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Prevention of complications in treating and caring for the Geriatric patients

Diploma thesis

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Written Declaration

I declare that I completed the submitted work individually and only used the mentioned sources and literature. Concurrently, I give my permission for this diploma/bachelor thesis to be used for study purposes.

Prague, April 2010 Annette Waale Lia

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Content

This review article will focus on the topic of **Prevention of complications in treating and caring for the Geriatric patients.**

In the following sections it will firstly be discussed how to generally evaluate the geriatric patient, together with the more general preventive measures used today.

In the review section, it will then be discussed how the research on this topic dictates the different approaches used today; the different systems of the body will be summarized together with the most important and common diseases associated with these. A detailed overview of the pathology and all potential diseases is beyond the scope of this article.

Lastly, the newest research concerning different treatment options will be presented and cited by research material.

Summary

In this review article, it has been focused on several important aspects on how to prevent complications in dealing with geriatrics patients. The different treatment options on every topic have also been addressed, and substantiated by research and trials.

The evaluation of the geriatric patient was preceded by discussions and presentations of research available, together with different challenges met in the caring and treatment of geriatric patient.

The conclusion will contain the author's evaluation of the literature at factual statements in the article.

Introduction

The treatment of the elderly is a vast and challenging topic. Despite this, this topic is sometimes neglected in literature and standard medical textbooks.
There are many challenges to the proper treatment of the elderly; different metabolism of the drugs, compliance and administration of the drugs and availability are only some of the issues which may be more difficult in the elderly than in the “standard” patient.

In a population, the patients over 65 years old make up around 14%, yet they consume 40% of the drug budget.
66% over 65 years and 87% over 75 years old are on regular medication.
34% over 75 % years are on 3 or more drugs.
Patients with home- care are on an average of 8 medications [2)].

The number of older patients has remained stable since 1990; the challenges regarding the development of good nursing and care are big because the number of people over 80 years will increase significantly in the years to follow; e.g. the proportion of elderly who are over 90 years will increase by 50% by 2020 and there will be five people of working age behind each person in the older population. Until 2040 this ratio will drop to under three [28)].

Thus, the topic of prevention of complications in the elderly patient is a very important one at present as well as in the future.

Evaluation of the elderly patient

Comprehensive evaluation of an older individual's health status is one of the most challenging aspects of clinical geriatrics. It’s necessary with an awareness of the many unique aspects of their medical problems, and cooperation with a variety of health

professionals is imperative; evaluation of the geriatric patient requires a perspective different from that used in the evaluation of younger individuals.
One must be tuned in to pick up on more subtle findings; special tools are often needed to achieve relatively small improvements in chronic conditions and overall function. Creativity is essential in order to incorporate these tools efficiently in a busy clinical practice.
In the screening of older patients it's also important to consider the immobility; home care or long-term-care facilities are often places where they need to receive treatment.
A randomized trial of annual in- home geriatric assessment showed the potential to delay the development of disability and reduce permanent nursing home stays (Stuck et al., 1995; Bula et al., 1999).

More recent trials of approaches to hospitalized geriatric patients suggest that geriatric assessment by a consultation team with limited follow-up does not improve health or survival of selected geriatric patients (Reuben et al., 1995), but that a special acute geriatric unit can improve function and reduce discharges to institutional care (Landefeld et al., 1995).
A controlled trial of inpatient geriatric evaluation and management showed significant reductions in functional decline without increased costs (Cohen et al., 2002).
Another randomized trial of outpatient geriatric assessment with the goal of improving adherence to the recommendations prevented functional decline (Reuben et al., 1999) [29)].

Environmental barriers

Environmental barriers are something that the geriatric patients often meet; they can be both physical and psychological. It is easier to recognize the physical barriers: stairs for the person with dyspnea, inaccessible cabinets for the wheelchair- bound, and so on. Psychological barriers refer especially to the dangers of risk aversion. Those most concerned about the patient may restrict activity justified by the need of protecting the patient or the institution. For example, institutions may restrain patients by putting them in wheels chairs or behind tables. It takes much more time and patience to work with patients to encourage them to do things for themselves than to step in and do the task. However, this behavior will encourage dependence[30)].

Preoperative evaluation

Geriatricians are often called upon by surgeons and anesthesiologists to assess elderly patients before surgical procedures. Although older patients have higher rates of major perioperative complications and mortality after major (not cardiac) surgical procedures than do younger patients, mortality is low, even in patients 80 years of age or older (Polanczyk et al., 2001). Morbidity and mortality, however, are influenced to a greater extent by the presence and severity of systemic illnesses and whether the procedure is elective or urgent.

Thus, evaluating a geriatric patient's preoperative status and risk for surgery necessitates a thorough assessment of cardiopulmonary and renal function as well as nutritional and hydration status. Factors that increase the risk of perioperative cardiac complications in patients undergoing non- cardiac surgery include: Ischemic heart disease, congestive heart failure, diabetes mellitus, and renal insufficiency (Lee et al., 1999).

Patients with a recent history of myocardial infarction, active angina, pulmonary edema, and severe aortic stenosis are at especially high risk (Mangano and Goldman, 1995).

Underlying conditions that are prevalent in the geriatric population, such as hypertension, congestive heart failure, COPD, diabetes mellitus, anemia, and undernutrition, need special consideration in the preoperative period (Thomas and Ritchie, 1995; Schiff and Emanuele, 1995).

Medication regimens should be thoroughly assessed to determine if some drugs should be continued or stopped. Results from several clinical trials suggest that use of beta-blockers perioperatively is associated with significant reductions in cardiac morbidity and mortality (Auerbach and Goldman, 2002).

Carefule evaluation should also be given to the risk of of thromboembolism and infection, many of which have documented efficacy in specific situations (Medical Letter, 1999; Geerts et al., 2001).

Many surgeons and anesthesiologists tend to favor regional over general anesthesia for

geriatric patients. Regional anesthesia, however, may have several potential disadvantages; Patients may need extra sedation and/or analgesia, thus increasing the risks of perioperative cardiovascular and mental status changes. We should thus sometimes use invasive monitoring in some patients. Neither the incidence of DVT nor the amount of blood loss seems to be substantially decreased compared to general anesthesia. Thus, decisions about the type of anesthesia should be carefully individualized on the basis of patient factors.

