a daughter or grand-daughter at home looking after the old folk. Therefore, while the benefits of industrialisation as regards the prosperity of society are great, it weakens the stability of the home once marked by elderly people in retirement.

C. Psychological factors:

GIDDON (1965) believed that "psychologic disturbance in the geriatric patient is essentially a by-product of a complex interweaving of the patient's physical illness, socio-economic difficulties and his pre-existing personality pattern." ROMSEY (1970) further pointed out that these problems may be related to cerebral arteriosclerosis or other circulatory disorders, organic brain disease, disturbance of metabolism or nutrition and the effects of insecurity in the face of changing environmental situations.

BRACELAND (1963) commented that "the person in later years is thus threatened from two sides at once---first by a realization of

his own declining forces, and second, by the attitude of society."

As we speak of a loss of status or prestige, as mentioned in previous section, we are not only referring to the matter of reputation, but are also concerned with a person's deep sense of worth which comes from his feeling of competence. This is the idea which will be emphasized later in the section on the management in the aged.

MASSLER (1956) stated in one of the first papers that appeared on the subject of 'gerodontology' that many clinical symptoms of the aging patient may be related to mental and emotional upheavals; e.g. their lessened income, their lack of security, and their loneliness are liable to a variety of psychosomatic complaints.

Related to psychological problems in the aged, there are some common behavioural disturbances of significance to the dentist:

(a) Hypochondriasis:

BUSSE (1961) discussed hypochondriasis with which the high concern for his body is most likely the result of a withdrawal of his interests in other persons or objects or

as a displacement of his anxiety. STORER (1966) indicated that hypochondriasis is a neurosis in which the patient has an anxious preoccupation with the body or parts which the patient believes are diseased or not functioning properly. Furthermore, the patient will enter an emotional disturbance with anxiety about illness and fear of death.

MARTIN (1965) presented the idea that anxiety connected with unconscious fear is that involving the individual's 'body image'. He stated that "the importance of any given part of the body, reactions to any change in it, or any loss thereof have a history that performs a most significant function in the individual's overall emotional evaluation of his body, or in Schilder's term his 'body image'. It follows that any alternation or removal of a part of a person's body, or any threat, real or imagined, to any part or whole, is highly charged emotionally, and the individual's reactions cannot more than that is merely expected, what is considered a realistic reaction to any loss or change."

The mouth, more than any other receptor system, contributes greatly to early ego development. Thus any loss or change in the mouth evokes strong responses of fear including:

- (1) mutilation and castration.⁶¹

(2) loss of youth:

- i.. decline in vigour (male);
- ii. loss of attraction (female):

(3) becoming dependent.¹⁶⁷

(b) Depression:

The depression of older persons is more related to the loss of self-esteem, resulting from their inability to meet their own needs.. Many old persons who are mentally ill become apathetic, inert, retarded, and gloomy, with a decline in personal standards.⁵⁸

Among the more onerous stresses for the aged person are loss of status and isolation. Apart from socio-economic factors, isolation is often caused by bereavement, through the gradual disappearance of friends and relations and the death of a spouse. This may be followed by prolonged reactions of grief, mixed with depression and apathy.¹⁶⁷

Dental symptoms of depression were described by MOULTON (1955). Glossodynia or burning tongue, for example, is a common complaint of the aging depressed female patient. Women have more difficult adjustments in psychological stress, especially in

the age period of menopause which depresses them because they feel they are no longer young.

Generally, in old age, aggression is most frequently directed at the self which is reflected in hypochondriasis and depression. The overall psychological symptoms are diminishing of interest in learning new things, fear of inadequacy, uncertainty about the ability to control situation, accompanied by the tendency to favour accustomed routines rather than fresh exploration, and preservation of holdings rather than extension of gains.

3. Physiological Processes of the Aged

A. Characteristics of the aging process:

STIEGLITZ (1949a) stated that "each and every organism has its own physiologic age which may be greater or less than its chronologic age. Furthermore, no organism is of uniform physiologic age throughout, for different structures and systems age at different rates at intervals in the life span." More particularly, HENSCHEN (1964) further reported the different age-spans of different portions of the body as below:

leucocytes	-- a few hours or days;
red blood cells	-- 110 to 120 days;
placenta	-- nine months;
thymus	-- 20 to 25 years;
ovaries	-- 40 to 50 years;
central nervous system	-- life long.

SILVERMAN (1962) pointed out that aging must be viewed "as a three dimensional phenomenon, involving the chronologic age, the physiologic age, and the psychologic state of the patient."

STORER (1966) stated that the aging process of tissue "is believed to begin with the formation of cross linkages in

proteins as well as in nucleic acids resulting in complexes of giant molecules which are not useful biologically and which cannot be excreted by the organism."

SHOCK (1961) investigated subjects between the ages of 20 and 90 and assumed that a gradual loss of functioning tissue makes a major contribution to age impairments. He also assumed that in man the breakdown of regulatory mechanisms, whether they be neural or endocrine in character, plays an important role in aging.

STIEGLITZ (1949) indicated that: "Aging, which continues throughout the span of life progresses for more rapidly in the beginning than at the end; the rate of change (aging) is greatest in the fetus, less in the infant, still less in the child and after maturity becomes so slow as to be perceptible only by observation spaced widely apart." SHOCK (1961) mentioned that age changes become most apparent when the individual is subjected to some form of physiological displacement.

In referring to physiological age, SILVERMAN (1962) stated: "there is a general need for regarding aging as a normal life process and not as an illness. Also, it must be remembered that there is an interaction between the processes of health and those

of disease. There are a number of changes which take place in aging people may be accepted as physiologically normal for this group. Those are gradual desiccation, retardation of cell division and capacity of cell growth and tissue repair, lowering of the basal metabolic rate, cellular atrophy, increased pigmentation and fatty infiltration, gradual decrease in tissue elasticity with ultimate degeneration of the elastic tissue, decreased speed and strength of neuromuscular reaction and progressive degeneration of the nervous system." The same point of view was presented by DOUGLAS (1963) and CARLSON (1954).

Generally speaking, aging is a progressive normal process which begins at birth (or in prenatal life) and progresses at varying degrees depending on a series of factors. According to STIEGLITZ (1949), RYAN (1951), SILVERMAN (1958) and EPSTEIN (1967), these factors can be listed as below:

- i. hereditary;
- ii. health, closely related to social well-being;
- iii. disease, resulting from internal environment;
- iv. nutrition;
- v. psychological factors.

The characteristics of the aged can be summed up as follows:

- i. dehydration, fissuring (tissue fragility);
- ii. tissue atrophy and decrease in tissue elasticity;
- iii. retardation of cell division and capacity of cell growth and tissue repair;
- iv. lowering of the basal metabolic rate;
- v. increased pigmentation and fatty infiltration;
- vi. decreased secretions by cell epithelial structures.

B. Functional changes:

STIEGLITZ (1949b) pointed out that "functional changes of aging must be viewed from both qualitative and quantitative angles. The internal environment of an organism is maintained at an extraordinarily constant condition." This constant condition involves the coordinated activities of more than one organ system.

Although physiological and chronological age are not necessarily identical, a study by ROSENTHAL (1960) who examined 1200 clinic patients at Temple University School of Dentistry who were over 60 years of age revealed:

- 32% with cardiovascular disease;
- 21% with genito-urinary disease;
- 16% with respiratory disease;

5% with neurologic disease;

7% with arthritic disease;

2% with mental disease.

In explanation of functional changes during the aging process, SHOCK (1961) referred to the losses in reserve capacities of the aged subject. He presented two factors related to reduction in reserve capacities as follows:

- i. the gradual loss of functioning cells in specific tissues and organs;
- ii. the fact that the cells remaining in old tissues are less capable of performing their activities.

With increasing age, the organ systems will show the following age decrement in performance capacities of the total physiological function:

- i. Nervous system: impaired vision and hearing; diminished attention, memory and mental endurance,
- ii. Endocrine system: decrease or imbalance in secretion,
- iii. Muscular system: loss of functioning units, decrease in strength and speed.
- iv. Digestive system: diminishment of secretion of HCl and digestive enzymes leading to malnutrition,

v. Cardiovascular system:

--diminished cardiac activity,

--arteriosclerosis,

vi. Respiratory system:

--fibrosis,

--loss of vital capacity,

--decrease of respiratory efficiency leading to
problem of oxygen exchange,

vii. Urinary system: decrements in renal blood flow,

glomerular filtration rate, and tubular functions

which lead to the inference that nephrons disappear,

viii. Skeletal system:

--lessened ability to heal,

--lowered metabolism,

--decreased vascularity,

--reduction in red bone marrow,

--osteoporosis leading to bone resorption

(according to DOUGLAS 1963, SHODK 1961, SILVERMAN 1962,
STORER 1966, and HEANEY 1971.)

C. Oral changes:

While the above-mentioned bodily alterations are general in nature, they have direct effects in the mouth and on oral

function. Thus OBST (1962) stated that "degenerative or systemic conditions in aging patients may be influenced by their oral condition and the reverse is also true -- oral changes are often the result of general deterioration."

ROSENTHAL (1960) mentioned that: "Abnormal tastes and glosso-pyrosis may have their origin in hormonal change, anaemia, diabetes, vitamin deficiency, nerve injury or psychic factors. The mucosa and gingivae are atrophic with diminished keratinization and reduced elasticity." Furthermore, he also indicated that hypochlorhydria reduces utilization of calcium and phosphorus with ensuing halitosis of the cranial, facial and alveolar bone.

COOKE (1971) described angular cheilitis. He said: "In the elderly, the sagging of the facial tissues as a result of age results in deep folds in the angles of the mouth, probably due to lack of lip support. the cheilitis may persist due to maceration of the opposed epithelial surface and the saliva is drawn along the furrows by capillary action." He also added that the injured tissue has the tendency towards a greater incidence of monilial infections. Apart from this, angular cheilitis is a common result of loss of vertical dimension of the face.¹⁵⁵ Furthermore, the loss of vertical dimension of the face can be the result of extensive occlusal wear and attrition of the

teeth.¹⁷² The end result is pulpal recession which may be accompanied by physiological and pathological pulpal change.¹¹⁶ DOUGLAS (1963) added that age leads to gingival resorption and exposure of cementum, leaving sensitive tooth structure in contact with the oral and extra-oral environment. A long term effect of dental disease will be the loss of tooth.

A reduced salivary flow is often an annoyance of elderly people. These patients report generalized and constant dryness of the mouth, smarting and burning of their oral mucous membranes and difficulty in speech and swallowing. The reduction of salivary flow may be a symptom of diabetes, glomerular nephritis or iron deficiency.¹²⁷ COOKE (1971) considered this condition as a result of atrophied parenchyma which has been replaced by fibrous tissue. This is a senile degeneration of the salivary glands.

MASSLER (1956), GOLDMAN (1954), LAMMIE (1956) and ELFENBAUM (1970), all mention that the oral mucous membrane may become atrophic and friable with a loss of elasticity in the aged.

To sum up, oral changes in the aged can be listed as follows:

- i. Tissue changes such as dehydration of oral mucosa, progressive thinning of the oral epithelium, leaving

the tissue vulnerable to mild stresses, and nutritional-
ly deficient cells, resulting from avitaminosis A, B,
and C;

- ii. Bone changes due to calcium deficiency and poor bone metabolism, leading to osteoporosis and ridge resorption;
- iii. Abnormal taste sensations, including burning sensation, possibly due to avitaminosis B and low estrogenic levels;
- iv. Decreased salivary flow and resultant difficulty in denture retention;
- v. Changes in interarch space and concomitantly in the temporomandibular joint;
- vi. A general decreased efficiency of the masticatory apparatus;
- vii. Tooth loss caused by long term dental diseases.

D. The significance of physiological processes in relation to oral problems in the aged:

It is well known that aging is accompanied by increased pathology. The aged are people and their oral problems are part of the general health problems of people. The problem deserves to be grasped in its 'total person' aspects, not merely

in the sense of 'blood and vulcanite dentistry'.³²

At this point it may be of importance to point out the statement enunciated by the Council on Dental Health of the American Dental Association:¹²

- i. Many general pathological conditions with manifestation in the mouth may be discoverable first in the course of dental examinations, interviews or treatment. Thus dentistry has an important role in the detection, control or correction of numerous chronic disease or impairments;
- ii. Persons with chronic illness require dental care;
- iii. Many dental conditions may become chronic. If uncorrected they may cause chronic impairment of various functions. Such impaired functioning often may be a factor in disease.

Aging is an universal phenomenon, synonymous with declination of life capacity, which needs improved awareness to facilitate more effective services for the elderly handicapped.

4. Review of Dental Needs

The purpose of this section is to know the extent of the problem, the number of treatable aged in the community and the nature and extent of their dental needs.

In regard to the problems of determining needs for dental care for the aged, some sources seem to indicate a lessened need for dental care among the aged. DOUGLAS (1963) claimed that this information was distorted. He said: "The information that has been compiled on 'dental needs of the aged' is frequently nothing more than the 'dental demand of the aged', and to make the interpretation more untenable, dental demand is equated only in terms of numbers of people who seek dental care, not in terms of the nature, severity and effect on the patient's physical condition of the dental impairments."

There are two explanations for this lessened need for dental care among the aged. In the first phase, it is a socio-economic factor. As mentioned previously, status change may lead the older person to give up all of his outside interests that have served to support and maintain his self-esteem, and instead he becomes more preoccupied with himself and effects a complete social withdrawal. The second factor which may play a role in the lessened need for

dental care among the aged is a psychological one. The aged accept a certain amount of 'aches and pains' as part of normal living and as part of what they themselves might think of as 'getting older'. In this situation, the aged might stand for some trouble that younger people would not.²⁹

As DUNNING (1970) pointed out, the needs for dental care follow a numbers of factor. He commented that needs vary in different groups and that these needs should be determined with surveys of particular population groups through public health facilities.

In 1960, ROSENTHAL presented a statistical survey made at Temple University School of Dentistry of 1200 clinic patients over 60 years of age. The observation of the dental structures showed that:

24% --abrasion, erosion, attrition or fracture of the teeth;

37% --periodontal disease;

38% --caries.

He commented that only 43% of the periodontal changes were treatable, whereas 50% of the carious teeth could be restored.

