



A2.2 – Educative resources for teachers

Safe medication/therapy application

<< Lesson Materials>>

Module: CARING TECHNIQUES FOR WELL-BEING

Sub-Module: **Safe medication/therapy application**



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Introduction

Module	CARING TECHNIQUES FOR WELL-BEING
Sub-module	Safe medication/therapy application
Lesson nr.	#1
Duration (minutes)	45 min
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Lesson Outcomes

The aim of the lesson is to acquire knowledge and skills in:

1. ability to understand the importance of basic drug administration safety precautions measures (expiry date, route of administration, purpose, dose, timing)
2. ability to identify and improve safe drug application
3. ability to identify drug management related risks (inappropriate storage, supply/out of stock)

medication

- **Drug** - any substance, regardless of its origin (natural or synthetic), in an appropriate pharmaceutical form and in a specific dose, used to achieve the desired therapeutic effect (treatment of a disease, injury), to prevent disease, for diagnostic purposes, or modifying unchanged functions the body.
- **OTC (over-the-counter drug)** - drugs without a doctor's prescription; in contrast to over-the-counter medications, prescription medications are abbreviated as **Rx**.
- The most common drug **dosage** units are milligrams (mg), micrograms (μ g), grams, international units (iu), milligrams per hour (mg / h; for potent drugs or painkillers in the form of patches).



medication

The mechanism of action of drugs is based on their interaction with a living organism, as a result of which a pharmacological effect is triggered, aimed at preventing the development of a disease or suppressing its causes and symptoms.

Chemical names (mainly in the clinical trial stage), **international** non-proprietary names (names of the active substance of the drug, e.g. paracetamol) and **trade** names, e.g. Panadol, are used.

medication

The action of the drug depends on:

- physicochemical properties (including solubility, degree of ionization, capillary and surface activity);
- the chemical structure determining the binding of a drug with the appropriate pharmacological receptor at a target site in the body (pharmacological target);
- the effect of the drug is proportional to the concentration of the drug at the hold point (to the dose used);
- individual characteristics of a given organism (body weight, age, sex, health status).

medication

The active substance of the drug, responsible for its therapeutic effect, is mixed with auxiliary substances in the production process; this mixture is given a suitable pharmaceutical form.

Classification of drug forms due to their physicochemical properties:

- solid - tablets (dissolving, effervescent, coated), lozenges, dragees, capsules, linguals, pills, powders, granules, suppositories;
- semi-solids - ointments, creams, pastes, gels, foams, patches, sprays;
- liquid - drops, solutions, syrups, emulsions, suspensions, liniments, liquids (bottles, ampoules, vials, pre-filled syringes), medicated shampoos.

medication

Drugs and their metabolites can be excreted from the body from:

- urine,
- with feces,
- bile,
- saliva,
- through the respiratory tract
- with sweat,
- with mother's milk.

The most important route of elimination of a drug from the body is through the kidneys and the liver.

Principles of using medications:

- prescribing only drugs with clear indications,
- the use of effective doses,
- providing a written instruction on the use of drugs,
- periodic control of prescribed medications,
- failure to use drugs with undocumented effectiveness,
- informing each doctor about all medications taken.



The most common side effects are caused by drugs:

- non-steroidal anti-inflammatory drugs (NSAIDs),
- laxatives,
- sedatives and sleeping pills,
- cardiovascular, hypotensive,
- psychotropic.

The most common side effects of these drugs include:

- 
- orthostatic hypotension,
 - kidney failure,
 - electrolyte disturbances.

In addition,
side effects of
medications
such as:

- 
- insomnia caused by the use of Ginkgo biloba preparations,
 - poorly controlled arterial hypertension due to the use of NSAIDs,
 - worsening of cognitive disorders caused by the use of antihistamines, e.g. loratadine.