Pharmacokinetics in the elderly

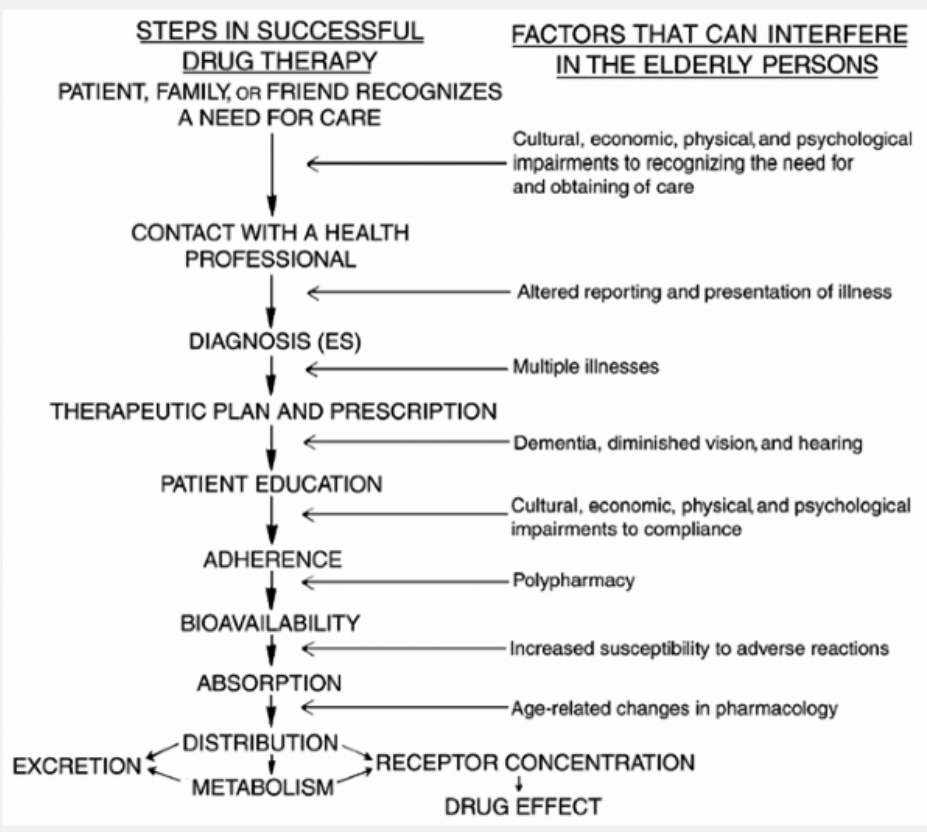
Since pharmacokinetics may be very different than in younger people, this topic is of great importance in geriatric medicine. Adverse drug reactions occur about twice as often in older than younger patients. Hospital admissions as a result of drug-related illness range from 2.3-27.3% [70)].

Compliance is very important in geriatric patients and risk of complications increase when the physician is not aware of nonadherence. Medications may appear to be ineffective, and dosages may be increased or a more powerful medication prescribed. Complications also arise when a patient becomes hospitalized or when supervision is increased. Patients then receive the prescribed medication and can have serious complications (eg, thyroxine dose is increased and atrial fibrillation develops) [71)].
Changes in diet can have profound effects, especially for patients taking hypoglycemics, diuretics, or anticoagulants. Medications prescribed in a hospital setting may work well in the controlled environment, but outside the hospital a patient can rapidly get into trouble. Typical conditions for this scenario are congestive heart failure (CHF) with changes in salt intake and diabetes with changes in carbohydrate intake [71)].

There is a tendency among health care professionals to treat symptoms with drugs rather than to evaluate the symptoms thoroughly. Because older patients tend to have multiple problems and complaints, and consult several health care professionals, they often end up with prescriptions for several drugs[72)].

It should be prescribed as few drugs as possible, and the dosage schedule should be as simple as possible. See fig. 1 for an approach to how the different challenges may be handled.

Fig. 1: Steps in drug therapy and factors that may play roles in the treatment



Source: C. Landefeld, Robert Palmer, Mary Anne Johnson, Catherine Johnston, et al.; Current Geriatric Diagnosis and Treatment, p. 424

Absorption

Several age-related changes may affect drug absorption. Most studies, however, have failed to show any clinically meaningful changes in drug absorption with increasing age.

Distribution

In contrast to absorption, clinically meaningful changes in drug distribution can occur with increasing age. Serum albumin tends to decline, especially in hospitalized patients. Although the decline is small, it can greatly increase the amount of free drug available for action.

Age-related changes in body composition can affect pharmacology by changing the volume of distribution (Vd); the elimination half-life of a drug varies with the ratio Vd:drug clearance. Thus, even if the rate of clearance of a drug is unchanged with age, changes in Vd can affect a drug's half-life and duration of action.

Because both the total body water and body mass is decreased in the elderly, drugs that distribute in these body compartments, (e.g. antibiotics, digoxin, lithium and alcohol), may have a lower Vd and can thus achieve higher concentrations.

On the other hand, drugs that distribute in body fat (some psychotropics), have a large Vd in the geriatric patients, and half- time will then be longer if the clearance is not equally increased [72)].

Metabolism

The metabolism of drugs varies between individuals and with aging. Hepatic enzyme activity, mass, and blood flow can decrease with age but are highly variable [71)].

The effects of aging on drug metabolism are complex and difficult to predict. They depend on the pathway of drug metabolism in the liver and on several other factors, such as gender and smoking [71)].

Excretion

Unlike in metabolism of drugs, the effects of aging on renal functions may be more predictable; renal function decline with increasing age by as much as 50% at the age of 85, and this can affect the pharmacokinetics of several drugs (and their metabolites) that are eliminated by the kidney[73)].

Tissue Sensitivity

Older persons are often said to be more sensitive to the effects of drugs. For some drugs, studies confirm this to be true. For others, however, sensitivity to drug effects may decrease rather than increase with age [73)].

Review

Following discussions will include discussions about how to prevent complications when dealing with the geriatric patient. The different organ systems with their associated diseases and morbidities will be addressed, together with the best evidence- based approaches in dealing with complications of treatment. A detailed description of the different drugs and treatment approaches is beyond the scope of this review article.

Nutrition and hydration in geriatrics

Nutrition

The nutrional aspect in the elderly is one of the most important topics in geriatrics, because the problems of undernutrition is added to other comorbidities. Also, it is often not given the appropriate attention in home or hospital settings. It is extremely common among the elderly, and studies have shown that ones in hospital, the nutritional state actually declines further.

Protein malnutrition affects 15% of older patients, 35- 65% of patients acutely admitted to hospitals, and 25- 60% of institutionalized patients [88)].

The simplest way to determine the nutritional state is to weigh the patient at and during admission, and assess some simple biochemical parameters (albumin, red cells, cholesterol, BUN and HbA1c).
Macronutrients (needed in large amounts) are carbohydrates, fats, fiber, proteins, and water.
The micronutrients (needed in smaller amounts) are minerals and vitamins.

The geriatric population's basal daily caloric need is estimated to about 30kcal/kg, this should be adjusted according to activity level and illness states (which gives higher energy demand from the body). Carbohydrates yield 4 kcal/g, protein 4 kcal/g and fat 9 kcal/g. General recommendations are 25% protein, 63% carbohydrates and 13% fat in the normal diet.

Here it will follow a brief discussion about the macronutrients:

Protein

Protein requirements increases when the body needs to recover from malnutrition or trauma or after an operation [91)].
U.S recommendations of daily protein intake, is 0.8 g/kg, while a proposed *maximum* daily protein intake would be about 25% of energy requirements (2 to 2.5 g/kg)[92)].
Just as important as amount is the content of amino acids (AAs); the eight essential AAs include phenylalanine, valine, threonine, tryptophan, isoleucine, methionine, leucine, and lysine; animal sources of protein contains all essential AAs, like milk, eggs, and meat [93)].
Nitrogen is a waste product of protein digestion and can be used in the evaluation of malnutrition. Protein consumption and urea in urin are used to calculate the nitrogen balance.[94)].
A negative value can be associated with burns, fevers, wasting diseases and other serious injuries and during periods of fasting. This means that the amount of nitrogen excreted from the body is greater than the amount of nitrogen ingested.
A positive nitrogen balance will be found in anabolic state.