In regard to those individuals who had exodontic experience, 87% required some prosthetic restoration, while only 11% could be treated by crown and bridges.

ZUR (1961) reported the results drawn from a survey of 1394 residents of nursing homes in northeastern, central and southern Illinois. It showed:

76% had dental needs;

33% had poor oral hygiene;

53% had poor mastication;

16% had soft tissue lesions;

29% were edentulous without replacements.

He commented that 42% of residents with needs could be satisfactorily treated without consideration of the economic factor. The remaining 58% had some physical or emotional condition which would limit treatment.

BALTZ (1962) and LOTZKAR (1963) reported a more comprehensive study conducted by the U.S. Department of Public Health. This project began in July 1957 and was completed in June, 1961 in Kansas City, involving 3,305 people ranging in age from 17 to 103 years. This study showed the following results:

- i. 67% of the people 75 years and older had lost all their teeth;
- ii. 90% of the aged who had remaining natural teeth had periodontal disease. The majority of these suffered periodontitis in varying degrees;
- iii. 44% needed extraction;

- iv. 31% needed upper and lower dentures;
- v. 24% needed fillings;
- vi. for the entire group, the DMF rate per person was 27.2 or 85% of the normal complement of teeth;
- vii. 37% were recommended for treatment;
- viii. 35% were considered untreatable for physical, mental, or other reasons.

ST. MARIE (1964) studied the dental needs of the non-ambulatory, chronically ill, home-bound and aged patient in Connecticut. He found that:

- i. 62% (108) were edentulous. One third of edentulous patients had dentures. 18 of the upper and 15 of the lower dentures needed repair, reline or replacement;
- ii. 38% were dentulous, 21% of them needed extraction, 6% needed operative care;
- iii. 117 patients needed some prosthetic treatment.

FRIEDRICH (1959) in a statement regarding the dental care of the aged in Nursing Homes in Fulton County, Georgia, where 26 homes and 855 patients were examined, wrote: "The most urgent need was noted in the number of teeth indicated for extraction either due to decay or due to disease of the supporting tissue. The

number of oral infections was appalling: practically all of the patients with natural teeth had some oral pathology ranging in severity from suspicion of cancer to mild gingivitis or gum disease. Of the 289 patients having one or more natural teeth present, periodontal or gum treatment was indicated for 119. Of the few patients with teeth present, 203 teeth needed filling, and 1404 teeth needed extracting. Extraction would have done more to clear up oral infection for these people than almost any other treatment that could be provided. Several cases were designated for oral surgery in preparation for dentures while others were indicated for surgery due to ill-fitting dentures that had been in place for long periods of time and were causing chronic irritation of mucous tissues." He also found that a number of those patients did not wear their dentures even if they were provided. These patients had been without dentures for years and stated they would be unwilling to wear them. Furthermore, WALDMAN (1964) reported the same point of view. Some of the patients were thought not to require dental care because they were satisfied with their present status. DOUGLAS (1963) claimed that most patients did not want care because there was much apathy, resignation and unwillingness to be disturbed, as well as some fear of pain and harmful effects. This fact necessarily would have to be taken into consideration in determining the specific needs in a service programme.

DRAKE (1970) studied 274 patients in nursing homes in North Carolina. He found that:

- i. The mean age of the sample was 76.8 years;
- ii. The mean DMF was high;
- iii. 63.4% were without any natural teeth;
- iv. Patients with natural teeth experienced a high rate of periodontal disease and poor oral hygiene;
- v. Many of the edentulous patients were evaluated as unable to retain dentures because of poor ridges or senility.

In England, no survey had been conducted to determine how much dental care the aged patient needs until 1971. An editorial in the British Dental Journal (1971) reported a survey in Cardiff. 327 people were examined. 111 were unhappy about their oral health because of ill-fitting dentures; retained root or lack of dentures. 284 were edentulous but only 213 were wearing complete dentures and 26 had never been supplied with dentures. It was assessed that 152 of the total sample required some form of treatment. Of the sample, 41% had not seen a dentist for over 20 years.

III THE MANAGEMENT OF ORAL PROBLEMS IN THE AGED

---DENTAL SERVICE PROGRAMME---

1. Environmental Help

KEMP (1965) made an excellent point about environmental help to old people when he wrote "... anything that lessens or destroys the old person's self-sufficiency and makes them more dependent is to be avoided. This is the danger of the institution. If help is left too late it will be of little use. If the elderly are left to ask for it they will very likely not do so." Any programme for them must include an opportunity for the individual to be productive to the maximum of his capacities. Most pleasures come from these capacities, whether mental or physical. Once these capacities diminish, people not only become older, but the quality of life is diminished also.¹⁴⁸

A. Socio-economic measures:

(a) Retirement policy:

The expert committee of W.H.O. (1959) suggested:

"Part-time employment of older people may provide work activity

within their capacity and of a satisfying constructive nature. Special employment services, with carefully developed counselling and vocational re-education where necessary, would also help the aged to make a more satisfactory place for themselves."

HAVIGHURST (1960) outlined a social policy for retirement as follows:

(1) A maximum of choice concerning the age and circumstance of retirement, limited by the actual work efficiency of a person. He should be permitted to work as long as he wants to and can measure up to an objective standard of accomplishment;

(2) Adequate financial security;

(3) Counselling and assistance in planning for retirement available to all who want them.

(b) Life style:

(1) Housing: There are many ideas as to how old people should be housed. The expert committee of W.H.O. (1959) brought out the point in regard to old people's dwellings that "they should be close to the community and the centres at which it gathers for ordinary activities and recreation, particularly in the case of those who have previously inhabited urban areas; they should be near shops, churches and places of entertainment. The accomodation

of old people may be interspersed with family houses, so as to avoid the sequestration of the aged. In designing this accommodation, account must be taken of the physical deficiencies of aged people, their difficulties in moving about without support, their problems in negotiating stairs, their forgetfulness and the dangers this creates." If old people cannot live with their children, the community must provide places where they can live in dignity, comfort, convenience, and cleanliness.

(2) Community activities: Old age inevitably isolates in varying degrees the aged persons. Their own friends are diminished in number by death, and physical infirmities begin to limit their activities. Whether the individual remains in his family or lives in an old person's home or other institution, he needs social contacts with those of different ages. There are several means to provide an opportunity for the aged to remain productive and active in the life of the community to the maximum of their ability.

i. Old age clubs: Informal gathering at suitable meeting-places within the community in which hobbies and creative activities are encouraged serves to foster friendly contacts among the aged. The clubs are commonly part of a greater social organization for voluntary services. Frequently they are organized by

churchgoers and their club is located in the church hall at a very low rental. The other favourite places suitable for aged people to spend their time in are the public library, the museum, and the art gallery. Most voluntary organizations arrange outings for members of old age clubs.⁶⁷

ii. Home visiting: The fear of becoming dependent plays a major part in the adjustment of the aged. The provision of 'family helpers' can do much to minimize this anxiety and to give them a feeling of independence and an assurance that they are able to carry on in the presence of varying degrees of disability. Home visiting can bring much-needed friendship to old people, keep alive their links with the community and dispel their feeling of not being wanted. Many desolate old persons can be drawn into social activities and clubs or into association with religious or other organizations.¹⁶⁷

B. Psychological rehabilitation:

Adjustments in old age have been discussed in relation to work and life style. The most important and difficult part of the programme for individual in old age is psychological adjustment. TITCHENER and LEVINE (1960) pointed out that "society lagging in many aspects of its development behind extension of the life span

of its members has failed to provide gratifying, useful, self-respecting roles for its aged members. Many are lonely or unhappily dependent upon somewhat grudging children." They referred to a 'preventive psychiatry' which should be applied in dealing with aged patients.

LEAKE (1960) stated: "It is wise to get ready for retirement long in advance, to know specifically what one will undertake to do and then to go at it cheerfully and with assurance that some degree of satisfaction may be derived from keeping busy." Thus he emphasised that each individual must learn, then, that it is up to him to prepare himself in such a way as to remain useful in the group to which he belongs, and to keep himself socially acceptable to those who are near him.

The expert committee of W.H.O. (1959) suggested a programme of vocational guidance and re-training for alternative employment to help old people to achieve new means of fulfilment. In this programme, cultivating fresh interests and encouraging participation in the activities and administration of the community are essential components in the fight against loneliness, boredom and a sense of futility.

C. Dentist-patient relation:

Much has been discussed about the development of good rapport between dentist and patient, but only recently have the psychological aspects of the dentist-patient relationship been emphasized. When a dentist treats an elderly patient with poor oral hygiene or who is neglectful about keeping appointments promptly, he should take into consideration his age and psychological and mental status before reacting or even before undertaking therapy.⁵⁴

BURMAN (1960) pointed out that "it is important for the dental practitioner to attempt to understand the thoughts that plague the older patient and to be able to set his mind at ease."

Oral changing has deep significance for many people. WECKSTEIN (1970) stated that "loss of all teeth can represent, to a woman, an early sign of aging, or an unattractive change in her highly prized appearance. Loss of all his teeth is more significant to a man at the time of his retirement or when he is in the process of struggling with current physical losses during his aging years." In another topic, WECKSTEIN (1970a) stressed the dentist-patient relation. He said: "The growing awareness of the need to understand their patients better has led dentists to search not only for techniques for better dental care but also for insights that will lead to a better understanding of their patients." The psychological relationship may even be more important than the treatment itself in certain therapeutic procedures.

D. Diet and nutrition:

A large proportion of the aged belong to the lower income groups,^{46, 105} and many authorities agree that an inadequate diet is not uncommon in old persons and that many suffer from being poorly nourished.^{47, 67, 168} They also found that many illnesses of the aged could be mitigated or prevented through proper nutrition.^{89, 100}

(a) Factors of the problems:

The factors which cause nutritional problems in the aged were described by JAMIESON (1958), NIZEL (1960), STERN (1967) and HEATH (1972) as follows:

(1) Ill-fitting dentures: Ill-fitting dentures with possible inadequate mastication could lead to inadequate digestion. The diet is often limited to softer food and important food items are automatically excluded.

(2) Existing food habits: The dietary pattern of many elderly persons often fixed by repetition, becomes a formidable structure which is difficult to modify. In many cases, it is based

on taste preferences, self-indulgence, prejudice, indifference, lack of appetite, poor fluid intake, apathy and fear.

(3) Physiological factors: With advancing age there is a diminishing sensitivity to taste and smell which interferes with the normal pleasure of eating. Digestion and absorption may also be retarded because of diminished function of the digestive system.

(4) Socio-economic factors: Low income and isolation provide little means or less incentive for the shopping and preparation of nourishing meals.

The end results of many nutritional problems are malnutrition or obesity with all their side effects of lowered resistance to stress and disease, resulting in ill health.¹⁶⁹

(b) Dietary patterns:

Oral health is very dependent upon the general condition of the body. HAZELL (1960a) stated: "A poor diet leads to malnutrition, to muscular weakness and debility, to anaemia, to polyneuritis with impairment of balance and co-ordination, to cardiac weakness

and a lowered resistance to infection. In addition, it causes local alimentary tract disorder such as soreness of the tongue, dyspepsia, and perhaps most commonly of all, obstinate constipation, or even faecal impaction." He suggested producing a properly balanced diet for the elderly by way of 'Meals on Wheels' service, and as a matter of routine by vitamin capsules, by iron-containing medicines, and by a liberal allowance of milk.

CLIMENTS and ROGERS (1966) suggested that it may be nutritionally desirable for the elderly to take six small meals during the day rather than three large ones.

(c) Nutrients for the aged:

(1) Proteins: The results of these studies made on elderly people to determine the most desirable level of protein intake suggested that their requirements do not differ greatly from those at other ages of adult life.^{20, 26, 89, 169} Aged persons should be encouraged to eat eggs, fish, and cheese and drink at least one glass of milk per day.

(2) Fats: For the aged, RICCITELLI (1962), W.H.O.(1965) and EXTON-SMITH (1968) advocated the substitution of appreciable amounts of polyunsaturated fats for saturated fats in the diet.

They claimed that this substitution will lower the concentration of cholesterol in the blood and that blood level of cholesterol correlates closely with the prevalence of arteriosclerosis.

(3) Minerals:

i. Calcium: JAMIESON (1958), CLEMENTS and ROGERS (1966) agreed that the results of calcium deficiency and lack of absorption in the diet of the aged cause an osteoporosis. Thus they recommended that the calcium requirements of the aged in good health are at least equivalent to those of younger adults. JAMIESON (1958) also reported that all mineral requirements are increased with age.

ii. Phosphorus: The daily intake of phosphorus should be equal to that of calcium. Phosphorus deficiency is rare because of the liberal distribution of phosphorus in foods (KRAUSE 1961, BURKET 1965).

iii. Iron: A 'tea and toast' diet (low in meat and eggs and vegetables) may not provide enough iron (CLEMENTS and ROGERS 1966, EXTON-SMITH 1955, JAMIESON 1958).

(4) Vitamins: The aged seem to be more susceptible to avitaminosis because of the problem of chewing which tends to

result in their overcooking food to make it soft and thereby destroying the vitamins. On the other hand, the diminished total food intake, the poor qualitative selection of food, the decline in absorption predispose the aged to avitaminosis. Thus CLEMENTS and ROGERS (1966) suggested that a helping of fresh fruit or green vegetable should be taken daily. PERRY (1961) reported that "many denture failures are the result of nutritional deficiencies." He suggested that the diets of elder patients must be supplemented with synthetic vitamins and minerals. In this way, the supportive tissue will be properly replenished and the tissue integrity will be maintained.

(5) Carbohydrates: CLEMENTS and ROGERS (1966) pointed out that 40-60% of the calories in the diet of many older people will be supplied by carbohydrate-rich foods. BOUCHER (1966) and KRAUSE (1961a) recommended restriction of carbohydrate is a preventive measure of reducing the possibilities of the chronic disease of aged, e.g. arthritis, gout, nephritis, arteriosclerosis, heart disease and hypertension, diabetes mellitus and results in a sounder body over a longer life span.

