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MANAGEMENT OF GERIATRIC CARE AND PHARMACOTHERAPY

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Aging population as the phenomenon, namely the increasing amount of elderly and economically inactive people in the society, becomes the problem of recent health care system financing, especially concerning the care of chronic and long-term senior.
Analysis of recent demographic development results, their comparison and stratification based on used medication according to age groups verified the impossibility to distinguish between the physiological aging effects, and the changes caused by diseases connected with elderly.
Recent geriatric care shows the importance and necessity to interconnect the treatment of seniors with their social care, as an important issue for this population group.
Multidisciplinary approach and multisector cooperation of the Ministry of Labour and Social Affairs and Family, the Ministry of Healthcare with the Autonomous Regions, is the way to address, set and launch the complex system of geriatric care together with its financing.
***Key words**: aging, involution changes, financing.*

Introduction

Lowered population growth as well as the aging population is becoming the feature of demographic development in Slovakia. The process intensity will directly influence mortality, fertility and migration trends, but indirectly, it affects other demographic factors, together with social, political, economic, cultural and many other factors. The most significant growth of post-productive age population was expected around 2015, so if the total population is doubled in 2030 in comparison with 1900, then amount of elderly in that period would be multiplied five times, moreover the population over 80-year old people would be multiplied by ten. That all leads to demographic shifting of medicine from the middle-aged care to senior-age care, what can be maned as medicine geriatrization.

Materials and methods

Analysis of recent demographic development results, their comparison and stratification based on used medication according to age groups verified the impossibility of distinguishing between the physiological aging effects, and the changes caused by diseases connected with elderly.

Results and discussions

Geriatrics deals with the complex care for aging people, and treating diseases typical for old age. It focuses on health, and functional state of organism during old age, disease peculiarities typical for the age, as well as their diagnosing and treatment. Geriatrics deals with the health care of the elderly. The word geriatrics itself is derived from the Greek words gerona = old man + iatros = doctor, and it comes out from the internal medicine background, with implemented knowledge of neurology, psychiatry, physiotherapy, ergo therapy and nursing. So it is necessary to add, that geriatric work represents a team work routed in a comprehensive geriatric assessment of the patient (Comprehensive geriatric assessment, CGA). Geriatric care is divided into: acute, chronic, palliative. The inseparable part of geriatrics is the long-term care (LTC) and complex health and social care of patients with severe chronic functional disabilities. The Slovak Republic's *Geriatric concept of health care* was published in the Ministry of Health Care Gazette, section 1–5 of January 25, 2007 Volume 55, No 28172/2006 of 04.12.2006. Health care, devoted to the population over 65, is included in the concept of geriatric care, aimed at maintaining the self-sufficiency, delaying addiction and dependence of older people to such an extent as to allow them to stay in their home setting familiar to them as long as possible (Concept of health care for geriatric patients and patients with long-term care of 15.01.2004).

Prevention, dipspansarisation and rehabilitation are the parts of geriatric health care, further they are divided as follows:

– Differentiated: based on the patients level of dependence, and required scope of adequate care.
– Continuous: a continuous care, from the hospital care to smooth transition to outpatient care.
– Activating: mobilizes a patient, influences his mental status, mobility and inclusion into society.
– Preventive: prevents complications.
– Planned: based on functional diagnostics, has set objectives and procedures.
– Complex: treatments are combined with psychotherapy and social interventions, deal with the overall condition, and is not concentrated only on one part of the

body and its disease, but takes into account the social consequences of disease.

1. Forms of geriatrics care

The geriatrics **outpatient care** is provided as general and specialized health care (Kadlec, 1998):

a) General outpatient care provided by the general practitioner for adults as well as Home nursing agencies (ADOS), that provide complex nursing care in the natural social setting by nurses, in accordance with the doctor's indication.

b) Specialized outpatient care – it is provided to geriatric patients in a geriatric outpatient clinic and in various specialized clinics for adults. It is also carried on in the Day-care centres that provide diagnostic, therapeutic and rehabilitation care in the elderly, which cannot be provided at their home setting.

