

Ensuring Better Health Care for the Elderly

Training Manual for Physicians

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The following books were consulted during the preparation of the manual

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About the manual

As people are now living longer than ever before in the history of mankind, medical care personnel are likely to see an ever increasing proportion of elderly patients in their practice. Geriatrics as a subject is inadequately represented in Undergraduate medical curricula, which leaves primary care doctors with very little understanding of the specific problems facing the elderly. Thus there is an overwhelming need for practicing physicians to gain a practical understanding into the health care problems of the elderly, including ways to identify and treat specific geriatric problems. The manual is a part of the endeavor to develop material that trainers can use while providing training to primary and secondary care physicians in the care of the elderly.

- ❖ The manual is a road-map of the problems encountered in every day clinical practice with respect to the elderly. It is not intended to be a complete reference textbook of geriatrics
- ❖ Physicians can learn about health care interventions and strategies for older people from this manual
- ❖ Trainees need not confine themselves to the descriptions and diseases described in this manual; as appropriate, health problems that may be prevalent in their local geographic area may be discussed and additional modules may be developed incorporating these disorders.
- ❖ The total duration of the programme should be 8 to 10 hours of learning spread over two days. The time required to discuss each topic is left to the discretion of the trainer. The manual covers material necessary for the trainers. It is left to the discretion of the trainers to decide on the amount of information conveyed to the trainees during the programme
- ❖ Pre and Post-training assessment at the completion of each module, can help in ensuring the achievement of the learning objectives. Ongoing assessment is also vital, so that the ideas learnt are disseminated into practice.

The overall goal of this programme is to train physicians in primary and secondary health care strategies which promote health and well being of older subjects.

Introduction

Definition of Ageing:

Ageing is the progressive and generalized impairment of functions resulting in the loss of adaptive response to stress and in an increasing risk of age-related diseases. It is a complex interaction between an individual and the environment over time. The overall effect of these interactions is an increase in the probability of dying, which is evident from the rise in age-specific death rates in the population.

Ageing in India :

- ❖ In the Census of the year 2001, the number of people aged 60 and above numbered about 76.62 million, constituting about 7.7% of the total population of India (up from 6.7 % in 1991). It is projected to rise to about 172 million by the year 2026 (about 12 % of the total population).
- ❖ The decadal growth rate for the elderly in the period 1991-2001 was around 35%, almost double the rate of increase for the general population
- ❖ Life expectancy at birth is 62.2 years and at age 60 is 17.1 years.
- ❖ The old age Dependency ratio is 13% (Old age dependency ratio gives an idea about the number of persons aged 60+ per 100 persons in the age group 15-59)
- ❖ Forty-five per cent of the elderly have chronic diseases and disabilities.
- ❖ The ten most common diseases are: hypertension, cataract, osteoarthritis, chronic obstructive pulmonary disease, ischemic heart disease, diabetes, benign prostatic hypertrophy, dyspepsia, constipation and depression.
- ❖ The five most frequent causes of death in the elderly are bronchitis and pneumonia, ischaemic heart disease, stroke, cancer and tuberculosis.

Challenges of an Ageing Population:

The UN defines a country as 'ageing' where the proportion of people over 60 reaches 7 per cent. The dependency ratio, which is a ratio of the working versus non working sections in the population, is rising steadily. This means that the burden of a larger group of older people will have to be borne by a relatively smaller younger adult working group.

Demographic changes influence health, economic activity and social condition of people. As the age structure of developing countries changes, demands on resources by different segments of population are expected to grow. The elderly will be marginated because of their decreased physical, economic and socio-political clout.

Nearly 60-75% of all elderly are economically dependent on others, usually their children. Even those with pensions find their economic status lowered after retirement. As people live longer, medical expenses will consume a major share of their savings. When people are already poor, living longer may

ultimately mean living with unattended medical problems as health services cannot be readily purchased.

With urbanization, families are becoming nuclear, smaller and are not always capable of caring for older relatives. The unconditional respect, power and authority that older people used to enjoy in rural extended traditional families is being gradually eroded in India in recent years.

In most of the developed world, women live longer than men by four to eight years. That is not so in India; in 1991, for instance, life expectancy at birth for females was 59.8 compared to 60.1 for males. The reasons for this have to be sought in India's patriarchal social system and the generally low status of women. Older women are likely to be illiterate, poor, widowed, have more health problems and report more psychological distress.

Advocacy, research, involvement of voluntary agencies, training different levels of gerontological workers, catalyzing the community, awareness building, organizing older persons themselves and networking with international agencies are all essential to empower older Indians.

A majority of the problems of the elderly occur in the community and a primary care approach may be one of the possible approaches. Physicians working in the area of primary and secondary health care in developing countries have a huge responsibility in providing quality health care to older people.

Health care workers can support older people in staying independent and healthy by understanding age-related norms, thereby maximizing the capabilities of older people. Among the reasonably healthy elderly there is a constant need for regular health care supervision, monitoring of blood pressure, early detection and treatment of chronic illnesses, monitoring of the effectiveness and side-effects of routine medication, assessment of nutritional status and instruction in healthy lifestyles. Health care workers should have the knowledge of what is normal in old age and what can realistically be expected as a good standard of health.

Important Concepts in Geriatric Medicine

- ❖ The principles on which geriatric medicine or the science of health care of the elderly is based include:
 - Individuals gradually become more and more heterogeneous or dissimilar as they age.
 - Ageing does not produce an abrupt decline in organ function; but disease always does.
 - Ageing process is accentuated by disease and attenuated by modification of risk factors, such as smoking, sedentary lifestyle and obesity.
 - Healthy old age can be attained with different levels of prevention and health promotion.
- ❖ Stereotyping of ageing
 - Stereotypes are generalizations about characteristics, which are considered to be typical of a particular group. It is often considered "all old people have problem in remembering", or "all old people are diseased".
 - Scientific evidence suggests that, on the contrary, older people are more heterogeneous than any other age-group.
 - Stereotyping of old age and older persons can be seriously harmful to them. It can contribute to discrimination, loss of self-esteem, and physical and mental decline in

older persons. Stereotyping also acts to counteract positive interventions for health promotion.

- Quality health care for older patients requires abolition of stereotyping from the mindset of health professionals.

- ❖ Ageing is associated with a decline in expectation of healthiness
- ❖ Underreporting of symptoms, ultimately leading to late recognition of illness and delayed intervention is widely prevalent.
- ❖ Minimizing of problems (Potentially serious problems are not reported due to various reasons)
- ❖ The Elderly may fail to recognize certain symptoms as abnormal
- ❖ Diseases often manifest themselves at an earlier stage because of impaired physiological reserve in older patients. Symptoms always reflect an imbalance between the severity of disease and intrinsic compensatory mechanisms. Since pre-existing diseases or physiological decline impair these mechanisms, even mild disease often tips the balance.
- ❖ Multiple pathology or concurrence of diseases is common (Disease-Disease Interactions and Disease-Treatment interactions are common). In older patients multiple symptoms are usually due to multiple diseases and use of multiple drugs. The usual practice of explaining all symptoms and signs by a single pathology as in a younger patient does not hold good in geriatric practice; Occam's razor does not cut too sharp in Geriatric Medicine. Many symptoms such as falls, syncope, dizziness, hip fracture, incontinence and delirium are caused by multiple pathological states and extensive investigation, for a unifying diagnosis is often non-productive.
- ❖ Functional loss is a final common pathway for most clinical problems in older patients, especially over the age of 75. The lesson for physicians and care-givers is that functional loss, especially if abrupt, is a reliable sign of disease. Rapid and comprehensive evaluation is the only appropriate clinical response.
- ❖ Older patients present with non-specific problems that may in fact be functional deficits.
- ❖ Especially vulnerable systems are likely to decompensate early from systemic disease elsewhere in the body. As the most vulnerable organ system, "the weakest link", is often different from the newly diseased one, the presentation of disease is atypical. The usual "weakest link" organs are the brain, lower urinary tract, cardiovascular system or musculoskeletal system. Thus, confusion, depression, incontinence, heart failure, falls and fainting are common presenting symptoms in diverse disease conditions.
- ❖ Blunting or Absence of Classic or common clinical signs and symptoms is well known.
- ❖ Clinical signs considered abnormal in younger patients are often common and normal in older people and may not be associated with a particular disease. Premature ventricular contractions, bacteriuria and impaired glucose tolerance are common signs and should not be considered as pathologic entities such as arrhythmia, urinary tract infection or diabetes requiring therapy respectively in the absence of systemic illness.
- ❖ Multiple small abnormalities in many organ systems produce significant clinical abnormality and, when corrected, the overall effect is gratifying. Confusion in a patient with dementia may be due to deafness, poor vision, heart failure and electrolyte imbalance, all of which, when corrected, produce significant improvement in cognition.

- ❖ Adverse consequences of diseases are more frequent in elderly patients. Prevention and treatment of diseases is thus much more productive. Treatment of hypertension and transient ischaemic attack and immunization for pneumococcal pneumonia and influenza are some of the measures which can be cost-effective in preventing myocardial infarction, stroke and life-threatening pneumonia

- ❖ The organ which is symptomatic is probably not the organ which is diseased.
- ❖ Older patients get symptomatic early but seek health care much later.
- ❖ Some signs, namely, anaemia, confusion and recent onset of incontinence warrant immediate attention though many clinical abnormalities may not be of importance.
- ❖ A single diagnosis for a symptom and its management is often not curative.
- ❖ Small interventions often produce dramatic results.
- ❖ All levels of prevention are effective in old age.

Assessment of the Older Patient

The term 'geriatric assessment' is generally used to describe a clinical approach to older patients that goes beyond a traditional medical history and physical examination. The rationale of geriatric assessment is to better recognize common geriatric disorders in order to improve functional outcomes and quality of life for older adults. The elderly are heterogeneous in function; thus, the approach to geriatric assessment depends in part on the patient being assessed and the site of assessment.

Although geriatric assessment may be comprehensive and interdisciplinary and involve multiple team members (eg, social services, nursing, medical, physical therapy, occupational therapy, psychology, audiology, dentistry, pharmacy, nutrition, speech therapy), it may also involve just 2 or 3 informal team members and be much more simple in scope and approach. However, in outpatient practice, the evaluation can be carried out with fair degree of accuracy by the primary or secondary care physician. The ultimate aim of such an assessment is cost-effective use of services, maintaining the patient active and providing good quality of care.

Assessment of the elderly follows the same principles of clinical evaluation as for any age group. However, while evaluating, several aspects of the older patients are to be reviewed which are often overlooked in a younger patient. The components of geriatric assessment are physical, functional, psychological (cognitive, affective), financial, social support and care facility, environmental and overall quality of life.

Baseline evaluation

- ❖ In addition to usual clinical evaluation (history-taking, physical examination and laboratory investigations), emphasis is placed on the assessment of different levels of functional ability in the form of activities of daily living.
 - **Basic activities of daily living.** These are independent of culture and education and include bathing, dressing, going to the toilet, transferring (moving from place to place), continence and feeding.
 - **Intermediate activities of daily living.** These are dependent on culture and socioeconomic status and include using telephone, shopping, preparing meals, and housekeeping, cleaning clothes, using public transport, taking medication and handling money.
 - **Advanced activities of daily living.** These are dependent on culture, socio-economic status and the past profession, and include recreational, occupational and community activities.
- ❖ In addition, mobility (gait and balance), nutritional status (adequacy and deficiency), social support, financial support, and home and immediate environment need to be assessed.
- ❖ Assessment procedures in the form of standardized scales are available for all these parameters. However, scales for each culture and socioeconomic setting differ greatly and need to be developed indigenously.

Evaluation of newly-worsened health status or newly-discovered risk factor

- ❖ Evaluation and management of newly-worsened health status requires a certain degree of structured approach to achieve the best result.
- ❖ When an old patient has got new deterioration of health status or a newly discovered risk factor, a brief functional status evaluation comprised of basic activities of daily living, cognitive status evaluation and affective status evaluation is essential. In the presence of a severe functional disability the patient should be hospitalized for detailed multidisciplinary assessment and management.
- ❖ In the presence of mild to moderate dysfunction in a stable patient, the symptoms need to be analyzed carefully for a contributing cause. When a cause has been found it should be managed, along with mobilization of care-giver support and rehabilitation in order to maximize function. However, when no cause is found, the dysfunction is managed with additional rehabilitation and care-giver support with similar results.
- ❖ When the functional evaluation reveals good function, the older patient needs to be reassured and advised on positive health behavior and regular screening to prevent future disability.

Multidisciplinary geriatric assessment

Ideally, geriatric assessment requires the involvement of experts from various disciplines, namely, physician, social worker, nurse, physiotherapist, occupational therapist, dietician and pharmacist. Patients with cognitive impairment or sensory deficit require additional inputs from psychiatrists, ophthalmologists and audiologists. Such facilities are generally available in secondary and tertiary care hospitals. However, most elderly patients live in the community and prefer to continue to live there. So the value of the primary care physician in their assessment and management is immense. In primary care setting of outpatient service, the physician with the help of a nurse and physiotherapist can handle most of the assessment. The primary care physician should evolve schedules which are cost-effective from the point of view of time and financial resources. In addition, the primary care physician must have the knowledge of availing specialized referral services whenever the patient requires such service.

The basic principles of medicine and surgery hold well in all ages; however, the finer details greatly vary in the extremes of age. The discipline of geriatric medicine is meant to prevent avoidable death and improve the quality of life in old age.

Module 2: Healthy Aging

Disease Prevention and Health promotion:

Disease prevention and Health promotion are important aspects of health for older individuals. Up to 70% of all diseases are partially or totally preventable through lifestyle modification, risk factor management, and primary or secondary preventive practices. However, the underutilization of preventive measures remains a major challenge in Geriatric Medicine.

Health risks in older patients

- ❖ Several health risks related to unhealthy behaviour have been identified in the last few decades. These include malnutrition (including over-nutrition and under-nutrition), inadequate consumption of dietary fibre and fruits, physical inactivity and sedentary lifestyle, smoking and excessive alcohol consumption. Consequently, several health promotion measures have been advocated to avoid the ill-effects of these unhealthy behaviours
- ❖ In addition, early detection of certain common cancers, risk factors for atherosclerotic vascular disease and immunization have been proven to be cost-effective.
- ❖ Prevention of accidents and injuries by maintaining a safe home environment and prevention of adverse drug reactions through safe medication management practices have been shown to protect the elderly from life-threatening health problems.

Nutrition

- ❖ Under-nutrition leads to frailty, physical dependence and premature death apart from impairment of the immune system, increased risk of infection and poor wound-healing.
- ❖ Ageing is associated with increasing incidence of Weight loss, being underweight and Protein-Energy Malnutrition
- ❖ Over-nutrition causes obesity and is associated with hypertension, IHD and diabetes, which are among the commonest health problems in old age.
- ❖ The energy requirement declines with age due to reduction in the body mass, body metabolism and physical activity. Yet older people are at high risk of under-nutrition due to several reasons, namely:
 - food is less palatable due to changes in taste and smell;
 - lack of teeth, gum problems and ill-fitting dentures make eating painful;
 - Reduced appetite due to lack of exercise, loneliness, depression, chronic debilitating disease, confusion, forgetfulness, side-effects of drugs, alcohol and smoking.

- ❖ Common nutritional deficiencies include iron, fibre, folic acid, vitamin C, Vitamin D, calcium, zinc, riboflavin and vitamin A.
- ❖ It should be ensured that older people are eating nutritious and easily digested diet and have access to food that is tasty and easy to prepare.
- ❖ A prudent diet that not only restricts total and saturated fat, but also avoids excessive caloric intake is recommended
- ❖ A healthy diet varies widely depending on the availability and cultural acceptability of foods. Most traditional Indian diets are now considered to be close to being ideal, at least for adults and the elderly.
- ❖ The principles of a balanced diet are similar in all ages. The elderly being a heterogeneous group, prescription of a uniform dietary schedule is difficult. However, certain guidelines can be followed to make a nutritious and balanced diet.
- ❖ Protein requirement is 1 g/kg/day, and water requirement is 30 ml/kg body weight / day.
- ❖ In Elderly patients with Pressure sores, Very High protein Diet (contain 25% of calories as protein) was associated with an increased rate of Ulcer healing.
- ❖ Healthy Ambulant elderly require 30 – 35 kcal /kg/day and bedfast elderly require 25 – 30 kcal/kg/day. The ideal body weight rather than the actual body weight should be used for calculation of calorie requirements.

Guidelines to healthy diet

1. Plant proteins are partial proteins. Two different partial proteins must be eaten together for complete nutrition (eg cereals + pulses).
2. Intake of complex carbohydrates and fibres (fruits, vegetables and greens) should be increased. High fibre foods help to lower cholesterol, blood pressure and glucose intolerance and prevent constipation. Simple carbohydrates (sugar and derivatives) should be consumed in moderation.
3. Calcium and vitamin D in the form of milk, curd, cheese, small fish and certain green vegetables should be increased to compensate for osteoporotic changes.
4. Salt intake should be limited.
5. Certain foods with antioxidant property (green, yellow and orange vegetables and fruits such as carrots, sweet potatoes, spinach, tomato and orange) protect against cancers and degenerative diseases.
6. Additional supplementation of vitamins and micronutrients may be required in the elderly as there is a higher risk of their deficiency, but is usually not necessary when a nutritious diet is consumed.

Exercise

- ❖ Ageing causes a progressive decline in power, strength and endurance of skeletal and cardiac musculature. Sedentary lifestyle and lack of physical activity accelerate this decline and are associated with higher risk of morbidity and mortality.
- ❖ Habitual exercise, by improving strength and maximum aerobic capacity (VO_2 max) as a result of conditioning effects, can provide added physiological reserve as well as enhance well-being by reducing effort and fatigue associated with activities of daily living
- ❖ Resistance Exercise to improve muscle strength along with more tailored exercise therapies, including those designed to improve balance, may be of particular value for older persons.

- ❖ Regular physical exercise has proven value in health promotion, which include:
 - Greater survival
 - Protection against cardiovascular disease
 - Weight management
 - Beneficial effect on glucose tolerance and lipoprotein metabolism
 - Protection against osteoporosis
 - Improvement of muscle strength and functional capacity
 - Improvement in psychological well-being.
- ❖ Physical exercise should be carried out at a frequency of 3 to 5 days per week, between 20 to 60 minutes per session, to achieve 70 to 80% of the individuals' maximum heart rate. A prudent target is a heart rate about 15 to 20 beats per minute over their resting heart rate.
- ❖ Exercise at this level, for several weeks is required for physical conditioning to occur. If not maintained, deconditioning occurs. Deconditioning is dramatic and 'malignant' when patients become bed-bound.
- ❖ Physical exercise in old age is limited by reduced maximum exercise capacity, IHD and chronic degenerative diseases of the musculoskeletal system which reduce exercise tolerance.
- ❖ While prescribing physical exercise the physician must evaluate the risks of exercise, potential for falls and accidents, medication, nutritional adequacy and motivation.
- ❖ The older person must be advised on self-monitoring of symptoms of IHD and must know when to stop if symptoms appear.
- ❖ Several types of physical exercises are available. The older person should choose the one which is enjoyable, easy to perform, convenient and inexpensive. Considering all aspects, brisk walking and stretching exercises seem to be the best for older individuals.
- ❖ Remember that "all adults should avoid inactivity, that some physical activity is better than none, and that adults who participate in any amount of physical activity gain some health benefits. However, for most health outcomes, additional benefits occur as the amount of physical activity increases through higher intensity, greater frequency, and/or longer duration" (2008 Physical Activity Guidelines for Americans).