2. Operational Procedures

A. Principles:

(a) Basic concept of dental service for the aged:

The oral cavity plays an important part in the maintaining and enjoying of life. All its functional activities whether concerned with food intake, or with communication, are the same in the aged and other age groups. Aging and health are interdependent and interrelating. Oral health is an integral part of total general health. All values of good oral health apply to the aged with increasing significance in most cases. The social and biological advantages of a healthy mouth are more needed and appreciated by the aged at a time in life when biological and sociological effectiveness is waning. BENNETT (1967) pointed out that there are several factors which lead to a greater demand for geriatric dental services. They are:

- i. An increasing number of people reaching the elderly periods of life in various stages of dental disrepair;
- ii. An increasing desire of elderly people for oral health maintenance;
- iii. An increasing demand from the individual and from government agencies for more complete and comprehensive dental service.

ZUR (1961) has quoted the principles relative to the provision of dental services under the Welfare Health Program issued by the American Dental Association. He stated that the responsibility rests first with family, then with the community. If this principle is applied to nursing home residents and the family is unable or fails to assume this responsibility, then it seems reasonable that dental care for these individuals should be the responsibility of the community.

In general, the delivery of dental health services to this group of the population will demand nutritional counselling, social checking, psychological examining, consideration of longevity, and the availability of auxiliary aids, such as help from the family, nurses, and good-will agencies. In promoting health programmes, BRUSKIN (1962) has pointed out the following principles:

- i. To prevent and alleviate chronic illness through good dental hygiene;
- ii. To enable all health professions to cooperate fully in programmes for the care of persons with long term illness;
- iii. To promote better dental health in the community as a means of preventing development of those chronic illnesses directly related to dental condition;

- iv. To help handicapped citizens to live well adjusted lives by providing special dental care and treatment tailored to the special problems involved.

(b) Considerations in developing of programmes:

In developing programmes to provide dental care services for special population groups, GALAGAN (1962) brought out the following problems which must be overcome:

(1) Organisation: Because dental services cannot be delivered on an individual, independent, and casual basis, they need the fellowship of mutual concern that will bind all of the people concerned together. Between these people there must be teamworks all working as a team for the common good. DUNNING (1970a) said: "The need to apply in one area more knowledge than can be possessed by one man is not the only reason for teamwork. Some tasks actually require more than two hands. Other tasks are more quickly or better performed if one worker confines himself to part of the task, leaving other parts to other workers. Repetition without shift of attention makes for speed and accuracy."

(2) Financing: The financing of dental services for the aged is particularly difficult. The reasons are as below:

- i. The aged gradually atrophy in socio-economic status;
- ii. The general feeling that the importance of dental care varies inversely with age.⁸⁰

As a result of the foregoing factors, the orderly financing of dental care for the aged has not been developed to date.

ANDERSON (1956) realized that a major long illness is usually disastrous to family finances. He predicted that the homebound are more likely to need financial aid from community or government sources than are ambulatory patients. The same point of view was also mentioned by ST. MARIE (1964). He said: "Most of the aged population are pensioners. Thus, the financing and programme support of the Welfare Department is of great importance."

DOUGLAS (1963) claimed that only welfare programmes and other types of state, local, and federal plans are able to handle the economic aspects of dental care to the indigent aged, whilst he considered that insurance on a voluntary, private basis is unachievable.

(3) Type of provision of dental services:

The traditional idea about dental services was that dentists confined their practices to those who sought them out. There have been few attempts to render this care for those

who are unable for sorts of reason to come to a dentist's office. There had been relatively few signs of the practicing dentist accepting the challenges of domiciliary care until the first step of the action taken in the meeting of the Joint Council to Improve the Health Care of the Aged which was held in Washington, D.C. in June, 1959.¹⁴⁴

In regard to deciding the type of service, DUNNING (1970c) said that there no exact rules could be followed, but he laid down some principles that seem of value:

- i. Search for real stress groups in the population where the need for education or for care clearly exceeds ability to obtain it.
- ii. Be prepared to educate without holding back for fear demand will exceed manpower supply. The demand is of economic value in encouraging recruitment of the profession.
- iii. Be attentive to public demand, particularly in the field of group care.
- iv. Learn team leadership for the more efficient use of auxiliary personnel.
- v. Concentrate the public programme on those services where prevention of disease can best be obtained and where team work is of greatest value.

- vi. Blend financial aid from private and from government sources, making most efficient use of the principles of insurance, prepayment and postpayment

B. Practical aspects of dental services for the aged:

We must always bear in mind that there is more than one way of reaching Rome. Since the common goal is to help uphold the dignity of man and assist in making old age worth living and more satisfying, ST. MARIE (1964) proposed three ways to render dental services to this particular population group:

- i. The bringing of dental service to the patient by means of portable equipment;
- ii. The community hospital when surgery or comparable treatment is indicated;
- iii. By the making of arrangements for care in the dentist's office.

He suggested that it is the physician's responsibility to indicate whether or not the patient can be treated at an out-patient facility, or if the portable equipment must be brought to him.

- (a) Domiciliary dental care:

(1) Development of domiciliary care and the necessary equipment:

Thirty years ago dentists rarely left their offices to treat patients. A new idea has attracted the attention of dental profession recently. The development of dental care programmes for the chronically ill was a major topic at the Seventh Dental Health Conference. At this Conference. GALAGAN (1956) stated that the graduate dentist, in general, is unprepared to treat these patients because they lack the kind of training required. LOTZKAR (1965) indicated the opposing view. He said: "The provision of dental services for the homebound patient is within the capabilities of the average practicing dentist. Specialized training is not necessarily required." DUNNING (1970) emphasised that more adequate training in both the undergraduate and the postgraduate are needed.

After the demonstration of types of equipment suitable for use in the care of home-bound dental patients in the First National Conference of the Joint Council to Improve the Health Care of the Aged, SHELDON (1959) prepared an article as a Council Report. He presented some suggestions relating to the problem of providing care to the chronically ill and the aged. The points are:

- i. the planning and conducting of studies to evaluate the dental health of patients in the various chronic disease facilities;
- ii. assessment of total community resources for care of the chronically ill and efforts to include dentists on the appropriate boards where possible;
- iii. the education of all persons involved in community health resources concerning the dental problems of the chronically ill;
- iv. the establishment of a loan closet of portable dental equipment by the appropriate health agency so that dentists can begin to meet the dental health needs of the chronically ill and handicapped patients;
- v. the establishment of an official dental committee which would act as a clearinghouse of information, educational material, and would help in developing programmes concerned with the chronically ill and disabled;
- vi. a study to explore methods of financing dental services for the chronically and handicapped;
- vii. the development of projects to demonstrate new and better ways of providing dental services

to the chronically ill and disabled.

LOTZKAR (1963) and WALDMAN (1964) separately reported the dental services programme in Kansas City. They mentioned the utilization of suitable portable equipment and treatment techniques which would make possible the provision of dental services for the homebound or institutionalized patient. The portable unit permitted manoeuvrability and provided adequate operating room in smaller residences. However, the incorporation of X-ray unit into the portable equipment was controversial in their opinion.

PICKLES (1969) presented an evaluation of portable dental equipment available. He found that the equipment suitable for one type of operation might not serve as well in other techniques. Usually, a portable unit that was required for one type of patient or programme might be partially useful only for others. He considered that two specific types of operating units should be evolved to solve this problem of providing a generalized practice. He listed eight characteristics as a guide to the development of the ideally portable equipment. The points are below:

- i. For portability, lightweight and highly mobile equipment is demanded;
- ii. For efficiency, the technology should compare

with the best in permanent clinics;

- iii. For simplicity, equipment must be easy to use set up, take down and repair;
- iv. For flexibility, equipment ought to be adaptable to various situations and operators;
- v. For durability, one should be able to predict the minimum of maintenance and breakdown;
- vi. For acceptability, it should be comfortable both during the use for the patient and for the clinician, with or without assistants;
- vii. For economy, the cost usually must be realistic;
- viii. For availability, sufficient production of units is demanded to ensure an adequate supply at all times.

The choice of instruments supplies and operating procedures for home care depends on the preference of the operator and varies according to the procedure. Generally, procedures should be simplified and a minimum amount of instruments and supplies should be carried. LOTZKAR (1972) suggested the following principles would be helpful:

- i. Double ended instruments should be used wherever possible in order to reduce space

and weight;

- ii. Disposable items should be used. Disposable needles are convenient and reduce the hazards of infection;
- iii. Stable impression material which need not be poured immediately should be used;
- iv. The smallest amount of supplies and equipment needed to perform any given operation should be presterilized and prepared in various kits for specific procedure.

(2) Home-bound care:

Varies sources indicate that there are significant number of the aged who are home-bound and in need of dental care. 12, 29, 35, 56, 96, 147, 158 These needs could be met in only one way---by bringing the service to the patient, rather than the patient to the service. DOUGLAS (1963) quoted a report for treating and handling home-bound patients as follows:

Definition:- The home-bound patient is anyone who is unable to receive dental services at a private dental office or at a dental clinic because transportation of such a patient is difficult or unavailable and/or where his medical position is such that hospitalization is not required or is unavailable,

thereby making it more convenient for dental services to be rendered to the patient in his own environment.

Qualifying factors for care:- Dental needs, life expectancy, nutritional status, general level of health, type and degree of disability, all of these should be considered before rendering of treatment.

Treatment processing:- In a report of a demonstration dental care program for home-bound patient, WALDMAN (1964) emphasized that "the comprehensive approach to the dental needs of this population included examination, prophylaxis, extraction, restoration, postoperative treatment, prosthetic appliances repair and relining of dentures, adjustments and maintenance on a recall basis." ST. MARIE (1964) said: "The home-bound patient should have a referral form completed by the dentist who last cared for him, if possible. In addition, the patient's physician should complete a brief medical history which would include any contraindication for any specific dental treatment. When the patient is unable to have either dental or medical forms completed, arrangements will be made by the project to determine the dental or medical history through hospital out-patient or in-patient files, through family contacts, or other resources. No person will be refused care under this project for inability to secure a dental and medical history, but in such cases, the project staff will provide the necessary diagnostic evaluation."

(3) Institutional person care:

In 1958, the National Conference on Nursing Homes and Homes for the Aged recommended that there be a dental evaluation for patients entering nursing homes and that member institutions assume responsibility for continuing dental care. The recommendation pointed to the need for dental evaluation on admission and the need for dentist with community interest to coordinate hospital, health department, and dental association participation in establishing a community programme.

WALDMAN (1967) found that dental care in nursing homes encountered the following problems:

- i. Poor communication existed between the nursing home, its staff, and the patient's family or guardian;
- ii. Family of many of the patients were not interested in dental care for the patient;
- iii. The patient felt it was too late for dental help;
- iv. The maintenance of oral sanitation was poor although health education sessions for nursing home personnel had been provided by the home care programme's dental hygienists;

- v. Nursing homes were reluctant to pay for dental services when they were the patient's guardian;
- vi. The nursing home frequently did not have or was not willing to provide space or personnel to assist the home care team.

WALDMAN (1966) investigated the costs for nursing home dental care. He said: "Dental care for nursing home patients was less expensive than care for patients residing in their private home. This was because increased numbers of patients at one residence reduced time needed for transportation as well as time for setting-up and breaking-down equipment."

BRUSKIN (1962) suggested that the staff nurses or attendants of nursing homes may be properly prepared to instruct patients on such matters as follows:

- i. the use of dentrifices and mouth washes in maintaining proper oral hygiene;
- ii. methods of toothbrushing and type of brush;
- iii. proper use of dental floss;
- iv. importance of daily oral hygiene maintenance for the patient's well-being.

ST. MARIE (1964) proposed that a screening examination

and mouth charting are needed in the first visit to each patient. The treatment plans are made by a staff dentist and are based upon a review of the screening evaluation by the senior dentist. These treatment plans are filed with the project secretary. She will maintain the records indicating the diagnosis, treatment performed, the dentist's time and receipts for service.

BALTZ (1962) emphasized that the basic commodity offered in nursing homes is nursing service by staff especially trained to care for the type of patient admitted in each facility. Besides basic nursing care the nursing service is also responsible for personal hygiene, good nutrition and food service, medical records, carrying out the treatment, care and restorative procedures as directed by the physicians, and seeing that dental services are available at all times. Social and spiritual needs must also be fulfilled.

RUTKIN et al. (1959) studied the residents of a nursing home. It was found that the desires of the patient were quite different from what the dentist felt was necessary for them. They suggested not doing anything more than the patient requested, since they found that there were inevitable complaints if they did not follow the patients' instruction to the letter. They also pointed out that standard, good dental care can be provided for

the rare alert patient if he seems ready to accept it. On the other hand, they preferred to repair the old denture rather than to construct a new one for reluctant patients.

(b) Community hospital dental care:

(1) Role of the hospital:

A significant finding revealed that there is a high percentage of home-bound patients who are not truly home-bound and could be transported to a central clinic for treatment.¹⁵⁷ KLUMPP (1959) predicted that hospitals will assume a role of increasing importance in the care of the chronically ill. He stated that "many of the solutions to the problem of rendering better dental health care to larger segments of the public will require a greater use of hospitals." Highly trained physicians, nuclear physicists, chemists, biologists, and even statisticians, are applying their specialized skill to medical problems. KLUMPP said that the hospital is the place where these diverse technologies can be concentrated best to the benefit of the patient. OBST (1962) reported that the programmes for research, postgraduates, and interns could be supported and carried out by the hospital. The fact that longterm hospital patients frequently

need dental care is the reason for dental facilities to be available in or affiliated with such organized institutions. This concept of a hospital does not imply that the comprehensive services and functions should be housed under a single roof. On the contrary, there could be advantages in a multiple institution. The important point is that the services and functions be administratively integrated to provide continuity of medical supervision and to facilitate the shift of patients from one service to another with a minimum of delay.

A report of the Dental Services Advisory Committee (1972) recommended to the Government of N.S.W. a proposal for the establishment of dental departments in selected public hospitals throughout the State to improve the situation and to ensure that standards of dental services in this State are not to deteriorate.

(2) Interaction of physicians and dentists:

OBST (1962) pointed out that "all areas of dentistry should be provided for in a hospital program for the chronically ill and aging. A well-equipped, well staffed department of dentistry in a chronic disease hospital, working in cooperation with the medical department and other departments, contributes greatly to the proper management of patients who are chronically

ill and aging." He concluded that "the provision for complete dental service as an integral part of total health care is a necessity in planning hospital programs for the chronically ill and aging. Many general and specific problems are encountered calling for the closest team activity on the part of physicians, dentist, nurses, speech therapists, social worker and psychologists."