Carbohydrate Metabolism

Carbohydrates are generally divided into simple carbohydrates (mono and disaccharides) and starches (polysaccharides/complex carbohydrates.). Sugars and most starches are easily digested and be taken up by the body. Another group of carbohydrates are undigestable polysaccharides, better known as fiber. This group is also further divided into soluble and insoluble. Fiber in nutrition is discussed in the GIT section.

Carbohydrates are a superior short- term fuel for organisms because they are simpler to metabolize than fats and proteins.

Simple carbohydrates are quickly taken up by the intestine, while complex carbohydrates need longer time to be broken down before they are available.

Of the elderly population, around 50 % have glucose intolerance with normal fasting blood sugar levels. By the age of 75 years, around 20 percent of the population has developed diabetes mellitus (Meneilly and Tessier, 2001).

Simple carbohydrates are also quickly taken up into the blood and leads to a sharp increase in blood glucose. Many older patients cannot produce and secrete a large enough amount of insulin to keep blood glucose within normal range. Complex carbohydrates, however, lead to a less steep curve which will last longer than the simple carbohydrates, which enables them to mount enough insulin to keep a healthy blood glucose [73)].

Fat

Fatty acids (FAs) are mainly found in the form of tracylglycerides. FA can be divided in to saturated and unsaturated; saturated fat is a good source of kcal and is very stable, unlike the unsaturated ones that are vulnerable to lipid peroxidation, better known as rancidity. Some of the unsaturated FAs cannot be produced de novo from the body and needs to be consumed in diet. The two essential FAs are omega 3 and 6.

In 1994, the UK Committee on Medical Aspects of Food and Nutrition Policy (COMA) recommended that people should eat at least two portions of fish per week, one of which should be oily fish.

The importances of essential fatty acids are further discussed in the CNS section.

Changes in body composition and energy requirements with aging

Lean body weight (mostly skeletal muscle) begins to decline by middle age as a result of several factors, including decreasing exercise and age-related declines in hormones (testosterone, estrogen, and growth factors).

Fat is metabolically inactive, and this leads to a decrease in caloric requirements. Older people are also less physically active, leading to further decline in caloric demands.

In some settings, such as the intensive care unit, indirect calorimetry is probably the optimal method of determining caloric requirements. In most cases, however, many formulas can be used to estimate resting caloric needs[89)].

Prevention of Malnutrition

A key way to help in the prevention of a possible fatality is to be aware of some clinical findings; dry mouth and skin, pale look, sunken eyes, cracked lips, bright discolored tongue, thin hair, anemia, chronic diarrhea, confusion, irritability, bone and joint pain, edema and poor wound healing [88)].

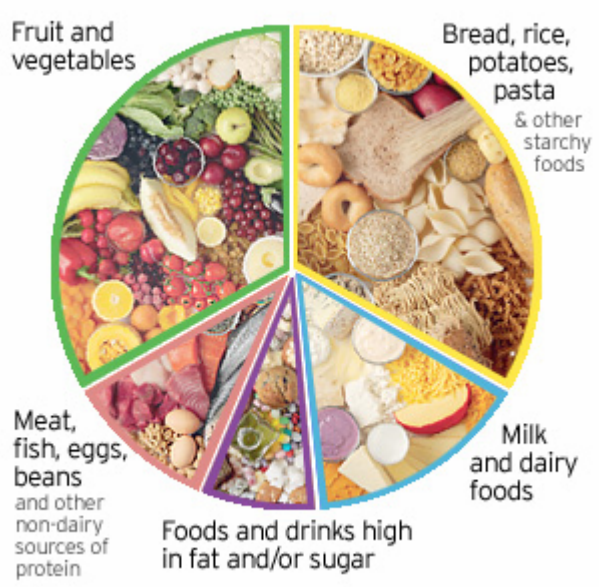
How can malnutrition be prevented or corrected?

- Monitoring weight every month
- High attention to nutrition and water intake, making sure that preferences are met (food appearance, consistency etc)
- Giving time enough for a relaxed meal.
- Avoiding packaging that is hard to open.
- Making sure that seating is comfortable and at the proper height.
- Correcting any underlying disease or condition, including mouth or hand problems that might interfere with eating or swallowing.
- Using specialized tools for those with hand weakness or severe arthritis
- Offer snacks between meals

In addition to macronutriens, micronutrients are just as important; a diet based on the following plate model (fig. 1) will provide all essential nutrients:

Fig 1: Plate model of nutrition

Source: Sainsbury's: Eating healthy.



If requirements still cannot be met, there are many types of supplements which can be added to the daily diet; pills, powders and ready- to- drink fortified sip feeds. They are available in many different formulas to fit several requirements, like low sugar for those with decreased glucose tolerance, high fiber, high or low caloric contents or devoid of certain allergens. They also come any many different flavors or neutral preparations.

Hydration

Dehydration is a frequent etiology of morbidity and mortality in elderly people, and causes the death and morbidity of many patients. Many of the cases of dehydration are associated with fluid dysbalance or serious inflammatory states in hospital settings, but also more obvious factors, like having too little intake of fluids during the day or apparently less severe diarrhea in a home- setting. Thus, mofification on water metabolism and fluid dysbalance are the main factors we need to consider in the prevention of dehydration.

Older individuals have been shown to have a higher risk of developing dehydration than younger adults; especially a decrease in the body mass which is not fat (total body water, muscles and bone comprising 73% water) contribute to this fact. Also, the sensation of thirst decrease in the elderly, and with the loss of cognitive skills and thus decreased access to beverages, the problem of dehydration is added to[95)].

Other studies show that when comparing healthy elderly men to younger controls, there are differences in the response to water deprivation; in older men, there are deficits in both the intensity and threshold of the thirst response. The ability to concentrate the urine also declines with age. There is both a decline in GFR and an increased incidence of renal disease with advancing age, which may contribute to impaired ability to conserve water. Because of a decrease in the percent total body water with age, equal volumes of fluid loss in young and old individuals may represent more severe dehydration in the elderly.

When compared with postmenopausal women, menstruant women are over 25 times more likely to suffer permanent brain damage as a complication of hyponatremic encephalopathy. Furthermore, menstruant women suffer seizures or respiratory arrest at far higher levels of plasma sodium (110 to 130 mmol/L) than occurs in postmenopausal women (95 to 123 mmol/L)[95)].

Creatinine clearance decreases with age by 1 ml/min/year after 40 years of age. The ability of the kidneys to respond to sodium load is also reduced, and this may lead to increased extracellular volume and hypertension. However, the aged kidney also has a lower ability to retain sodium, making the person more prone to salt depletion.