Smoking

- ❖ Cigarette smoking is the leading preventable cause of morbidity and mortality in old age.
- ❖ Smoking is responsible for most of the respiratory problems in the elderly. It causes a variety of cancers.
- ❖ Smoking is an important cause of IHD and stroke. It is also associated with osteoporosis.
- ❖ Smoking is one of the three determinants of functional disability in old age (the other two are obesity and lack of physical exercise).
- ❖ Despite the knowledge of advantages of smoking cessation, most smokers have difficulty in quitting due to withdrawal symptoms (nicotine craving, irritation, frustration, anxiety, restlessness and difficulty in concentrating) and lack of motivation.
- ❖ The benefits of quitting smoking are the same in older age as in younger individuals. Attempts must be made to eliminate smoking. However, if the person cannot quit smoking it should at least be cut down.
- ❖ Nicotine replacement is the most effective pharmacological intervention to help smoking cessation. It is available in the form of Chewing gums and Skin patches.
- ❖ Drugs including Bupropion, Clonidine and Nortriptyline may help in decreasing the urge to smoke.
- ❖ Behavioural and cognitive strategies for smoking cessation should include:
 - Use of support groups;
 - Information about the long- term and short-term adverse effects of smoking;
 - Discussions and films;
 - Techniques for substituting other hand activities;
 - Ways to avoid temptations such as visualization of the effects, aversion strategies such as keeping a jar full of cigarette butts, self-monitoring by maintaining records of when tempted, what was done, what the circumstances were and so on;
 - Stimulus control by avoiding situations which cause the person to want to smoke;
 - Avoidance of stress by relaxation techniques.
- ❖ Prevention of relapse is the most challenging task in smoking prevention programme and every attempt should be made to continue with the cessation programme after relapse.

Alcohol

- ❖ Alcohol intake in excess increases the potential for diseases such as cardiomyopathy, cirrhosis of the liver, atrophic gastritis, chronic pancreatitis, peripheral neuropathy and dementia, falls and accidents, malnutrition, immuno suppression and social isolation.
- ❖ Discovery of alcohol abuse in an older patient may be difficult due to:
 - Age-related physiological changes;
 - Presence of chronic disease;
 - Effects of medication;
 - Alteration in lifestyle after retirement;
 - Denial by the patient and family.
- ❖ Alcohol increases the depressant effects of neuroleptic drugs, analgesics and CNS depressants such as sedatives, tricyclic antidepressants, anxiolytics and benzodiazepines.

- ❖ In old age, intoxication from alcohol can occur with relatively small amounts due to decreased metabolism as a result of an increase in body fat, slowing down of liver metabolism and increased sensitivity of brain to the effect of alcohol.
- ❖ Symptoms of intoxication and withdrawal can be easily mistaken for diseases and age-related physical changes. Several features of alcohol abuse such as memory loss, poor balance, frequent falls and ill-health may be ignored as consequences of ageing.
- ❖ Health care personnel are often not aware of the problem of alcohol abuse among older patients. Misconceptions regarding association of alcoholism with a higher social status, lack of communication skills in asking uncomfortable questions on alcoholism and a fatalistic attitude may lead to missing alcohol abuse in older subjects.
- ❖ Drinking problems must be assessed through direct questioning as well as indirect questions on the history of falls, accidents, episodes of confusion, symptoms of self-neglect such as weight loss or poor hygiene, or lack of attention to usual activities. The family should also be used as a source of information.
- ❖ Treatment of chronic alcoholism requires specialized effort by a multidisciplinary team through hospitalization. Nutritional support, treatment of withdrawal symptoms, psychiatric support and group therapy are some of the measures which should be part of the management of chronic alcoholism.

Screening for Disease

- ❖ Early detection and treatment is an important step in the secondary prevention of disease and disability.
- ❖ Regular screening for common, life-threatening and disabling diseases is important for health promotion.
- ❖ Several diseases such as hypertension, heart disease, diabetes and cancers of the breast, cervix, colon, rectum and prostate can be detected during screening and managed with better results.
- ❖ About 50% of all breast cancers occur in women aged over 65 years. All women should learn to do self-examination.
- ❖ Alterations in bowel habits, new onset of constipation, smaller stool size or blood in stools, anorexia, weight loss, wasting, anaemia and low backache are indicators of colorectal cancer which involves an appreciable amount of morbidity and ill-health. Digital rectal examination and examination of stool for occult blood should be a part of routine health examination for people over 40 years of age.
- ❖ All women over 40 years of age should be screened for cervical cancer with annual pelvic examination and Pap smear.
- ❖ The incidence of Cancer of the prostate increases with age and may be asymptomatic. Annual rectal/digital prostate examination is always recommended in all elderly men.
- ❖ The vision, hearing, teeth and feet of older people should be inspected periodically.
- ❖ Screening requires resources (time and finances) but is extremely cost-effective in the long run.

Prevention of accidents

- ❖ Accidents are associated with: pain and trauma of injury; loss of function, prolonged immobility and its complications; fear of future accidents and self-imposed isolation; and loss of independence.
- ❖ Most accidents in old age are in some way or the other related to normal age-related changes in the sensory system and the musculoskeletal system. These changes include:
 - Poor vision;
 - Defective hearing;
 - Decline in proprioception;
 - Decline in sense of touch and temperature;
 - Defective balance and gait; and
 - Poor muscle strength and co-ordination.
- ❖ In addition, several other factors increase the probability of falls and accidents in elderly subjects. These include:
 - Cognitive impairment, acute confusional state and dementia;
 - Chronic illness;
 - Vasoactive drug use
- ❖ A large number of accidents can be avoided by recognizing and compensating for normal age-related changes. Several interventions can improve environmental safety. These include:
 - Use of contrasting colours to enhance the older person's vision and depth perception;
 - Removal of obstacles, Bright lighting;
 - Use of flat shoes; and
 - Availability of stable structures to hold on to in case of an impending fall.

Prevention of adverse drug reaction

- ❖ Older persons require multiple drugs due to the presence of multiple diseases. As a result there is a high risk of drug interactions and adverse drug reactions.
- ❖ Pharmacokinetics and pharmacodynamics of drugs are altered in old age due to alterations in absorption from gastrointestinal tract, detoxification in liver, excretion through kidney, composition of body fat and muscle mass and total body water and drug receptor sensitivity.
- ❖ Drugs which produce adverse reactions include: antibiotics, anti-arrhythmics drugs, digoxin, diuretics, non-steroidal anti-inflammatory drugs, anti-Parkinsonian agents, anti-cholinergic drugs, sedatives, anti-depressants, anti-hypertensives, anti-coagulants and psychotropic drugs.
- ❖ Interventions to reduce adverse drug reactions include:
 - Frequent review of medication;
 - Instructions about possible side-effects;
 - Minimizing the number of drugs used;
 - Limiting use of over-the-counter drugs;
 - Remaining alert for common side-effects such as: confusion, orthostatic hypotension, falls, sleep disturbances, constipation, diarrhoea, urinary incontinence and urinary retention.

Immunisation

- ❖ Specific immunizations against following diseases have been recommended in old age. These are:
 - Pneumococcus
 - Influenza virus
 - Tetanus
 - Herpes Zoster

- ❖ Though all these vaccines are available in India, only tetanus toxoid is affordable for the vast majority of people. Pneumococcal and influenza vaccines are expensive and thus are specifically recommended for those elderly persons in whom pneumococcal and influenza infections are either more frequent or can be dangerous.

Indications For Pneumococcal and Influenza vaccines :

- ❖ Chronic Kidney Disease
- ❖ Nephrotic syndrome
- ❖ Chronic obstructive pulmonary disease
- ❖ Congestive heart failure
- ❖ Ischaemic heart disease
- ❖ Cirrhosis of liver
- ❖ Diabetes mellitus

Module 3: Cardiovascular System

Normal age-related changes in cardiovascular system

- ❖ Physiologic and Structural changes in the cardiovascular system with aging decrease cardiac functional reserve capacity limit the performance of physical activity and lessen the ability to tolerate a variety of stresses, including cardiovascular disease.
- ❖ Peak exercise cardiac output and peak exercise ejection fraction decrease in the elderly
- ❖ Maximal heart rate response to exercise declines
- ❖ Cardiac dilatation, enabling an increase in the stroke volume compensates for the diminished heart rate response to maintain the increase in cardiac output required for exercise
- ❖ Geometric contour of the heart is altered, with decrease in ventricular compliance leading to substantial reduction in the early diastolic filling rate, along with increased dependence on the contribution of atrial contraction to late ventricular filling to maintain cardiac output.
- ❖ Cardiac contractility is normal but the duration of contraction and relaxation is prolonged.
- ❖ Aortic and large artery thickness and vascular stiffness increase in aging, with resultant increase in arterial systolic pressure, pulse pressure and ventricular afterload.
- ❖ Both systolic and Mean Blood pressure increase with aging with widening of the pulse pressure
- ❖ Baroreceptor responses are blunted, especially the heart rate response to orthostasis and hypotension is impaired. In other words, the heart rate does not increase enough to compensate for the reduction in cardiac output due to orthostasis and hypotension.
- ❖ Decreased number of SA node pacemaker cells, decreased number of bundle branch cells and fibrosis and calcium deposition in the cardiac skeleton occur. This increases the risk for sick sinus syndrome, Atrial Fibrillation and Atrial Flutter.
- ❖ Alterations in cardiac function with age are the manifestations of a decreased β -adrenergic responsiveness.
- ❖ Thickness of Mitral and Aortic Valve leaflets and the circumference of all four cardiac valves increase in the elderly

Common cardiovascular problems

Hypertension

- ❖ Hypertension in the elderly is a disease state that is associated with an increased risk of adverse outcomes (including Coronary Heart Disease, Congestive Heart Failure, Stroke, Chronic Kidney Disease and Peripheral Vascular Disease).
- ❖ Hypertension is the commonest health problem in old age. More than half (50 – 70 %) of the elderly population in all developed and most of the developing societies have hypertension. However, a majority of these hypertensives are either undiagnosed or uncontrolled.
- ❖ Systolic blood pressure (SBP) has greater predictability for vascular events (stroke, IHD, CHF, renal failure and mortality) than diastolic blood pressure in older individuals. At any level of Diastolic Blood Pressure, adverse events are progressively greater at higher levels of systolic Blood Pressure.

- ❖ A large number of the elderly hypertensives have isolated elevation of SBP, which also greatly enhances cardiovascular risk.
- ❖ Primary or idiopathic hypertension is the commonest cause of high blood pressure in old age, though atherosclerotic renovascular hypertension, while rare, is more common in the elderly.
- ❖ Blood pressure measurement needs to be performed with care to avoid false labelling (pseudohypertension). Hypertension should not be diagnosed based on a single measurement alone. The White Coat Effect is also more prominent in the elderly.
- ❖ 24-hour ambulatory blood pressure readings may provide a better indicator of the risk of subsequent cardiovascular events, than standard blood pressure monitoring.
- ❖ Measurement of postural blood pressure changes is important both at diagnosis and during subsequent follow-up.
- ❖ Treatment of hypertension in old age produces major benefits and reduces the incidence of stroke, ischaemic heart disease (IHD) and heart failure.
- ❖ Treatment should begin with lifestyle modification, salt restriction and weight loss.
- ❖ Pharmacological interventions can include use of β -blockers and thiazide diuretics alone or in combination. ACE inhibitors and ARBs are also effective antihypertensives, are renoprotective, and improve outcomes in high-risk patients. Long acting Dihydropyridine CCBs (Amlodipine and Felodipine) are also effective and safe Antihypertensive agents. In general, the choice of drug should be based on co-morbid conditions. Stage II hypertension (JNC 7 \rightarrow SBP \geq 160 or DBP \geq 100) usually requires combination drug therapy.
- ❖ Initial Drug dosage should be half the starting dose for younger patients.
- ❖ The goal of treatment is to achieve a blood pressure of less than 140/90 mm Hg, though in patients with isolated systolic hypertension an intermediate goal of 160 SBP is acceptable. SBP closer to normal provides more benefit.
- ❖ Drugs that produce orthostatic hypotension should be used with caution. (α -blockers, peripheral adrenergic blockers and high-dose diuretics). Drugs that cause cognitive dysfunction (central α_2 -agonists, i.e. clonidine) should be avoided.

Coronary Heart disease

- ❖ CHD is a very common cause of disability and death in old age.
- ❖ Risk factors for CHD in old age more or less remain the same, and include hypertension (systolic and diastolic), smoking, dyslipidemia and obesity. In addition, oestrogen deficiency of post-menopausal state and poor physical activity are other important risk factors specific to old age.
- ❖ The manifestations of CHD in older patients are similar to those in young patients. However, silent ischaemia and cardiac failure are more frequent in older subjects. Similarly, diagnostic tests are no different in old age though the interpretation of the exercise-induced ischaemia may be difficult.
- ❖ Medical management of the symptoms is usually carried out by short- and long-acting nitrates, β -adrenergic blockers, ACEIs or ARBs, and calcium channel antagonists, though development of tolerance to nitrates is a frequent problem.

- ❖ Aspirin / Clopidogrel and Statins may offer the same benefits in the elderly as in a younger population
- ❖ PTCA is an excellent option for older subjects who continue to have symptoms despite medical management. As it avoids anaesthesia and thoracotomy, short-term survival is much better than with coronary artery bypass grafting (CABG). The need for repeat revascularisation procedures is higher with PTCA and long term outcomes are similar with both procedures. Despite the high risk of peri-operative mortality, CABG has better event-free survival rates than medical management in symptomatic elderly.
- ❖ **Acute myocardial infarction** in old age may be missed due to the absence of pain. Dyspnoea and fatigue may be the only manifestation. Survival after acute myocardial infarction in old age is much less than in younger patients. Older patients have a high prevalence of congestive cardiac failure. Thrombolytic therapy in old age is limited by the presence of several contraindications and is associated with higher rates of mortality and complications.

Chronic Heart failure

- ❖ The prevalence of heart failure steadily rises with increasing age to more than 10% in persons over 75 years of age, with higher risk in men.
- ❖ Hypertension, coronary heart disease, diabetes mellitus and valvular heart disease are the well-recognized causes of cardiac failure in old age.
- ❖ Breathlessness on exertion, cough, orthopnoea, paroxysmal nocturnal dyspnoea and fluid overload are classical features of cardiac failure. However, exertional symptoms may be less prominent in the elderly because of reduced physical activity; fatigue, weakness and tiredness may be the only symptoms. Altered sensorium, irritability, lethargy, anorexia, abdominal discomfort and gastrointestinal disturbances are more common symptoms of Heart Failure in the elderly.
- ❖ In addition to establishing a diagnosis of heart failure and determining cause, it is also important to identify factors that contribute to worsening HF symptoms. Common precipitants of HF exacerbations in older adults include nonadherence to dietary restrictions or medications, myocardial ischemia or infarction, uncontrolled hypertension, arrhythmias (especially atrial fibrillation or flutter), anemia, systemic illness (eg. Pneumonia, UTI, sepsis), iatrogenic (post-op fluid overload, transfusion) and drugs (NSAIDs).
- ❖ An Echocardiogram is the preferred test for evaluating LV function. Chest X-Ray may show Cardiomegaly, Pleural Effusion and signs of pulmonary venous congestion and alveolar edema. The ECG may show signs of underlying ischemia or arrhythmias.
- ❖ Complications of HF include progressive symptoms and functional decline, recurrent hospitalisations due to acute exacerbations, arrhythmias, which cause syncope or sudden death and DVT or Mural thrombus formation with embolisation.
- ❖ Management of HF is often complicated by the presence of comorbid conditions that may influence both the clinical course and treatment (eg. Renal dysfunction exacerbated by diuretics and ACE inhibitors, Cognitive dysfunction interfering with compliance and patient assessment, Polypharmacy increasing drug interactions and decreasing compliance, and Frailty exacerbated by hospitalisation and increasing the risk of falls).
- ❖ Distinction must be made between patients with predominantly systolic HF (LVEF < 45%) from those with predominantly diastolic HF (LVEF ≥ 45%)

- ❖ ACE inhibitors are the cornerstone of therapy for patients with impaired systolic function. It is important that renal function and electrolyte status be regularly monitored. In patients who are unable to tolerate ACE inhibitors because of cough, ARBs are an acceptable alternative.
- ❖ The combination of Hydralazine and Isosorbide dinitrate is an additional option in those unable to take ACEI or ARBs.
- ❖ β -blockers are recommended in all patients with stable HF in the absence of contraindications. Approved medications include Metoprolol, Bisoprolol and Carvedilol.
- ❖ Digoxin at 0.125 mg once a day is recommended in HF patients who remain symptomatic despite other therapy.
- ❖ Diuretics, with the exception of Spironolactone and Eplerenone have not been shown to improve clinical outcomes in HF; however, they are essential for relieving congestion and edema and for maintaining euvolemic state.
- ❖ Spironolactone at 12.5 – 25 mg once a day has been shown to reduce mortality by up to 30% in patients with advanced systolic HF.
- ❖ Patients with symptomatic diastolic HF require strict control of Blood Pressure, aggressive management of CHD, judicious diuresis, and ACEI, ARBs, β -blockers, CCBs, nitrates and digoxin as needed.

Other common problems

Other common cardiovascular diseases include cardiac failure, peripheral vascular disease, complete heart block, atrial fibrillation, pulmonary and cerebral thrombo-embolism, and aortic stenosis. The diagnosis and management of these conditions are well-established and do not differ in older persons from that in younger individuals.

SYNCOPE

Syncope is defined as a sudden transient loss of consciousness associated with loss of postural tone and spontaneous recovery without resuscitation. It usually lasts for few seconds to few minutes. It is attributed to sudden and transient reduction of blood flow to parts of brain (brain stem, reticular activating system) responsible for consciousness.

Usually there are no residual symptoms such as confusion, drowsiness or headache after recovery, but some elderly persons may occasionally experience these symptoms. Presyncope or near syncope is a sensation of impending loss of consciousness that may or may not precede syncope.

Nearly 3 % of emergency department visits are due to syncope or falls, but recent surveys indicate that syncope accounts for only 1%. Majority of them are more than 65 years. In chronic care centres the annual incidence is 6% and recurrent episodes occur in 30 % of them. 50 % of the elderly patients do not give accurate history of syncope and it is very much unreliable in the presence of cognitive impairment.

About 30 % of healthy elderly experience syncope atleast once in their lifetime. Nearly 50 % Of syncopal attacks are unwitnessed. Most of the episodes of syncope occur in bedrooms or bathrooms. Hence a detailed history, clinical examination and laboratory investigations are essential to identify the cause of syncope.

CAROTID SINUS SYNDROME

Carotid sinus syndrome (CSS) is an important cause of syncope and presyncope in elderly. It is characterised by episodic bradycardia and/or hypotension due to exaggerated baroreceptor-mediated reflexes or hypersensitivity of carotid sinus. Carotid sinus hypersensitivity (CSH) is

diagnosed when five seconds of carotid sinus massage produces asystole of more than three seconds (cardioinhibitory) or a fall in systolic blood pressure of more than 50mm Hg (vasodepressor) or a combination of the two (mixed).