(3) Practical means:

It was the Jewish Chronic Disease Hospital of Brooklyn, New York which initiated attention to the dental care of the chronically ill and the aged.¹¹⁶

ORDENE et al. (1960) described the following means of treatment that were employed in the hospital:

- i. The use of dental chairs with mobile bases which can be moved away from the dental units in the clinic so that stretchers and wheel chairs can be moved into place;
- ii. The use of special toothbrushing techniques¹⁵¹ for cleaning the mouths of bedridden or otherwise debilitated patients, usually by a dental

hygienist or aid;

- iii. The use of special relaxant or premedicant drug therapy for difficult-to-handle patients, including general anaesthesia, when necessary with specially designed manual restraints to protect the patients.
- iv. The use of equipment designed to facilitate the treatment of the patient in the supine position if necessary;
- v. The assignment of one dentist to a patient to follow the patient for all dental treatment, if possible, in an attempt to establish doctor-patient rapport;
- vi. Giving special attention to the medical needs of sick patients, maintaining contact with the patient's physician.
- vii. Use of special prosthodontic techniques because of special needs of some chronically ill patient;
- viii. Use of carefully developed and conceived treatment plans because of the need for speed in treating some of these patients who cannot tolerate long periods of dental care.

(c) Dentist's office dental care:

(1) Role of the practicing dentist:

COLLINS (1965) indicated that "the most effective program of dental care is centered in the office or the clinic. Some of the advantages are permanent, e.g. adjustable equipment, a steady flow of patients, utilization of the time of the dentist and assistant with no losses through travel and setting up equipment and ready availability of necessary materials and medicaments."

LINN (1971) pointed out that the personality of the patient often moulds his reaction to dental treatment. DOUGLAS (1963) expressed the opinion that treating aged patients in the dental office is different from treating younger patients. Furthermore, he said that "the practicing dentist can most effectively play a role in the care of the aged patient by contributing first, through the dental profession, to wider campaigns to reach the masses of elderly patients."

SILVERMAN (1962) pointed out that "the aging person's personality is the sum total of his ideas, emotions, and behavior. It depends in part on his life's experiences and his state of

health." These factors are in constant interaction and the practitioner always must hold them in balance if he is to provide satisfactory clinical care. He emphasized that the principal responsibility of dentists toward aging patients is "to provide care for acute inflammatory condition, to maintain and retain the residual oral structures and to restore teeth adequately for ingestion of food."

(2) Approach to the patient:

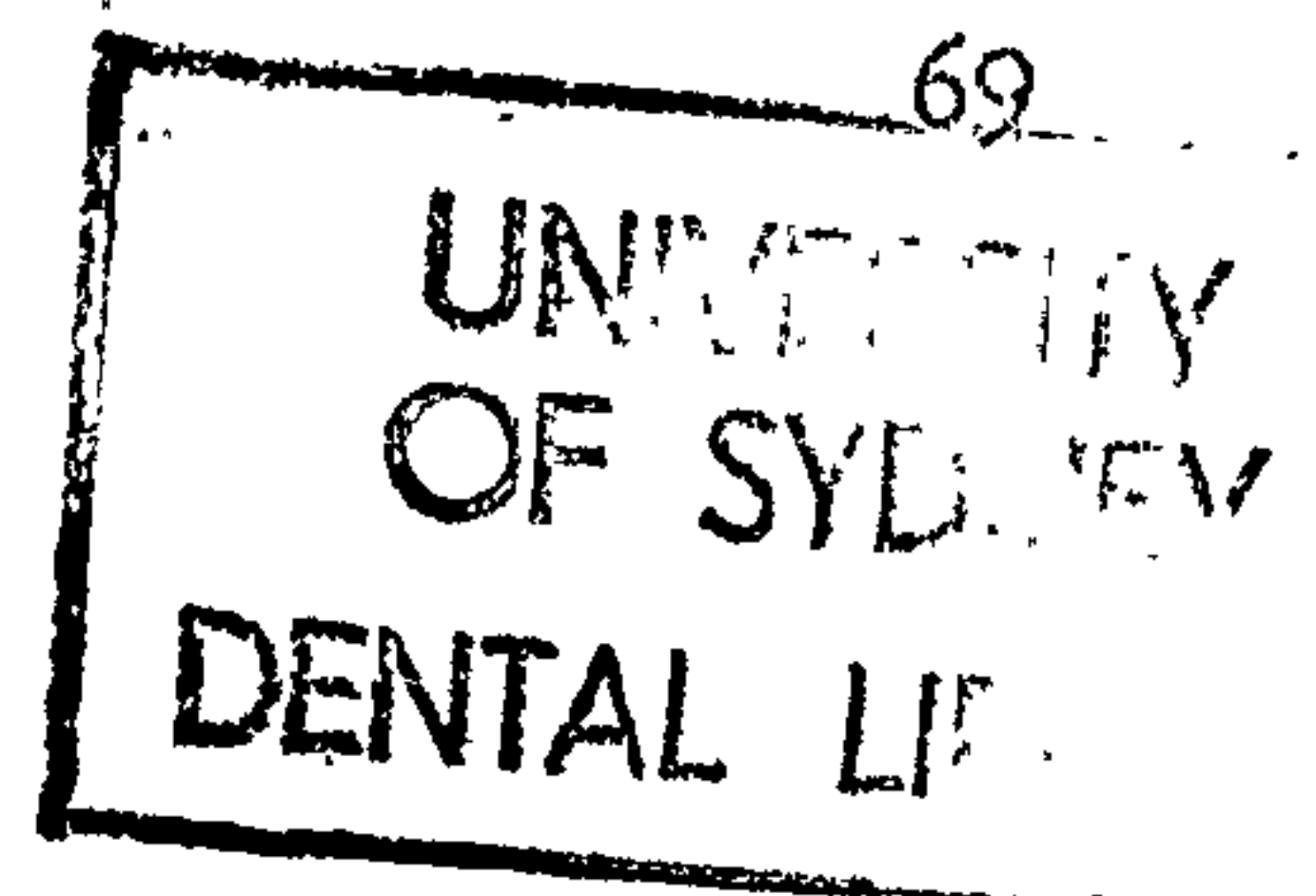
MORROW (1970) was of the opinion that a dentist's ability to communicate with his patients is closely related to a successful practice. He has set a formula for success--goal, plan, desire, confidence, and determination--which must become an integral part of a dentist's attitude. This attitude generally influences both the types of treatment plans he presents to his patients and how successful he is in convincing the patients to accept them. MORROW also believed that "the dentist must be able to determine his patient's I.Q. and according to his own standards combined with the patient's appreciation, perform a dental service that is optimal for the patient."

In the dental clinic, patient anxiety is likely to occur and may impair a good working relationship. WEIKSTEIN (1970) agreed with the use of tranquilizers or anaesthesia to treat the

symptoms of anxiety. He also oriented procedures to strengthen the ego functions of such patients. Those are:

- i. doing the work immediately;
- ii. giving no false assurances or false compliments;
- iii. feeling no anxiety about presenting the procedure;
- iv. feeling no hostility toward the patient.

3. Dental Manpower



Any health care programme needs trained personnel to apply their knowledge to those who demand their care. Due to increasing life expectancy and the awareness of the importance of oral health, dental services are needed more frequently than ever before in many countries. To deliver the treatment, dentists, of course, are the most important people to consider. Owing to the fact that treatment can not be given by any one person, the word 'teamwork' must frequently be heard. Thus we must also consider the auxiliaries that make up the team as a whole.

Although the shortage of dental manpower is a worldwide problem, WILLCOCKS and RICHARDS (1970) indicated that the total numbers of personnel are only one of a series of factors which affect availability of dental care facilities. They emphasized the other aspects of the problem, e.g. how they are organized and how efficiently they are used, how available and accessible they are, what are their demographic characteristics, and how these are changing in relation to population characteristics and dental needs.

In evaluating present and future dental manpower needs, HILLENBRAND (1963) suggested four factors which must be considered.

They are:

- i. the present population of a country and the predicted rate of growth;
- ii. the current resources of the profession and its capacity for future growth;
- iii. the ratio of dentists to population which is desired for a given country;
- iv. professional, economic, political, social and educational factors which may alter or characterize present and future needs for dental care.

DUNNING et al. (1967) in their approach to the same topic discussed the needs for dental manpower. They proposed the following points which should be considered:

- i. the population, its size and dental needs;
- ii. production of dentists in terms of recruitment, procedures for admission, sites of education, and programmes in dental public health;
- iii. production of auxiliaries, their training and the education of practitioners in their effective utilization;
- iv. utilization of manpower, its distribution and 'busyness', use of technical advances, and continuing education facilities;
- v. demand for care and change in this as a result of health

- education and social changes;
- vi. effects of preventive measures.

All the factors mentioned above can be taken as a clue for production of dental personnel to meet the demand for care of a reasonable level. The problem of manpower in provision of dental care for the aged can be overcome by the following ways.

A. Dentists:

There are many reports related to the statistics of dental manpower from different countries. The needs for more dentists are universal. In view of the provision of and demand for dental services varying from country to country, and the multi-factors, e.g. economic, sociological and culture, playing vital roles in these differences, the total number of dentists or the dentist-population ratio is no longer the only keystone in the complicated problem of dental manpower. The productivity and output of dentists attracted the attention of MORE (1961). He discussed the need for increase in manpower and methods of increasing productivity in the following ways:

- i. the invention, installation and effective use of equipment and methods;
- ii. a streamlining of office practices;

- iii. a broader training and use of ancillary technical personnel;
- iv. better financing of the early years in practice, coupled with an effort to improve the distribution of dental services;

APPLEWHITE (1972) claimed that a dentist in dental team should be a 'doctor', a teacher. The duties of the dentist to provide dental care would be:

- i. to diagnose and plan treatment;
- ii. to delegate to auxiliaries duties for which they were trained;
- iii. to physically direct and supervise auxiliaries;
- iv. to maintain professional standards;
- v. to perform those duties that lie beyond the competence of the auxiliaries;

GORDON (1972) state that "the older dentist who has seen aging changes in himself and his patients can more easily be interested in the field of gerodontology, but by the time his interest becomes sufficiently active, his own physical limitations have often reduced his professional productive capacity." Thus he concluded that "the future of dental health for the aged must depend upon the reason and industry of the younger dental ranks, in whom the rest of

dentistry and dental education are inculcating the highest possible professional principles to meet professional goal still sought."

In order for a dental student to become accustomed to the problems which accompany older patients, DUNNING (1970) stressed that more adequate training is necessary for the care of patients whose primary complaints lie outside the oral cavity. Regarding the training of the dental profession, the most influential influence is the dental educational system. DOUGLAS (1963) proposed that the following orientations should be included in the undergraduate curriculum of the dental school:

- (a) Courses designed to bring about understanding of the aging process and acceptance of it as normal. The undergraduate should learn to differentiate between physiological 'deterioration' and pathological change;
- (b) Courses leading to comprehension of the following geriatric problems:
 - (1) medical problems common in the aged;
 - (2) medical problems complicated by age;
 - (3) psychological problems which occur during the aging process;
 - (4) the post-menopausal syndrome.

- (c) Courses involving the specific dental problems of the aged:
- (1) oral tissue changes;
 - (2) periodontal changes;
 - (3) effects of drugs on the aged;
 - (4) psychological reaction of the aged to dental treatment:
 - i. replacement of missing teeth;
 - ii. extraction of teeth and effect on psychological aspect;
 - iii. need for retention of teeth etc.
 - (5) common oral symptoms of the aged;
 - (6) special practice problems in the care of the aged:
 - i. in oral surgery and anaesthesia;
 - ii. in prosthodontics etc.

LOTZKAR (1963) mentioned the need for a training programme to provide the student with an opportunity to deliver complete and comprehensive treatment for patients who cannot obtain treatment through the usual means. He also emphasized that there is a need for post-graduate and continuing education for the dentist to meet the responsibility of providing dental services to the chronically ill and the aged.

To sum up, the resolution of the problems of dental manpower in provision of services for the aged is no different from that for any other population group. Special orientation should be included in the undergraduate curriculum of dental schools to increase ability to cope with dental problems in the aged. Apart from increasing the productivity and output of the dentist, a broader training and use of auxiliary personnel can help to meet the professional goal.

B. Auxiliary dental personnel:

LEECH (1970) pointed out that "both the government and the dental profession have become increasingly aware of the future potential demands for dental treatment and the shortage of dental manpower to deal with it." He claimed that the only answer is the greater use of operative ancillary help.

(a) Significance of auxiliary dental personnel:

An expert report of W.H.O. (1959a) revealed that: "Trained auxiliary personnel provide the dentist with assistance that will relieve his own hands and his own time so that he may devote himself more fully performing those professional services which specifically require his special skills and knowledge and which could

not be executed safely by one with less experience and education." The report further pointed out that combinations of other auxiliary groups would permit a dental health team to provide a much improved dental health services.

(b) Utilization of auxiliary dental personnel:

Auxiliary dental personnel are classified into four categories. They are chairside assistants, dental laboratory technicians, dental hygienists, and school dental nurses. A programme of dental care for the aged will make use of three types of auxiliary personnel:

(1) Chairside assistants: The basic principle is that the chairside assistant's function is to assist the dentist to make 'four handed dentistry', providing ways of working more effectively and speedily. The actual help the assistant gives during the service procedures is the coordinating of appointments; the preperation, set-up and break-down of equipment in foreign environments; the psychological assurance given to patients. The recording of data, and public relations efforts are some of the aspects of the programme handled by the assistant.¹⁵⁷

(2) Dental technicians: Dental technicians, whose main

function is the fabrication of appliances, should work according to the prescriptions and under the supervision of the dentist.

(3) Dental hygienists: The dental hygienist performs most prophylaxis procedures. Because many home-bound patients are confined to nursing homes, the hygienist tries to orient the personnel of nursing homes to the specific dental health needs of their patients.