The most common side effects - Digestive system:

- chemotherapy for cancer - mouth ulcers
- certain antidepressants - dry mouth
- antibiotics, inhaled glucocorticosteroids used in asthma - fungal lesions of the oral cavity
- non-steroidal anti-inflammatory drugs (aspirin, naproxen, diclofenac) - gastric ulcer, peptic ulcer, bleeding
- magnesium compounds, antibiotics – diarrhea
- opioid painkillers (e.g. morphine), aluminum compounds - constipation
- iron - dark color of the stool
- cancer chemotherapy, antibiotics, morphine - nausea, vomiting
- statins, paracetamol, diclofenac, methotrexate, vitamin A - liver damage

The most common side effects – Respiratory system:

- aspirin, some beta blockers - bronchospasm, shortness of breath, worsening of asthma
- opioid painkillers such as morphine - breathing problems
- ACE inhibitors - dry cough

The most common side effects

– Circulatory system:

- caffeine, nasal decongestants - increased blood pressure, increased heart rate
- antihypertensive drugs, diuretics - lowering blood pressure
- antiarrhythmic drugs when used incorrectly, potassium - disturbances in heart rhythm and conduction

The most common side effects

– The nervous system:

- opioid painkillers, antiallergic drugs, sleeping pills, tricyclic antidepressants - sleepiness, excessive sedation
- caffeine, pseudoephedrine, certain antidepressants - over-excitement
- aminoglycoside antibiotics, salicylates, furosemide - damage to the organ of hearing and balance
- vasodilators and drugs for high blood pressure - headache

Metabolic Disorders:

- 
- tricyclic antidepressants, hormonal drugs, some neuroleptics - weight gain
 - insulin, some antidiabetic drugs - lowering of glucose levels
 - antibiotics, especially penicillins, sulfonamides, general anesthetics, morphine, cancer chemotherapy - allergy, rash

Rules for the correct intake of drugs

Order	In order to take medication correctly, the following rules should be followed:
Follow	follow medical recommendations
Swallow	swallow the tablets and capsules whole
Do not crush or crush	do not crush or crush the tablets
Do not divide	do not divide the tablets if there is no special scale
Do not pour out	do not pour out the contents of the capsule
Use	use a special measuring cup for liquid medications
Do not cut through	do not cut through any medications provided with patches (transdermal patches)

Rules for the correct intake of drugs

Take	take your medications with drinking water
Do not combine	do not combine taking the drug with alcohol
Follow	follow the recommended doses of drugs and the duration of their use
See	see the package leaflet
Store	store drugs at the required temperature, out of the reach of children
Talk	if in doubt, talk to your doctor, pharmacist or nurse

Factors related to the characteristics of the drug that may increase the risk of a drug mistakenly administered:

- similar in appearance to a tablet (similar color or shape)
- drugs with similar names, manufactured by the same entity that uses a similar layout of the packaging,
- drugs with trade names that can be confusing, e.g. Celebrex, Cerebryx and Celexa) - ambiguous labeling of drugs. The names of some slow-release drugs may differ from the names of the common form only by a prefix. Unfortunately, many different prefixes are used which indicate similar properties, e.g. slow release, delayed release or long acting (e.g. XL, XR, CR, SR)
- label too small to read or the dose information on the vial is difficult to read
- no measuring tools (e.g. syrup spoons)

By definition, **modified release dosage** forms are those formulations where the rate, profile or site of release of the active ingredient is different from that of a conventional dosage form administered by the same route.



This includes forms of the drug with:

- **prolonged-release** - medicines can release the active ingredient over a very long time. This makes it possible to reduce the dosing frequency without the need to adjust the dose. Usually it is enough to swallow one tablet a day.
- **delayed release** - mainly the so-called gastro-resistant tablets, coated with a substance resistant to gastric acid, so the drug is released only in the further parts of the gastrointestinal tract.
- **pulsatile release** - that is, one that provides a repetitive release system.
- **accelerated release** - designed so that the absorption time begins as quickly as possible, e.g. orodispersible tablets.

Mysterious shortcuts

- SR-E - Slow-Extended Release (Isoptin SR-E)
- LAR - Long-Acting Release (Sandostatin LAR)
- RD - Retard (Dicloberl Retard)
- LA - Long Acting (Zoladex LA)
- CR - Control Release (Trittico CR)
- MR - Modified Release (Setal MR)
- SR - Slow Release (Tertensif SR)
- XR - Extended Release (Trittico XR)
- XL – Extended Liberation (Cardura XL)
- ZOK, ZK - Zero Order Kinetic - a drug that releases the active substance according to the zero-order kinetics (e.g. Betaloc ZOK, Metocard ZK)
- Depot - long-acting drugs (e.g. Clopixol Depot, Lucrin Depot)
- PROLONGATUM - prolonged release tablets (e.g. Kalipoz Prolongatum)

Storage of drugs

Medicines should be stored in their original packaging, in closed cabinets (protected from light), in a room with a temperature below 25°C and protected against unauthorized access.