Orthostatic hypotension:

Failure of orthostatic control is an important cause of syncope. Orthostatic or postural hypotension is defined as either 20 mm Hg fall in systolic blood pressure or 10 mm Hg fall in diastolic blood pressure on assuming an upright posture from supine position. The prevalence of postural hypotension varies between 4 % and 30 % among older persons living in community. Autonomic failure and drugs are important causes of orthostatic hypotension.

Mechanism of hypotension	Drugs
Vasodilation	CCB Nitrates ACE Inhibitors
α -adrenergic blockade	α -adrenoceptor antagonists Phenothiazines Tricyclic Antidepressants
Volume Depletion	Diuretics
Activation of Vascular Dopaminergic Receptors	Bromocriptine

Autonomic failure, primary or secondary are associated with postural hypotension. Aging can also be considered as a cause of autonomic failure. Secondary autonomic dysfunction has been associated with many neurologic disorders like multiple sclerosis, brain stem lesions, compressive and noncompressive myelopathy, guillain-barre syndrome, diabetic neuropathy.

The clinical manifestations of orthostatic hypotension vary from dizziness to syncope associated with blurring of vision to blackout. The precipitating factors are sudden postural change, prolonged recumbency, physical exertion, raised intrathoracic pressure (coughing, straining during defecation, micturition) and use of vasoactive drugs.

Diagnosis of orthostatic hypotension involves the demonstration of postural fall in blood pressure after active standing. The aim of therapy in symptomatic patients is to improve the cerebral perfusion.

Non pharmacological interventions for orthostatic hypotension include avoidance of precipitating factors, raising head end of the bed at night, continuous pressure to lower limbs by a support garment to prevent venous pooling etc. Cardiac pace makers provide benefit by increasing heart rate during postural change.

Diuretics should be avoided and salt containing foods are recommended except in patients with congestive heart failure. Three drugs are commonly used to raise the blood

pressure. They are Fludrocortisone, midodrine and desmopressin (DDAVP). Fludrocortisone, a mineralocorticoid is used in a dose of 0.1 - 0.2 Mg

VASOVAGAL SYNCOPE:

This form of syncope is the common faint that may be experienced by normal persons and accounts for nearly 50% of all episodes. The mechanism in vasovagal syncope is a sudden fall in venous return, rapid fall in ventricular volume and collapse of the ventricle due to vigorous contraction.

Healthy older subjects are not prone to vasovagal syncope compared to young adults. Due to age related decline in baroreceptor sensitivity, the paradoxical responses to orthostasis are less marked in them.

In elderly it accounts for only 1% - 5%. The vasovagal syncope is characterised by hypotension and/or bradycardia sufficiently profound to produce cerebral ischaemia and loss of neural function and a sense of ill health. Head up tilting as a diagnostic tool was reported in 1986 and since then the validity of this technique has been established

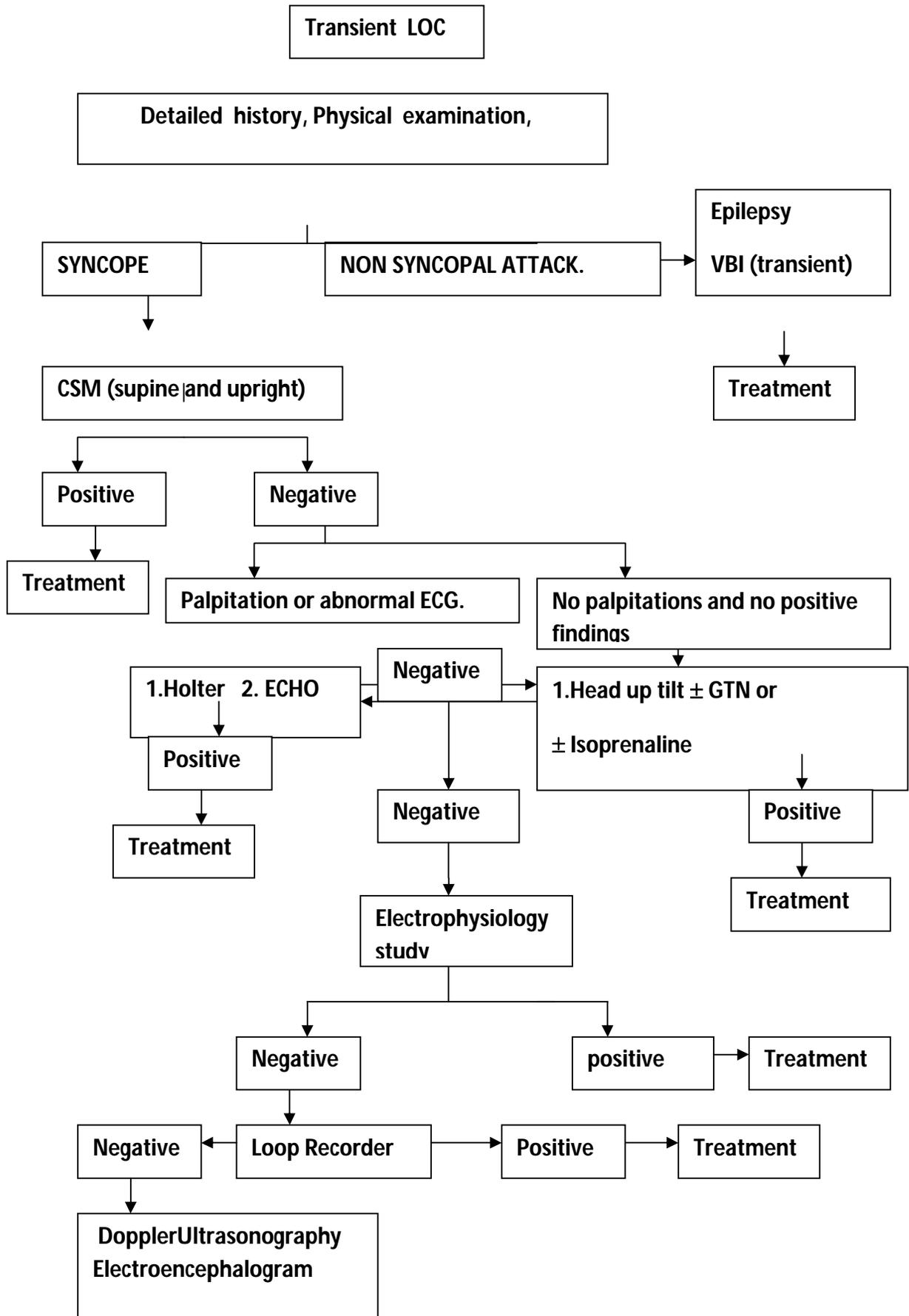
The first step in the treatment is avoidance of the precipitating factors, vasodilator drugs and taking immediate action - eg. lying down during prodrome which help to avoid episodes of vasovagal syncope.

Permanent cardiac pacing, dual chamber pacing being the preferred mode, in patients who have recurrent syncope with significant bradycardia, has proved to be beneficial. Other measures like elastic supports, relaxation techniques (biofeedback) and conditioning using head-up tilt as therapy are advised as adjuvants.

In elderly, multiple illness are very common and the cause for syncope can be multifactorial. Hence it is difficult to offer a precise diagnosis. Therefore it is important to follow a protocol for evaluation of such patients and carefully attribute a diagnosis.

A detailed history and physical examination which should include examining heart rate & rhythm, carotid and cardiac bruit, peripheral pulse, blood pressure recording in supine and standing posture during morning hours. Assessment of gait, mobility, muscle strength, screening for vision & hearing must be done.

Supine blood pressure must be measured after about 10min. of rest. Then standing B.P. should be recorded for upto 3 min. while the patient is standing unaided. In 90% of patients with orthostatic hypotension, a significant reduction will have occurred within 1min. of standing. A sustained fall of 20mm Hg of systolic pressure or 10mm Hg fall in diastolic B.P. or a fall of systolic pressure to 90mm Hg or less, is diagnostic for orthostatic hypotension.



Module 4: Respiratory System

Normal age-related changes in respiratory system

- ❖ Increased size of larger airways, calcification of cartilagenous airways and hypertrophy of the mucous glands of the airways are characteristic of airway ageing.
- ❖ In small airways and air spaces, there is a loss of supportive elastin and collagen leading to dilatation of alveolar ducts and air spaces. Alveolar septa are shortened and this gives the appearance of flattened alveoli. Though the alveoli increase in size, there is a decrease in their number; therefore, there is a less alveolar surface and a less effective exchange of oxygen and carbon dioxide.
- ❖ The elastic recoil of the chest wall and the lung decrease. The decrease in the elastic recoil of the lung is due to a decrease in the alveolar surface area, thus decreasing the surface tension forces of the alveoli.
- ❖ Respiratory muscle strength declines due to age-related changes in muscles. The thoracic cage becomes stiff and rigid as a result of ossification of costal cartilage and kyphosis of spine, which also affects ventilation.
- ❖ Most lung volumes and capacities fall with ageing. The vital capacity and maximum breathing capacity declines. Ventilatory responses to both hypoxia and hypercapnia are impaired in old age. The central control of breathing is impaired.
- ❖ There is also a decrease in the cough reflex and in ciliary action in the lungs. Bacterial colonization of the airway is frequent. All these changes are worsened by smoking and enviromental air pollution.

Common Respiratory problems

Pneumonia

The decrease in ciliary function and cough reflex, along with changes in the immune system, make the older person more susceptible to pneumonia. Pneumonia is the commonest infectious disease in old age causing 50% of all deaths due to respiratory disease. Lower respiratory tract infections are 50 times more common in the elderly subjects as compared to adolescents. It is the cause of fever in more than 60% of febrile episodes in the elderly inpatients and is the third most frequent cause of hospitalization in the elderly after myocardial infarction and stroke. In addition, pulmonary infections are the terminal event in patients with other serious or chronic diseases such as stroke, degenerative neuro-muscular diseases, dementia, congestive heart failure and malignancies.

Despite impressive advances in the treatment of pneumonia with anti-microbial agents in intensive care, one-third of the elderly patients requiring hospitalization die of severe pneumonia.

The type of organism is usually determined by the situation where the infection is aquired. In hospital-acquired pneumonia enteric gram negative bacilli, *Moraxella catarrhalis*, anaerobes (aspiration), *S.pneumoniae*(drug resistant strains), *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*,

Staphylococcus aureus and Pseudomonas are the more frequent causes of pneumonia whereas S. pneumoniae, Mycoplasma pneumoniae, Chlamydia pneumoniae or H. influenzae are common in community-acquired pneumonia. The organisms responsible for hospital-acquired infections have higher virulence and possess multiple antibiotic resistance.

Risk factors predicting Complicated Pneumonia:

Presence of any of these risk factors increases the risk of complications, including death. They may be used to assess the requirement for inpatient therapy.

History
Coexisting illness (COPD, congestive heart failure, chronic liver disease, chronic kidney disease, cerebrovascular disease, hospitalization within the last year, others) Post-splenectomy Alcoholism Immunosuppressive therapy
Physical
Respiratory rate > 30/min Heart rate > 125/min Temperature > 40°C or < 35°C SBP < 90 mm Hg or DBP < 60 mm Hg Altered mental status Evidence of extrapulmonary infection
Test data
WBC count < $4 \times 10^9/L$ or > $30 \times 10^9/L$ Absolute neutrophil count < $1 \times 10^9/L$ Hct < 30 % or Hgb < 9 mg/dL Creatinine > 1.2 mg/dL or BUN > 20 mg/dL PaO ₂ < 60 mm Hg or PaCO ₂ > 50 mm Hg breathing room air Arterial pH < 7.35 Sodium < 130 Glucose > 250 Albumin < 30 g/L
Chest x-ray
Multilobar involvement Pleural effusion Cavitation Increase in size of pulmonary opacity $\geq 50\%$ within 36 hours

Pneumonia in the elderly tends to be different from that in other age-groups in its clinical manifestation and outcome. The presentation of pneumonia in the elderly is often atypical with prominent non-respiratory symptoms like confusion, incontinence and immobility. The signs of inflammation like fever, tachycardia and leucocytosis may be absent. Some form of pre-existing morbidity is present in most patients, chronic obstructive airway disease being the commonest. These

differences attain significance if the individual is living alone as the disease may progress without the patient seeking medical care.

The progression and resolution of pneumonia is also slower in old age with a prolonged stay in hospital. Respiratory infections result in very high mortality in the elderly patients as compared to younger patients.

The diagnosis of pneumonia is usually clinical, confirmed by chest X-ray. The etiologic agent is not identifiable in approximately half of cases of CAP.

The treatment of pneumonia in all age-groups including the elderly is largely empiric because of the non-specificity of clinical and radiographic features and limitations of the diagnostic testing for identifying an etiologic pathogen. The initial empiric therapy is based on the principle of covering all common organisms for that age-group and locality.

The initial antibiotic should include an oral betalactam and a macrolide antibiotic for ambulatory patients. A respiratory fluoroquinolone (levofloxacin, moxifloxacin or gatifloxacin) can be used as monotherapy as an alternative. In general, a class of agent that the patient has not received for the past three months should be chosen. For hospitalized patients antibiotics should be administered parenterally and reviewed every 48-72 hours.

The presence of co-existing illnesses and complications of pneumonia generally influence the duration of antibiotic therapy. However, most organisms require treatment for about one to two weeks with 3-6 days of parenteral antibiotic therapy.

Failure of treatment with the above syndromic approach is often the result of inadequate antibiotic selection, unusual pathogen and non-infectious illness.

Tuberculosis:

Infection with *Mycobacterium tuberculosis* is universal though the prevalence of the disease varies from population to population influenced by its socioeconomic status. The prevalence of tuberculosis in the aged has always been considered higher than in younger individuals, the risk of tuberculosis is higher in old age due to several reasons.

M. tuberculosis remains viable in the reticulo endothelial system for long periods in quiescence and gets active when the host immunity declines. Immunity against tuberculosis is mostly T cell mediated, which is worst affected during ageing of the human immune system.

The elderly all over the world having gone through the era of untreated tuberculosis constitute the largest reservoir of infected individuals and have the highest risk of developing active disease through the recrudescence of dormant infection.

The clinical manifestations, response to drug therapy and outcome from tubercular infection in old age have been considered distinct and different than in younger individuals. Fever, night sweats, haemoptysis and cough are usually uncommon and non-specific complaints and weight loss may be prominent. Radiological manifestations also differ in the aged comprising of widespread and patchy infiltrates and miliary pattern rather than classical upper lobe lesion. The tuberculin reaction is usually negative.

The treatment of tuberculosis in the elderly is similar to that in younger subjects. The World Health Organization recommends a short course chemotherapeutic regimen, unsupervised or directly observed, with isoniazid (5mg/kg/day), rifampicin (10mg/kg/day), ethambutol (15mg/kg/day) and

pyrazinamide (25mg/kg/day) with or without streptomycin (0.5gm/day) for two months followed by isoniazid and rifampicin for four months. It is advisable to avoid streptomycin.

Adverse reactions and drug interactions are frequent in old age; however, the risk of frank hepato toxicity is no higher than that in younger patients.

Bronchial asthma

Bronchial asthma is often confused with the more prevalent chronic obstructive pulmonary disease (COPD) in old age though it remains a distinct entity. As a result its true prevalence is not known. Most elderly patients with bronchial asthma develop it in adult life and not in childhood; as a result history of atopy is usually absent.

Older patients have a similar presentation of the disease with intermittent cough, wheezing and breathlessness. These features are often confused with COPD and left ventricular failure, which are also common in old age.

The management of bronchial asthma in acute and chronic phases is no different in older patients than in younger patients though complications and mortality are often higher in old age.

Acute asthma should be managed with high-flow oxygen and nebulized β -agonists along with oral or intravenous corticosteroids. Patients with rising carbon dioxide retention and impending exhaustion should be managed with mechanical ventilation.

The mainstay of treatment of chronic stable Asthma is inhaled corticosteroids. Various agents are available with differing systemic absorption. In general systemic absorption of moderate doses of inhaled corticosteroids (Beclomethasone 400 – 800 mcg/day, Fluticasone 250 – 500 mcg/day) is negligible. Corticosteroids should be used on a daily basis to suppress airway inflammation. The long acting β -agonists (Salmeterol and Formoterol) are considered to be long-term agents, and may be used in combination with inhaled steroids. Oral anti-inflammatory agents include the Leucotriene receptor antagonists (Montelukast, Zafirlukast), Oral Lipoxigenase inhibitors (Zileuton) or sustained release theophylline. These oral agents may be used as the sole anti-inflammatory agents in Mild stable Asthma. However, even in this condition, low doses of inhaled corticosteroids are the preferred option. Long acting β -agonists are contraindicated for use as the sole agent for long-term therapy.

Rescue medication is used for symptom relief. Inhaled Salbutamol or terbutaline can be used as needed for acute airway obstruction. At usual doses, inhaled β -agonists are virtually free of adverse effects.

A particular concern in the elderly is that improper technique in the use of Metered Dose inhaler might lead to significant under-delivery of medication. Education in proper technique and the use of a Volume spacer can minimise this problem. The use of Dry powder inhalers may occasionally be more suitable for the elderly; however some elderly individuals have problem generating the initial airflow required. Newer devices are being developed to overcome these deficiencies.

Oral steroids (starting at 1 mg /kg / day and tapering rapidly over 5 to 7 days) may sometimes be required for acute symptoms, to avoid hospitalisation.

Chronic obstructive pulmonary disease

COPD is characterised by airway obstruction that is not fully reversible. COPD includes Emphysema, Chronic Bronchitis and Small Airways disease. Severe α_1 Anti-trypsin deficiency is a genetically proven risk factor for COPD.

Smoking is the commonest cause of COPD. Smoking causes an accelerated decline in the volume of air exhaled within the first second of the forced expiratory maneuver (FEV1) in a dose-response relationship to the intensity of cigarette smoking. This dose-response relationship between reduced pulmonary function and cigarette smoking intensity accounts for the higher prevalence rates for COPD with increasing age. Nearly a third of the elderly subjects have COPD though half of them are not diagnosed or treated.

The three most common symptoms of COPD are cough, sputum production and exertional dyspnea. Many patients have such symptoms for years before seeking medical attention. As COPD advances, the principal feature is exertional dyspnea, significantly limiting everyday activities. The frequency of exacerbations increases.

Symptoms of hypoxia, which include fatigue, malaise and weight loss, and sleep disturbances are other common symptoms. Signs include hyperinflated chest, wheezing, polycythaemia and cyanosis, and oedema and raised jugular venous pressure (JVP) in the presence of right heart failure. Clinical features and chest X-ray are diagnostic which can be confirmed by the obstructive pattern in pulmonary function testing.

Only Smoking cessation, Oxygen therapy in chronically hypoxic patients and lung volume reduction surgery in selected emphysematous patients have been shown to alter the natural history of COPD. All other therapies are directed at improving symptoms and reducing the frequency of exacerbations.