BENNETT (1967) proposed the employing of dental aide to cooperate in managing geriatric dental problems. In contrast to the dental hygienist, the duties of a dental aide would consist of:

- i. teaching patients to use the various devices for oral care and cleanliness, e.g. toothbrushes, water irrigation, tissue massage, dental floss etc.
- ii. routinely following up the patient in his oral care;
- iii. instructing patients of the basis and rational for maintaining oral hygiene;
- iv. rendering oral care measures where required by the physical state of the patient, e.g. toothbrushing, gingival massage, water irrigation and care of prosthetic appliances;

- v. scheduling patients with a dental facility of patient's choice, or arranging for in-patient dental care. Keeping interim records of patient's dental status for the dentist;
- vi. fabricating or altering dental devices for oral hygiene so that modification of the appliance would render it more usable to the patient;
- vii. assisting in the use of other oral hygiene adjuncts such as mouthwashes, disclosing wafer, etc.

(c) Factors affecting the requirements of auxiliary dental personnel:

According to HILLENBRAND (1963), decisions as to the number and type of auxiliary dental personnel depend upon the following factors:

- (1) The stage of development of the country and of the profession;
- (2) The definition of duties which require professional competence and which cannot be delegated to persons less qualified;
- (3) The definition of the scope of activity and its limitation for auxiliary personnel;

- (4) The level and type of supervision to be imposed on auxiliary personnel;
- (5) The control of the quality of service rendered by the profession's auxiliaries;
- (6) The possibility of multiplying auxiliary personnel to the point at which the status of the dental profession is lowered or endangered.

Generally, the most efficient way to deal with the problem of the shortage of dental manpower is a broader training and use of auxiliary personnel. The need for such personnel is based on the recognition that the supply of dentists and conventional assistants is inadequate to meet present, much less future demands and needs of the population for dental care. As auxiliary functions are increased, the quality of dental care should not be lowered or endangered.

4. Extent of Dental Care

It is recognized that dental care is not uniformly delivered to each individual aged patient. It should be coordinated with the other aspects of the patient as a whole, such as the factors of dental needs, life expectancy, nutritional status, general level of health, psychological evaluation. Some may be capable of receiving complete and comprehensive treatment. Others may be treatable to a limited extent, whereas still others may not be able to receive any treatment except emergency and palliative procedure. FRANKS and WINTER (1974) emphasize that criteria for providing dental care to the elderly should be:

- i. to preserve the identity of the individual;
- ii. to allow the person to grow old gracefully.

Unnecessary or contraindicated treatment can produce serious physical consequences or place an added burden upon an already weak patient.

HENRY (1967) mentioned a survey in which the patients were divided into three groups:

- class I : those needing immediate treatment;
- class II : those needing routine treatment only;
- class III : those needing no treatment but interested in education about oral hygiene.

The extent of dental care was outlined by ST. MARIE (1964) and HENRY (1967) in the same way. They grouped dental care into three categories:

- i. minimal care: removal of infection and restoration of the mouth to as healthy a condition as is compatible with the patient's illness;
- ii. intermediate care: removal of all sources of infection, control of periodontal pathology, and completion of the restorative procedures to maintain them satisfactorily for mastication;
- iii. complete care: removal of infection, control of periodontal pathology, restoration of the cavities in the remaining teeth, and the replacement of missing teeth for patients expected to live more than two years.

Dental services should be rendered at different levels according to patient's individual conditions so that the dental profession will run efficiently and have maximal achievement.

5. Patient Education

A. Aims

To promote the acceptance of optimal dental care by the patient is the aim of patient education. Thus effective patient education actually consists motivation of and communication with the patient. CAPPA (1970) expressed the opinion that "the more advanced the patient becomes in the understanding of his problems, the more effectively we can communicate with him so that he desires his mouth to be brought back to the best possible condition, and also so that he is motivated to perform whatever procedures are necessary in order to prevent further destruction from dental disease."

CINOTTI et al. (1964) discussed the motivating and teaching of patients. He said: "Patient education is a complex process that involves not only the dentist but also every member of his staff."

In patient education, auxiliary personnel play an important role. Many times, patients will ask them a question in preference to asking the dentist. Auxiliary personnel should be familiar with the illustrations and visual aids used in the office, so that dentists can use them to help explain dental health problems to the patient.

B. Principles of patient education for the aged:

Patient education must be a continuing process, from the first contact with the patient throughout the length of time he is in dental care. It is desirable for a dentist to understand how people learn and what techniques are most effective; he will then be able to educate his patient.¹⁸ In regard to the dentist-patient relationship, WECKSTEIN (1970a) stated that "the growing awareness of the need to understand their patients better has led dentists to search not only for techniques for better dental care but also for insights that will lead to a better understanding of their patients."

Some principles of patient education for the aged will be discussed as follows:

(a) Methods to communicate with patients:

In communication with patients, psychological barriers against dental treatment should be broken down. In this respect, the statement of CAPPA (1970) is very significant. He said that "patients have basic fears that may serve as blocks to their acceptance of necessary dental treatment. They may range from fear the work's not standing up, to fear implanted in the patient due to

some incident in his past, even as far back as childhood. As we educate the patient and communicate with him, we must try to uncover these fears, bring them into the open, discuss them, and eliminate them from the patient's thinking. It is much better to anticipate potential blocks and discuss them as early as possible, before they become so ingrained in the patient they limit his acceptance of necessary dental treatment."

Most persons who live to an advanced age suffer some problems of aging, such as a marked decline in hearing and eyesight, loss of physical vigor, memory deficits, failure of sex functioning, loss of teeth perhaps some failure to adjust the denture and, perhaps psychologically most important, the loss of independence. By way of solving this problem, CINOTTI et al. (1964a) suggested a positive dental approach: dentists could arrange for periodic visits for a check-up, an examination of teeth or dentures, and a little conversation.

(b) Ways to motivate the patients

Research has shown that instructions and advice are more likely to be forgotten than any other kind of information. CINOTTI (1964) claimed that the use of visual aids is of immeasurable value, because such material will answer question that words alone cannot.

CAPPA (1970) suggested that effective types of visual aid are patient's radiographs, diagnostic models and bone pictures, as well as photographs. The better educated the patient can become regarding the causes of dental disease, the more effectively we can communicate with him regarding his problems. CAPPA also suggested points to remember in communication with patients:

- (1) Use layman's language in talking with the patient;
- (2) Stop periodically and ask whether he is understanding everything up to that point, or if he has any questions so far;
- (3) Try to keep the educational portion along the line of his problems. Concentrate on the areas which pertain to his case;
- (4) The patient's attention span for unfamiliar material is short. Be sure to deal with the most important part of his problem first, as this is what he will remember best.

Most aged patients are home-bound. Home care is a difficult area in which to motivate the patient. In this area, dental auxiliary personnel should be trained to answer questions asked by patients regarding the oral hygiene programme as well as diet control programme.

----- SPECIFIC MANAGEMENT -----

It is not the purpose here to discuss in any detail of the clinical dental treatment for the aged. It is important to understand some of the underlying principles on which effective dental services and programme planning may be based. Dental health programmes leading to prevention and control of dental problems lead also to prevention and alleviation of chronic illness and disabilities. The problems will be attacked through the following ways:

1. Periodontal considerations;
2. Restorative considerations;
3. Oral medical considerations;
4. Oral surgical considerations.

1. Periodontal Considerations:

Some epidemiological studies report that the prevalence and severity of periodontal disease increase steadily throughout life.^{101, 134} Other investigators noted a non-significant correlations between age and periodontal disease.^{51, 125} SHEIHAM (1969) found that females had less severe periodontal disease than males. This is explained as due to less deterioration of oral hygiene which is better in females than males. When age and oral hygiene are both compared to periodontal disease, the effect of hygiene is more predominant; age takes a secondary place.⁶⁰ Periodontal considerations in regard to the aged may be discussed in two ways: preventive aspects and therapeutic aspects.

A. Preventive aspects:

As is well known, periodontal disease is the major cause of tooth loss in the adult population. Applying the rule in the care of the aged, the most important need is prevention, — the aim being to preserve the identity of the individual. Means applicable at this stage are (a) establishment of good oral hygiene; (b) prophylaxis with scaling.

(a) Establishment of good oral hygiene:

As demonstrated experimentally by LÖE et al. (1965), when no oral hygiene is practised, there is initially increased plaque formation followed by gingivitis. CRAIG et al. (1971) suggested the following methods of plaque control:

(1) Diet : Patients should be advised to avoid the frequent ingestion of foods that contain ordinary sugar which favours the formation of both plaque and acids;

(2) Tooth brushing : Tooth brushing is the most widely recommended method for removing soft accretions from the teeth and gingivae. However, few patients are able to perform the procedure adequately without receiving proper tooth brushing instruction:

- i. Tooth brushing design : Soft-bristle, flat trim tooth brush, small and to be replaced frequently;
- ii. Frequency of brushing : After each meal or snack if possible; at least once a day a thorough cleaning;
- iii. Method of brushing : Seven different methods of brushing were evaluated at the 1966 World Workshop of Periodontics. The conclusion was that the conscientious and correct

application of any method is more important than the technique itself. Chart's method has been found to be particularly effective in plaque removal.⁹⁴

(3) Additional cleansing aids : In a plaque control programme, plaque must be removed from all tooth surfaces. To do this adequately patients may need instruction in the use of dental floss, soft wooden interdental stimulators and rubber points.

GRAIG et al. (1971) noted the viewpoint that "any gingival inflammation associated with a deposit of supragingival calculus is believed to be initiated by bacterial plaque covering the calculus and not by the calculus itself. The only role of calculus in this situation is thought to be its ability to retain plaque." If proper preventive periodontics had been initiated, a good oral hygiene is then established. Thus people will not become the geriatric problem of the future.

(b) Prophylaxis with scaling:

ALTMAN and WENDON (1974) stated: "The complete removal of all calculus from all tooth and root surfaces is of paramount importance in the management of periodontal disease, although often neglected because the presence of subgingival calculus has

not been detected." They also pointed out the threat posed by calculus:

(1) It is impossible for the patient to remove it, or the plaque present on its surface;

(2) It is often quite difficult for the dentist to diagnose its presence, unless he is particularly observant and routinely uses a periodontal probe;

(3) It requires meticulous removals, whilst avoiding additional trauma to the inflamed tissues;

(4) It will re-form rapidly unless adequate plaque control is taught and practised.

The above viewpoints reveal the importance of preventive measures in the oral health of the aged. The dental auxiliary can assume the responsibility of preservation of good oral hygiene in the aged.

B. Therapeutic aspects:

In outlining a treatment plan for a patient, one must consider the patient's general health and medications which may alter the case management. Age is important in determining the prognosis of teeth affected by periodontal disease. As NISENGARD et al. (1970) pointed out that the age of patients must be taken into

account for periodontal therapy which often requires significant time and entails some discomfort. They stated that "in patients with limited life expectancy of only a few years, the complete elimination of periodontal disease may be unjustified. Instead, the goal of therapy should be the elimination of discomfort." They further commented that "the success of periodontal therapy often requires elimination or modification of habits, ... oral habits are only a local manifestation of systemic influences and must be treated as such. Any practitioner who attempts to treat the periodontal condition without reference to the whole individual -- to his habits, his needs, and his desires -- is counting failure."

Periodontal disease attacks the soft tissue that support the teeth and the bone that supports them. The inducing factors of periodontal disease are deposits of calculus, malocclusion of the teeth, food impacted between the teeth and against the gingivae, mouth breathing, bruxism and the introgenic damage done by poor restoration and other prostheses. More serious and complicated factors are the systemic diseases which have oral manifestations. Alveolar bone resorption may occur in hyperparathyroidism, Cushing's syndrome, diabetes mellitus, osteomalacia, syphilis, postclimacteric hormonal deficiencies and any disease that causes a faulty protein metabolism. No matter what the cause, the final result of

periodontal disease is the loss of teeth. It is significant to realize that the teeth which escape the ravages of dental decay may be lost in late adulthood because of infected gums which are unable to retain those healthy teeth.

Periodontal treatment, including multiple splinting, gingivectomy to lengthen clinical crowns, and occlusal equilibration, can be used successfully in selected cases. Dealing with the aged; the therapeutic point of view should be focused on the preservation of the natural dentition. It not only is of benefit directly to the overall health of the individuals but also contributes greatly to slowing down the aging process, both physiologically and psychologically.⁵⁵

2. Restorative Considerations

A. Conservative dentistry:

According to WEINE (1966), the objective of geriatric dentistry must be the preservation of the masticating apparatus for the older patient. Treatment procedure available today allow the retention of teeth as healthy, functioning members of the masticatory apparatus for the life time of the patient. The aged are cognizant of available services and are not willing to sacrifice their teeth unnecessarily.

ZIEGLER (1964) developed the following guide to preserving the teeth of the aged:

i. The common problem from the standpoint of tooth and pulp conservation is the root caries appearing in old persons. When the cementum of the teeth begins to come in contact with oral fluids due to gingival recession and areas for easier food impaction appear (plaque formation) plus relaxation of contacts, root caries occurs. A technique for placing an amalgam restoration on the proximal on the root surface of a large buccal lingual width and then preparing an inlay using amalgam restoration as the gingival seat be applied in aged patient.

ii. To conserve the pulp, metacortalone and camphorated

paramonochlorophenol, when the pulp has been inflamed, can be used. This will stop all symptoms of inflammation if they have not been too severe and later on the pulp may be treated with a zinc oxide eugenol base and the tooth restored.

iii. Another problem with older patients is the splitting of teeth. Many of these do not crack off but just become sensitive when chewing. Occlusal restorations capping both buccal and lingual cusps can solve the problem and many of these teeth are serviceable for a number of years.

iv. In cases of pulp exposure due to removal of deep caries, pulpotomy or root canal therapy should be considered even in oldsters. The percentage of successful cases is not as high as in younger people.

v. In severe cases of erosion, both on the gingival and on the occlusal, and in combination with abrasion, many times it is necessary to use the full cast crown as the restoration of choice.

ELFENBAUM (1968) stated that "secondary dentine often appears to obliterate the canal in the teeth of the elderly, but the canal can be enlarged by chelating agents and special instruments. If not, the foramen may be sealed through a surgical apical opening, or if the inaccessible canal is in one of the roots of a multirooted tooth, it can be resected."