Hypernatremia in the elderly is usually due to dehydration, rarely due to high intake of sodium. Iatrogenically caused hyponatremia is usuallay caused by water overload. Too rapid

correction may cause cerebral dehydration, and diuretics should be used with caution, to avoid salt depletion[95)].

It is important with a multidisciplinary approach to the potentially life- threatening situation of dehydration, and it should be emphasized towards caregivers to encourage drinking.
In general:
Food contributes 0.5 to 1 litre, and the metabolism 0.25 to 0.4 litres.This means that to reach RDI men should drink 2 to 3 litres and women 1 to 2 or 6 – 8 cups each day.

Preventive approaches to cardiovascular diseases

Diseases of the cardiovascular system (CV system) in the elderly is a big concern both medically and financially in both developed and developing countries today [1)]; In 2001, ischemic heart disease was ranked as the leading cause of death in developed countries and ranking as number 3 in developing countries.
The importance of preventing such diseases is thus of utmost importance.

Age- related changes of the cardiovascular system are great contributing factors to the array of symptoms of this system; increase in blood pressure and decrease in heart rate, cardiac output, blood vessel elasticity, cardiac myocytic size and number, and beta- adrenergic responsiveness are all considered in a normal course of aging.

Pathology of these entities may manifests as atherosclerosis, coronary artery disease (CAD), myocardial infarction (MI), congestive heart failure (CHF), hypertension (HTN) and arrhythmias [2)]. Also fibrosis and fat infiltration of SA node and conducting system leads to slower conduction which predispose to heart block and bradyarrhythmias. Left atrial size increases because of changes in cardiac filling, which may lead to fibrillations of e.g. atrium. Increased circulating catecholamines, with down- regulated receptors, decreases the hearts

ability to cope with stress. These losses of functions greatly contribute to the deterioration of the elderly patient.

The most common drugs used in the treatment of the conditions discussed above differ slightly from country to country, but usually include one or more of the following:
Beta blockers, diuretics, ACE inhibitors, aspirin, warfarin and calcium channel blockers [2)].

Pharmacological treatment of CV diseases

Diuretics

This group of drugs is often considered first- line treatment together with beta blocker for hypertension; the body will get an increased excretion of water and sodium. The increased diuresis will also unfortunately allow other important electrolytes and minerals to be excreted with them; potassium, magnesium are lost and will in the long run contribute to worsening of the hypertension, cramps, constipation, and may even cause hyponatremia. The prescribing doctor should encourage patients to eat foods high in potassium (e.g. bananas, apricots and oranges) and most fruits and vegetables in general have high levels of this mineral. Magnesium can be found in most nuts and seeds [33)].

Beta- blockers

This class of drug has been used since the late 1950s, Propranolol being the first clinically used beta- blocker [14)].
This type of drug have various indications, but is used especially for the management of cardiac arrhythmias. They are also used as cardioprotective drugs following diagnosis of myocardial infarction and in chronic hypertension [3)].

There are several different types of beta blockers and it is imperative that the treatment be carefully selected to suit each patients needs;
Some might find the sedating, anxiolytic properties of lipid soluble beta blockers very troublesome, while others see this as a positive side effect if they are already struggling with anxiety and sleeping disturbance. An anxious patient will thus benefit from this selection of drug as they then can taper or even discontinue anxiolytic medication all together, while another patient may perceive this as a negative effect.

Many large clinical trials reviewed in four meta-analyses, and one subsequent RCT have shown that several beta-blockers increase life expectancy in patients with heart failure due to left ventricular systolic dysfunction, compared with placebo. This effect has been seen in patients with all functional classes of heart diseases [12) 13)].

Calcium channel blockers (CCB's)

CCBs are a class of drugs that disrupt the conduction of calcium channels.
It has effects on many excitable cells of the body, such as cardiac muscle, i.e. heart, smooth muscles of vessels and neurons.
The main clinical usage of calcium channel blockers is to decrease blood pressure, but is also used in angina pectoris. As these two may occur together as comorbidities, calcium channel blockers may show to be a very good choice in these patients.

Calcium channel blockers has also been a choice in chronic heart failure, however, evidence show that this may not be the best choice of drugs for this disease; three randomized controlled trials done in the U.K. with medium- to long-term follow up suggest that calcium channel blockers do not improve life expectancy compared with placebo in patients with heart failure who are already receiving an ACE inhibitor [15) 16) 17)]. Verapamil, diltiazem and short-acting dihydropyridines such as nifedipine can cause clinical deterioration [18) 19)].

Thus, the health economic conclusion in these studies is that there is no relevant economic evidence relating to calcium channel blockers in heart failure patients.

Angiotensin Converting Enzyme inhibitors (ACEi)

Angiotensin Converting Enzyme inhibitors (ACEi) are a group of pharmaceuticals used mostly in the treatment of hypertension and congestive heart failure.

Systematic reviews of randomized controlled trials comparing ACEi to placebo, have found that ACEi therapy in patients with heart failure due to left ventricular systolic dysfunction increases life expectancy compared to placebo [20]. The effect is more marked in patients with more severe LV systolic impairment, or more severe symptoms.

ACEi therapy also decreases the risk of hospitalization for heart failure in such patients, and also for patients with asymptomatic left ventricular systolic dysfunction [19].

The symptoms of heart failure in patients with heart failure due to left ventricular systolic dysfunction improve on therapy with an ACE inhibitor [20) 21)]. There is some evidence from a randomized controlled trial that quality of life improves with ACEi therapy in this group [22].

ACEi treatment is also suitable in patients with diabetes mellitus, as it has some nephroprotective properties. It can for the same reason be used as treatment in patients with chronic renal impairment [23].

Anticoagulant therapy

Warfarin is used in patients with increased risk of thrombosis, embolism, atrial fibrillation and in patients with artificial valves. It is one of the most common drugs used in clinical practice today. Unfortunately, treatment with warfarin has several shortcomings; many commonly used medications interact with warfarin, as do some foods, and its activity has to be monitored by frequent testing of INR to ensure an adequate and safe dose is taken.

Also, warfarin increases the risk of bleeding, a side- effect that is potentially more dangerous in the elderly patient. The risk of severe bleeding is small but definite (a median annual rate of 0.9 to 2.7% has been reported), and any benefit needs to outweigh this risk when warfarin is considered as a therapeutic measure [27].

The risk of bleeding will also increase further with concurrent use of NSAIDS, a group of drugs commonly used in the elderly against pain relief and various rheumatic diseases.

Other commonly used drugs for antiplatelet treatment will also increase the bleeding risk; one example being clopidogrel [27].

Some antibiotics further increase the risk of bleeding by decreasing vitamin K- producing intestinal bacteria. This is important interaction to consider, as both drugs are more frequently used together in the elderly than in the rest of population.

Aspirin

This NSAID is a commonly used analgesic, anti- inflammatory and anti- platelet drug. Aspirin's inhibiting function on the platelets has resulted in its wide use in preventing ischemic heart disease, strokes and blood clots[74].

The main reported undesirable side- effects are GIT ulcers, stomach bleeding and tinnitus.