Treatment of COPD involves relief of airway obstruction by bronchodilators; β -agonists like Salbutamol and Anticholinergic agents like Ipratropium and Tiotropium. Inhaled steroids do not usually offer additional benefit, but may be offered to patients who have good acute response to β -agonists. Oral theophylline offers modest benefits. Long-term home oxygen therapy is recommended in patients with persistent hypoxia (resting oxygen saturation < 90% with signs of pulmonary hypertension or right heart failure) for a minimum of 16 hours per day.

All patients with COPD should be strongly urged to quite smoking and educated about the benefits of quitting. Bupropion and Nicotine replacement therapy are pharmacological adjuncts for use in Smoking cessation therapy.

Pulmonary rehabilitation involves education and cardiovascular reconditioning. It has been shown to reduce the need for hospitalisation.

COPD is a strong indication for influenza and pneumococcal vaccination.

Acute exacerbation of COPD

Acute exacerbation of COPD is the commonest cause of hospitalization of COPD patients. Upper or lower respiratory tract infection is the usual cause of acute exacerbation. It causes severe hypoxia and can lead to death. Inhaled corticosteroids reduce the risk of exacerbation by 25 – 30 %. Prophylactic antibiotics have no role in prevention of exacerbation.

Treatment involves bronchodilators (β -agonists and anticholinergics) by nebulization, supplemental oxygen and antibiotics (co-amoxyclav, amoxicillin, doxycycline). Intravenous Glucocorticoids reduce the length of stay in hospital, hasten recovery and reduce the chance of subsequent exacerbation or relapse for a period of upto 6 months. Patients not responding to this therapy and developing severe hypoxia may require mechanical ventilation, for which age is not a contraindication.

Lung cancer

Lung cancer is possibly the commonest cancer in older men all over the world and its prevalence among older women is steadily rising. Ninety-five per cent of these cancers are related to cigarette smoking. The clinical features of lung cancer (cough, haemoptysis, and chest pain and weight loss) in old age are no different though older patients present themselves in a much advanced stage of the disease.

The diagnostic evaluation of lung cancer in old age should aim at both tissue diagnosis and operability from the anatomical as well as functional points of view. Diagnostic procedures are similar and include cytological examination of the sputum, imaging and fiberoptic bronchoscopy. The staging principles are also no different.

Adenocarcinoma is the commonest of all types of cancers in old age comprising 32% of all cases while squamous carcinomas comprise about 29% of cases. Small cell carcinomas are primarily managed by chemotherapy with or without radiotherapy. Non small cell carcinomas that are clinically localised at presentation are managed with surgery or radiotherapy. Chemotherapy has a palliative role in NSCC.

Smoking is the single most important cause of respiratory disease in old age.

Module 5: The Gastrointestinal System

Normal age-related changes in the GI system

- ❖ With ageing the oral mucous membrane atrophies. Teeth are lost due to periodontal disease, poor oral hygiene and resorption of mandible. The muscles of mastication become weak. The number of taste buds decreases. Salivary secretion is reduced. As a result dietary intake is adversely affected.
- ❖ The swallowing mechanism is affected by disturbed co-ordination between oropharyngeal muscles and upper oesophageal sphincter. Poor oesophageal peristalsis leads to dysphagia in elderly subjects
- ❖ Gastric emptying for liquids is delayed whereas that for solids remains normal. Gastric acid secretion may increase or decrease depending on the presence of H. pylori infection and the concomitant use of drugs.
- ❖ Bacterial overgrowth in the small intestine can lead to malabsorption. Absorption of fat takes longer and postprandial serum bile acid levels are reduced. These changes may lead to early postprandial satiety, leading to decreased overall intake. Calcium, Zinc and Vitamin absorption may be reduced.
- ❖ Vascular ectasias (angiodysplasia) may occur in the large intestine. Prolonged colonic transit time, decreased mucous secretion, increased colonic connective tissue and smooth muscle atrophy, along with weakness of Abdominal muscles may predispose to constipation.
- ❖ Liver volume, blood flow and perfusion decline with age. The ability to regenerate after injury or resection is diminished. Due to circulatory and enzyme changes, metabolism of some drugs is altered. This may lead to drug toxicity at standard doses. Cholelithiasis and Choledocholithiasis are common. Main pancreatic ductal dilatation is more common.

Common disorders of the GI tract

Hiatus Hernia and Gastro-esophageal reflux

- ❖ Hiatus hernia and gastro-esophageal reflux are the most common problems of upper G.I. tract in old age. The prevalence increases after the age of 50 and may be present in as many as two-thirds of the people over 60 years; the condition being more common in women. Typical symptoms include pyrosis and sour regurgitation.
- ❖ Persistent, untreated, or undertreated symptoms may lead to complications of acid reflux disease, including esophagitis, peptic strictures, esophageal ulcers with bleeding, and Barrett's esophagus.
- ❖ Many elderly patients with GERD have reduced symptoms because of decreased visceral sensation or the use of medications that may blunt or reduce sensation. Quite commonly, however, patients have atypical symptoms, such as a chronic cough, difficult-to-control asthma, laryngitis, or recurrent chest pain.
- ❖ Esophagogastroduodenoscopy (EGD) should be performed in all patients with persistent reflux despite medical therapy, patients with a history of acid reflux more than 5 years, and patients with complications.
- ❖ Interventions to correct the situation include:
 - ❖ weight loss if the person is obese
 - ❖ Minimise fats, Alcohol, Caffeine, Nicotine at night

- ❖ Avoiding eating at least 3 hours prior to bedtime
- ❖ Sleeping with the head of the bed elevated by 6 inches
- ❖ H₂ receptor antagonists or PPIs and prokinetic drugs.

NSAIDs, gastropathy and peptic ulcer

- ❖ More than 40% of elderly patients are prescribed NSAIDs, and up to 8% will be hospitalized because of a complication of NSAID use within the first year of initiating treatment. All NSAIDs increase the risk of Peptic Ulcer Disease (PUD), although some appear to carry a lower risk of inducing an ulcer than others. A meta-analysis revealed that ibuprofen, at doses < 1200 mg/day, was the NSAID least likely to induce serious GI injury, with a relative risk of inducing PUD 2.1 times greater than for controls.
- ❖ Cyclo-oxygenase-2 (COX-2) inhibitors have been shown to have less overall GI toxicity. However, no data exist regarding the complications of chronic use of COX-2 inhibitors in elderly patients.
- ❖ Peptic ulcer induced by NSAIDs, H. pylori or other causes tends to be very virulent in old age. Presentation of ulcer disease is usually acute, often with bleeding or perforation, though gastric ulcer may remain subtle. Anaemia due to chronic blood loss, fatigue and weight loss may be the only complaint in some patients.
- ❖ PPIs should be started and continued for 8 weeks. Patients who require chronic NSAID or aspirin use should be treated concurrently with a PPI or misoprostol.
- ❖ Acute infection with H. pylori leads to a localized mucosal inflammatory response, reducing the normal gastroduodenal mechanisms that protect the mucosa from ulceration. H. pylori is thought to be responsible for nearly 70% of GUs and 80–90% of DUs not related to NSAID use. Acute H. pylori infection may lead to ulceration of the stomach or duodenum, whereas chronic H. pylori infection may lead to atrophic gastritis, gastric adenocarcinoma, or development of a mucosa-associated lymphoid tumor (MALT lymphoma).
- ❖ Testing for H. pylori should be performed in all individuals with a history of peptic ulcer disease or evidence of gastritis, duodenitis, or gastric atrophy or when an ulcer or erosion is identified during endoscopic examination. The diagnosis of H. pylori infection can be made from biopsies obtained during upper endoscopy or by detecting antibodies in the serum. Breath hydrogen tests are most useful in documenting eradication. Multiple treatment regimens have been shown to be effective in eradicating H. pylori. A twice-daily PPI for 10-14 days in conjunction with 2 different antibiotics (clarithromycin with either metronidazole or amoxicillin are the most effective) is the most common therapy. Eradication rates range from 75–95%, depending on the treatment regimen. The recurrence of PUD and complications of PUD are markedly reduced with H. pylori eradication

Non-ulcer dyspepsia

- ❖ Dyspeptic symptoms without any endoscopic evidence of ulcer are a frequent complaint in older subjects. The aetiology of non-ulcer dyspepsia is not known definitively though several causes, including psychological factors, gastrointestinal dysmotility and H. pylori infection have been considered. Up to half of the patients of non-ulcer dyspepsia have chronic gastro-duodenitis.
- ❖ Patients with non-ulcer dyspepsia respond well to therapy for peptic ulcer.
- ❖ Gastric cancer may mimic peptic ulcer and non-ulcer dyspepsia in early stage and must be excluded if the older patient shows atypical manifestations.

- ❖ Low-dose tricyclic antidepressants may improve symptoms of dyspepsia

Cancers of the gastrointestinal tract

- ❖ Cancers of the gastrointestinal tract increase with age.
- ❖ Cancer of the colon is more common in women and cancer of the rectum is more common in men. Symptoms include change in bowel habits, new onset of constipation or diarrhoea, decreased size of stool, blood in stool, loss of appetite, wasting, weight loss, weakness, and dull pain radiating to the back which can be relieved by bending. The morbidity and mortality associated with colorectal cancer is very high. Colorectal examinations are recommended for screening for cancer. Digital rectal examination and checking of stool for occult blood should be a part of routine health checks for people over 40 years of age. For people over 50 years of age, a colonoscopic examination should be considered every three to five years.
- ❖ The incidence of cancer of the oral cavity, oesophagus and stomach also increases with age. In some ethnic groups the occurrence of these cancers is higher as compared to others, probably due to dietary factors and tobacco chewing. Oral screening for sores and other signs of cancer should be done, especially among persons who are at high risk from smoking, chewing tobacco and drinking alcohol or especially hot beverages regularly.

Constipation

- ❖ Older persons frequently complain of constipation than younger persons. However, this problem is not a part of normal ageing, since there are few age-related changes in the gastrointestinal tract.

Constipation is not a part of normal age-related changes.

- ❖ Diet deficient in fibres and poor fluid intake are most important causes of constipation in old age. Other causes of constipation are:
 - drugs such as diuretics, anticholinergics, opiates and antidepressants;
 - mental health problems such as depression and dementia;
 - laxative abuse;
 - chronic debilitating disease and functional disability; and
 - lack of physical exercise.
- ❖ Long-term complications of constipation are faecal impaction, mega colon, urinary infection and incontinence and confusional state. Impacted stool needs to be removed manually. Increasing fluid intake, Exercise, Bowel training regimens and Education help in relieving the problem to a large extent. Bulk forming agents or stool softeners may be used as first line therapy. Osmotic agents like Milk of magnesia or lactulose may be tried if the initial agents do not work. Stimulatory agents like senna or bisacodyl are best avoided for long-term use.

Module 6: The Endocrine System

Changes in reproductive system in women

- ❖ The interval of hormonal flux preceding menses cessation is the menopausal transition. During this time, many women experience signs and symptoms of estrogen deficiency, which may persist for 2-8 years before menopause
- ❖ Menopause is a physiological process which takes place between the early 40s and 50s in which the ovaries reduce their production of female sex hormones. Several physical and emotional changes occur, which have short-term and long-term implications.
- ❖ Long-term implications of menopause are structural changes in sex organs, urinary tract and skin; and an increasing risk of IHD, osteoporosis, dementia and certain types of cancer.

Menopausal signs & symptoms.

Vasomotor/ Neuroendocrine	Integument	Urogenital	Skeletal	Cardiovascular
Headache	Decreased skin elasticity	Increased risk of UTIs	Osteopenia	Increased LDL-C
Exacerbation of depression and panic disorder	Hirsutism	Urinary incontinence	Loss of height	Decreased HDL-C
Hot flashes	Mucosal dryness	Dyspareunia	Osteoporosis	Increased body fat
Palpitations	Alopecia	Vaginal atrophy	Fractures	Atherothrombotic events
Sleep disturbances	Deepening of the voice	Vulval pruritus	Frailty	
Memory/cognitive changes		Sexual dysfunction and decreased libido		

Hormone Replacement Therapy (HRT)

HRT is the administration of the female sex hormones oestrogen and progesterone after natural menopause. HRT can be given in several forms such as tablets, transdermal patches and vaginal creams, but each route has different benefits and limitations which must be evaluated individually for each woman .

The benefits of HRT include:

- ❖ Improvement in vasomotor symptoms
- ❖ Improvement in Vaginal Atrophy
- ❖ Prevention of Osteoporosis and reduction in incidence of fractures. Currently not recommended, as risk outweighs the benefit of therapy.

- ❖ May decrease risk of Colon Cancer

The risks of HRT are:

- ❖ Increased risk of Endometrial and Breast Cancer
- ❖ Increased risk of venous thromboembolism
- ❖ Gallbladder disease
- ❖ Increased risk of stroke and Non-fatal MI
- ❖ Increased risk of Systemic Lupus Erythematosus

Changes in reproductive system in men

- ❖ Total Testosterone as well as free and bioavailable testosterone levels tend to decline with age, and circadian fluctuation in testosterone also declines with age.
- ❖ The hypogonadism associated with aging is hypothalamic/pituitary in origin and is not accompanied by a rise in luteinizing hormone.
- ❖ Signs of testosterone deficiency include Loss/decrease of libido, Decreased muscle mass, Decreased strength, Decreased visuospatial skills, Osteoporosis, Arthralgias, Diminished well-being, impaired mood, Fatigue, Anemia, Increased irritability, Lethargy
- ❖ Most men over 65 years of age have at least some enlargement of the prostate.

Late-life sexuality

- ❖ Cultural norms, attitude of the individual and the family, value systems and religious beliefs, physical and emotional health, and environmental factors affect the expression of sexuality.
- ❖ An older person's attitude to sexuality depends on his or her past experiences, positive psychological development and physical health.
- ❖ Health problems such as cardiovascular disease, respiratory diseases, cancer, arthritis, osteoporosis, stroke, Parkinson's disease, anaemia, diabetes, chronic prostatitis in men and chronic cystitis in women, urinary incontinence and functional limitations can reduce sexual desire and activity.
- ❖ Many drugs have side-effects which either reduce sexual desire or cause Erectile Dysfunction in men; these are: sedatives, certain analgesics, anti-spasmodics, anti-depressants and certain anti-hypertensives.

Normal age-related changes in endocrine system

- ❖ The circulating growth hormone levels and IGF-1 levels decline and are possibly responsible for many manifestations of ageing.
- ❖ The aging thyroid gland develops both micro- and macronodules and increasing amounts of fibrous tissue and lymphocytes. There is a reduction in follicle size and colloid. The thyroid may lie more retrosternal and may become smaller in size. Normal aging is accompanied by a slight

decrease in pituitary thyrotropin release but especially by decreased peripheral degradation of T_4 , which results in a gradual age-dependent decline in serum triiodothyronine (T_3) concentrations without changes in T_4 levels.

- ❖ Adrenal secretion of DHEA gradually decreases over time, while corticotropin secretion, which is physiologically linked to plasma cortisol levels, remains largely unchanged.
- ❖ Ageing is associated with glucose intolerance. The factors that lead to the derangement of carbohydrate metabolism are:
 - decreased glucose-induced insulin secretion
 - impaired insulin-mediated uptake of glucose by skeletal muscle and adipose tissue and
 - Influence of increased body fat, physical inactivity, increased dietary carbohydrates, impaired renal function, hypokalemia, increased sympathetic nervous system activity.

Common endocrine problems

Diabetes mellitus

- ❖ Diabetes mellitus is a common health problem in old age. However, 50% of the elderly diabetics are undiagnosed and more than 50% of all diabetics are over the age of 60 years.
- ❖ A vast majority of the elderly have Type 2 Diabetes; However, Type 1 Diabetes is not uncommon in the elderly and should be considered in the elderly diabetic who is unwell with severe hyperglycemia and ketonemia.
- ❖ A venous plasma glucose level of 200 mg % at random or after two hours of 75 gm of oral glucose indicates a definitive diagnosis of NIDDM with predilection for development of serious long-term complications such as retinopathy, nephropathy and neuropathy.
- ❖ Older diabetics with vascular and neurological complications of diabetes utilise the hospital services 2-3 times more than the general non-diabetic population.
- ❖ Long term complications of diabetes are related to the duration and severity of hyperglycemia.
- ❖ Diabetes is also associated with a higher risk of dementia.

The aims of managing diabetes in the elderly are:

- ❖ To relieve symptoms of hyperglycaemia, prevent undesirable weight loss and avoid hypoglycaemia and other adverse drug reactions;
- ❖ To screen for and prevent complications specific to Diabetes
- ❖ To reduce the lifetime risk of developing Atherosclerotic Vascular Disease in the Coronary, Cerebral and peripheral Vascular beds

Common problems faced during the management of diabetes in the elderly include:

- ❖ Irregular oral intake (confusion, poor appetite)
- ❖ Recurrent infections (UTI, LRTI, skin)
- ❖ Foot ulceration
- ❖ Increased vulnerability to hypoglycaemia
- ❖ Concurrent systemic disease (heart failure, renal failure)
- ❖ Difficulty in communication and
- ❖ Poor social support

Glycaemic control can be achieved by lifestyle modification (including appropriate dietary practices and increased physical activity), Oral Anti-Diabetic agents and Insulin.

Insulin is indicated in Type 1 Diabetes, for glycemic control in oral antidiabetic drug failure, in the presence of infection, ketosis, hyperosmolar state, surgery and Acute Myocardial Infarction.

Hypothyroidism

- ❖ Hypothyroidism is a clinical state which results from a decreased production of thyroxine(T_4) by the thyroid gland or, rarely, tissue unresponsiveness to normal concentrations of circulating thyroid hormone. Deficient thyroid hormone secretion is most commonly a result of primary dysfunction of thyroid gland and infrequently secondary to pituitary or hypothalamic failure to secrete TSH and TRH respectively.
- ❖ Hypothyroidism is a common problem in older subjects – more so in women. Common causes of primary hypothyroidism in old age include immune-mediated thyroid destruction, burnt-out Graves' disease, radio-ablation and surgical removal of the gland.
- ❖ Hypothyroidism in old age presents itself in a insidious manner over many years. As a result the patient and close relatives are rarely aware of the disease and attribute most physical alterations to the ageing process.
- ❖ Obesity, deafness, coarse skin, cold intolerance, hoarse and slurred voice, fatigue, arthralgia, entrapment neuropathy and a low cardiac output state with bradycardia are common features in old age
- ❖ Classic features of hypothyroidism are detected in only 10% of the laboratory-confirmed cases. Neuro-psychiatric manifestations are most frequent and include cognitive impairment, depression and delirium. Neurological findings may include dementia, ataxia, and carpal tunnel syndrome. Stressful conditions can precipitate an acute decline in the mental status presenting as coma.

- ❖ Sub-clinical hypothyroidism is not an uncommon problem in old age where abnormalities of lipid metabolism may be the only manifestation.
- ❖ Definitive diagnosis requires demonstration of high TSH values (> 10 mU/L) with low free T_3 and free T_4 concentrations.
- ❖ Replacement of L-thyroxine is the most definitive treatment of hypothyroidism. In older patients, replacement should start with a very low dose (25 mcg) and should be increased slowly to avoid cardiovascular toxicity.