It is debatable whether pins should be use to reinforce a silver amalgam restoration to build up a broken down tooth for an old person. Fracture lines may develop readily because of the tooth's loss of moisture and increase in calcification.

B. Fixed bridge prostheses:

WINKLER (1972) claimed that "with the newer developments in dentistry, including high-speed tooth preparation with improved diamond cutting instruments, safer and longer-acting local anaesthetics premedication and more emphasis on indirect techniques, crown and bridge prosthodontics should be within the realm of treatment planning for the elderly."

ELFENBAUM (1967) discussed several factors related to the aging process which must be kept in mind if crown and bridge prosthodontics is anticipated for elderly patient. He mentioned the following points:

i. If the teeth of an older person are severely abraded, their occlusal tables are worn flat and wide. The bucco-lingual width should be reduced to conform with the reduced masticatory force. The contour of crowns and fixed bridge should harmonize with the acquired forms of the teeth of the elderly.

ii. Because of pulpal recession and secondary dentine

formation in the area previously occupied by the pulp chamber, full crowns are the restoration choice for the abutment teeth.

iii. The use of pins in the teeth of old patients for retention purposes should be avoided. The gradual dehydration of the hardtooth structures leaves them prone to cracking and fracturing.

iv. The mucosa of the edentulous areas where the pontics are to be fitted deserves as much respect from the dentist. The ridge laps of pontics must be constructed of substances easily tolerated by the tissue. The ridge laps of pontics must be highly glazed porcelain which barely touches the mucosa.

v. If a tooth is critically important for a crown or bridge but is endodontically involved, and if it defies conventional root canal treatment because the canal is totally obstructed or inaccessible, it may be salvaged by a reverse root canal filling or by amputating the untreatable root.

vi. Multiple sluiceways cut into the occlusal surface of posterior teeth will increase their cutting efficiency.

vii. Multiple abutments will distribute the masticatory load over a greater number of remaining teeth.

C. Partial denture design:

WINKLER (1972) stated that the design of a partial denture

for an aged patient with limited arm movement or a partial or complete paralysis should be as simple as possible to facilitate removal and cleansing by the patient or the person responsible for his care. In the vast majority of cases, a simple circumferential clasp on both sides of the mouth is sufficient. The retentive terminal portion of the clasp arm should not extend too deeply into the undercut zone, preferably remaining as close to the survey line as possible. Cast clasp arms should be tapered and narrow, only retaining sufficient bulk to ensure needed strength. Clasp arms at times may have to be non-retentive.

The case should be designed carefully to spread the masticatory load over as many abutment teeth as possible. An impression technique that takes some of the stress off the abutment teeth and redistributes it to the edentulous ridge is preferred.

D. Complete denture construction:

An ideal prosthetic restoration is essential to the maintenance of the general health of the aged, both physically and mentally. The replacement of missing teeth and associated structures and the establishment of an efficient functional occlusion is a necessity for their optimal health and well-being.

It is important for the aged person to retain an interest in food. He must be prevented from gradually changing his diet to softer foods which require little or no chewing and are easy to swallow. Malnutrition can result. This leads to an unhealthy oral tissues which will not provide a satisfactory foundation for successful denture service, no matter how carefully the impression technique and the remainder of the procedure are executed. In complete denture construction, the interrelationship of an adequate diet, physiologically sound denture-bearing tissues, general health of the patient, patient motivation, dentist adaptability, and a functional prosthesis is important to successful prosthetic treatment of the aged.¹⁶⁵

(a) Mouth preparations

It has long been known that ill-fitting dentures alter the condition and form of the underlying soft tissue as a result of their constant or excessive pressure.¹¹⁵ Since soft tissues of the denture-supporting areas that have been subjected to the abuse of an ill-fitting denture are not in satisfactory condition for impression for a new denture, there is need for a material that can 'treat' the edentulous tissue by acting as a cushion and massaging the edentulous tissue to restore circulation. Tissue conditioners allow the denture bearing tissue to recover and return

to its normal healthy condition.⁹⁸

BOOS (1959) and JONES (1962) were of the opinion that the patient should refrain from wearing the existing denture for an absolute minimum of 12 to 14 hours before the impression for the new denture is made.

JOHNSON (1967) and NEVIN (1969) discussed the immediate denture. They agreed that immediate denture will stimulate and condition the underlying ridge and tissues to maintain their normal tonicity and form.

(b) Impressions:

Although the subject of impression procedures has for years been a highly controversial one, the objectives to be obtained in the taking of the impression are universal, They are:

(1) An intimate surface adaptation to the supporting tissue surface: LAMMIE (1957) considered two factors must be secured to develop a high degree of success in retention of complete denture:

- i. The development of a completely encompassing salivary meniscus of extremely thin dimension

between the denture base and the oral tissue;

- ii. The development of an intact salivary film between the fitting surface of the denture and the supporting mucosa.

(2) Maximum extension within the limits of physiological tolerance: TUCKFIELD (1955) explained that this conduces to the denture in following ways:

- i. It makes maximum use of any retentive force whether such be surface tension, adhesion, or atmospheric pressure;
- ii. It distributes the load of mastication over the maximum surface;
- iii. It enables the polished surface to be shaped to give maximum muscular control.

(3) A nicely rounded peripheral form: This peripheral form will increase border seal which is positive contact of the entire perimeter of the denture base to the yielding tissue outlining the basal seat which includes the posterior palatal seal area.⁹⁹

The impression should be made without distortion or displacement of tissue. The upper impression should extend back to

the humular notch on both sides. The retromolar pads should be completely covered by the lower impression for stability of denture. There is a general criteria that preliminary impressions should be taken in stock trays with the secondary or final impression in custom tray.

For home-bound patients, stable impression material which need not be poured immediately should be used. Zinc oxide eugenol pastes are contra-indicated in old patient, for example, in those with xerostomia where the material tends to stick to the dry tissue surface. In such cases, a 'light body' polysulphide rubber impression material is preferable.

(c) Vertical dimension:

NASR and GRIFFITHS (1973) classified difficult patients for registration of jaw relation into four categories. Aged patients who have little muscular coordination usually develop a habitual pattern of eccentric closure. Therefore, when new dentures are constructed, they show disharmony between centric occlusion and centric jaw relation. They recommended the use of an acrylic resin splint or a modified mandibular denture to condition the patient to close their jaws in centric relation.

Often the aged patient would be an old denture wearer and the occlusal relationship with the old denture in contact probably would be one of gross over-closure, due to loss of the alveolar ridge tissue and/or wear of the occlusal surface of the artificial teeth. For aesthetic and functional reasons the patient may request that this lost vertical dimension be restored to normal. The amount of increase given in a new denture should not be more than two or three mm. OSBORNE (1960) was of the opinion that most elderly patients should be left with excessive rather than reduced free way spaces.

The vertical dimension must not be increased. If it is greater than the correct vertical dimension of occlusion, the muscles of closure will be under constant strain. Excessive resorption of the residual ridge with flabby tissues will take place and the patient will experience constant discomfort and possibly T-M joint pain, sore ridges, difficulty in producing an 'S' sound, and clicking of the teeth.

In aged patient, the recording of vertical dimension occasionally causes difficulty, particularly where a habitual occlusion has been established. In this situation, FRANKS et al. (1974) recommend to advise the patient to keep the lower denture out of the mouth for a few days, when the 'memory' of the disturbed

occlusal path tends to be reduced. Meanwhile, a muscle therapy, proposed by BOOS (1959), would be helpful. The muscle therapy is for conditioning the muscles as well as facilitating the movement required for many types of jaw relation registration. Then, the vertical dimension of occlusion could be recorded by measurement between facial landmarks as described by PLEASURE (1951).

(d) Centric relation:

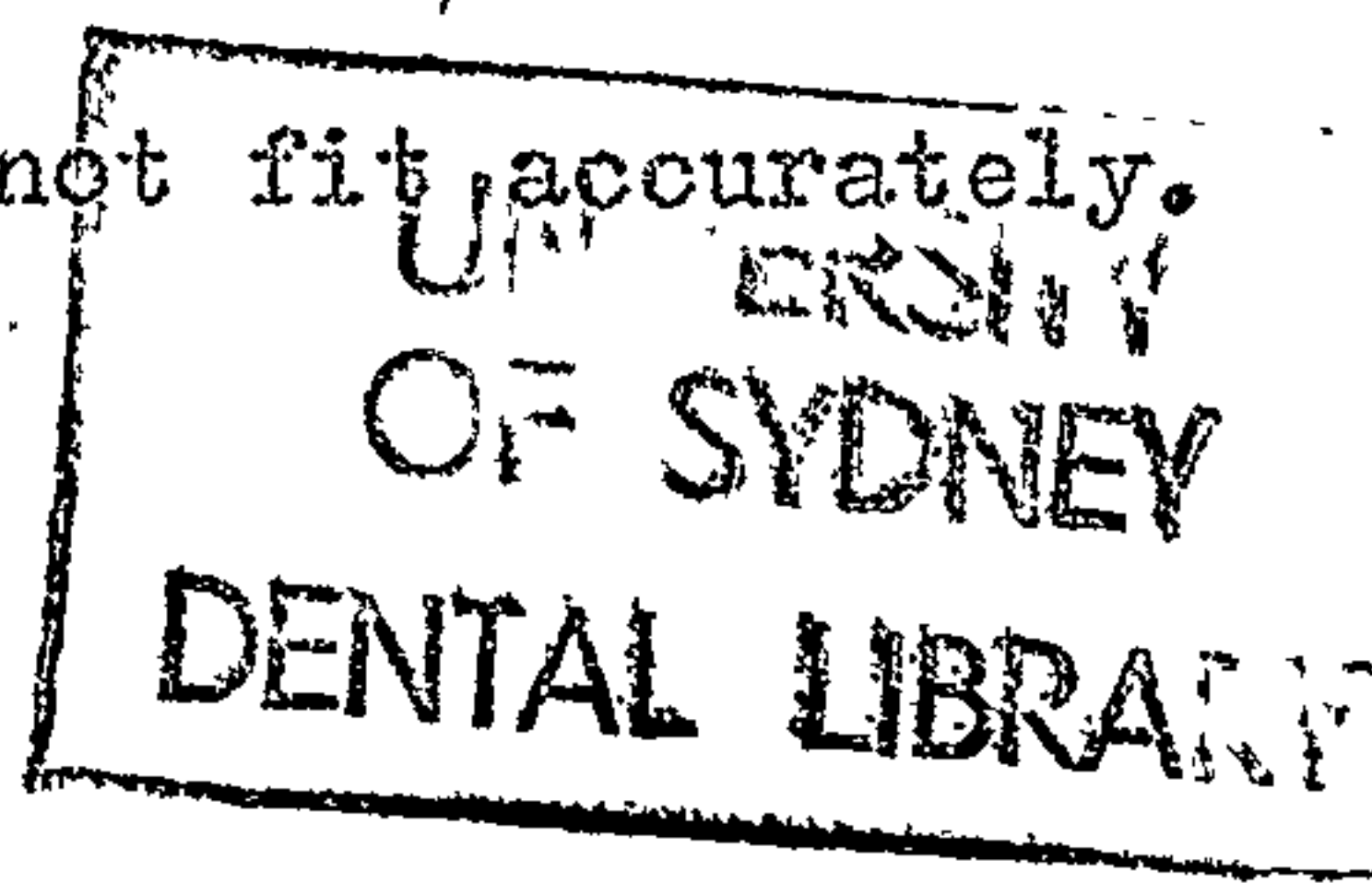
The centric relation must be recorded at the established vertical dimension. It may be recorded by various methods. The accuracy of the result is more important than the method of recording it. The popular methods of registering centric relation are intra-oral Gothic arch (needle-point) tracing, and the wax recording procedure. Both of these methods have been criticized for their inaccuracies by many authors. TRAPOZZANO (1955) and WINKLER (1972) are opposed to Gothic arch tracing because some elderly patients are unable to follow the movement instructions. They considered that Gothic arch tracing cannot be used for the aged because of their inability to equalize the pressure between the maxillary and mandibular bite rims.

The elderly patient must be comfortable and relaxed during the recording of centric relation. Since we want a minimum

of closing pressure, the word 'close' should be used instead of 'bite'. Premedication with mild barbiturates or tranquilizers may be used in the case of an extreme lack of muscular coordination.

All registrations should be made on stabilized bases which should be as accurate as the finished denture. The accuracy of the registration will be lost if the bases do not fit accurately.

(e) Tooth form:



The posterior teeth are the keystone of the occlusion of a complete denture. Together with the arrangement, they are the working surface of the denture, and no matter how strong the retention developed, nor how well shaped the polished surface may be, cuspal interference associated with unbalanced articulation can destabilize the denture. Whether or not it causes actual dislodgement, it certainly will cause tissue trauma, which in turn may lead to ulceration in localized areas. Although McLEAN (1937) and FRIEDMAN (1951) claimed that the use of anatomic teeth providing maximum cusp and surface contact throughout the entire range of functional jaw movements will afford maximum masticatory efficiency, many prosthodontists recommend non-anatomic or cusplless posterior teeth for edentulous aged patients. According to KRAJICEK (1959), non-anatomic posterior tooth forms provide the following advantages.

They:

- i. direct vertical forces within the denture border;
- ii. eliminate detrimental horizontal stress;
- iii. provide balance;
- iv. ensure denture stability;
- v. compensate for tissue resorption;
- vi. protect and conserve the remaining ridges;
- vii. promote efficiency.

The tooth form selected must meet certain specifications set up by SEARS (1952) and others. Briefly, some of them are as follows:

- i. freedom of movement in eccentric positions;
- ii. crushing as well as cutting areas;
- iii. direct sillways to prevent clogging and retention of food on the occlusal surface;
- iv. ability to concentrate the major load of mastication lingual to or directly on the crest of the ridge for denture stabilization.
- v. ability to centralize the stresses of mastication by placing the major load in the second bicuspid and first molar region;
- vi. working occlusal surfaces that are narrow than those of natural teeth of comparable size.