Inpatient geriatric health care is provided at hospitals, at acute geriatric departments. Chronic inpatient geriatric care is provided at the after-care wards, and wards for chronically ill, and at sanatoriums. Despite the fact that these beds are considered as geriatric ones, based on the concept of geriatrics – they can be also used for the patients over 18, so they are not solely intended for geriatric patients, what in real practice can distort the availability of geriatric beds. Geriatrics further solve the health problems of people in long-term care at social service facilities, and geronto-psychiatric departments.

Terminal palliative and hospice care represents an integral part of care for geriatric patients, where the terminal care is aimed at maintaining the patient's quality of life.

Palliative, compassionate care is derived from the Greek word *paliatus* (dressed in cape) with the meaning to cover, conceal, and disguise the signs of diseases that cannot be removed. According to the World Health Organization, palliative care is an active, total care of patients at the time of their disease, when their body is not responding to causal treatment and when the control of pain and other symptoms, and psychological and social problems are becoming the primary. Palliative and hospice care is provided to patients suffering from incurable fatal diseases in the terminal stage and is aimed at maintaining their quality of life, but not healing. It is provided when the ill refuses aggressive treatment, when the vital organs are failing or the side effects surpasses the benefits of therapy. In maximum possible scope it is focused on the patient's comfort, safety, control over the symptoms as far as possible, and preparing the patient for death (Hegyi, Krajčík, 2010).

World Health Organization includes in the palliative medicine also treatment and care for patients, whose disease is not responding to curative treatment; and the time when crucial is becoming the treatment of pain, individual symptoms, solving psychological, social and spiritual needs of the patient, that provides him relief from pain and other symptoms.

Dying is accepted as a normal and natural process, and palliative medicine creates supporting system allowing the ill to live the best quality and as active as possible life until the death. Palliative care neither accelerates nor delays death, but solves the quality of life, mental and spiritual aspects involved. Its inseparable part is preparing the family members on the death of the patient, and helping them to overcome the grief associated with the death of the family member.

Hospice care is a part of palliative care focused on the terminally ill in the phase of dying, and preparing their family and relatives. This treatment cannot be provided in hospitals, where the family cannot be taken, and the care is indicated to patients with causal treatment failure. In the past it was devoted to cancer patients, but recently there is increased number with non-oncological diseases. The length of hospice care is limited by 6–10 month time of the patient's life remaining period, and for relatives up to 18 months. The increasing number of non-cancer diseases (where the survival time is longer then of cancer diseases), recently changes the prevailing proportion of patients with cancer patients in hospice care on the side of the non-cancer patients with terminal diseases. This increasing number requires re-assessment of palliative care in near future.

Hospice care forms:

a) Home hospice care (represents about 80%).

- Outpatient Palliative Clinics.
- Palliative Care Centres.
- Mobile Hospice.

b) Institutional hospice care – inpatient facilities, such as hospice, palliative medicine departments (represents about 20% of provided care).

Hospice care is provided wherever the patient in need is present.

Except for the ethical dimension, the terminal care has also significant economic dimension. About 50% of health care lifetime costs are used during the last two years of life. The attempts to reduce them, however, are not very successful.

2. Peculiarities of older age diseases

Older Age Diseases have some general peculiarities:

Polymorbidity – simultaneous occurrence of several diseases, "chain reaction" when one disease triggers the development of other diseases (Kadlec, 2010).

An example of such events cascade can be for example: osteoporosis → femoral fracture → immobilization syndrome. Loss of self-sufficiency or depression → insomnia → insomnia medication → drug-induced intoxication → fall → injury → post traumatic malfunction.

Causes of polymorbidity:

a) insufficiency of organs, arising combination of morphological changes (leading to functional changes), involution changes (overgrowth of connective tissues) and changes in blood flow.

b) summing effect of degenerative diseases with tendencies to cause a chain reaction.

c) negative mutual influence of individual diseases.

Peculiarities of clinical picture are preconditioned by changes in the body, patient's personality and changed doctor's approach to the patient.