Hyperthyroidism

- ❖ Over-production of thyroid hormones leads to the clinical condition of hyperthyroidism. This disease is common in old age and 20% of all hyperthyroidism patients are aged 60 years or more. Hyperthyroidism is far more common in women than in men, with estimates ranging from 4:1 to 10:1. In contrast to younger age, hyperthyroidism in old age is more likely to be due to multi-nodular toxic goitre than Graves' disease. Other causes include toxic adenoma, inadvertent thyroid supplementation and heavy ingestion of iodine or iodide-containing substances.
- ❖ The clinical presentation of hyperthyroidism in old age is rarely classic and includes progressive functional decline, anorexia, weight loss, fatigue, cardiac arrhythmia and cardiac failure. A syndrome termed as "apathetic hyperthyroidism" comprising of weakness, lethargy, listlessness, depression and chronic wasting may be the presenting features while classical features of hyperactivity, irritability and restlessness so common in younger age- groups are absent. Sub-clinical hyperthyroidism in older patient may present itself as refractory atrial fibrillation.
- ❖ The diagnosis of hyperthyroidism requires the demonstration of high-circulating T_3 and T_4 with undetectable TSH values in blood. Thyroid scan is also essential to delineate thyroid anatomy and planning of treatment.
- ❖ The management of hyperthyroidism in old age requires early control of cardiovascular manifestations by β -adrenergic blocking agents and control of toxic symptoms by anti-thyroid drugs (propylthiouracil, carbimazole). Thyroid ablation by radioactive iodine is a good option in older patients, which provides one-time treatment without resorting to surgery.

Module 7: The Musculoskeletal System

Normal age-related changes in the musculoskeletal system

Muscles

- ❖ Approximately 30% of muscle mass is lost between the ages of 30 to 80
- ❖ Cross sectional area of muscle fibres decrease, leading to a significant loss of strength
- ❖ Aging also produces a marked decrease in the level of IGF-1 and the subsequent ability to repair or build new muscle
- ❖ Several factors contribute to the loss of muscle strength whose relative contribution varies from individual to individual. These include:
 - irreversible loss of motor units and muscle fibres and their replacement by non-contractile tissue, namely, fat and connective tissue
 - failure to achieve maximal activation of muscles due to loss of motivation, reflex inhibition, various types of arthropathy with or without pain
 - disuse and deconditioning and
 - deficiency of anabolic hormones such as growth hormone and male and female sex hormones.

Bones

- ❖ Bone is a dynamic tissue which undergoes constant remodelling throughout life.
- ❖ Bones have an important role in calcium and phosphorus homeostasis apart from providing mechanical support to the body.
- ❖ Bone mass changes throughout life in three phases: growth, consolidation and involution. Ninety per cent of the bone mass is formed during childhood and adolescence till the closure of epiphysis. In the next 15 years of the consolidation phase bone mass increases to reach the peak at around mid- thirties in both the sexes.
- ❖ In the involution phase bone loss starts between 35 and 40 years in both sexes, which accelerates in the decade following menopause. Women lose 35% to 50% of the trabecular bone (vertebrae, hip and end of long bones) and 25% to 30% of the cortical bone (shaft of long bones) while men lose 15% to 45% of the trabecular bone and 5% to 15% of the cortical bone.
- ❖ The loss of bone mass involves loss of both minerals and proteins. This results in bones becoming less dense and porous.

Joints and periarticular soft tissues

- ❖ With ageing the surface of the articular cartilage tends to break down as a result of changes in chondrocyte replication and collagen synthesis.
- ❖ There is a decrease in tensile stiffness, fatigue resistance, and strength of the joints.
- ❖ Periarticular soft tissues, such as inter-vertebral discs, ligaments, tendons and capsules of joints undergo several age-related changes.
- ❖ There is a gradual decrease in the water content, volume and mechanical resistance of inter-vertebral discs, a change similar to that seen in cartilage.
- ❖ There is thickening, distortion and fibrosis of joint capsules.
- ❖ Ligaments and tendons lose tensile strength.
- ❖ The subchondral bone undergoes irregular thickening and sclerosis along with cyst formation.

Consequences of age-related changes in musculoskeletal system

- ❖ The most important functional impairment is a marked loss of muscle strength.
- ❖ There is a reduced range of movement of the spine and peripheral joints and loss of joint proprioception contributing to problems of balance.
- ❖ Changes in vertebrae lead to kyphosis and loss of height.
- ❖ These changes lead to joint and periarticular pain and difficulty in initiating movement due to stiffness.
- ❖ Susceptibility to trauma increases.
- ❖ The overall result of these functional impairments is locomotor disability which is only next to visual disability in prevalence.

In evaluating the patient with musculoskeletal problems, the clinician needs to consider the "functional unit", composed of articulating bones, ligaments, cartilage, capsule, the muscles that affect movement, and the nerves that control movement, and sense position and movement (proprioception).

Common diseases

Osteoarthritis

- ❖ Osteoarthritis is the most common chronic joint disorder. The prevalence rises with age and osteoarthritis of the knee is the most important cause of pain in the elderly living in the community.
- ❖ The disease is classically defined as a focal lesion of the articular cartilage, combined with a hypertrophic reaction (sclerosis) in the subchondral bone and new bone formation (osteophytes) at the joint margins
- ❖ Pathologically it is characterized by a loss of and change in the composition of cartilage proteoglycans, leading to failure of normal responses to stress. Consequently, the cartilage

breaks down and the bone is exposed and a clinical syndrome of pain and disability is established.

- ❖ Osteoarthritis is considered to be primary if it is idiopathic and secondary in cases of previous injury or disease of the target joint
- ❖ Female sex, genetic predisposition and obesity are known risk factors.
- ❖ Osteoarthritis tends to affect the distal interphalangeal joints, thumb base, knee, hip, and intervertebral facet joints. Wrists, elbows, metacarpophalangeal joints, and shoulders are usually less likely to be affected by osteoarthritis.
- ❖ Radiological features are usually diagnostic and include: loss of joint space, marginal osteophytes, subchondral sclerosis and loss of alignment.
- ❖ Being a degenerative disease, treatment of osteoarthritis is limited to symptomatic relief with analgesics and physiotherapy.

Clinical features of osteoarthritis

Pain
Stiffness
Bony swelling and crepitus
Loss of movement
Instability
Loss of function

- ❖ Prosthetic replacement of hip and knee are very useful though not affordable for most elderly.

Rheumatoid arthritis

- ❖ RA is a common problem whose prevalence increases with age. Usually the presentation is insidious in onset with characteristic features of an inflammatory synovitis.
- ❖ Clinical symptoms include joint pain and swelling with tenderness and stiffness, which is maximum during morning hours. Hands, wrists and feet are the frequently involved joints. Malaise and fatigue are prominent systemic symptoms.
- ❖ Extra-articular manifestations are common and involve most systems.
- ❖ Diagnosis is usually clinical, supported by radiological abnormalities and presence of rheumatoid factor in serum.
- ❖ The course of the disease can be rapidly progressive or intermittent with short or long remissions.
- ❖ Treatment of RA involves analgesia with NSAIDs, modification of the course of the disease with disease-modifying drugs (methotrexate, chloroquin, corticosteroids), rehabilitation and corrective surgery if required.
- ❖ RA in older patients has some specific problems which include immobility, effect of co-morbid conditions and risk of adverse effects from NSAIDs.

Osteoporosis

- ❖ Osteoporosis is defined as a systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of the skeleton, leading to enhanced bone fragility and increased fracture risk.
- ❖ Osteoporosis is now recognized as a common health problem in old age. It is estimated that about 35% of the post-menopausal women in India are osteoporotic.
- ❖ It is silent until the medical complication occurs, which in this case is an osteoporotic fracture. The number of the elderly women who have osteoporosis-related crush fractures of the spinal vertebrae or fractures of either the radius or the neck of the femur has reached epidemic proportions.
- ❖ Thus the devastating consequences of osteoporosis including fractures, have led to a significant increase in morbidity and mortality and enormous financial burden, making it a major public health problem.

Risk factors

The aetiology of osteoporosis is multi-factorial.

The primary factors are increasing age, heredity and oestrogen status.

Other risk factors which can cause osteoporosis are:

- ❖ premature and surgical menopause
- ❖ heavy tobacco and caffeine use
- ❖ alcoholism
- ❖ inadequate dietary calcium and vitamin D intake
- ❖ small build
- ❖ sedentary lifestyle
- ❖ drugs: corticosteroid and anti-epileptic drugs
- ❖ co-morbid conditions: hyperthyroidism, diabetes.

Osteoporosis is a silent disease. Its clinical importance lies in the fact that it may lead to fracture which produces pain and deformity.

The most common fractures to occur are that of the wrist, the hip and the vertebra.

Hip fractures are the most severe and are associated with significant morbidity and mortality.

A significant collapse of one vertebral body usually leads to severe pain. In addition to repeated pain, numerous crush fractures result in loss of height and often in a marked kyphosis which may lead to cardio-pulmonary embarrassment and severely reduced exercise tolerance and disability.

Diagnosis

Earlier, the diagnosis of osteoporosis was used to be made with the occurrence of fracture. The current trend is to make diagnosis early in order to prevent fractures.

Early diagnosis is based on measuring the bone density. There are several techniques to measure bone density, of which dual-energy X-ray absorptiometry (DEXA) is most reliable. For the diagnosis of osteoporosis and osteopenia, standardized guidelines from WHO are usually used.

As it is not possible to undertake universal screening, women 50 years of age or older, with four or more risk factors, are required to undergo bone densitometry.

Management of osteoporosis

The primary goal of the management of osteoporosis is to prevent osteoporosis in the first place and prevent fracture if osteoporosis has already set in by treating it.

- ❖ The primary goals of the treatment of osteoporosis include increasing the bone mass and reversing bone loss by inhibiting bone resorption and stimulating bone formation.
- ❖ Various drugs used in the treatment and prevention of osteoporosis are:
 - Anti-resorptive agents: oestrogen, progesterone, bisphosphonates, calcium, calcitonin and Selective Estrogen Receptor Agonists.
 - Bone formation agents: fluoride, parathyroid hormone.
 - Agents with unknown action: vitamin D and analogues, anabolic steroids.
- ❖ Primary prevention of osteoporosis involves:
 - Taking diet rich in calcium and vitamin D
 - Avoiding tobacco, alcohol and excess of tea and coffee
 - Brisk physical exercise

Falls and fractures

Falls are the second leading cause of accidental death .Seventy-five percent of these falls occur in the older adult population. One third of the older adults who fall, sustain a hip fracture and are hospitalized, die within a year. Falls not only affect the quality of life of the individual but also influence the caregiver and family. Even if the fall does not result in hospitalization, fear of falling becomes a major factor. Fear leads to inactivity and loss of confidence. This, in turn produces a cycle of fear, loss of self-confidence, and inactivity, thereby decreasing the quality of life and increasing the risk of fall.

Falls are generally not the result of a single factor but rather a combination of both internal and external factors. Falls are one of the major problems faced by the elderly and it is considered a "Geriatric Giant". Recurrent falls are an important cause of morbidity and mortality in the elderly and are a marker of poor physical and cognitive status.

The incidence of falls increases with increasing age, and fall-related complications are a leading cause of death in the elderly. The consequence of falls includes fractures, soft tissue injury, restricted mobility and psychological trauma. More than 80% of hip fractures in the elderly are due to falls. These lead to increased utilisation of health care resources. Consequent psychological fear may lead to the "Post Fall Syndrome", a state in which an elderly person restricts his mobility or becomes dependent on others, in spite of normal neurological status.

A Fall is defined as a sudden unintentional change in position, causing a subject to land on the ground or on lower level, not as a result of major intrinsic or extrinsic hazards. A recurrent fall is defined as two or more fall events occurring within a period of six months.

About a third of the community living elderly fall in a year. Some studies indicate that 25-50% of community-dwelling elderly fall at least once annually and half of them have multiple falling episodes. The incidence of falls is higher in institutionalized elders, owing to their poor health and higher reporting rates.

Aging changes include impairment of vision and hearing, reduction of proprioceptive and vibratory sensation, increased sway, altered gait and slower righting reflexes. These physiological changes alone do not cause a fall but increase the liability to fall.

Most often, a fall is multifactorial. It is due to multiple underlying problems such as physical illness, cognitive decline, medications and environmental hazards. The risk factors for falls in elderly are listed below.

Risk Factors for Falls

Intrinsic Factors	Extrinsic Factors
1. Old Age / Female sex / Low body mass index 2. Neurological – Cognitive impairment Postural instability Parkinsonism Stroke / Gait disorders Peripheral neuropathy Sleep disturbance 3. Visual impairment 4. Musculoskeletal – Foot disorders Muscle weakness of lower limbs 5. Cardiovascular – Arrhythmias Postural hypotension Cardiac failure 6. Medication – Polypharmacy Sedatives / hypnotics Diuretics/Antidepressants 7. Acute Illness – Pneumonia / M.I 8. Metabolic disturbances 9. Behavioral - alcohol intoxication 10. Psychological - depression	1. Ground surface – Uneven, slippery floors 2. Lighting - Poor lighting Glare from lamps 3. Furniture – Low lying furniture Chairs without arms 4. Improper walking aids and footwear

ASSESSMENT OF FALLS:

Screening:

Falls and their sequelae are potentially preventable and hence annual screening for falls is recommended. For individuals who have experienced one or more falls, a further evaluation is recommended. Falls are often multifactorial, hence a detailed evaluation is mandatory, particularly in those with recurrent falls.

Assessment includes a complete detailed history regarding the fall, individual's fear of falling, presence of acute or chronic illness and medications.

Symptoms that occurred, immediately prior to fall or with the fall episode, like light headedness, dizziness, vertigo, palpitations, chest pain, dyspnoea, sudden focal neurological deficit, aura, syncope, or urinary / faecal incontinences, should be elicited.

- Previous falls history
- Location of fall
- Activity at the time of fall
- Timing of fall and length of time on ground
- Trauma or injury as a result of fall.

Medication history is elicited in detail with specific attention given to newly started drugs or for which the doses has been increased recently. Functional assessment with ADL score is done.

This includes assessment of vision, gait and balance and lower extremity joint function. Detailed neurological examination including cognitive screening using Mini Mental State Examination (MMSE) is done. Cardiovascular assessment and evaluation of various intrinsic and extrinsic factors are done.

Specialized Assessment

This includes assessment of gait & balance by various tests such as the (i)Functional Reach (FR) which measures dynamic balance (ii)Berg Balance Scale- a measure of functional activity (iii)Timed get up and go test and (iv)Performance oriented mobility assessment which is a measure of balance and gait. Home safety evaluation is done for falls that occur at home, with regard to extrinsic factors.

Treatment

After the patient is stabilized the treatment of the primary cause of fall should be implemented. These include physiotherapy (Balance training and muscle strengthening exercise) use of elastic stockings for orthostatic hypotension and specific drug therapy, dose adjustment and review of medications. Home safety measures are useful.

FALL PREVENTION

A multifaceted intervention may be adopted for fall prevention. This includes

1. Fall-related education
2. Environmental assessment and modification
3. Modification of medication regimen
4. Exercise programs to improve strength, balance and endurance. (i) Muscle strengthening / resistance exercise (ii) balance training (iii) aerobic / endurance training (iv) flexibility exercises and (v) Tai-chi, an ancient martial art form of China. The slow and direct rhythmicity of movements contribute to development of movement strategy to prevent falls in actual life.

Module 8: The Urinary System

Normal age-related changes in the urinary system

- ❖ The kidney size and number of nephrons decline with age. The number of nephrons per kidney decreases by 30-50% between ages 25 and 85 years.
- ❖ The blood circulation declines as a result of sclerosis of renal vasculature.
- ❖ The glomerular filtration rate (GFR) declines nearly 50% between 20 and 90 years of age.
- ❖ In spite of all these changes the kidneys maintain the volume and composition of the extra cellular compartment within normal limits in old age. However, in the face of stress the compromised renal function becomes apparent.
- ❖ The kidney becomes less responsive to sodium loss. The anti-diuretic hormone (ADH), which acts to alter the permeability of certain kidney cells for the conservation of water, is less effective with the loss of sodium and water.
- ❖ Glomerular filtration is usually the highest during daytime with the largest volume of urine excretion. In older people, this pattern is altered and kidneys continue to be quite active during the night.
- ❖ The bladder capacity decreases from 500-600 ml to about 250 ml. Not only is the capacity lowered but there is also more residual urine remaining after voiding. The smaller capacity of the bladder, coupled with higher night-time glomerular filtration, results in nocturia , in the older persons.
- ❖ Older persons usually have less muscle tone in the abdomen and pelvis in women, which makes bladder control more difficult.
- ❖ In men, enlargement of the prostate can block the flow of urine through the urethra, causing hesitancy and difficulty initiating the stream and finally leading to retention of urine or retention with overflow.
- ❖ In older women, there is laxity of pelvic musculature resulting in incontinence of urine.
- ❖ The net result of the changes in the kidney and urinary tract are:
 - Higher risk of infection, Risk of life-threatening hyponatremia
 - Nocturia & Urinary incontinence, Necessity of adjustment of drug dosage in old age.

Common diseases:

Urinary tract infection

- ❖ Significant bacteriuria or the presence of >10 organisms per millilitre of urine with or without symptoms is considered as urinary tract infection (UTI).
- ❖ The prevalence of bacteriuria increases with age though it is more common in women. Asymptomatic bacteriuria can be detected in 30% of the elderly females and 10% of the elderly males above the age of 65 years.
- ❖ The prevalence of asymptomatic bacteriuria is much higher in chronically ill patients and can be detected in 20% of males and 60% of females.
- ❖ Asymptomatic bacteriuria does not require therapy and is not significantly associated with serious renal disease. Antibiotic therapy of asymptomatic bacteriuria only results in temporary clearance of infection.
- ❖ Symptomatic urinary tract infection in elderly patients is nearly always secondary to the introduction of the organism to the urinary tract by catheterization or any other instrumentation.
- ❖ Factors that encourage the growth and persistence of the infection in the urinary tract are:
 - structural abnormalities in the urinary tract (prostatic hypertrophy, uterine prolapse, strictures, stones and neurogenic bladder);
 - renal scars associated with vesico-ureteric reflux;
 - vascular insufficiency;
 - declining immunity;
 - Diabetes mellitus and Indwelling catheters.
- ❖ In patients, living in community, E. coli is the commonest isolated organism in 85% of cases.
- ❖ In the institutionalized elderly the profile changes to Proteus, Klebsiella and Pseudomonas.
- ❖ Symptomatic UTI always needs to be treated. Five to seven-day course of therapy with, amoxicillin, cotrimoxazole, norfloxacin or ciprofloxacin is effective as a initial therapy till the availability of culture reports.
- ❖ In the presence of shock and septicaemia, parenteral antibiotic therapy with ciprofloxacin, cephalosporins or amino glycosides and hospitalization are required.
- ❖ Management of urinary tract infection in a catheterized patient is often difficult and prolonged.

Benign prostatic hypertrophy

- ❖ Benign prostatic hypertrophy (BPH) is an extremely common problem of advancing age.
- ❖ Enlargement of the periurethral portion of the prostate leads to the obstruction of urinary outflow.
- ❖ The symptom complex associated with BPH includes frequency, urgency, hesitancy and thin stream leading to urinary obstruction and retention of urine.
- ❖ Diagnosis is usually done by rectal digital examination and ultrasound examination of the bladder and the prostate. Urodynamic studies help in the therapeutic decision-making.
- ❖ Trans urethral resection of prostate is the gold standard mode of therapy for prostatic hypertrophy.
- ❖ In recent years medical management with specific long-acting α_1 adrenergic antagonists (such as terazosin and doxazosin) and α -reductase inhibitors (finasteride) have been used with excellent results in patients at early stages BPH and in patients who are inoperable.