Its effects on the incidence of pancreatic cancer are mixed; one study published in 2004 found a statistically significant increase in the risk of pancreatic cancer in women. However, a meta-analysis of several studies, published in 2006, found no evidence that aspirin or other NSAIDs are associated with an increased risk for the disease.

The drug may be effective in reduction of risk of various cancers, including those of the colon, lung and maybe upper GIT [75] [76] [77]

Primary prevention and non- pharmacological treatment.

Before prescribing medications with potentially disabling side effects, it is always necessary to first consider lifestyle and diet modifications.

Exercise might be difficult to initiate if the patient has been inactive for a longer period of time. It is thus imperative to always encourage an active lifestyle in an early age as possible. Weight reduction itself can also contribute to reduction of blood pressure and further plaque formation in already atherosclerotic arteries.

A diet plan focusing on decreasing salt, saturated fats and refined sugar will be the main goal. Increasing the intake of fruit and vegetables will provide fiber, electrolytes and minerals like potassium, calcium, magnesium and phosphate. Addition of healthy fats like

fish, avocadoes, nuts and seeds will not only improve blood lipid profile, but also decrease the risk of depression and dermatological complaints.

Omega 3 - Increasing the fraction of omega 3 to omega 6 will also have an anti-inflammatory effect.

Moderate **alcohol** intake has also shown by some studies to have beneficial effects on the CV system; Recently, it was discovered that a powerful antioxidant in red wine, called Reservatrol, may contribute to better health; it is currently under investigation for use in cancer patients.

Antioxidants found in fruit and vegetables may also have health- promoting effects, and should be present in a diet- oriented preventive approach; the prevention of excessive oxidation of potentially damaging oxidative radicals has been shown by several studies to prevent heart disease, neurological diseases and cancer, and thus increase life expectancy [23) 24)].

Studies also show that the minerals magnesium and potassium are important in reducing hypertension [26)]; based on some trials, it seems reasonable to sometimes use oral magnesium supplementation by either dietary or pill supplementation as a therapeutic option in subjects with these common cardiovascular and metabolic conditions. This is especially relevant since currently, both men and women consume considerably less than the recommended dietary allowance (RDA) of magnesium, which is 350 – 400 mg/day. Since a typical diet of an older patient contains a lot of white bread and very little fruits and vegetables, it is important to consider supplementation of magnesium in their diet [26)].

Witteman et. al evaluated the antihypertensive effect of PO magnesium supplementation (22 mmol/d as magnesium aspartate) in 91 middle-aged and elderly women with mild to moderate hypertension, in a 6- month, double-blind, placebo-controlled trial. Magnesium lowered systolic and diastolic BP by an average of 2.7/3.4 mm Hg. When combining potassium supplementation and salt restriction to magnesium supplementation, they found an even greater fall in BP (7.6/3.3 mm Hg) [26)].

Other published clinical trials of magnesium supplementation in hypertension has been promising; Kawano et. al recently studied the effects of 8 weeks of magnesium oxide. 400 mg was taken twice daily in GP office, home, and in ambulatory setting. BP in 34 male and 26

female Japanese subjects with essential hypertension, ages 33-74 were included in the trial. Both diastolic and systolic BPs fell significantly during supplementation; those having the highest baseline BPs experienced the greatest magnesium-induced fall in pressure. Similarly, Itoh et. al found that oral magnesium supplementation for 4 weeks not only increased serum levels of magnesium, but lowered BP, improved total cholesterol and high to low density lipoprotein (HDL:LDL) ratios in otherwise healthy volunteers.

Preventive approaches to central nervous system- related diseases

Diagnoses in the elderly concerning the CNS are increasing in number; diseases such as Alzheimer's Disease and vascular causes of dementia, depression and insomnia have all increased rapidly during the last decades[28)]. All have a potential of causing tremendous distress on the patient, but also on the closest family and friends of the patient. The importance of preventing these conditions and improving the geriatric patient's quality of life thus continues to be source for vigorous research and studying.
The above noted diseases will here be discussed briefly together with considerations needed to prevent them.

Dementia

The most frequent subgroups of dementia are Alzheimer's disease and vascular dementia, Alzheimer's disease being the most common one [28)].
A slight decline in memory, attention and cognitive function is considered normal in the ageing population. However, when severe deterioration occurs and quality of life is affected, it is considered as a disease; symptoms like memory loss, decreased orientation or

visuospatial abilities, deterioration of language and aggressiveness may all cause serious debilitation to the patient and family.
Since several risk factors exist, the treatment of these may obviously potentially be important clues in the primary prevention of dementia; hypertension, coronary artery disease and diabetes mellitus are all well- known diseases, and often considered to mainly be lifestyle illnesses. They may all contribute to the development of vascular dementia, although the precise mechanisms are not fully known [28].
10% of those fitting the diagnosis will have a medically identifiable cause of the dementia symptoms like decreased thyroid hormones, nutritional deficiencies, infections and electrolyte disturbance. Treating the underlying cause and not the symptoms will thus correct the condition and spare the patient of unnecessary drugs and side effects.

Depression and anxiety often occur as comorbidities, further deteriorating the state and complicating the treatment; additional comorbidities to dementia usually means more medications and thus increased chances of adverse effects and interactions. Because of the fact that geriatric patients often are prescribed numerous medications, it is always important to exclude these as contributing factors to decreased cognition and other symptoms.

The three acetylcholinesterase inhibitors donepezil, galantamine and rivastigmine are used as options in the management of people with Alzheimer's disease of moderate severity only (MMSE score of between 10 and 20 points) [9]. However, no studies clearly show that they are effective, and the FDA (U.S.) has not approved any of them for treatment of AD [10].
There are no approved medications for the treatment of vascular dementia, making preventive measures imperative [28].

In the primary prevention of dementia, there are still disputes about if this is yet possible. Several studies indicate however, that lifestyle and physical and mental exercise may prevent some cases of dementia.

Stimulating activities*:* A passive life is not good for our brains. We know that physical activity is healthy for the heart, muscles and lungs*.*

At the Karolinska Institute in Stockholm, the researchers discovered that it is important to have a hobby and they found that the recreation consisting of physical, mental and social activities (e.g. card games, learning a new language, traveling, or learn an instrument), stimulate our brain and thus reduces the risk of dementia or Alzheimer's disease. The study included 800 people over 75 y.

Obesity: A team led by researchers at the Farber Institute for Neurosciences at Thomas Jefferson University in Philadelphia and Edith Cowan University in Joondalup, Western Australia, showed that being extremely overweight or obese increases the likelihood of developing Alzheimer's disease. They found a strong link between BMI (body mass index) and high levels of beta- amyloid, the protein plaques found in the brain of AD patients.

Over the last five years it has been postulated that that many of the conditions that raise the risk for heart disease such as obesity, uncontrolled diabetes, hypertension and hypercholesterolemia may also increase the risk for AD[79)].

Recommendations by the American Heart Association for the prevention of obesity include: Do moderately intense cardio 30 minutes a day, five days a week *or* vigorously intense cardio 20 minutes a day, 3 days a week *and* do 8- 10 strength- training exercises twice a week. Moderate- intensity physical activity means working hard enough to raise your heart rate and break a sweat, yet still being able to carry on a conversation. It should be noted that to lose weight or maintain weight loss, 60 to 90 minutes of physical activity may be necessary.