Following events can be assigned among the clinical picture peculiarities:

– Micro symptomatology: symptoms are expressed only in minimum, they often leads to inability to detect the

disease, i.e. absence of fever and leucocytosis in acute infections. Thyrotoxicosis can be manifested as fatigue, or weight loss, or isolated tach fibrillation. Other times the symptoms typical for the disease entity, for example, complete lack of abdominal muscles tension at peritonitis.

– Changed course of disease causes of changed clinical picture are:

– Changes in the body (morphological and physiological changes).

– Changes in the patient's personality:
  – Increased requirement of attention.
  – Exaggeration of symptoms (aggravation).
  – Hiding the symptoms (trivialization).

– Changed approach of health professionals (i.e. ageism, age discrimination to older patients at diagnosing, operational solutions, hesitation with decision-taking, ascribing disease symptoms only to age and old age).

– The Iceberg Phenomenon – the disease clinical picture shows only the minimum of symptoms, but often are present more distant symptoms, when at the forefront of the clinical picture are manifested symptoms localized to other organs or systems, i.e. acute myocardial infarct appears as acute abdomen (Németh, 2009).

– Tendency to Protracted Course – acute diseases usually lasts longer, often is healed incompletely, and remain in some form. With chronic diseases come compensation periods which are only temporary, and decompensations which are repeated.

– Acceleration Phenomenon – any serious disease in old age significantly influences (accelerates) aging process and worsens functional human potential (Németh, 2009).

Susceptibility to Complications – complications based on their occurrence can be divided into:

a) "Chain reaction".

b) "Push-out phenomenon".

Chain reaction with so-called pathological cascade comes when one disease entity is the impulse for the emergence of another, that complicates the course of the original disease, i.e.: dehydration → hypotension → brain hypoxia → stroke → hemiparesis → bedsores.

The push-out phenomenon means that non-specific complications without any direct relation to the existing disease can severely overlap the clinical signs. For example: complications of fluid or electrolyte economy are hidden under confusion, or depression; or urinary incontinence is the root of bedsores etc.

Adaptation failure is preconditioned by the changed functional state of organism and by adaptation mechanisms disorders, which are manifested by geriatric maladaptation syndrome. The chronic stress can be a cause of adaptation failure, and the stress factors can be of biological, psychological and social origin. This syndrome is the typical disease of older age with strong health and social impact. It reduces the quality of life, affects morbidity and mortality, and thereby increases the care costs for elderly people.

Social dimension of illnesses in old age means that every chronic disease has social impact on the patient. The disease results in reduction or the loss of self-sufficiency, which has many significant social consequences when comes to changed social status, often leads to social isolation. Worse social situation acts as a psycho-social stressor that can lead to adaptation failure. For example: senior's low retirement forces the senior to heat insufficiently, what can cause pneumonia with necessary hospitalization. After the hospital release, the senior returns home and continues the stay at cold environment, so there is the threat of pneumonia relapse with repeated hospitalization (Hegyi, Krajčík, 2010).

Accumulation of chronic diseases sets the precondition for malfunctions, which must be properly evaluated by functional geriatric examination, which is a complex examination of the senior's health state, accompanied by evaluation of his physical performance, self-sufficiency and mental functions in the context of his social situation. Its inseparable part is the active search for health and social risks, and proposal of preventive, therapeutic and social measures aimed at the maximum benefit of the individual patient. It focuses on risky seniors who due to complex clinical disability, lost or endangered self-sufficiency require individual approach and care, which are not commonly provided in routine clinical practice.

3. Classification of geriatric disorders

Classification of functional *geriatric disorders* set by geriatric functional examination:

1) Impairment – harm or failure of the whole body, its individual parts, or organism.

2) Disabilities – limited capabilities of the individual, inability, incapability of a person to perform common activities.

3) Handicaps – limitation or inhibition to perform and meet the requirements of the society followed by segregation or isolation.