(f) Surface finishing:

SCHIESSER (1964) defined the polished surface of the denture as the surface which is normally brought to a high polish on a dental lathe and which contacts the tongue, cheek, and lips. The contour of the polished surface is largely dependent upon the buccolingual position of the teeth in relation to the residual ridge and upon the form of the wax-up of the trial denture bases. The vertical relation of occlusion and the width of the posterior teeth also affect the shape of the polished surface.

To ensure stability it is essential that this surface does not interfere with the action of dislodging muscles, but that it establishes an inclination to provide both active and passive muscular fixation of the denture.

According to LIDDELOW (1964) and OSBORNE (1960), for the upper denture the buccal surface should face downwards and outwards; the palatal surface will face inwards and downwards. For the lower denture, the buccal surface should face outwards and upwards; the lingual surface must also extend inwards and upwards below the anterior and lateral parts of the tongue, and as far posteriorly as permitted by the range of action of the tongue and the internal pterygoid muscle. With such a sublingual and mainly horizontal

extension, the denture will rest to a great extent on the soft tissues of the floor of the oral cavity and provide a resting place for the tongue.

The denture must be placed in the denture space so that there is an equilibrium between the inward pressure exerted by the lips and cheeks and the outward pressure exerted by the tongue.

The buccal and labial surfaces must be contoured fully without heavy root carving and interdental papillae must also be fully lifted to obviate food trapping. Lingual and palatal carving should be limited to provide smooth surfaces without obvious junctions between acrylic and tooth substance. Reproduction of gingival rolls, rugae and stippling accumulate food debris and are irritating to the elderly patient.⁶³

(g) Adjustment:

Changes do occur in the fit and occlusion when dentures of acrylic resin are processed. TERRELL (1958) emphasized that: "It is useless to develop accurate centric and balanced occlusion on an articulator and then lose them in the flasking and curing process." Overextensions and occlusal interferences are the main causes of patient discomfort, especially for the menopause female

and the male climacteric. With an increase in sensitivity, the supporting soft tissues have a reduced capacity to adapt to a prosthesis. A series of insertion adjustments are necessary as part of routine recall procedures to correct any change of a finished denture. If the patient is a new complete denture wearer, mastication should not be attempted until after the dentures are balanced and milled. The lower denture can be removed while eating. The patient should learn to eat soft vegetable first, then harder vegetable, then bread, and finally meats. Food should be cut into small pieces and chewed slowly. It usually takes several months before the geriatric patient will learn to eat well with complete dentures.¹⁶⁵

In general terms, full denture should avoid sudden dramatic change. Where a denture has been worn for many years and has proved satisfactory except for the failure of the material, the basic shape and design of the old denture should be maintained in the new replacement.

E. Resilient denture liners:

As result of a reduction in thickness of the mucosa and a possible reduction in surface area,⁸⁶ the mandibular ridge in particular is covered by a thin layer of soft tissue. The end

result is a small denture-bearing area covered by a thin and relatively non-resilient mucosa. When masticatory load is applied through a hard denture base to this type of foundation, pain is very likely to result. The pain receptors are compressed between the thin mucosa and the sharp spicules of bone. A soft lining to the lower denture in such cases frequently gives comfort to the patient.

(a) The principle of resilient relining:

LAMMIE and STORER (1958) stated that the principle of this treatment is the replacement of the lost resilient mucosal tissue covering the residual ridge with a layer of soft material of similar resilience on the base of the denture. Besides absorbing a part of the masticatory load, it could distribute the force throughout the resorbed ridge to minimize the pressure at any one particular spot.

(b) Desirable properties of the material:

STORER (1962) listed the desirable properties of a denture liner as follows. It should:

- (1) be non-irritant and non-toxic to the oral mucosa, odourless and tasteless;

- (2) be dimensionally stable during processing and in use;
- (3) have minimal water absorption;
- (4) have a high bond strength to the rigid denture base material;
- (5) have permanency of resiliency;
- (6) have a high resistance to abrasion;
- (7) be simple to process;
- (8) be easy to repair.

(c) Indications:

HOBKIRK (1973) suggested that soft liners should not be used routinely; they should be used only in cases:

- (1) where non-surgically removable alveolar irregularities are traumatizing the denture bearing mucosa: to form a cushion to dissipate the load on these tissues which are easily traumatised.
- (2) where maximum stability and minimum soft tissue loading have been incorporated into a prosthesis and the denture bearing mucosa is still unable to accept the loads: on a restricted ridge, resilient lining can extend onto movable tissues owing to its softness whereas the hard material cannot do so.

A report of the Council on Dental Material and Devices (1969) recommended that soft resilient liners be considered only as temporary expedients. The silicone-rubber resilient reliners, when properly used, are the most appropriate of the various types available. Resilient liners must be checked regularly by the dentist and replaced when unsatisfactory.

3. Oral Medical Considerations

A. Denture sore mouth:

NYQUIST (1952) studied the denture sore mouth with a large case series as well as clinical experiments including patch tests and mucosal contact tests. He reached the conclusion that trauma is the predominant cause of the occurrence of denture sore mouth. A hypersensitiveness of the oral mucosa against some constituent of the denture base or the possibility of toxic effect from free monomer in an acrylic is also conceivable, but the frequency of such injuries is quite low.

COOKE (1971) discussed the denture sore mouth associated with a burning sensation which is a common complaint of the elderly. He said that "the whole of the palatal mucosa outline precisely by the shape of the full denture is erythematous, edematous, friable and spongy."

WINKLER (1972) claimed that these inflammatory changes in the oral mucosa are not confined to the user of prosthetic replacements. He extended the causative factors into external, internal, psychology, a combination of any two or all three of these. The following are the salient points of correction:

(a) Inflammation caused by external factors:

(1) If a positive result is obtained from patch test for allergic response, the aim should be to avoid contact between the sensitizing denture base and all oral tissues. The denture can be remade using another resin for the base, or a cast gold or cobalt-chrome base constructed.

(2) To eliminate the free monomer present in incompletely cures denture base or auto-polymerized relines.

(3) To avoid excessive pressure from a denture base on the incisive papillae,

(4) To spread the forces of mastication over as great an area as possible to minimize local stresses by proper design and tooth selection.

(5) To eliminate the irritating preparation, food, restoration, or habit will bring prompt relief.

(b) Caused by internal factors:

Systemic disturbances, possible include nutritional or

vitamin deficiencies, metabolic and circulatory disturbances, pernicious and iron-deficiency anaemia, gastrointestinal disorder, and hormonal imbalance.

A burning sensation of the tongue and denture-bearing tissue is often associated with climacteric, female and male.

The dentist has no reason to attempt to diagnose and treat systemic disorder and menopausal symptoms. All he can do is to refer the patient to a physician if he deems it necessary.

An adequate intake of protein is essential for a well-balanced diet which is the corner stone of general health.

(c) Caused by psychological factors:

These patients are usually postmenopausal females, nervous, worried, tense, and anxious, with a variety of actual or imagined systemic disorders. Only as a last resort and with the patient's permission should psychiatric consultation be sought. If the patient is already under psychiatric care, a consultation between the dentist and psychiatrist with the full knowledge of the patient to discuss the proposed treatment is indicated. The use of tranquilizers and sedatives should be undertaken with caution.

B. Xerostomia:

In elderly people, the epithelial lining of the salivary ducts and glands may atrophy and be replaced by fibrous and/or fatty tissue and cause a hyposalivation. ELFFENBAUM (1968a) cited that the dry mouth is part of a syndrome of signs and symptoms, and is not a disease entity in itself.

FRANKS et al. (1974b) also was of opinion the "mouth dryness is a symptom of many elderly persons suffering from various systemic complaints such as uraemia or achlorhydria as well as disorders affecting glandular activity of which senile diabetes is an important example." Drymouth frequently results from the administration of drugs and from other conditions such as menopause, x-ray irradiation and vitamin deficiencies. The diminished function of the glands also results in a change in the saliva itself which becomes more viscous and ropy. This change in the character of saliva contributes to plaque formation and creates a favourable environment for the growth of cariogenic bacteria as well as a susceptibility to fissuring of the mucosa and irritation and infection of the oral tissues. It also affects the taste sensations, mobility of the tongue, ease of swallowing food, and wearing of appliances.⁴⁴

WINKLER (1972) suggested that the treatment start with an increased intake of water and frequent mouth rinses. Coating the tissue surface of the denture with petrolatum or lubricating jelly, silicone fluid, or semisolid denture adhesive preparations can temporarily increase denture retention and decrease irritation of the underlying soft tissue. He also recommended a therapeutic dose of nicotinamide (250 to 400mg t.i.d.) to decrease in salivary flow caused by nutritional deficiencies. Pylocarpine hydrochloride or nitrate in 5mg doses before meals will cause a pronounced flow for two to five hours. Sucking lemons or sugarless sour candies and chewing sour pickles may be effective.

C. Angular cheilitis:

In the elderly, the sagging of the facial tissues as a result of age results in deep folds in the angles of the mouth. This can be aggravated when the height of the lower face is reduced by severe abrasion of the teeth that is not compensated by passive eruption or by resorption of the bony ridges of the maxilla and mandible. In this condition, the intermittent drooling of saliva along the furrows by capillary action will lead to the cheilitis.¹⁴⁰

COOKE (1971) suggested that a water repellent ointment is useful as well as antifungal treatment. Local application of

Neocortef at night for a week or two will help to heal the cheilitis rapidly.

Because angular cheilitis is of course associated with other disorders including vitamin B complex deficiency and anaemia, the dentist should know enough to advise the patient about diet and nutrition. When the dental assistant and hygienist become trained in clinical dentistry, the supplementary health regimen may be assigned to the auxiliary personnel in the dental office.³

D. Candidosis:

Candidosis is a fungus infection. It causes the mucosal and skin lesions referred to as moniliasis. GREENBERG and SHIP (1970) cited the candidal infections are significant for the following reasons:

- i. Treatment in the early phases of the disease helps prevent the fungus from becoming seated deep within the epithelium;
- ii. Moniliasis occasionally causes severe disseminated infection such as endocarditis, pneumonia, and meningitis;
- iii. Moniliasis often indicates the presence of systemic disease.

FRANKS and WINTER (1974a) emphasized that the chronically sick on long-term chemotherapy with broad-spectrum antibiotics and corticosteroids may develop attacks of acute oral candidosis, which is also associated with systemic disease such as diabetes melletus, cancer, leukemia, aplastic anaemia and agranulocytosis. They stated: "Such attacks of oral candidosis may be treated with either nystatin or amphotericin B." Furthermore, they commented that therapy by means of solution or cream suitable for oral use may be preferable to the sucking of tablets for many patients.

GREENBERG and SHIP (1970) associated chronic oral moniliasis with endocrine disorders, denture stomatitis, angular cheilitis and a distinctive form of leukoplakia. Because the chronic monilial infection commonly precedes the endocrine disturbance by several years, they claimed that "any patient with chronic oral moniliasis should have periodic evaluation of serum calcium, serum phosphorus and urinary ketosteroids and hydroxysteroids, so that the parathyroid or adrenal disorder can be detected prior to the development of tetany or shock."

Generally, candidal infections are another important oral health problems in the aged. These problems can be solved with improvement of oral hygiene. Dental auxiliary personnel can easily take over this responsibility if they are suitably trained.

E. Oral cancer:

The problem of cancer itself is still far from clear. Malignant cancers of the mouth are rare, but their incidence increases sharply with age. A general idea of oral cancer in the elderly has been discussed recently by many authors.^{23, 38, 50, 107, 139, 154} It is not the intention in this analysis to become involved with the oral pathological aspect. No attempt will be made to review all the various tumour growths, but rather highlight conditions under which the dentist should be alert for such conditions.

(a) Types of oral cancer occurring in the elderly:

According to the literature reviewed, the types of oral cancer in the aged could be classified as follows:

- (1) Squamous cell carcinoma of the mouth, particularly the lateral border of the tongue and floor of the mouth;
- (2) Squamous cell carcinoma of the lip;
- (3) Basal cell carcinoma of the facial skin;
- (4) Tumour of the minor salivary glands;
- (5) Mesenchymal tumours and tumours metastatic to the jaw bones.

(b) Classical signs:

The classical signs of a malignant condition, which should arouse alert suspicion, are:

- (1) Persistent ulceration. Any unexplained ulcer which lasts for longer than 10 days should be treated with suspicion;
- (2) Induration, thickening and hardening of the tissue;
- (3) Proliferative growth of tissue above its normal level, often with changes in the surface texture and color changes;
- (4) Fixation of the affected tissue to the underlying structures.

Cancer of the mouth is generally a painless lesion in the early stages until the lesion has become large and secondarily infected.

(c) Examination and diagnosis:

The cytologic examination offers some guidance, but smear biopsy is entirely unsatisfactory for the diagnosis of suspected oral malignancy. Incisional or excisional biopsy followed by tissue examination is essential for a proper

diagnosis to be made.

To complete an oral examination, the following points should be carried out:

- (1) the face is inspected and palpated;
- (2) the lips are closely examined and bidilittally palpated;
- (3) All areas of the oral mucosa are inspected and palpated;
- (4) the salivary gland orifices are examined and their patency established;
- (5) there is an examination of the lymph nodes that drain the oral cavity and face.

(d) Treatment:

Oral cancer is normally treated by surgery, radiotherapy, or a combination of both. The development of chemotherapy has led to attempt to use these agents either locally or systemically.

(e) Role of the dentist:

The dentist must be certain that there are no dental irritating factors associated with lip lesions. Unexplained

rapid loosening of the teeth should always be most carefully investigated. The dentist's most important role is that of detecting an early lesion and referring the patient for adequate definite care on which the prognosis for the patient with oral cancer generally depends.

4. Oral Surgical Considerations

The principles of oral surgery are the same regardless of the age of the patient, but the problems which arise in the elderly person differ in a number of respects from those in the young adult. The geriatric patient has a diminished tolerance to any stressful situation. The patient's homeostatic mechanism cannot maintain equilibria under sudden stress, dehydration, starvation or extremes in temperature. This patient has a narrow margin of safety since his compensatory mechanism and other physiologic processes are weakened.¹³⁰ Indeed, it is prudent practice to obtain medical consultation for all aged patients prior to surgery. This will permit the physician to make an intelligent decision concerning the proposed treatment plan and perhaps prevent undue concern. UHLER (1962) commented that any approach other than the team approach to the old patient is illogical. Careful preoperative evaluation should include special consideration to nutrition and fluid balance. It is necessary to correct several nutritional deficits in order to minimize recovery time and ensure a successful outcome.