Diet*:* A healthy diet can reduce the risk of mental deterioration later in life and aid in weight loss.

Researchers followed the diet of 13,000 women since 1972. They compared fruit and vegetables intake with the state of their brains after the age of 70 years; the women who consumed most vegetables like as spinach and broccoli (rich in folate and antioxidants), presented the best results in the study.

Reviews on the use of vitamins have not found enough evidence of efficacy to recommend vitamin C, E, or folic acid with or without vitamin B12 as preventive or treatment agents in AD. Additionally, high vitamin E is associated with important health risks [80) 81)].

Healthy fatty acids in the form of omega 3 has been researched as a possible tool in preventing or treating AD or dementia; research done by a research team from Université Victor in Bordeaux, France, shows that Alzheimer's dementia can be prevented through the intake of Omega 3 fatty acids from fish. The results of scientists' research show that fish fat slows calcification and protects brain cells. The reason that concentrated linseed and fish oil might be beneficial is that it consists of the long- chain polyunsaturated omega-3 fatty acids EPA and DHA. These are vital building blocks in the body and very important for brain functions and development. The body cannot synthesize these fatty acids de novo. DHA and EPA are made by microalgae that live in seawater. These are then consumed by fish and accumulate to high levels in their internal organs. A newly discovered fish oil, E-EPA, may prevent memory impairment and speed up recovery from major depression.

Fatty acids prevents blood clots themselves, contribute to the production of phospholipids, as well as maintain healthy membranes of nerve cells [82)].

1700 people were followed from their 68th year for a period of 7 years, their eating habits concerning fish being recorded. Those who had oily fish only once a week reduced their risk of developing dementia by 34% and the risk for developing AD was reduced by 31% (Professor Arne T. Høstmark et. al at the University of Oslo, Section for preventive medicine).

Yet another study (*Journal of Neuroscience,* April 2007) showed benefits from supplementation of omega 3 fatty acids; a group of mice were genetically modified to develop accumulation of amyloid and tau proteins in the brain. The mice were divided into four groups, with one group receiving a typical high- fat diet (with omega 6: omega 3 ratio being 10:1). The other three groups received various amounts of omega6:omega 3 ratios.

After three months of feeding, all the DHA supplemented groups were noted to have a lower accumulation of beta amyloid and tau protein.

Insomnia

This is an extremely common problem in the geriatric population; As many as 40% of patients over the age of 60 may experience insomnia, frequent awakening, and disrupted sleep [11)]. A recent study done in Thailand showed that almost ½ of patients over 60 years had insomnia. Here, poor perceived health and depression were factors strongly associated with insomnia [34)].

In a survey done last decade by the National Institute on Aging included over 9000 patients over the age of 65. In this survey, 28% reported difficulties initiating sleep and 42% reported symptoms of both difficulties in sleep initiation and maintenance. The problems with sleep were in this survey associated with increasing number of respiratory symptoms, physical disabilities, nonprescription medications, depressive symptoms, and poorer self-perceived health [34)].

The biological rhythm is disturbed by psychological or physical reasons, or by a poor sleep pattern. Insomnia may be increased by pain, may be the start of a depressive episode or it may be part of dementia in association with nocturnal agitation. The sleep deprivation itself may contribute to decrease in cognitive functions [35)].

To prevent this spiral of deterioration and to improve quality of life and prevent diseases related to insomnia, it is important to have a systematic approach to the management; Routines that causes noise in a nursing home, stress management, and medications like anti-depressants, anxiolytics or sleeping drugs are some of the possibilities in managing insomnia; Most patients usually don't need consultation with a sleep specialist, unless a primary sleep disorder is suspected (sleep apnea). Any disorders that may interfere with sleep should be optimally controlled.

It is important that the patient is reassured about that one occasional night without sleep, doesn't mean that there is a health problem present. Also, not eating big meals or consuming stimulants like coffee a short time before going to bed, prevent some of the insomnia cases [35)].

Sleep restriction therapy is sometimes beneficial. The patient is sometimes deprived of some sleep, but only in the beginning: patient should wake up at the same time every morning and avoid daytime naps.
Muscle relaxation techniques are also useful tools for some patients.

Depression

The prevalence of clinically important depressive symptoms is between 8 to 15% among elderly living at home and 30% among the institutionalized elderly [36)]. Major depression affects 3% of elderly persons in the community, 11% in hospitals, and 12% in long-term care settings. The number of cases is expected to increase over the next 2- 3 decades because the younger patients who now suffer from depression, get older. Depression is one of the most common risk factors for suicide[36)]. For white men in the U.S., suicide is 45% more common among those aged 65 to 69 years, > 85% more common among those aged 70 to 74, and more than three and a half times more common among those >= 85 than among white men 15 to 19 years old. Suicide rates do not increase with age among women. The elderly are less likely to seek out to offers of help designed to prevent suicide [35)].

Clinically there are described several grades of depression, depending on severity; Brief depression, melancholia, dysthymic disorder, major depression and psychotic depression are one to classify the severity of the depression .
To be able to prevent depression in the elderly, it is important to look at the risk factors and the etiology. Several very disabling illnesses may cause secondary depression, and proper health care must be given to prevent this; cancer treatment should be as comfortable and effective as possible, heart failure should be adequately treated, as should thyroid disorders like hypothyroidism which is not infrequent in the elderly population [36)]. Alcoholism, drug abuse and problems related to family or other social groups are other clusters of risk factors that can be prevented by proper intervention and treatment [36)].

Diet: Also in mood disorders like depression, omega 3 fatty acids may play an important role in prevention. In 2004, a study found that 100 suicide attempt patients on average had significantly lower levels of EPA in their blood as compared to controls [84)].

Circadian rhythm disturbances: Several studies point to a possible contribution of circadian rhythm disturbances in the development of depression and sleeping disorders. Participants exposed to 10,000 lux for two half-hour sessions at fixed times in the morning and evening, showed beneficial effects on rhythms, mood and sleepcycle. This is a safe and inexpensive treatment option.

Preventive approaches to respiratory diseases

Respiratory function gradually decreases after age 20. However, if the patient has not been exposed to too many environmental insults (smoking and other toxins, repeated respiratory infections), most elderly people have sufficient lung reserve to avoid symptoms.
The physiologically changes that occurs in the lungs of an elderly person resembles the changes in mild emphysema; the number of alveoli and capillaries decrease, so does compliance. This normally does not cause any problems, but it makes the patient much less resistant to infections and general stress exerted upon the respiratory system (e.g. decreased mucociliary transport and airflow [37)].

Apart from the obvious risk of lung infections, other potentially life- threatening events like pulmonary embolism, respiratory failure, lung cancer and COPD need to be considered when dealing with geriatric pulmonary medicine. In the next section, the most important diseases from a preventive point of view will be discussed.

COPD

COPD refers to chronic bronchitis and emphysema, two commonly co-existing diseases of the lungs in which the airways become progressively narrowed [86)].