Prescription drugs containing sugar or plant extracts are useful for a maximum of 7 days, some other drugs - 14 days, and those that are spirit solutions for up to 3 months.

The shelf life of drugs depends on the conditions of their storage. Galenic and hormonal drugs, and antibiotics are particularly unstable in storage. Liquid medications and ointments are usually more sensitive than solid medications.

Storage of drugs

Some drugs require refrigeration (2-4°C), e.g. insulin, antibiotics, sera, suppositories, pessaries.

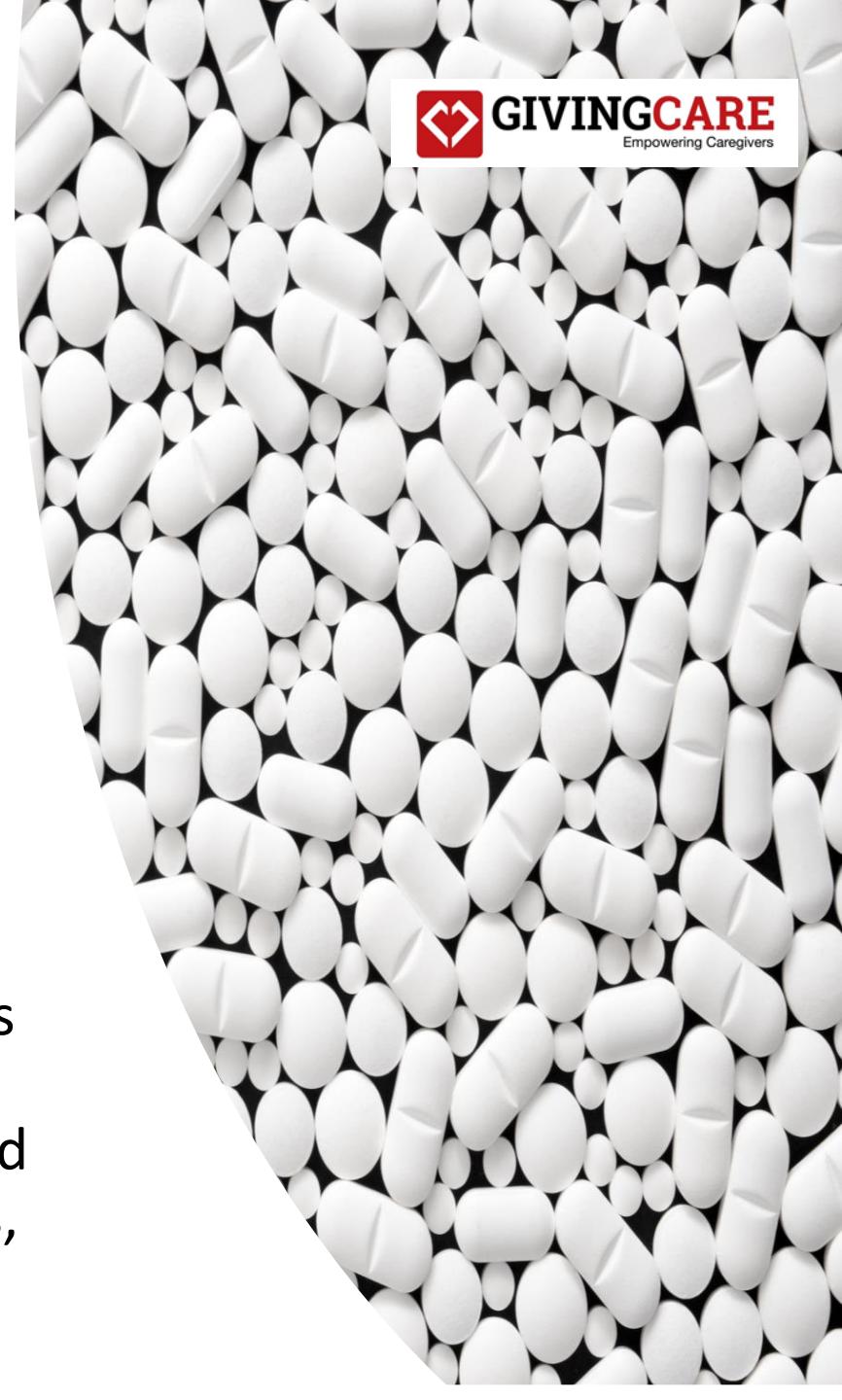
Medicines subject to the law regulating the handling of narcotic substances are stored in a closed cabinet - they are subject to strict records, the doctor is responsible for dispensing and documenting them.