Malignancy of prostate

- ❖ Cancer of the prostate is a common malignancy of old age, which can be detected early by screening and managed satisfactorily.
- ❖ Clinical manifestations are either silent or similar to benign hypertrophy in early stages. In late stages when skeletal metastasis is frequent it becomes one of the most painful conditions. Unfortunately, a majority of the patients with cancer of the prostate present with metastatic disease.
- ❖ Management involves radical surgery in early stages, and in younger patients when co-morbid conditions do not seriously impair functional status.
- ❖ In not-so-fit patients, hormonal manipulation with anti-androgens, namely, non-steroidal flutamide and steroidal diethylstilboesterol, have been found to be effective when combined with bilateral orchidectomy. Radiotherapy is another alternative in such patients.
- ❖ Early detection with regular digital examination and assay of a specific marker PSA (prostate-specific antigen) has currently emerged as useful strategies for secondary prevention.

Urinary Incontinence

Urinary Incontinence is defined as the involuntary loss of urine in sufficient amount or frequency, to be a social and / or health problem. It is a common, potentially disabling problem, which is often curable when identified.

Urinary Incontinence has a higher prevalence in women and increases with ageing and disability. The prevalence varies from 15%-20%, above the age of 70 years, in the community and reaches 50% in the elderly placed in long term care facilities. Unfortunately, urinary incontinence is often neglected by the patient as well as physician, leading to under reporting and treatment. Specific and direct questioning regarding incontinence should be a part of geriatric enquiry and screening, to identify this potential & treatable health and social problem.

Adequate mobility, normal cognition and effective lower urinary tract functions are essential to maintain continence. Incontinence can occur due to affection of any of these functions. With ageing, bladder capacity declines, residual urine volume increases, and involuntary bladder contractions are common. There is also a decline in bladder outlet and urethral resistance pressure, in women, due to laxity of pelvic structure and diminished estrogen level. Although, ageing per se does not cause incontinence it can contribute to its development in the presence of co-morbidity.

Incontinence is classified into acute & transient and chronic & established, depending on the onset and duration of the problem. From the clinical point of view, the four basic categories of incontinence are Urge Incontinence, Overflow Incontinence, Stress Incontinence and Functional Incontinence. Based on the etiology, it is classified as Urologic, Neurologic, Psychological and Functional. Distinguishing between Urologic and Neurologic disorders and problems like diminished mobility and cognition is important. Like other geriatric problems, incontinence is often due to multiple disorders with ageing changes.

Acute & Transient Incontinence

Acute & Transient Urinary Incontinence is very common in elderly in acute care setting. Incontinence that is sudden in onset, usually related to acute illness such as delirium caused by infection or metabolic abnormality. Fecal impaction is a common problem, which can cause mechanical obstruction of the bladder outlet resulting in Overflow Incontinence. Inflammation of the lower urinary tract due to atrophic vaginitis and urithritis can contribute to incontinence. Hyperglycemia, fluid overload, cardiac failure can lead to Transient Incontinence. Iatrogenic cause of incontinence is due to

medications, which commonly include diuretics, anti cholinergics and psychotropics. Identifying and treating the underlying problem will resolve the incontinence.

Chronic & Established Incontinence

There are four basic types of Established Incontinence in the elderly, namely, stress, urge, overflow and functional. Often a combination of these types occurs in an individual due to abnormalities at various levels along with ageing changes.

Stress Incontinence is the involuntary loss of urine, usually in small quantities due to increased abdominal pressure during cough, laugh, etc. It is common in elderly women due to weakness of pelvic floor musculature and sphincter, due to multiparity, surgery, instrumentation, etc.

Urge Incontinence is due to inability to delay voiding and results in leakage of large volume of urine. It is often caused by detrusor hyperactivity secondary to lower urinary tumors, stones and outflow obstruction. Neurological disorders like stroke, dementia and Parkinsonism and spinal cord injury can cause Urge Incontinence in elderly.

Overflow Incontinence results from mechanical forces on a distended bladder and/or due to urinary retention caused by lower urinary obstruction by prostate, stricture and cystocele. A contractile bladder due to diabetes, spinal cord injury can result in overflow incontinence.

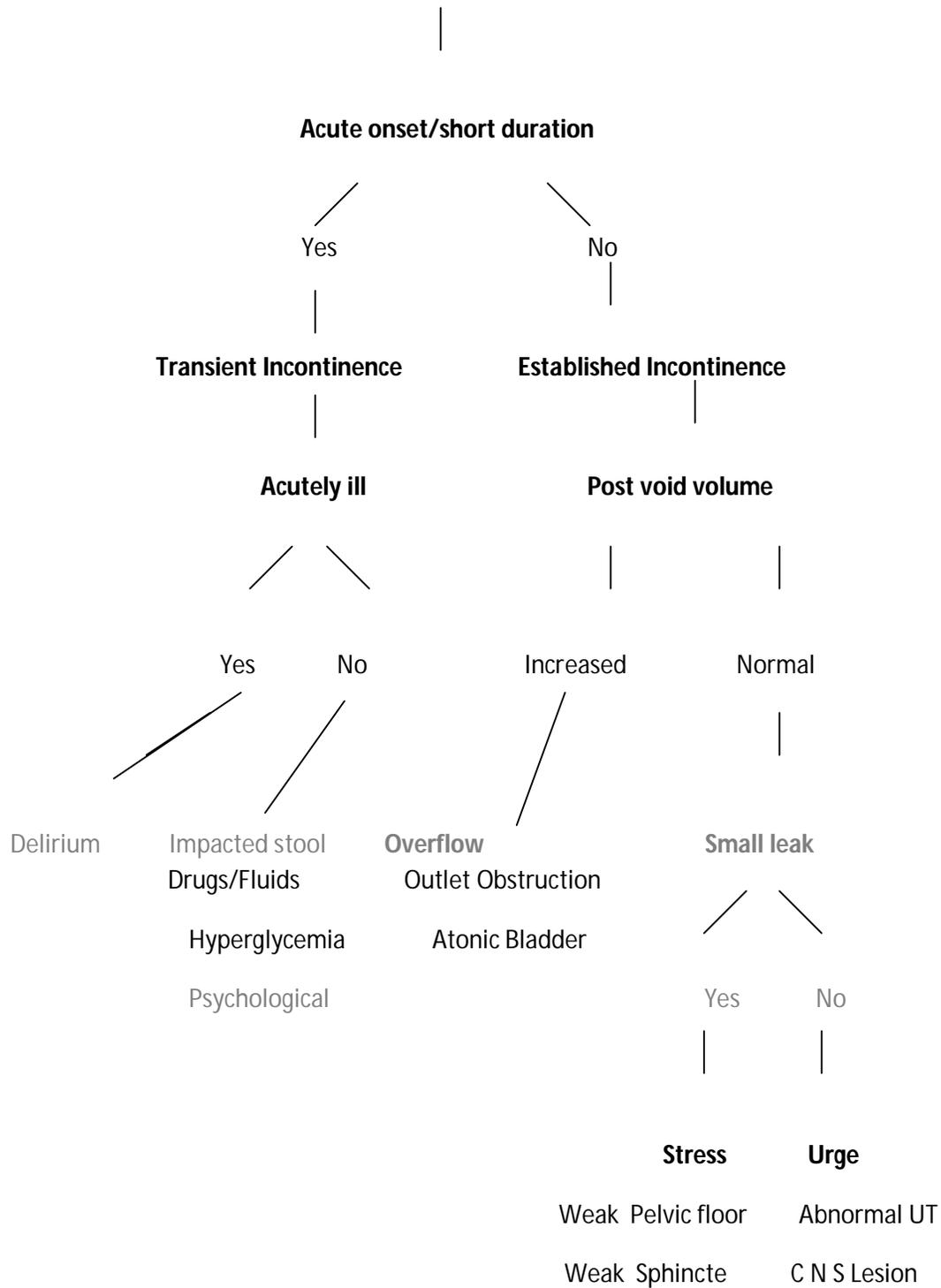
Functional Incontinence is due to inability to reach toilet secondary to physical and/or cognitive incompetence. Psychological factors such as depression and hostility can occasionally result in Functional Incontinence.

Mixed types of incontinence are common among elderly, especially the combination of urge, stress & functional incontinence in older women and institutionalized elderly.

Evaluation

The first step in evaluating incontinence is to differentiate acute & transient from established incontinence, as the management and the outcome are quite different in the two forms. A detailed history and a thorough physical examination to identify functional, cognitive and neurological impairment are essential. Maintenance of a bladder record, urine analysis and estimation of post-void urine volume are imperative. In selected cases gynecologic and urological evaluation, including urodynamic studies are to be carried out.

APPROACH TO INCONTINENCE IN ELDERLY



Management

Appropriate management of the underlying cause of acute incontinence is essential to avoid a permanent problem. Catheterization of a transient incontinence is unjustified, as it may lead to infection and prolonged mobilization. A good nursing care and using pads will provide better outcome in long run.

In the management of established incontinence, the clinical type and the underlying causes have to be identified to provide appropriate intervention. Supportive measures, in the form of education, modification of fluid intake and using garments and pads should be encouraged. Pelvic muscle exercises, bladder training and retraining are useful in stress and urge incontinence.

Scheduled toileting and habit training are advised to dependent elderly. Drugs like anticholinergic agents and antispasmodic agents are useful for urge incontinence. Conjugated oestrogens can be tried in stress incontinence. Alpha-adrenergic antagonist are useful in urge incontinence associated with prostatic enlargement. Cholinergic agonists are useful in atonic bladder with overflow incontinence.

Intermittent catheterization can help in the management of patients with overflow incontinence. Chronic catheterization is restricted to persistent overflow incontinence with pressure sores and to terminally ill elderly. Surgical interventions are considered for elderly women with pelvic floor & sphincter laxity and uterine prolapse and in men with outflow obstruction.

- ❖ Urinary incontinence is common and potentially disabling but often neglected problem in elderly.
- ❖ Specific screening and simple evaluation can identify the type of incontinence which can guide to management principle.
- ❖ Mixed incontinence is common and often due to multiple causes aggravated by aging changes, functional and cognitive decline.
- ❖ Specific drug therapy, bladder training procedures, surgical methods, catheterization and supportive measures in the form of undergarments and pads can achieve continence in majority of the elderly.

Module 9: Brain Ageing and Cognitive Impairment

Normal age-related changes in the brain

- ❖ Numerous changes occur in the brain structure with age. These include: loss of neurones, reduction in the size of the brain, enlargement of ventricles and accumulation of lipofuscin and plaque, including amyloid.
- ❖ There is also reduced transmission efficiency, probably due to the smaller number of cells and reduced levels of certain neurotransmitters.
- ❖ There is also decreased number of receptors and changes in receptor sensitivity.
- ❖ Cerebral blood flow is decreased by about 20 percent and there is alteration in cerebral auto regulation.
- ❖ These structural and functional changes have no real significance since the normal older brain is still quite capable of learning and remembering.
- ❖ However, in some individuals these age-related changes are excessive with significant functional impairment, which is termed as cognitive impairment.

Cognitive impairment

- ❖ The clinical features of an aged brain are subtle or manifest alterations in cognition and behaviour.
- ❖ The cognitive impairment of old age not amounting to dementia has been termed as “benign senescent forgetfulness” or “age-associated memory impairment”.
- ❖ Age-associated memory impairment (AAMI) is a well-defined entity and is characterized by:
 - Onset after 50 years of age;
 - Gradual onset of memory dysfunction, substantiated by psychometric evidence;
 - Intact global intellectual function;
 - Absence of dementia (mental state examination score-MMSE score >24); and
 - Absence of any neurological, medical and psychiatric disease or use of drugs.

Alzheimer’s disease and other dementias

- ❖ Dementia, on the other hand, is a clinical syndrome characterized by persistent impairment of multiple cognitive capacities, which includes:

- Impaired memory;
 - Disturbances of language function and visuo-spatial skills; and
 - behavioural problems.
- ❖ Cognitive impairment of normal ageing produces little disability and can be easily distinguished from dementia even early in the disease.
 - ❖ Several pathological conditions cause dementia which include:
 - Degenerative diseases: Dementia of Alzheimer's type, dementia of Lewy body type, front temporal dementia
 - Vascular: Multi-infarct dementia, lacunar state
 - Infective: AIDS dementia complex, Creutzfeldt- Jacobs disease
 - Treatable dementia: Normal pressure hydrocephalus, Tumors, Subdural hematoma Hypothyroidism, chronic Alcoholism.
 - Post-neurological insult: Head injury, cerebral anoxia
 - ❖ Among all these conditions Alzheimer's disease and vascular dementia are most common.
 - ❖ The most important risk factor in the development of dementia is ageing. The prevalence of dementia increases from less than 1% at 60 years to 40% at 95 years, doubling every six years.
 - ❖ Dementia is the most important public health problem of old age in the developed world and in the near future will become so in India and other developing countries as well. There are about four million patients of dementia at present in India. Care of such a large number of the demented elderly is a major challenge for the society.
 - ❖ Alzheimer's disease which is the commonest form of dementia has distinctive pathological features which include: neocortical neuronal loss and deposition of extra-vascular amyloid and neurofibrillary tangle in brain tissues. A definitive diagnosis requires the demonstration of these characteristic pathological changes. However, a probable diagnosis of Alzheimer's disease can be made from a gradual onset and progressive impairment of cognitive functions after the exclusion of other causes which may be sufficient to explain these deficits. Well-defined guidelines are available for clinical diagnosis.
 - ❖ The clinical course of Alzheimer's disease passes slowly but progressively steadily through three phases: first, phase of involvement of higher mental function; second, phase of focal neurological deficit; and third, phase of global neurological dysfunction. The first phase may last more than two years while the second and third phases together may last between four to five years. Alzheimer's disease in general is associated with reduced survival.

- ❖ The clinical diagnosis of dementia involves a two-step process:
 - Diagnosis of dementia and its differentiation from normal ageing, other psychiatric illnesses, delirium and amnesic syndromes; and
 - Differential diagnosis of the possible causes of cognitive decline.
- ❖ The criteria for the diagnosis of dementia as contained in the WHO International Classification of Diseases (ICD–10) include:
 - Evidence of dementia – decline in intellect, impairment of activities of daily living, depressive symptoms, hallucinations and delusions.
 - Insidious onset and gradual deterioration.
 - No evidence of another clinically diagnosable cause of dementia.
 - No history of sudden onset or neurological signs of focal damage (hemiparesis, visual field defects, sensory loss, loss of co-ordination) early in the course of disease.

Clinical manifestations of dementia

Cognitive & other problems in dementia

Memory loss

Poor concentration

Visuo-spatial difficulties

Non-specific focal scortical damage

Speech and language defect

Focal neurological deficits

Inability to recognize self and others

Seizure

Disturbances of muscle rigidity and gait

Bladder and bowel incontinence

Total confinement to bed

Behavioural problems

Agitation

Personality change

Abnormal eating behaviour

Wandering

Mood disorder

Anxiety, phobias, fear

Restlessness

Hallucinations, Delusions

Shouting, rage, violence

Disinhibition

Compulsive behaviour

- ❖ The precise aetiology and pathogenesis of Alzheimer's disease are poorly understood; as a result there is no specific treatment available for this disease.
- ❖ The treatment modalities for Alzheimer's disease are: (i) specific (choline esterase inhibitors) and (ii) symptomatic (antipsychotic, antidepressants and sedatives). Of all the agents available for treatment of cognitive impairment, choline esterase inhibitors are the best developed and most successful with only mild impact on cognitive symptoms.

Care of the demented patient

The objectives of caring for a demented elderly are:

- Protection from harm
- Maintenance of independence in daily activities as long as possible
- Improvement in communication
- Prevention and reduction of occurrence of difficult behaviour
- Provision of support to family care-givers

- ❖ Many things in the home must be considered while planning for safety. If the demented person turns the stove/ burner on, then fire is a potential hazard. If the stove is electric, it should be disconnected when the elderly is at home alone as well as during the night if wandering is a problem. The older person must always be under someone's observation in order to be secured and protected to prevent wandering away from home. The most important point is to anticipate the safety needs by conducting a thorough assessment of risk.

- ❖ In order to maintain independence as long as possible, demented persons must be kept stimulated and involved in activities. Reality orientation is an approach in which the demented person is re-educated by health care workers and family members in a regular manner. The process should start with simple objects in the surrounding going on to activities of daily living. Sensory stimulation is another approach in which different senses are stimulated by familiar objects (scent for smell, sugar or salt for taste, etc.) with recall and reminders.

- ❖ Communicating with a demented person can be very frustrating. It is important that health professionals and family care-givers do not respond by ignoring the older person, talking to them as if they were a child, answering for the older person before giving them a chance to answer for themselves, or shouting or speaking harshly to the older person. Instead, communication should stress the following:
 - ❖ The older person should not be hurried when trying to speak and they should be allowed time to consider what they want to say.
 - ❖ If the older person starts to forget what they are trying to say, the last words or sentence that they spoke should be repeated to give them the cue.
 - ❖ Short simple sentences and ones which can be answered by a yes or no should be used.
 - ❖ The most important content of what needs to be communicated is given at the end of the sentence.
 - ❖ Instructions should be given one at a time.
 - ❖ Background noise and distractions should be avoided as far as possible.

- ❖ Part of the importance of communicating well and patiently is that this often prevents the occurrence of agitation and other disruptive behaviours. The most common behaviour problems in demented persons include:
 - Resisting care;
 - Screaming;
 - Striking out physically;
 - Taking clothes off in inappropriate places
 - Hoarding things; and
 - Smearing faecal matter.

- ❖ In order to determine which factor triggers difficult behaviour, the patient must be observed and the family care-giver should be interviewed. Bathing and toileting are the common ones which start these behaviours. Other factors which cause these behaviours are too much stimulation in the environment from people and noise, unfamiliar person and places, being forced to do something, too many instructions at once, accumulation of physical energy from inadequate activity and exercise, fatigue, physical discomfort from pain, fever or constipation and inability to communicate needs.

- ❖ Approaches in reducing violent behaviour may include the following:
 - Making a routine for daily care to improve predictability.
 - Determining the ideal time of day for doing needed things.
 - Trying not to surprise the person by any action.
 - Avoiding argument and physical restraining.
 - Diverting the person's attention.

- ❖ Engaging the older person in recreational activities which use the whole body.

- ❖ The family needs a great deal of emotional support in taking care of a relative with dementia. This may include co-ordination with support groups. The family also needs to have arrangements for relief of responsibilities so that the caretakers do not become exhausted and socially isolated.

Acute Confusional State

Acute Confusional State is a common, serious and often unrecognized neuropsychiatric disturbance in elderly patients. It is a common presentation of various disorders in the elderly, with adverse outcome.

Acute Confusional State in the hospital is associated with increased morbidity, closer nursing surveillance, higher hospital cost per day, longer hospitalizations and increased rates of nursing home placement.

Acute Confusional State is a disorder of content of consciousness in which there is an inability to focus and sustain attention and incapacity to think with customary speed and clarity. It is often associated with perceptual disturbances and altered cognition.