In developed countries, COPD ranks as the third most common cause of death and is a huge economic burden to the society [87)].

80 to 90% of cases of COPD are due to smoking, so naturally, the main prevention is smoking cessation. Also, lung cancer, which is another well- established risk of smoking, have smoking cessation as primary prevention.

A group of experts looked at 300 research trial articles about gold standard approaches to smoking cessation. The results from their work show which methods that are the most effective; group a) *Control* groups quit at a rate of around 10%. b) *Pharmacological* treatments resulted in 15-33% quit rates. d) *Psychosocial* interventions resulted in 14-25% quit rates. Little or no evidence was found to support use of c) *alternative* medicine or cigarette substitutes.

Preventive approaches to diseases of the musculoskeletal system

As we age there is progressive loss of calcium form bone, our muscle atrophy from decrease in use and declining growth factors and our joints have less cartilage[38)].

These factors lead to debilitating disease seen in some extent in almost all geriatric patients[39)].

In the following section, it will be focused on osteoporosis.

Osteoporosis

Osteoporosis is very common and much under- recognized and undertreated. In UK, 30% of women over 70 years have had at least one vertebral fracture and 32% over 90 years a hip fracture.

Studies in the UK shows that the mortality following a fractured neck of femur is between 20% and 35% within one year in patients aged 82, ± 7 years, of which 80% were women.

After peak bone mass is achieved in our late 20, we slowly lose some bone mass each year. Before menopause, major losses are prevented by stimulation by estrogens, but as soon as our hormone levels are declining, bone losses are hard but not impossible to counteract. Factors leading to even higher loss are smoking, alcohol, low body weight, hyperthyroidism, hyperparathyroidism, renal failure and inactivity. Commonly used drugs like steroids, warfarin and long-term heparin use also leads to an accelerated loss. As the lack of estrogen after menopause is the main reason for decreased bone mineralization, hormone replacement therapy is a common approach to prevention of bone loss in postmenopausal women[43)].

Interestingly, in Europe, with emphasis on Scandinavia, the rate of osteoporosis is higher than in the rest of the world[78)]. This has led some to believe that lack of sufficient sun exposure during winter months leads to vitamin D deficiency and decreased uptake of calcium. Calcium is very import for the skeleton, and a decreased uptake would lead to less calcium in the body available for bone building. The reality may however be more complex, since some populations with extremely low calcium intake also have extremely low rates of bone fracture, and others with high rates of calcium intake through dairy products have higher rates of bone fracture.

Other factors, such as protein, salt and vitamin D intake and exercise, can all influence bone mineralization, making calcium intake one factor among many in the development of osteoporosis [40) 41) 42)].

The **Women's Health Initiative (WHI)** was initiated in 1991 and their objective was to do medical research on major health problems of older women.

The WHI studies were the first large, double- blind, placebo-controlled clinical trials of HRT in healthy, postmenopausal women. The WHI estrogen/progestin trial and estrogen- alone trial were both stopped early (July 2002 and February 2004, respectively) because preliminary results indicated that the health risks of the conjugated estrogen/progestin exceeded benefits[44) 45)].

Other treatments for osteoporosis are bisphosphonates, selective estrogen receptor modulators, calcitonin, cyclic PTH injections and strontium.

Calcium and vitamin D supplementation

A meta- analysis of randomized controlled trials involving calcium and calcium + vitamin D, supported the use of high levels of calcium (1,200 mg or more) and vitamin D (800 IU or more) [55].

A possible increase in the rate of myocardial infarction (heart attack) was found in a study in New Zealand; 1471 women participated. If confirmed, this would indicate that calcium supplementation in women otherwise at low risk of fracture may cause more harm than good [56].

The Women's Health Initiative (see above) found that even though calcium + vitamin D increase bone density by 1%, it did not affect hip fracture. It did increase formation of kidney stones by 17%[57] .

Conclusion is thus that for primary prevention we should focus on exercise, eating moderate amounts of calcium containing food and moderate exposure to the sun in our early years. Then, if necessary, we should later take calcium and vitamin D supplements as a secondary prevention.

Bisphosphonates

They can taken once a day, once a week, once a month PO application or once a year by injection.

NICE (National Institue of Health and Clinical Excellence, UK) recommends initiation of bisphosphonate treatment to all women over 75 after a fragility fracture without a bone density measurement [46].

The PO preparations are associated with esophagitis and are therefore sometimes poorly tolerated; weekly or monthly administration decreases likelihood of esophagitis, and is now standard.

Although dosing with the IV preparations avoids problems of esophagitis, these agents are rarely associated with osteonecrosis of the jaw, a rare but severe bone disease. For this reason, PO bisphosphonate therapy is probably to be preferred.

Selective estrogen receptor modulators (SERMs)

SERMs act on estrogen receptors in the whole body in a selective manner; they act on the bone by slowing bone resorption by the osteoclasts. SERMs have been proved as effective in clinical trials [47) 48)].

Calcitonin

Calcitonin directly inhibits osteoclast. By inhibiting osteoclast activity, bone resorption is reduced[49)].

Teriparatide (recombinant PTH)

This relativly new drug has been shown to be effective in osteoporosis. By acting like PTH, it stimulates osteoblasts, thus increasing their activity. It is used mostly for patients with established osteoporosis and who have already suffered fractures.

Strontium

Oral strontium has proven to be effective, especially in the prevention of vertebral fractures. In laboratory experiments, strontium was shown to stimulate the proliferation of osteoblasts, as well as inhibiting the proliferation of osteoclasts.
Another important point is that Strontium has side effect benefits over the bisphosphonates, as it does not cause any form of upper GI side effect, which is the most common cause for medication withdrawal in osteoporosis. A small increase in the risk of venous thromboembolism was noted in some studies[50) 51)].

Large focuses especially the last years have been on primary prevention of osteoporosis.
A great bone-mass in our late 20 will help us maintain a health skeleton longer, as it after peak mass decreases 0.5% pr. year after this and after menopause up to 5% [39)].
Primary prevention of osteoporosis should thus already start in our early twenties and continue out life. Staying active after peak bone mass is achieved is, however, just as important.
Multiple studies have shown that aerobics, weight bearing, and resistance exercises can all maintain or increase BMD in postmenopausal women. Many researchers have attempted to pinpoint which types of exercise are most effective at improving BMD, however, results have

varied. The BEST (Bone-Estrogen Strength Training) Project at the University of Arizona identified six specific weight training exercises that resulted in the largest improvements in BMD; this project suggests that squats, military press, lateral pulldown, leg press, back extension, and seated row, with three sessions a week, was good in the primary prevention of osteoporosis [52) 53)].

Additional benefits for osteoporotic patients other than BMD increase include improvements in balance, gait, and a reduction in risk of falls [54)].

Preventive approaches to diseases of the gastrointestinal system

A normal course of ageing is a decrease in gastric acidity, decrease in peristalsis, increased mucosal damage, decrease in iron and calcium absorption, decreased hepatic mass and hepatic blood flow[59)].