Suitability for the use of drugs depends on the form of the drug - examples

- antibiotics for children in the form of a powder for reconstitution - the resulting suspension is effective for 5-14 days;
- nebuliser suspensions - the package contains several aluminum bags with plastic disposable containers inside. The medicine remaining in the intact disposable containers is usable for 3 months after breaking the aluminum pouch;
- drops - most drops should be used within 28 days after opening, and up to 7 days without preservatives. There are eye drops in the so-called minimsach - for single use;
- syrups - their storage time from the day of opening is usually 28 days;
- insulin - after taking it out of the refrigerator and putting it into a pen, it should be used within 30 days;
- tablets - regardless of whether they are in blisters or bottles - even after opening, they retain their full value until the expiry date.

Administration of drugs

- In administration important is to know the name, dose, method and frequency of administration, expiry date, form and appearance, action of the drug, but also side effects, symptoms of overdose and intolerance, drug reactions, and first aid.
- The risk of side effects of medications is influenced, among others, by the age of the patient, sex, body weight, as well as comorbidities (kidney or liver diseases, depression, sensory disturbances), use of stimulants (alcohol, nicotine, drugs) and taking the drug for the first time, taking more than 4-5 drugs, taking the drug "on your own".



Preparation and administration of drugs

- Before preparing and administering drugs, you should ensure good working conditions, good lighting, and complete equipment.
- You should show maximum concentration when doing this activity.
- The medication should be checked at least three times before administration.
- The control of the drug on the label and leaflet concerns: name (trade, international), dose, form, expiry date, appearance, route of administration.



Preparation and administration of drugs

- Medicines should be administered according to the doctor's orders, including before a meal, during a meal, after a meal, regardless of the meal.
- There are some limitations to bear in mind:
 - Calcium containing products are contraindicated during treatment, incl. with antibacterial drugs as they hinder their absorption. Calcium also makes iron absorption difficult, unlike vitamin C, which increases iron absorption.
 - Grapefruit juice interacts with many medications, including statins. Consuming large amounts of dietary fiber reduces the absorption of drugs.



Preparation and administration of drugs

- Remember that some medications cannot be given because they should not be crushed, others cannot be combined with gavage food, or the patient has to take the medicine when the stomach is not full.
- In order to avoid crushing the tablets, an alternative may be drugs in liquid / syrup form (e.g. Flegamina, Haloperidol). It is best to use liquid medications instead of tablets, never crush the medications.



Preparation of the user of the drug

- Every person should have a basic knowledge of the dosing of drugs.
- The care giver should assess user knowledge and whether he/she will be able to regularly and independently take medication.
- Sometimes it is necessary to write down the dosage method in a notebook, propose special cassettes for drugs that facilitate dosing.



Introduction

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Sub-module	Safe medication/therapy application
Lesson nr.	#2
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Drug actions (systemic, local, causal, substitute)

Drug interactions

- Drugs may have a **local (injection site) effect** or, after being absorbed into the body, a **systemic effect**.
- Drugs may act on the cause of the disease and have a **causal or symptomatic effect** - e.g. by destroying bacteria or parasites that cause the infection (this is how antibiotics and other chemotherapeutic drugs work) or by compensating for a specific system deficiency - e.g. in vitamins in hypovitaminosis or a specific bioelement, e.g. bone calcium in decalcification or iron in hypochromic anemia.
- **Substitution/replacement therapy**, e.g. in the case of hypothyroidism or diabetes, is also a pharmacological method of treatment, e.g. for opioid addicts.



Drug actions

- Topical drugs - they are not absorbed from the surface of the skin and mucous membranes into the blood; they only work where they are applied.
- Drugs that have a general effect - penetrate the skin, mucous membranes, are absorbed from the muscle, subcutaneous tissue; this action occurs after it enters the bloodstream.