Various reports have suggested prevalence rates that ranged from 10-30 % and incidence rates from 4-53 % in the hospital setting. Around two thirds of the elderly patients undergoing emergency surgery develop Acute Confusional State. The rates are highest among frail patients and those with dementia. The incidence in those undergoing elective surgeries is around 30 %.

Advanced age and Frailty are the major risk factors for developing recurrent confusional state. Premorbid Cognitive Decline, Psychiatric illnesses, Malnutrition, Chronic Anticholinergic drug use and Sensory Impairment are the other risk factors for developing confusional state.

Precipitating factors for Delirium include drugs, electrolyte imbalance, infections (esp urinary and respiratory tract), Urinary retention and Fecal impaction, Cardiac problems and Neurological problems like Stroke, Meningitis and Head Trauma. Acute illness affecting any organ system and acute exacerbation of chronic illness may precipitate Confusional State.

The hallmark of Acute Confusional State is acute cognitive dysfunction with impaired attentiveness, which develops suddenly or over a short time (usually hours to days). Acute fluctuations in mental status with varying levels of inattention and altered level of consciousness are present. Changes in orientation, memory and abstract thinking may occur but not diagnostic.

Psychomotor activity may be variably abnormal. Delusions (of persecution), hallucinations (visual) tremor abnormalities in the sleep wake cycle occur in most of the patients. In some frail elderly patients, Acute Confusional State may precede the appearance of another illness and may be the only early manifestation of that illness. Acute Confusional State may persist for many weeks or months.

Diagnostic criteria for Delirium according to DSM-IV

- Disturbance of consciousness (i.e., reduced awareness of clarity of environment) with reduced ability to focus sustain or shift attention.
- Change in cognition (memory deficit, disorientation or language disturbance) or development of a perceptual disturbance that is not accounted for by pre-existing, existing or evolving dementia.
- The disturbance develops over short period of time (over hours to days) and tends to fluctuate during the course of the day.
- Evidence from the history, physical examination or lab tests that the disturbance is due to direct physiologic consequences of a general medical condition/Drug or substance intoxication or withdrawal/multiple etiologies (both).

Diagnosis consists of two elements: Establishing the presence of Acute Confusional State and establishing the underlying cause. Failure to diagnose or misdiagnosis occurs in 80% of cases but is less likely with interdisciplinary input.

A thorough history is required to determine the frequency and duration of mental status changes and other clinical features. A drug review focuses on the changes in drug regimen (additions, deletions or dose changes)

A physical examination can be challenging in a patient with Acute Confusional State. Vital signs including pulse, blood pressure, respiratory rate, temperature and oxygen saturation may provide important clues. Cardiac, pulmonary, abdominal, neurologic and mental status examinations should be performed. The physical examination should elicit signs of physical illness, focal neurological disorder, meningitis, increased ICT and head trauma.

Serial MMSE, Delirium rating scale and Confusional Assessment Method are some of the commonly used tools in diagnosing and assessing recovery.

Confusional Assessment method (CAM)

Acute Confusional State.

Criteria	Evidence
Acute change in mental status	Observation by a family member, caregiver or Primary care physician
Symptoms that fluctuate over minutes or hours	Observation by nursing staff or other caregivers
Inattention	Patient history, Poor digital recall
Altered level of consciousness	Hyperalertness, drowsiness, stupor or coma
Disorganized thinking	Rambling or incoherent speech

The first three criteria plus the fourth/fifth must be present for the diagnosis of Acute Confusional State. CAM can detect Acute Confusional State even in the presence of dementia.

Laboratory evaluation is guided by the history, physical examination and drug review. CBC, serum electrolytes, urine analysis and blood cultures are the most useful investigations. CT of the head, CSF analysis and EEG are the less helpful but frequently performed. An ECG and a chest x-ray can be obtained if a cardiac or pulmonary disorder is suspected.

The primary differential diagnoses are dementia and depressions both of which may co-exist with Acute Confusional State. Differentiation between dementia and Acute Confusional State is not always clear and the features of the two syndromes may sometimes overlap.

Acute Confusional State	Dementia
Sudden onset	Insidious onset
Precise time of onset	Uncertain time of onset
Usually reversible	Slowly progressive
Short duration (days to weeks)	Long duration(years)
Fluctuations (over minutes to hours)	Good days and bad days
Abnormal levels of consciousness	Normal levels of consciousness
Typically an association with drug use/ withdrawal or acute illness	Typically no association with drug use or acute illness
Almost always worse at night (sun downing)	Often worse at night
Inattention	Attention not sustained
Variable disorientation	Disorientation to time and place
Typically slow, incoherent and inappropriate language	Possible difficulty finding the right word
Impaired but variable recall	Memory loss especially for recent events

The elderly patient with Acute confusional state is often vulnerable to iatrogenic problems, especially those due to physical and chemical restraints. Bladder and Bowel incontinence or retention is a common complicating problem. Bedridden patients are prone to atelectasis, pressure sores and deconditioning. Acute malnutrition related to an inability to attend to eating may also occur.

Prognosis and Management:

Hospitalized patients with Acute Confusional State have a tenfold higher risk of medical complications (including death), longer hospitalization and increased need for post acute placement after discharge.

Management of Confusional State includes treatment of underlying disorders, removal of contributing factors, behavioral control, avoidance of iatrogenic complications and support of the patient and family. A geriatric interdisciplinary team involving the family and friends can provide the best care.

Behavioral control may be necessary to ensure patient comfort and safety. Usually social restraint is preferred to physical or chemical restraints. Placement of delirious patients near the nursing station is recommended and family members are encouraged to stay with the patient. Items that help patients orient themselves (clocks, calendars) must be provided and patients who need glasses and hearing aids should be encouraged to wear them.

Discontinuation of drugs or treatment known to precipitate Acute Confusional State is recommended. Psychoactive treatment may be required to treat agitation rather than the Acute Confusional State itself. For most patients low doses of high potency anti psychotics (eg. Haloperidol 0.25-1 mg po/ im/iv) are preferred. Use of Risperidone (0.25-1mg) has been recently suggested to treat hyperactive Acute Confusional State, due to their less extra pyramidal side effects.

Module 10: Stroke

Definitions

- ❖ Stroke is defined as rapidly developing clinical signs of focal or global disturbance of cerebral function with symptoms lasting 24 hours or longer, or leading to death, with no apparent cause other than of vascular origin.
- ❖ Events lasting for less than 24 hours are termed as transient ischaemic attack (TIA). The characteristics of the mode of onset, together with specific neurological symptoms and signs, suggest the lesion's location and its cause.
- ❖ Stroke ranks first in frequency as well as in urgency among neurological disorders, accounting for more than half of all neurological admissions in old age.
- ❖ Stroke continues to be one of the top three leading causes in death and disability in later life. More than a half of all stroke patients die within one year of the episode. Only one-third of the survivors make good recovery. Stroke is responsible for more than a quarter of all cases of severe disability in the community.

Clinical manifestations

- ❖ Stroke is a syndrome resulting from a range of heterogeneous conditions that affect the cerebral vasculature and blood flow. Strokes can be either occlusive or haemorrhagic.
- ❖ Occlusive/ischaemic strokes account for 65% of all strokes and can be due to thrombosis or embolism involving large vessels and small vessel occlusion (lacunar stroke). Thrombotic strokes are the commonest of all varieties resulting from atherosclerosis of cerebral blood vessels. Embolic strokes usually have the cardiac structural and/or rhythm abnormalities as the main source of embolism.

- ❖ Haemorrhagic strokes account for 35% all strokes and can be due to the rupture of micro-aneurysms and intra-cerebral blood vessels. Haemorrhagic stroke is nearly always associated with hypertension.

Risk factors

- ❖ **Hypertension** is the single most important risk factor for stroke.
- ❖ Other risk factors for stroke include:
 - Increasing age
 - Family history
 - Obesity and hypercholesterolemia
 - Smoking
 - Lack of exercise
 - Heart failure
 - Atrial fibrillation
 - Diabetes mellitus
 - Anticoagulant therapy.

Management

- ❖ The diagnosis of stroke is always clinical. Investigations are required to confirm the pathology and aetiology of stroke, to detect treatable cardiovascular risk factors and identify treatable complication of stroke, for which baseline investigations of blood, ECG and chest X-ray are useful.
- ❖ Imaging investigations such as CT scan and MRI scan are sensitive investigations for the diagnosis of the aetiology of stroke. Carotid ultrasound Doppler studies are very useful in detecting carotid atherosclerosis in patients with TIA.

- ❖ The management of stroke involves:
 - Medical intervention to minimize impairment;
 - Prevention and treatment of acute complications;
 - Rehabilitation to minimize disability; and
 - Adaptation to minimize handicaps.
- ❖ Prevention of stroke in patients with TIA requires:
 - Modification of risk factors: hypertension, smoking, cholesterol;
 - Drug therapy with antiplatelet agents and anticoagulants; and
 - Carotid endarterectomy.
- ❖ The patient as well as the family requires support in terms of education, training and counselling. Community and domiciliary rehabilitative services are essential for stroke patients living in communities.

Hypertension is the single most important risk factor for stroke. Primary prevention of stroke is one of the important goals of healthy ageing, and achievement of this goal demands early detection and control of hypertension.

Medical Management

Acute management of stroke has been revolutionised in the last few decades with the development of thrombolytic therapy , intervention procedures including stenting.Early hospitalisation, limited time window, availability of imaging techniques and facilities for interventional p[rocedures, limit these procedures to few specialised stroke centres.

Rehabilitation

- ❖ Stroke rehabilitation is a multidisciplinary activity which focuses on problem-solving education about the disability in order to reduce the handicap.

- ❖ The basic principles of stroke rehabilitation are documentation of the impairment and handicaps; and maximization of independence and minimization of dependency.
- ❖ A holistic approach taking into account the physical and mental state of the patient is required to achieve the best results.
- ❖ The rehabilitation programme should address several sequelae which affect the patient's quality of life: Dysphagia, Various speech defects, Problems of perception (neglect, agnosias, apraxias) Spasticity, Hemiplegic shoulder, Edematous limb, Seizures & Depression and apathy.

Module 11: Mental Health

Stresses of old age

- ❖ Common situational stresses in the older people include:
 - Widowhood and the death of other significant relatives;
 - Care-giver stress;
 - Fear of death, financial difficulties and loss of independence;
 - Changes in living arrangements and previous roles; and
 - Social isolation.

The emotional response to these problems include grief, guilt, loneliness, loss of meaning in life and lack of motivation, anxiety, anger, feelings of powerlessness and depression.

Barriers to accepting mental health problems in old age

- ❖ Though a positive mental outlook is essential to healthy ageing, many issues faced in old age create serious emotional challenges for the elderly.
- ❖ Coping resources and coping strategies to face emotional challenges in old age are largely influenced by value system and cultural traditions.
- ❖ Acknowledgement of mental health problems and willingness to accept mental health interventions and services are also influenced by cultural factors.
- ❖ Older adults and their families usually deny the existence of mental health problems because:
 - They feel these problems are shameful;
 - They believe the problem is a repayment for the bad deeds done in an early life;
 - They are convinced the healing of illnesses is in God's hands;
 - They think suffering should be endured;
 - They want to appear in control in order to maintain their dignity; and

- Emotional control is valued in the society and admitting the need for help suggests that one is not in control.
- ❖ As a result elderly patients may seek medical care for non-specific somatic complaints such as headache, insomnia, dizziness or other vague physical symptoms instead of seeking psychiatric care.
- ❖ Seeking help from traditional healers is also extremely common for such symptomatology prior to approaching the modern health care system.
- ❖ Thus, the mental health need of older people is greatly underestimated despite very high prevalence of psychiatric illnesses.

Psychiatric diseases of old age

- ❖ Older people suffer a wide range of psychiatric disorders. Concurrent physical illnesses increase the vulnerability to mental health illness.
- ❖ Though underestimated and undetected, most of these conditions have excellent prognosis with proper management

Common psychiatric problems in old age

- Depression
- Personality disorder
- Anxiety disorders
- Post-traumatic stress disorder and bereavement
- Somatoform disorders
- Late life delusional disorders
- Obsessive compulsive disorders
- Self-neglect
- Alcoholism

Depression

Depression in later life is a public health problem, if left untreated, it causes considerable distress and disability to the individual, family and the society. Diagnostically it poses a challenge to the primary care physicians because of atypical symptoms and co-morbid conditions.

The point prevalence of major depressive illness in community-dwelling elderly ranges from 1%-9% and it is about 36% to 46% in acutely ill hospitalized elderly and about 10 to 22% among the elders in long-term care facilities. Compared to young adult females, the prevalence is slightly lower in older women.

Major depression is a syndrome defined by diagnostic criteria, including depressed mood or loss of interest or pleasure in activities (anhedonia), with a total of five or more symptoms in a 2-week period. It is important to note that most of the symptoms must be present most of the day, nearly every day.:

1. Depressed mood
2. Loss of interest
3. Weight change
4. Sleep disturbance
5. Agitation or retardation
6. Fatigue
7. Guilt
8. Inability to make decisions
9. Suicidal ideation or attempt

For diagnosing minor depression, two to four symptoms must be present for two weeks

Elderly depressed patients may complain prominently about somatic symptoms, and may be less likely to report the emotional or ideational components of their condition. Particularly common are physical symptoms such as headaches, fatigue, disturbed sleep, dizziness, chest pain, vague joint or limb pain.

The first step in diagnosing Depression is to be aware of Depression as part of the differential diagnosis. Using a screening tool such as the Geriatric Depression Scale may help to determine whether there is a problem that requires further exploration.

Treatment

The treatment involves both psychotherapy and pharmacological agents. The treatment involves an acute phase which targets about controlling of symptoms and it lasts for about 6-12 weeks, a continuation phase of 4-9 weeks and a maintenance phase of 1 year or longer. Also any other associated medical problem should be optimally controlled.

Tricyclic antidepressants

These are the traditional agents and have been replaced by the newer drugs due to their potential side effects in elderly. Among them, nortriptyline was the most frequently used drug. These agents precipitate delirium, orthostatic hypotension, urinary retention and constipation and is best avoided in patients with prostatic hypertrophy, narrow angle glaucoma, cardiac conduction defects, IHD, seizure or cognitive impairment.

Selective Serotonin Reuptake Inhibitors(SSRI)

These agents acting primarily on serotonin system are the most favoured drug for treating all types of depression in elderly.

Citalopram is the SSRI of choice followed by sertraline and paroxetine. Fluoxetine is the less favoured drug. They differ in their side effects and it is possible to switch from one to another.

SSRIs are popular for the treatment of depression, but some are strong metabolic inhibitors of certain cytochrome P450 substrates. The elderly are frequently on numerous medications, so this potential for interaction becomes a highly relevant clinical issue.

Psychotherapy

Psychotherapy can be tried and are just as effective as antidepressants, especially in mild to moderate depression. Interpersonal psychotherapy (IPT), cognitive-behavioral therapy (CBT), and problem-solving treatment (PST) have been shown to be very effective and are treatment alternatives guided by patient choice in mild to moderate depression.

Electroconvulsive therapy

Electroconvulsive therapy (ECT) is a first-line treatment for depression with psychotic features; it is an alternative to combination medication treatment with antidepressants and antipsychotics.

Module 12: The Sensory System

Skin

Age-related changes:

- ❖ Both the layers of skin epidermis and dermis change with advancing age.
- ❖ The thickness of epidermis decreases. The stratum corneum loses moisture making the skin dry and rough. The melanocyte number declines, which reduces the protection against sun rays and leads to appearance of small hypopigmented spots (actinic lentiginos). There is a reduction in the number of skin Langerhans cells; as a result, immunity against infection declines.
- ❖ In the dermis the fibroblast number decreases along with the production of extracellular matrix. This is the single most important reason for the wrinkling of the skin in old age. Vascularity of the skin declines and wound healing slows down.
- ❖ Sweat and sebaceous gland secretion declines and nerve supply gets disorganized.
- ❖ The hairs turn grey due to loss of melanin and there is loss of hair on the scalp.
- ❖ Growth of nails slows down.

Common disease conditions

- ❖ Infections: Common infections are herpes zoster, scabies, decubitus ulcer and pyoderma.
- ❖ Pruritus: As a result of dryness or systemic disease. Treatment: emollients, antihistaminics.
- ❖ Xerosis: Dry and rough skin as a result of ageing. Treatment: emollients.
- ❖ Seborrheic dermatitis: Treatment: topical anti-fungal or cortisone cream.
- ❖ Drug reaction.
- ❖ Cancers, e.g. basal cell carcinoma, squamous cell carcinoma, and malignant melanoma.

Eye

- ❖ Eyelids become lax. The lid margins rotate away from the eyeball causing disruption of flow of tear. Lachrymal gland secretion is reduced and eyes become dry.
- ❖ Subconjunctival vessels become fragile and give rise to subconjunctival haemorrhage.
- ❖ There is fluid accumulation in endothelial cells of cornea which clouds its transparency. Fluid deposition in the periphery of the cornea gives rise to arcus senilis.
- ❖ Distortion of the anterior aspect of uveal tract leads to chronic close-angle glaucoma.
- ❖ Lens becomes rigid and there is loss of accommodation (presbyopia). Denaturation of lens protein leads to formation of cataract.
- ❖ Different layers of retina undergoes degeneration and manifests as macular degeneration if that part of the retina is involved.
- ❖ The net effect of these age-related changes in the eyes are:
 - inability to see small objects and details;
 - defective accommodation and defective depth perception;
 - extra sensitivity to glare; and
 - defective colour vision, i.e. red, orange and yellow seen better than blue, green and purple.

Common diseases

Cataract

- ❖ Cataract is the commonest cause of visual impairment in old age.
- ❖ The basic pathology involves denaturation of lens protein. Multiple factors contribute to development of cataract; these are: family history, malnutrition, diabetes, smoking, medications such as steroid and previous eye surgery.

- ❖ Cataract is characterized by painless blurring, gradual loss of vision, increased sensitivity to glare and general darkening of vision. Signs and symptoms include (i) frequent changes in eye glasses; (ii) needing brighter light to read; (iii) poor night vision, and (iv) fading or yellowing of colours.
- ❖ Cataract interferes with the older person's ability to live and function independently. Cataracts usually develop in both eyes in persons over 50 and are present to some extent in most persons over 70 years of age.
- ❖ Treatment of cataract is surgical, removal of the lens and implantation of intra-ocular lens is done under local anaesthesia, which is the safe and simple procedure

Glaucoma

- ❖ Glaucoma is a condition in which there is increased intra-ocular pressure due to a defect in the outflow of aqueous humour. Left untreated, glaucoma can lead to blindness.
- ❖ Loss of vision from glaucoma can be prevented if the disease is detected and treated before noticeable damage occurs to the optic nerve.
- ❖ There are two common types of glaucoma seen in older persons:
 - Open-angle or chronic glaucoma in which there is loss of peripheral vision late in the disease. This is the most common type of glaucoma in older people. Vision loss usually begins with deteriorating side vision, also known as "tunnel vision". It can happen so gradually and painlessly that the older person is unaware of any trouble until the optic nerve is already badly damaged. The diagnosis is made by measuring intra-ocular pressure using specialized equipment.
 - Narrow-angle glaucoma occurs when there is a sudden blocking of the drainage angle of the eye. Extreme pain, coloured halos around lights, headaches, nausea and vomiting, and

blurred vision are symptoms of this type of glaucoma. If this condition is not attended to urgently, blindness results.