GIT problems are common in the elderly and include a big range of symptoms; from mild episodes of acid reflux to life-threatening episodes of bowel ischemia. Comorbid illnesses and polypharmacy may also contribute to complications. For instance, there is an increased risk of peptic ulcer disease in the elderly because of increased NSAID use, which often masks ulcer-related pain[59)]. This make the thorough evaluation of medications important.

In this section the focus will be on constipation and gastroesophageal acid reflux.

Constipation

Constipation can be defined as infrequent bowel movements (< 3/week), straining at stool, hard consistency, pain with defecation, or the need to digitally assist evacuation [60)]. Using all these definitions, the prevalence of constipation in the elderly in the community setting is estimated to be 40%, nearly twice that of middle- aged patients. 45% of elderly patients take

laxatives regularly. The elderly patients complain of straining at stool (25.6%), hard stools (27%), incomplete evacuation (22.7%), and the need to digitally assist evacuation (20%). Abdominal bloating and distention may occur, and patients may complain of rectal fullness, rectal pressure, back pain, left lower quadrant pain, or generalized abdominal discomfort [60].

Commonly prescribed drugs that commonly lead to constipation include opioids, antidepressants, anti- hypertensives and diuretics. This is cuased directly by the action of the drug or secondary to e.g. dehydration anticholinergics used in urinary incontinence[60].

Other common etiologies are lack of fiber in the diet, neuropathy secondary to longstanding diabetes or alcoholism, hypokalemia (leads to decreased peristalsis), hypothyroidism, parkinsonism, stroke, painful defecation because of hemorrhoids, diverticula and functional constipation [61].

Constipation is often treated by osmotic laxatives or stimulants. Lactulose (an osmotic laxative) is digested by colonic bacteria to short chain fatty acids and this is beneficial to the enterocytes, but will cause excessive flatulence and bloating.
Stimulant laxantia is powerful and should only be used with caution after other measures have been tried; it causes elctrolyte disturbance and depndency if used continously over a long period of time. With long- term use, the patient will be less able to defecate without stimulation by the agent.

Since many of these etiologies include lifestyle and diet, this is something to emphasize towards the patient as primary preventive measures.
Encouraging the patient to increase fruit and vegetables in his or her diet, will give fibers which help against the constipation, and it will also replenish the body with potassium.

There are two types of fibers each serving important properties;
Soluble fibers are broken down by colonic bacteria leading to decrease in the colonic pH, which again protects the mucosal lining from developing polyps. It also increases the absorption of minerals and maintain barrier functions.

Insoluble fibers are not handled by colonic flora; they hold the water, thus softening the stools.
Current recommendations from the United States National Academy of Sciences, Institute of Medicine, suggest that adults should consume 20–35 grams of dietary fiber per day.
For comparison, a regular slice of white bread (25g) contains no more than 2 g of fiber [63)].
Some plants contain significant amounts of soluble and insoluble fiber; For example prunes have pulp with soluble fibers, and plums have skin containing an insoluble fiber source[64)].
If the recommendations cannot be reached by diet alone, several fiber supplements are on the market.

Some considerations are important in the prevention of constipation using fiber supplementation; one should make sure the patient concurrently increases the fluid intake; the fiber holds more water in the colon and thus more water is lost with it. Failure to increase fluid intake might worsen the constipaton.

Gastroesophageal reflux disease (GERD)

GERD is the most common GI disorder affecting the elderly. Symptoms affect at least 40% of the elderly U.S. population on a monthly basis and approximately 7-10% on a daily basis. Persistent symptoms can dramatically affect quality of life; 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. All these complications are more likely to occur in the elderly [65)].
Factors that can contribute to GERD are hiatal hernia and obesity. It has been shown that 13 % of changes in esophageal acid exposure can be attributed to obesity and its increased intra-abdominal pressure [66) 67).]

Commonly used drugs are OTC (non prescription), antacids like Calcium-carbonate, aluminum hydroxide and magnesium hydroxide.
Excessive use of calcium-carbonate might lead to milk alkali syndrome with alkalosis, kidney stones and hypercalcemia. The hypercalcemia itself leads to maintainance of the increased acid proudction as calcium stimulates gastrin release which agains stimulates gastric acid; a

vicious circle is initiated. Hypercalcemia will also lead to constipation, and one might be tempted to add on laxatives. Choosing the right alternativ is crucial in preventing more medication being added to the list.
Aluminum and magnesium hydroxide works best in combination when used in patients with normal stool frequency. This because aluminum leads to constipation and magnesium to diarrhea.
These drug have existed for many years, but has declined in its use due to newer agents like proton pump inhibitors (PPIs) and H2 receptor blockers. These newer agents however, usually have more side effects.

First and main focus should be primary or secondary prevention of the condition;
As obesity is one of the main causes of the disease, a weight reduction regime should be initiated. Exercise combined with a nutritional plan has shown to be more effective than any of them alone[68)].
Dietary modification recommendations are based on the assumption that certain foods and lifestyle are considered to promote GERD. However, a 2006 review suggested that evidence for most dietary interventions is low (excluding coffee and alcohol); only weight loss and elevating the head of the bed were supported by evidence. Another study showed benefit by avoiding eating two hours before bedtime [69)].

The following may exacerbate the symptoms of GERD:

- Coffee and alcohol stimulate gastric acid secretion; drinking these before bedtime may cause evening reflux.
- Antacids based on calcium carbonate (but not aluminum hydroxide) were found to actually increase the acidity of the stomach. However, all antacids reduced acidity in the lower esophagus, so the net effect on GERD symptoms may still be positive.http://en.wikipedia.org/wiki/Gastroesophageal_reflux_disease - cite_note-17
- Foods high in fats reduce lower esophageal sphincter competence, so avoiding these may help. Fat also delays stomach emptying.
- Large meals. Having smaller, more frequent meals reduces GERD risk, because there is less food in the stomach at any time.

Conclusion

It is clear from the researches that have been conducted on the topic of geriatric treatment complications that this topic poses a big challenge is sometimes quite different from other patient groups; health- care providers are forced to think I slightly different ways and take many more problems into consideration.
Another aspect which further underlines the importance of this, is the fact that the population, at least until now, live longer in the developed countries. The consequence is thus that the geriatric patient today will have several more and complicated diseases compared to the patient of yesterday. The need for continued vigorous research on the topic is underlined by the increased need for more expensive and sophisticated treatment as a consequence of this increasing age.

The preventive approaches used in the geriatric patient may be quite different from the younger population in several aspects, and these need to always be considered;
The physiological deterioration of the body in the elderly may confuse clinicians as to what is the source of the disease.
Polypharmacy in the elderly is a common situation, and it needs to be addressed; is it the disease or the actual interaction of drugs that cause the symptoms? How will the specific patient react to a drug that may not have been tested in this age group?

Another aspect of pharmacology in the elderly is compliance; it is imperative that the patient take the prescribed medications to get the most out of the preventive strategies. Good routines need to be adapted by the treating doctor concerning this potentially disabling situation of many interactions and noncompliance.
From a more psychological point of view, dementia and Alzheimer's disease may contribute to a lack of communication and ethical dilemmas.

All these points do emphasize the need of further vigorous research in the future in the form of studies and trials, on this very important topic in medicine.

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