The geriatric diseases as well as their diagnostic process have their own specifics, with strong interest in elderly person, and respect of the age specifics. It is a complex process, where the bio-psychosocial assessment is included, which is more patient-oriented than senescence-oriented, and the result is geriatric intervention that does not mean the total cure, but the effort of the patient's satisfaction.

Perignostic assessment respects evaluation of the old man's home, his functional profile, independence or dependence.

The most frequent geriatric diseases are:

During the senia occur diseases commonly occurring at various ages as well as diseases typical only for specific geriatric age so called *specific geriatric syndromes*.

The most common causes of death with people over 65 years are cardiovascular diseases, cerebrovascular diseases and cancer, that make up to 75% of deaths, and the accidental deaths occur three times more often than at the rest of population.

Diseases occurring in geriatric age are divided into 3 groups:

1) Diseases directly related to old age (premature aging, diseases bound with old age, bronchitis at senile emphysema, aging-associated diseases such as senile pruritus, senile dementia, senile cataract, presbyopia, presbycusis, etc.

2) Diseases with an optional relationship to old age: arteriosclerosis, prostatic hypertrophy, etc.

3) Diseases without direct relation to old age affecting all ages, such as infectious diseases.

4. Therapy peculiarities of older age

Pharmacotherapy is in the geriatric age characterized by polypharmacy, high incidence of adverse drug reactions, additionally with atypical clinical manifestations, variations in pharmacodynamics and pharmacokinetics. The cause of polypharmacy is seniors polymorbidity (Tab. 1).

Pharmacokinetics influences processes that are present during physiological aging, pathological processes, as well as the external influences.

Pharmacodynamics is changed by losses of receptor, changed sensitivity of target tissues. It is known that the old body has more sensitive or less sensitive reactions to certain drugs.

Table 1

Important factors influencing pharmacokinetics at old age [10]

Pharmacokinetics parameters	Physiological aging changes	Pathological changes	External factors
Resorption	Higher pH of gastric juices, smaller resorption surface, a lower intestinal motility	Achlorhydria, constipation, diarrhoea, gastrectomy, malabsorption syndrome, pancreatitis	Antacids (enteral), anticholinergics, cholestyramine, drug interactions
Distribution	Lowered cardiac output, lowered volume of the circulating fluid, a greater proportion of fat, lower levels of plasma albumin	Cardiac insufficiency, dehydration, oedema, ascites, hepatopathy, malnutrition, renal insufficiency	Drug interactions
Biotransformation	Liver involution , lower enzymes activity, decreased liver perfusion	Hepatopathy, fever, malnutrition, thyroid disease	Eating habits, drug interactions, smoking
Elimination	Decreased perfusion of the kidneys, lower glomerular filtration, reduced tubular secretion	Hypovolemia, renal insufficiency	Drug interactions

5. Adverse drug reactions

As it has been shown with a greater number of prescribed drugs grows the incidence of adverse reactions. The cause of increased adverse reactions in geriatric patients, polypharmacy of drugs are common in polymorbidity (Plevová, 1992).

It should be noted that the same clinical picture of the side effect can be induced by various types of drugs, such as disorientation and confusion. These may be caused by the use of analgesics, digoxin, corticosteroids, other psychopharmacology drugs and other drugs (Tab. 2).

Table 2

Relation of the amount of used drugs and adverse reactions [10]

Amount of drugs used during one year	% of people with adverse drug reactions
1–2	2
3–5	7
6–10	13
>10	17

The above mentioned polypragmasia is closely related to drug interactions and the number is growing exponentially with the number of prescribed drugs.

6. Factors increasing the risk of drug interactions are as follows:

– Incorrect dosage of drugs.
– Incorrect combinations of drugs with similar effects.
– Inadequate drug combination.
– Low therapeutic index.
– Simultaneous prescription of several drugs by different doctors.
– Additional self-medication.
– Long-term treatment and others.

In particular *the dangerous interactions* are those which induce arrhythmia, cause hypertensive crises, hypoglycaemia, central spasms, or increase the preparedness for bleeding.

From the above mentioned comes out, that the risky drugs are in particular:

– Oral antidiabetics (phenformin, metformin).
– Anticoagulants (especially warfarin).
– Glycosides (digoxin).
– Antiepileptics.