Many patients have feelings of considerable anxiety before any dental or surgical procedure.^{102, 126} The operator should make a special effort to spend some time with the patient

explaining in simple and reassuring terms the proposed procedure.

A. Anaesthesia:

General anaesthesia frequently is more of a problem in the aged patient in poor physical condition than is surgery. Such patients should be in the hands of a specialist anaesthetist. ZITER and MASTROCOLA (1972) preferred to local anaesthesia for aged patients, especially those with cardiovascular disease. They indicated that the following procedures and precautions should be followed in administration of local anaesthesia:

- (a) If a patient is known to react to a specific local agent, another kind of solution should be used;
- (b) Pain at the injection site should be reduced with topical anaesthetic compounds;
- (c) The lowest effective concentrations of anaesthetic should be used;
- (d) In order to avoid complications, aspiration is recommended before every injection. If blood is aspirated, the cartridge should be discarded and another cartridge used;
- (e) The lowest concentration vasoconstrictor compatible with total anaesthesia should be employed;
- (f) All injections should be made slowly with minimal pressure;

- (g) Following injection, the patient should be kept under close observation. If unusual reaction develop, indicated resuscitative and supportive measures should be promptly instigated.

Many physicians advise the use of anaesthetics which do not contain vasoconstrictors in patients who have coronary or hypertensive heart disease or congestive heart failure.

B. Surgical management:

The purpose of this section is to review briefly basic oral surgical concepts which are universal regardless of the age or physical status of the patient. Detailed descriptions of surgical techniques are beyond this thesis. Because of the fact that aging tissues have a decreased circulation, have less functional reserve, and tolerate trauma very poorly, fine needles and fine suture material must be used. Tissue trauma in aged patients is much more likely to cause circulatory embarrassment which could lead to necrosis.¹³⁰ Thus, aging tissues should be handled as gently as possible. Precise flap design is of crucial importance in surgery for the aged. The base of the flap should always be wider than the free margin and the design should permit closure over firm bony support. Dead space beneath flaps should be prevented. Not

to do so invites bacterial invasion and breakdown.

One should strive for good haemostasis in operations on the aged patient to prevent as much blood loss as possible. Aged patients are known to tolerate blood loss very poorly, even in minimal amounts. In keeping with this concept, surgery should be carried out as quickly as skill and good surgical principles will allow. It has been estimated that after one and one half hours of surgery, the mortality rate increases by 25 percent.¹⁵⁶

ZITER and MASTROCOLA (1972) commented on surgery in the aged patient. They said: "Despite more complicated management, age itself is not a contraindication to surgical therapy. With judicious preoperative evaluation and meticulous attention to technical detail, when indicated, surgery in the aged patient will be both successful and rewarding."

C. Postoperative care:

In the recovery period, more frequent postoperative visits are essential in order to abort any anticipated complications. Oxygen, airway and suction must be at the patient's side until he has recovered. Many authors recommend that postoperative complications should be treated promptly and aggressively. The 'wait

and see' attitude can be dangerous with elderly patients who are declining in the reserves of their various organs and systems.

ZITER and MASTROCOLA (1972) stressed that care must be taken to maintain the blood pressure at a level close to that of the patient in his normal daily existence. They indicated that blood volume maintenance can be accomplished in the following ways:

- i. Strict monitoring of blood loss during surgery;
- ii. Early replacement with whole blood;
- iii. Scrupulous attention to haemostasis, since persistent oozing can be an insidious cause of appreciable blood loss.

If the patient is bedridden, he should be encouraged to change positions in bed from side to side. If the patient is not bedridden, he should be urged into ambulation within 24 hours to preclude circulatory, respiratory and urinary complications.¹⁵⁶

Pain control is an important postoperative consideration. FRANKS et al. (1974b) point out that pain and stress can give rise to an elevation in vascular tension which is unsupportable by some of the cardiac arteries with a consequent danger of cerebro-vascular accident. Pain or fear which can cause an overstimulation of the sympathetic nervous system can result in a

cardiac standstill causing sudden death of the patient undergoing dental treatment. Use of a sedative and an analgesic will give more efficacious pain relief with less respiratory depression than will a larger dose of a single analgesic.

Routine antibiotic therapy is important; this procedure is defended on a basis that all oral surgical work on aged patients is done in a potentially infected field, in a patient who has a lowered resistance to infection. When an older patient has been discharged as cured, the obligation of the oral surgeon has not terminated. The postsurgical geriatric patient must be kept on an effective follow-up schedule.¹⁵⁶

IV DISCUSSION

In the previous literature reviewed, a reasonable attention has focused on the oral health of the aged as a part of total well-being. Because of the increasing longevity as well as the relatively higher incidence of chronic disease in this age group, the importance of embodying concern for the total dental problems and the total patients up to a community level cannot be overlooked. The total care of the problems in a community would not be complete without government concern. In other words, only social security programme and other types of federal, state and local plans seem able to solve the problems of dental care to the indigent and sick aged. Of course, the another essential factor to implement the programme is the acceptance of the public. If the public was not ready to accept any type of assistance to the aged, no amount of policy and no legislation would be acceptable to the people.

FRIEDRICH (1959) first pointed out that the federal government has three effective means in the solution of problems of dental care for the aged. They are:

1. to support research programme;
2. to support local dental public health activities;
3. to support public assistance programmes and stimulate the use of funds for dental care.

It is logical to said that the responsibility of the federal government for the dental health of the aged is to provide quality dental care to more people.

Participation by governmental agencies in the provision of health care for special population group --- low-income and the aged, has taken two forms: (1) Programmes of financial assistance such as Medicare and Medicaid³⁶ and (2) financial support for community or neighborhood health centres which provide direct services to an eligible population.³¹ The centres are staffed by salaried physicians, nurses, social workers, dentists, and a variety of aides and auxiliaries. POSNICK (1974) has reported a successful programme of a federally funded neighborhood health centre. He comments that the centre has achieved a satisfactory degree in its delivery of a preventively oriented dental programme for its low-income population. The role of dentistry in the health centre has been listed by JONG et al. (1972) as follows:

1. the provision of direct dental services;
2. the provision of dental health education;
3. the provision of jobs to community people and the training of community people as health personnel;
4. the recruitment of auxiliaries and dental students;

5. the relating of dental health to the total health of patients;
6. the training and sensitization of dental students and auxiliary students.

Judging from the functions mentioned above, the community health centre represents an encouraging portion of the solution for the complex problem of delivering health care.

Another important avenue of providing dental care to chronically ill and the aged is through government hospital services. An obvious example of this type of effort has been recommended by the Dental Services Advisory Committee (1972a): "Pensioners and other persons confined in their own homes or in nursing or convalescent homes are a special dependent group deserving a high priority in the distribution of dental care. A domiciliary service should be available from the out-patients departments of general hospitals....."

For a long-range point of view, to strengthen the community dental care programmes for children and to intensify water fluoridation can reduce the extent of the dental problem of the aged population group in the future.¹⁷⁰

The concern of dental society is another aspect which should

not be overemphasized in providing dental care to the aged person. GALAGAN (1962) first pointed out the ways in which local dental societies can assist in handling the problems of dental care for the chronically ill aged. He made the following suggestions:

1. to form committees on chronic disease in each local dental society;
2. to seek out the agency in the community concern with chronic disease, and discuss the dental needs of chronic disease patients with the people in the agency;
3. to take an inventory of the local situation and the available resources;
4. to discuss the situation with the state dental public health director;
5. to establish means for meeting the need;
6. to investigate available means for helping the homebound patients;
7. to stimulate the development of portable equipment to meet the need for outside-office care;
8. to experiment with payment systems which will reimburse the dentist adequately for the service rendered during a time when the patient is undergoing severe economic duress.

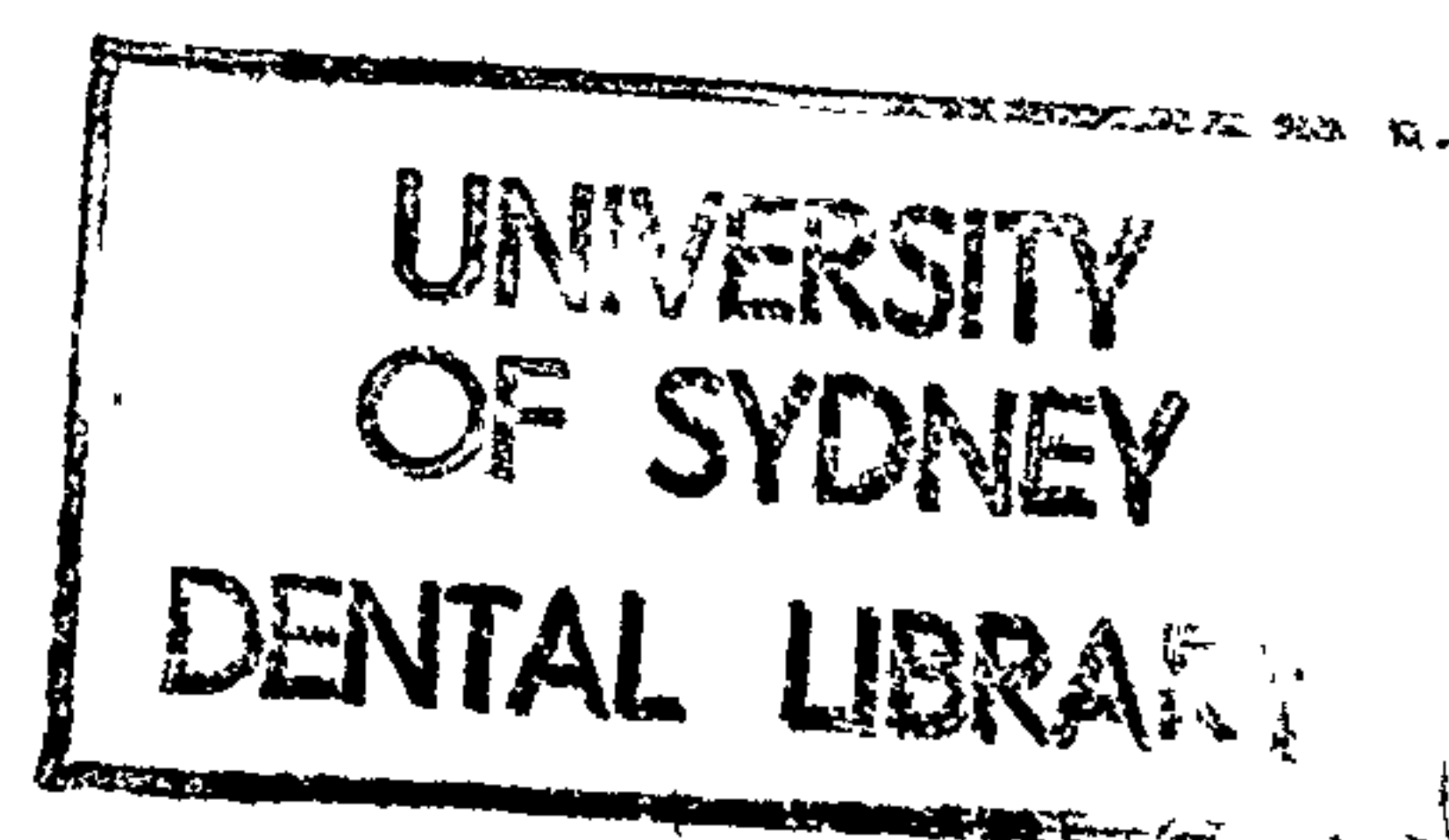
ST. MARIE (1962) was of the opinion on the dental society concern that the leadership must be at all levels--local, state, and national. He stated the points as follows:

1. The national leader should consider the overall philosophy and concept of a national programme. They must then carry this information to state dental societies.
2. Each state should develop its own administrative committee with a programme to make the above concept come alive.
3. Adequate and comprehensive dental services for the aging persons of all community should be one of the main objectives of the local leaders.

All the leaders will necessarily be working coordinately to develop further ideas which can form a basis for an acceptable and workable programme. Furthermore, an intelligent, intensive action by constituent and component dental societies is necessary in cooperation with medical, nursing, hospital, and nursing home organizations.⁷⁴

These activities will perform a national concern for the large numbers of aged patients requiring dental care; but there

still seems to be a lag between the awareness and the action phase of this effort. This lag should be eliminated with the motivation of young dental graduates in a sense of obligation to the aged if themselves are to be entitled to the respect of society when they graduate into the senior citizens class. One theme deserves to bear in mind that the old folks of the future will be no strangers; they will be ourselves.



V SUMMARY AND CONCLUSIONS

Aging is a universal phenomenon which needs alert awareness to facilitate more effective dental services for a rapidly increasing proportion of old people in the general population. Aged patients present problems to the dentist because old age brings about unique socio-economic and psychological difficulties that affect the individual's adjustment. Physiological processes contribute to psychological reactions at a significant level.

Due to the size of the oral problems in the geriatric population is increasing dramatically in every country, attention is focused on the provision of dental services in terms of public health point of view. The clinical aspects of dental treatment for the aged is also reviewed in this thesis for the purpose to understand some of the underlying principles on which competent dental services and programme planning may be based.

Judging from the literature reviewed, the following conclusions are drawn on the merits of the management of oral problems in the aged:

1. The dental profession must be cognizant of the problems of aging and the psychological characteristics of the aged before delivery of dental services.

2. Special orientation should be included in the undergraduate curriculum of dental schools to increase ability to cope with dental problems in the aged.
3. A complete programme should demand nutritional counselling, social checking, psychological examining, consideration of longevity, and the availability of auxiliary aids.
4. The dental health of the aged should be the responsibility of government---federal, state and local. The creation of a salaried community dental services including a section capable of undertaking dental care of those in local authority homes and geriatric and handicapped patients confined to their own homes is an ideal worth striving for.
5. For a long-range point of view, to strengthen the community dental care programmes for children and to intensify water fluoridation can be the preventive means for reducing the extent of the dental problem of the aged population group in the future.

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