Tolerance - weakening of the drug's effect

- Most often it occurs after prolonged use. To achieve the strength of the primary pharmacological effect, the dose should be gradually increased. Tolerance is reversible because the level of sensitivity may return to its original level after drug discontinuation.
- The cause of tolerance may be the increased activity of liver enzymes, which are responsible for biotransformation, and the drug is excreted faster from the body. Hence the desire to increase the dose (barbituric acid derivatives, phenytoin). An interesting example of tolerance is the use of morphine, as a person tolerant to morphine takes a lethal dose for a normal human.

Cumulation

It concerns the case of administering the drug in too short intervals of time, i.e. the body will not have time to excrete the previous dose and is already receiving the next one.

The degree of accumulation depends on the structure of the drug, the degree of drug binding to blood proteins and the half-life of the drug, i.e. the concentration of the drug after a dose is halved.

Drug administration routes

The method of introducing the drug into the body, i.e. the route of administration, depends on the form of the drug, drug dose, time of its absorption, and individual therapeutic indications. The following drug administration routes are distinguished:

- **Oral route** - drugs in the form of powders, tablets (dissolving, effervescent, coated), capsules, lozenges, pills, granules, solutions, syrup, suspensions, emulsions, drops, pastes, gels;
- **Inhalation** - drugs in the form of aerosols for inhalation (emulsions, solutions or suspensions), mainly anti-asthma drugs;

Drug administration routes

- **Transdermal route** - drugs in the form of solutions, suspensions, emulsions, ointments, gels, creams, sprays, foams, patches with an analgesic, medicated shampoos;
- **Injection (parenteral)** - drugs administered by intramuscular, intravenous and subcutaneous injections with the use of ampoules, vials, pre-filled syringes;
- **Rectal route** - drugs in the form of powders for the preparation of liquids and suspensions, tablets, suppositories, capsules, creams, ointments, foams, liquids, gels.

Medicines administered in the form of intravenous injections show the fastest action.

We distinguish between doses:

- a) **threshold dose** (minimum, sub-therapeutic) - this is the smallest amount of a substance that has a certain effect on the human body.
- b) **therapeutic dose** - the amount of the drug causing the inhibition or stimulation of organ functions within physiological limits.
- c) **loading dose** - this refers to a dosage definition in which the first dose is much greater than the subsequent doses called maintenance doses.
- d) **toxic dose** - amount of a drug that produces a poisonous effect.
- e) **lethal dose** - this dose is fatal due to paralysis of respiration and heart function.

Drug interactions

The following factors may affect the occurrence of drug interactions:

- the number of medications taken,
- age (the elderly and children are particularly at risk),
- coexistence of other diseases (renal and hepatic insufficiency),
- the use of new drugs,
- the use of strong drugs with a small difference between therapeutic and toxic doses,
- treatment by several doctors and the lack of information on the simultaneous intake of drugs by the patient,
- taking over-the-counter medications without the doctor's knowledge, self-treatment of patients.

Drug interactions

Typically, each drug can either increase or decrease the effect of the other.

However, there are groups of drugs that exhibit more dangerous interactions:

- drugs that inhibit blood clotting,
- antidiabetic drugs,
- some drugs used in cardiovascular diseases, drugs that lower cholesterol,
- antifungal drugs,
- sleeping pills,
- sedatives and antiepileptics,
- theophylline,
- NSAIDs (aspirin, ketoprofen, ibuprofen), anti-cancer drugs.

Interactions between drugs, supplements, and food and drink

- Supplements containing **vitamin A, D, E, K, which are easy to overdose**, can quickly reach toxic values and damage the liver. Vitamin A in pregnant women can damage the fetus; vitamin A and beta-carotene should be taken with caution by tobacco smokers due to the greater risk of side effects; high doses of vitamin E are not recommended in patients with cardiovascular diseases due to possible complications from this system; omega-3 fatty acids can increase the risk of bleeding when you are taking medicines that reduce clotting, such as acetylsalicylic acid (Aspirin), used in cardiovascular diseases;

Interactions between drugs, supplements, and food and drink

- **Potassium supplements** can be overdosed in the event of excessive use with certain medications, such as those used for high blood pressure, such as "potassium sparing" diuretics, which can lead to an increase in potassium levels and fatal arrhythmias; people with renal insufficiency must not take potassium preparations on their own;
- **Extracts of ginkgo biloba, ginseng, garlic, echinacea, green tea** with drugs that reduce clotting (Acenocoumarol, Warfarin) due to the risk of bleeding, ginseng extract may reduce the effectiveness of diuretics and lower blood pressure, used in the evening may cause insomnia;