- Older persons should be screened for glaucoma regularly with the measurement of intra-ocular pressure, and those with any known history of the disease would need periodic examinations.

Macular degeneration

- ❖ Age-related macular degeneration is a common cause of impaired vision and rarely complete blindness.
- ❖ Atrophic form of macular degeneration involves degeneration of retinal pigment epithelium and capillaries, resulting in the dysfunctioning of photoreceptors. There is no treatment for this condition.
- ❖ Exudative form of macular degeneration is characterized by capillary leakage and sub-retinal haemorrhage. Laser photocoagulation has been considered useful.

Diabetic retinopathy

- ❖ Diabetic retinopathy is one of the commonest complications of diabetes mellitus.
- ❖ Retinal changes include capillary leak, retinal haemorrhage, vitreous haemorrhage and retinal scarring and detachment.
- ❖ Vision may become blurred, distorted or partially blocked. Untreated, this condition eventually leads to blindness. Diabetic retinopathy is a common cause of blindness in old age.
- ❖ Development of diabetic retinopathy depends on the duration of the disease and control of diabetes.
- ❖ The primary goal of management is prevention of retinopathy in the first place through proper glycaemic control. Arrest and retard visual impairment if the condition has already set in.

- ❖ Regular monitoring for retinopathy is the single most important step in its management.
- ❖ Several pharmacological interventions have been developed in recent years which include the use of ACE inhibitors and laser photocoagulation.

Prognosis of diabetic retinopathy has improved tremendously in recent years with regular monitoring and laser photocoagulation.

Ears

- ❖ With ageing structural changes take place in the organ of Corti (sense organ of hearing) which include a decrease in the number of hair cells and ganglion cells. Blood supply to cochlea decreases. There is also a decline in the number of sensory nerve fibres from the sense organ.
- ❖ Subtle changes in hearing begin in the forties. The earliest feature is reduced discrimination, especially to consonants, trills (e.g. rr sounds) and sibilants (e.g. s, z, sh, zh sounds). High frequency sounds are affected first with progression to lower frequency sounds. Presbycusis (age-related loss of hearing) is common in older persons. Men are affected a little more than women and more than one-third of the people over 65 years of age have significant hearing impairment.
- ❖ Uncompensated loss of hearing can make older people appear mentally impaired and withdrawn when they are normally not. Inadequate hearing can result in lack of understanding and the older person's inappropriate response or expression may be wrongly interpreted as confusion or problems with mental status.
- ❖ Hearing loss can also interfere with socialization, as making an effort to listen becomes too embarrassing with eventual avoidance of participation in talking and hearing. The following behaviour suggests hearing loss associated with ageing:
 - the older person tends to shout and others tend to speak very loudly to them;

- the older person often requests to have things repeated;
 - the older person talks little, appears not to participate, or appears to ignore what is going on when in a group of people; and
 - the older person becomes suspicious that things are being said about him.
- ❖ In addition to these observations, there are several simple tests which can give some idea of the older person's hearing ability. One of them involves standing approximately three feet behind the older person. Using a normal speaking tone, a set of words are to be spoken which the older person has to repeat later. If the older person cannot repeat many of the words, the exercise has to be repeated again from the front with adequate lighting.
 - ❖ Often a hearing aid can be helpful. However, it must be made sure that the older person and the family know how to (i) insert the appliance; (ii) turn it on and off properly; (iii) know the battery type and where to get more; and (iv) know how to test and replace the batteries.
 - ❖ While communicating with the older person, speaking slowly, facing the person with lower pitch of voice can be more useful than raising the voice and only creating more high frequency sounds, which are heard with difficulty. Avoiding background environmental noise and several conversations at a time in group discussions may be useful.
 - ❖ Earwax is frequently a cause of, or at least aggravates, hearing difficulties; therefore, this should be the first thing to be checked. Cleaning the ear is usually preceded by insertion of wax-dissolving drops to loosen the cerumen.

Taste and smell

- ❖ Taste receptors are located primarily in the taste buds of the tongue. With ageing the number of taste buds diminishes and the remaining buds have a higher threshold for stimulation to activate them. It is uncertain whether taste declines enough with age to interfere with the enjoyment of eating. It takes more flavour or spice to stimulate taste buds. The perception of

how things taste may be impaired by age-related changes in smell. In addition to the changes in the taste buds, there is decreased salivary secretion. Poor dental hygiene, absence of teeth, and/or poorly-fitting dentures also can alter the sensation of taste. Taste and smell go hand in hand. Receptors for smell are located in the lining of nasal passages and the number of nerve fibres decreases with age. The combined effects of changes in taste and smell can:

- make food taste less appealing, thereby reducing food intake;
 - conflict with recommended dietary limitations; for instance, excess use of salt and sugar, since reasonable use is hard to taste; and
 - interfere with the ability of smell and taste to protect the elderly from harm. For example, if older persons cannot smell smoke, they may be unaware of a fire hazard.
- ❖ Most interventions for age-related decline in taste and smell involve education of the older person and the family about the changes in these senses and the possible dangers to safety which may be associated with them.

Implications of sensory decline

- ◆ Decline in sensory system leads to limitations in independent functioning.
- ◆ Sensory overload or distortion may overwhelm the elderly and prevent effective functioning by interfering with their ability to understand and correctly interpret clues in the environment.
- ◆ These may result in confusion, avoidance of social interaction, isolation, sleep disturbance, loss of appetite, irritability and depression.

Module 13: Cancers

Cancer is one of the five common causes of death in elderly Indians. With increase in the incidence and prevalence of cancer of all types physicians are more likely to encounter older patients with cancer.

Biology of cancer in old age

- ❖ Age is the strongest risk factor in the development of cancer. Though the relationship between cancer and ageing is unclear, the increased risk of cancer in old age is possibly due to:
 - Poor DNA repair mechanisms;
 - Oncogene activation and tumour suppressor gene loss;
 - Decreased immune surveillance for tumours; and
 - Prolonged exposure to carcinogens.
- ❖ Ageing tissues are more prone to tumour development. However, aggressiveness and spread of cancer tends to decrease with advancing age in many cases. Still the diagnosis of cancer in most older patients is done at a much late stage than in younger patients.
- ❖ In developed societies 55-60% of all cancers and 70% of all cancer deaths occur after the age of 65 years. Limited data from India suggests that 20% of all cancers are reported in patients above 60 years of age.
- ❖ There are certain cancers which mostly occur after the age of 50 years. These include head and neck cancer and cancers of cervix, upper and lower gastro-intestinal tract, pancreas and prostate. Half of the breast and haematological malignancies are encountered after the age of 60 years.
- ❖ There is evidence to suggest that though the progression of cancer may be different in old age, its diagnosis in older patients is invariably accomplished at an advanced stage of the disease.
- ❖ The delay in diagnosis is due to:
 - lack of interest in the screening for cancer;
 - lack of awareness about the problem; and
 - fatalistic attitude towards cancer in general.

Principles of management: surgery, radiotherapy, chemotherapy

- ❖ Elderly patients are usually under-treated due to a widely prevalent misconception that elderly patients are less eligible for surgery and they tolerate radiotherapy and chemotherapy poorly.

Scientific data on very old patients with cancer is scant as most studies tend to exclude this group of patients. While deciding on the treatment the life-expectancy of older patients should not be underestimated.

- ❖ The older patient with cancer should be approached with the same principles of therapy as patients of any other age-group. The perceived frailty of the patient in the absence of any objective evidence should not prevent the physician from providing appropriate therapy. Age does not adversely influence the efficacy of treatment nor does it predispose to higher toxicity. The state of physical fitness and mental health should be the consideration rather than the chronological age and all options of therapy should be considered.

Surgery

The decision to operate in an older patient should depend on:

- ❖ Functional status- physical and cognitive
- ❖ Target organ status & Level of co-morbidity.
- ❖ Fitness for anaesthesia

Radiotherapy

- ❖ Older patients being unsuitable for surgery often receive radiotherapy. Both the physician and patient should have a clear picture about the situation while deciding about radical or palliative radiotherapy.
- ❖ Poor physical health and the presence of multiple co-morbid conditions can increase radiation morbidity while very old patients in good physical health in early cancer can show good response. The outcome of radiotherapy depends on:
 - Cognitive state
 - Renal function
 - Cardio-pulmonary reserve
 - Bone marrow resilience
 - Integrity of skin and mucous membrane.

Chemotherapy

- ❖ Older patients are also candidates for chemotherapy as primary treatment in haematological malignancies and as adjuvant treatment in many solid malignancies. As a general principle,

chemotherapy should be given in full regimen. However, modification of the drug dosage depends on:

- Drug pharmacokinetics
- State of hepatic and renal function
- Organ-specific toxicities on bone marrow, myocardium and CNS
- Improved drug delivery system.

Palliative care

- ❖ Palliative care is defined as active care of pain, distressing symptoms and other psychological issues of an incurable or terminal cancer patient. Older cancer patients are more likely to require palliative. The most important action in palliative care is pain relief with even round-the-clock oral opium or its derivatives. Symptomatic care for all symptoms should be attempted in the right earnest. All physicians must have the ability to provide palliative care.

Quality of life in older patients with cancer

- ❖ Quality of life is determined by the ability to perform everyday activities which reflect physical, mental and social well-being in the presence of a disease. Patient's satisfaction with cancer treatment is related primarily to drug toxicity and then to disease control. Older patients usually prefer good-quality short life to quantity of life.

Prevention of cancer and screening

- ❖ Measures that include life-style changes, diet and exercise are probably of lesser value in the primary prevention of cancer in old age.
- ❖ On the other hand, secondary prevention by early detection by screening is of great practical value. Cancer is a hundred times more common in males aged 75 years than that those aged 25 years, so screening is most cost-effective at old age.
- ❖ Some common cancers which should be routinely screened are
 - Lung - Chest X-ray
 - Colorectal - Digital examination, stool occult blood
 - Prostate - Digital examination
 - Breast - Self-examination, mammography
 - Cervix - Pap smear
- ❖ However, because of several social and behavioural reasons older individuals may not be very keen on cancer screening programmes.

Module 14: Burden of care-giving and elder abuse

The burden of care-giving

Like most traditional societies, in India family provides the care to its older members. Changes in the value system, family structure and social institutions are threatening to disrupt this age-old care system.

- ❖ People are living longer and this has increased the number of generations living together, sometimes up to as many as three to five generations.
- ❖ Housing being very expensive and living space being small, accommodating several generations of old people is becoming harder. This is especially true if the older person requires an aid such as a walker or a wheelchair.
- ❖ Traditionally, women, usually the daughter-in-law and sometimes daughters, have been responsible for the care of the elderly. For economic viability, more and more women are going for employment outside the home. As a result the traditional care model is getting disrupted.
- ❖ In these changing circumstances the care of the elderly in the family has become an important social issue. It is possible to have two generations of older persons in a single family expecting care from younger generations whose number has dwindled due to smaller family norms.
- ❖ Long-term care of a frail and physically-dependent older person leads to a variety of physical, emotional, social and financial stress for the care-giver, which is termed as 'care-giver burden'.
- ❖ The care-giver is usually the "hidden patient" and the health care worker must direct some attention towards the needs of the care-giver. Prolonged stress of caring ultimately affects the well-being and living condition of the older person.

The care-giver is as much in need of care and attention as the older person.

Assessment of care-giver burden

Assessment of care-giver burden includes:

- Capability of the older person in self-caring
- Type of care required by the older person (feeding, dressing, bathing and toilet)
- Amount of extra time the care-giver needs to spend in caring for the older person.
- Arrangements for rest and relaxation for the care-giver
- Resources and support systems available for the care-giver.
- Vague complaints about physical health by a care-giver should make one suspect that they need more assistance in the home.

Supporting the care-giver

- ❖ In developed countries “care-giver burden” has been recognized as an important issue in the care of the elderly by the social support agencies. Methods of assessing care-giver burden and supporting them when in need have been developed. However, in developing countries the concept of care-giver burden is alien and carries a negative implication. As a result no formal system exists.
- ❖ The care-giver needs to be supported to:
 - maintain his/ her physical and mental health
 - avoid development of abusive situation
 - reduce the risk of institutionalization
 - promote good quality life for the entire family.
- ❖ The role of the primary care physician is rather limited in supporting the care-giver in the prevailing system. However, several interventions can be organized with community support without requiring much resource. Some of the methods of providing assistance to care-giver are:
 - Organization of day hospitals, day-care centres and centres for seniors which provide engagement and food;
 - Respite care which is aimed at sharing the burden of care with family and other informal care-givers; and
 - Outpatient and inpatient care for the investigation of major problems.

Elder abuse

- ❖ Elder abuse refers to the ill-treatment of an older person. The usual place of elder abuse is his/ her home but it can also take place in their children’s home, residential care, nursing home and hospital.
- ❖ The spectrum of elder abuse is very broad and comprises of physical abuse, psychological abuse, financial abuse, sexual abuse and neglect.
- ❖ **Physical abuse** includes non-accidental and intentional use of physical force leading to pain and injury. Examples of physical abuse are slapping, hitting, pushing, burning and physical restraint by tying; leading to bruises, fractures, burns, sprains, cuts, etc.
- ❖ **Psychological abuse** includes repeated and constant use of threats, humiliation, scolding and any other forms of mental cruelty leading to physical and mental distress. Examples of

psychological abuse are treating the elderly like a child, blaming, intimidating, threatening violence and isolating, leading to fear, depression, sleeplessness and anorexia.

- ❖ **Financial abuse** includes unauthorized and improper use of resources (funds and property) of the older person. Examples of financial abuse are misappropriation of money, valuable and property; forcing the elderly to change the will and not allowing the older person to use his/ her resources, leading to loss of money, forced poverty, decline in standard of living and eviction from house.
- ❖ **Sexual abuse** includes direct or indirect involvement in sexual activity without consent. Examples of sexual abuse are looking, indecent exposure, harassment, touching of breast or genitalia, .
- ❖ **Neglect** includes repeated deprivation of the assistance that the older person needs for activities of daily living. Examples of neglect are failure to provide food, shelter, clothing, medical care, hygiene, personal care, and inappropriate use of medicine, leading to malnutrition, bedsore, over-sedation, depression, confusion and life-threatening health problems.
- ❖ **Detection of elder abuse** is difficult. Usually more than one type of abuse co-exists. It is a very sensitive issue and requires a high index of suspicion for detection. Signs of elder abuse include the following.
 - Skin injuries, bruises, untreated ulcers and bedsores on the older person with inadequate explanations.
 - Evidence of severe malnutrition and dehydration in the absence of obvious disease.
 - Unsatisfactory personal hygiene on several occasions when the older person is unable to care for himself/ herself.
 - Medical attention is not made available when the older person needs it.
 - Medications are not used despite clear instructions from the physician
 - The older person is afraid or hesitant to talk about his/her state of affairs or injury.
 - The older person is left alone without much to do for enjoyment or spending time.

Management and prevention of elder abuse

- ❖ Management of elder abuse requires involvement of several professionals. The physician should use tact and discretion while dealing with elder abuse. The steps involved are:
 - assessment of the older person's physical and mental capacity
 - assessment of general quality of care

- assessment of relationship with the abuser at home or institution
- assessment of the abusers for his/ their problems
- counselling of the abuser
- documentation, liaison and interaction with other professionals (police, social worker) when the victim is incapable of caring for himself/ herself or does not want to accept help
- involvement of other family members, relatives and community leaders
- institutionalization in old age home or nursing home if abuse cannot be prevented with the above means.

Financially dependent/ partially dependent/ independent

Present occupation

Previous occupations

Smoker / non-smoker / ex-smoker

Alcohol: never / occasional / regular

Any other addiction

Clinical evaluation

Existing diagnosis

- 1.
- 2.
- 3.
- 4.
- 5.

Drug treatment

- | | |
|----|----|
| 1. | 2. |
| 3. | 4. |

Present problems

- 1.
- 2.
- 3.
- 4.

Past medical history (mention diagnosis/ symptoms and year)

1.

2.

3.

4.

Physical examination

Weight

Height

BMI

BP- Lying

Standing

Pulse

Peripheral pulses

Pallor

Edema

Oral cavity

No. of teeth

Loose teeth

Caries

Cardiovascular system

Respiratory system

Abdomen

Hernia

Hydrocele

Central nervous system:

Locomotor system

Functional assessment

Vision

Hold the vision card at 14" distance from the subject while wearing corrective lenses (whenever applicable).

Able/ unable to read

Able/ unable to read

right eye

left eye

If unable to read, check for

corneal opacity

cataract

Hearing

**Whisper into each ear
unable to hear**

Able / unable to hear

Able /

separately from behind the head

to avoid lip reading

right ear

left ear

Arm *Able/unable* *Able / unable*

Ask the patient to touch the back of the head. right arm left arm

Ask the patient pick up the pen from the table. right arm left arm

Leg

Ask the patient to rise from the chair, walk 10 feet, return and sit down.

Able/ Unable to perform

Depression

Ask the patient:

Do you often feel sad and depressed? Yes/ no

Urinary incontinence

Ask the patient

Do you ever lose your urine and get wet? Yes/ no

Activities of daily living

Bowels

0 - incontinent (or needs enema)

1 - occasional accident (1/WK)

2 - continent

Bladder

0 - incontinent

1 - occasional/ accidental

2 - continent

Grooming (making neat and clean appearance) Toilet use

0 - needs help and personal care

1 - independent

0 - dependant

1 - needs some help.

2 - independent

Feeding

0 - unable

1 - needs help

2 - independent

Dressing

0 - dependent

1 - needs help

2 - independent

Transfer (bed to chair and back)

0 - unable

1 - major help (1-2 people)

2 - minor help (verbal/physical)

3 - independent

Mobility

0 - immobile

1 - wheel chair dependent

2 - walks with help from one person

3 - independent (but may use aid)

Stairs

0 - unable

Bathing

0 - dependent

1 - needs help

1 - independent

2 - independent

Total

(0 - 20)

Incremental activities of daily living

Are you able to:

Dress up yourself?

Get out of bed yourself?

Eat without help?

Do you do your own shopping?

Home environment –

Safe

Unsafe

Do you have trouble with stairs inside or outside of your home?

Do you have hazardous bathroom, floor?

Is the lighting proper?

Social support-

Who would be able to help you in case of illness or emergency?

Will you consider moving into an old age home/ senior citizen home?

Investigations

Hemoglobin

Total leucocyte count

Differential leucocyte count

ESR

Urine: Albumin

Sugar

Microscopic examination

Fasting blood sugar

Post-prandial blood sugar

Blood urea

Serum creatinine

Serum calcium

Serum phosphates

Serum uric acid

Serum protein/ albumin/ globulin

Serum cholesterol

Serum triglyceride

Electro cardiogram

X-ray chest

Complete diagnosis

1.

2.

3.

4.

Management plan

1. Therapeutic

2. Physiotherapy and rehabilitation

3. Referral to surgeon/ ophthalmologist/ E.N.T. specialist/ dental surgeon

4. Referral to psychiatrist

5. Referral to nutritionist

6. Other professionals