The important part of the pharmacotherapy is determination of plasma values in drugs because of low therapeutic index. The patient-physician compliance is very important for successful and safe pharmacotherapy at geriatric patient (Tab. 3).

Table 3

Examples of adverse drug reactions [10]

Symptoms, illness	Drug, drug group
Hypotension	Diuretics, anti-hypertensives, beta-blockers, hypnotics, sedatives, neuroleptics, antidepressants
Falls	Hypotensive drugs, hypnotics, neuroleptics, tranquilizers, anti-arrhythmic drugs, antidepressants, antihistamines
Confusion	Neuroleptics, antidepressants, hypnotics, sedatives, NSAIDs, cardiac glycosides, corticosteroids
Depression	Reserpine, beta-blockers, corticosteroids
Urinary incontinence	Diuretics, hypnotics, sedatives, neuroleptics, beta-blockers, prazosin, lithium
Constipation	Codeine, anodyne, spasm analgesics, diuretics, anticholinergics
Diarrhoea	Broad-spectrum antibiotics cholinergic drugs, Prokinetics
Vomiting	Some chemotherapeutic drugs, cytostatic drugs, emetics
Cough	ACE-inhibitors
Extrapyramidal symptoms	Neuroleptics, methyldopa, reserpine
Disturbance of consciousness of hypoglycaemia	Insulin, oral hypoglycaemic drugs
Worsening cognitive functions	Neuroleptics, hypnotics, sedatives, central anticholinergics, hallucinogens, hypoglycaemic drugs

The non-compliance can cause cognitive disorders, visual acuity reduction, deafness, arthritic hand changes, impaired fine motor skills, trembling of the limbs, lowered quality of life, adverse drug reactions, effort to discuss treatment with neighbours and a tendency to self-medication.

Patients over 60 years of age on average take 4 different drugs. During the last 10 years the total consumption of drugs has increased. About 90% of seniors at long-term institutional care, take on average 3–4 drugs, the most frequently vasodilators, rheological drugs, cardio tonics, analgesics, diuretics, calcium channel blockers and ACEI (Hegyi, Krajčík, 2010).

About half of people over 70 years of age admit self-medication, where the most widely used self-medication drugs are: analgesics 20%, laxatives 14%, anti-sclerotic drugs 13%, psychopharmacological drugs 10%, geriatrics 9% and vitamins 6%.

Treatment of geriatric patients has its problems and rules. Failure of fundamental principles of geriatric therapy by doctors as well as the changed patient's response to treatment often leads to iatrogenic trauma. The most common causes are: drugs polypharmacy, incorrect dosage, side effects occurrence and adverse drug interactions.

Obstacles to proper treatment of patients in older age are as follows:

– Inaccuracy in diagnosis.
– Diagnostic nihilism of doctors to elderly patients.
– Polypharmacy is the result of polymorbidity and the result of treating all diseases at the same time.
– Ignorance of the proper drug dosage in the elderly age (changed pharmacokinetics and pharmacodynamics).
– Improper choice of drugs.
– Interactions ignorance.
– Prescriptions of risky drugs that are not recommended for old age.
– Non-compliance of the patient.

Main principles of treatment:

– Make correct diagnosis and determine real medication requirements.
– Identify treatment priorities.
– Prefer causal treatment to symptomatic one.
– The doctor must be aware of the pharmacokinetic and pharmacodynamics properties of drugs, must know their therapeutic index and the age-related properties.
– Dose is individual and lower at treatment launching, further is derived from adverse drug reactions and drug interactions.
– As shortest treatment duration as possible.
– As simple dosing as possible.
– Avoid polypharmacy.
– Provide the patient and relatives with the most detailed education about the treatment.
– If possible, during the long-term medication it is good to interrupt medication for a short period of time (Tab. 4).

When treating the geriatric patients should be kept in mind:

– Some medications can worsen basic illness or hide the disease symptoms.
– Drug therapy sometimes decrease the quality of life.
– With older age increases the risk, and treatment benefit is being reduced.
– The treatment of one disease sometimes leads to other disease worsening.
– For some diseases is preferred the non-pharmacological therapy.
– The laboratory parameters are affected and changed by certain drugs (Hegyi, Krajčík, 2010).

Table 4

Risky drugs non-recommended in geriatrics [10]

Drug groups	Non-recommended drugs
Sedatives / hypnotics	Barbiturate short-acting: pentobarbital, phenobarbital
	Long-acting benzodiazepines: diazepam, lorazepam, chlordiazepoxide
	Meprobamat
Anti-depressives	Amitriptyline
	A combination of antidepressants and neuroleptics
Anti-hypertensitives	Propranolol
	Methyldopa
	Reserpine
	Hydrochlorothiazide in a dose of > 50 mg / day
Antidiabetics	Chloropropamide
Analgesics	Propoxyphene
	Pentazocine
Non-steroid anti-rheumatics	Indomethacin, fenylbutazone

Pharmacological prevention creates and inseparable part of the geronte pharmacotherapy:

– Prevention of cardiovascular events by antiplatelet agents.

– Prevention of osteoporosis by administration of combined vitamin D and Calcium.

– Vaccination against influenza as part of primary prevention in geriatrics.

– Vaccination with pneumococcal infections at the age over 65 years.

Conclusions

The attention should be drawn to the existing phenomenon of aging population not only in Slovakia, but also to peculiar diseases in the geriatric period, and the issues of chronic long-term care provision with its payments. This problem is very recent, mainly due to the increasing number of economically inactive and elderly people in the society, which is going to rise. To solve the issue it is necessary to define hospitalization for medical reasons (worsen health condition), and what is social hospitalization, that means the client's residence requiring a 24 hour care due to the consequences of physiological aging (dementia, incontinence, immobilization). It is necessary to set the residence payment for the patient based on the combination of physiological processes of aging and pathologies, where are necessary auditing physicians and medical advisors. Moreover is important to improve communication and cooperation of the Ministry of Labour and Social Affairs, the Ministry of Health as well as the local authorities.

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Менеджмент геріатричної допомоги і фармакотерапії

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Старіння населення як явище, зокрема зростання кількості літніх і економічно неактивних людей в суспільстві, становить проблему сучасного фінансування системи охорони здоров'я, особливо щодо надання допомоги хронічним хворим і особам літнього віку.

Аналіз останніх демографічних даних, їх порівняння і розподіл за віковими групами на основі використаних ліків свідчить про те, що фізіологічні ефекти старіння та зміни, викликані захворюваннями літніх людей, розрізнити неможливо.

Встановлено, що важливим питанням для даної групи населення є необхідність об'єднання лікування та соціальної допомоги.

Міждисциплінарний підхід і багатопрофільна співпраця Міністерства праці та соціальних справ і сім'ї, Міністерства охорони здоров'я та Автономних регіонів мають бути покладені в основу розробки та запровадження комплексної системи геріатричної допомоги разом з її фінансуванням.

Ключові слова: старіння, інволюційні зміни, фінансування.

Менеджмент гериатрической помощи и фармакотерапии

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Старение населения как явление, а именно, повышение количества пожилых и экономически неактивных людей в обществе, представляет проблему современного финансирования системы здравоохранения, особенно относительно оказания помощи хроническим больным и лицам пожилого возраста.

Анализ последних демографических данных, их сравнения и распределение по возрастным группам на основе использованных лекарств свидетельствует о том, что физиологичные эффекты старения и изменения, вызванные заболеваниями пожилых людей, различить невозможно.

Установлено, что важным вопросом для данной группы населения является необходимость объединения лечения и социальной помощи.

Междисциплинарный подход и многопрофильное сотрудничество Министерства труда и социальных дел и семьи, Министерства здравоохранения и Автономных регионов должны быть положены в основу разработки и внедрения комплексной системы гериатрической помощи вместе с её финансированием.

Ключевые слова: старение, инволюционные изменения, финансирование.

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