Interactions between drugs, supplements, and food and drink

- It is recommended to wash down medications with boiled water (at least half a glass), because mineral waters, due to the content of minerals, may limit the absorption of certain medications, as well as strong coffee, tea, milk drinks; citrus juices, especially grapefruit juices, from cranberries are contraindicated when taking medications for hypertension, immunosuppressants;
- Fiber-containing foods may inhibit the absorption of many drugs, fats may limit, and in some cases intensify, the absorption of drugs - this requires taking into account a specific time when taking drugs, reading the information on the packaging;

Interactions between drugs, supplements, and food and drink

- It is not recommended to:
 - use supplements, over-the-counter drugs without consultation, while taking anticoagulants, antiplatelet drugs and non-steroidal anti-inflammatory drugs (NSAIDs);
 - use any medications or supplements on your own in the case of chemotherapy, as this may lead to complications;

Interactions between drugs, supplements, and food and drink

- It is advisable to have a list of currently taken medications and supplements prepared and show it during a doctor's or nurse's visit; in the case of lonely people, seniors, so the list should be placed at home in an easily visible place (e.g. stuck on the refrigerator). The "Envelope of life" is more and more common in retirement homes.

Drug-alcohol interaction



The effect of consuming alcohol during drug treatment does not have to be immediately visible.

Itself has a harmful effect on the liver, kidneys, circulatory system and brain. When combined with substances in drugs, the toxic effects can be exacerbated.

Popular over-the-counter drugs (OTC) that should absolutely not be combined with alcohol are:

- **Paracetamol** - drinking alcohol-containing drinks and treating a hangover with painkillers will damage the liver.
- **Aspirin** - by itself it has an irritating effect on the gastric mucosa, and when combined with alcohol, it may contribute to stomach ulcers and gastrointestinal bleeding in the long run.
- **Ibuprofen** - although it is relatively safe, in combination with ethanol it can irritate the gastric mucosa.

Drug-alcohol interaction

Popular over-the-counter drugs (OTC) that should absolutely not be combined with alcohol are:

- **Furagine** - a popular diuretic for urinary tract infections, taken with alcohol, it blocks the liver's enzyme aldehyde dehydrogenase, which breaks down acetaldehyde into less toxic acetic acid. Aldehyde poisoning may result and dangerous symptoms may occur: vasodilation, increased sweating, sudden drop in blood pressure, breathing disorders, anxiety, vomiting, nausea, etc.
- **Codeine** - is a substance found in many cough pills and syrups. When combined with ethanol, it increases sleepiness, causes dementia, and can even lead to respiratory depression and suffocation.

Drug-alcohol interaction

Popular over-the-counter drugs (OTC) that should absolutely not be combined with alcohol are:

- **Antibiotics** are one of those drugs that absolutely must not be combined with ethanol. Just one drink weakens the action of antibiotics and the therapy is no longer effective. Some antibiotics can interact dangerously with C₂H₆OH and cause liver and kidney damage, nausea, vomiting, headaches and heartaches, and even seizures. Acetaldehyde accumulating in large amounts can cause serious poisoning. Particular care should be taken especially when taking antibiotics from the imidazole group (metronidazole, tinidazole), sulfonamides (cotrimoxazole), and cephalosporins, because they may be followed by a disulfiram effect, i.e. similar to what occurs after the use of the so-called alcohol label with disulfiram. You must never stop taking an antibiotic because of a planned event. It works because you use it regularly and take the full prescribed dose. Discontinuation of antibiotic treatment or interruption of treatment may lead to worsening of the infection.

Drug-alcohol interaction

Popular over-the-counter drugs (OTC) that should absolutely not be combined with alcohol are:

- **Antidepressants and sedatives** - some antidepressants can raise blood pressure and increase the toxic effects of alcohol, while hypnotics, especially benzodiazepines and their derivatives, can cause drowsiness, distraction or even respiratory depression. The combination of benzodiazepines and barbiturates and alcohol can kill you from suffocation.
- In combination with alcohol, **antiallergic drugs** may increase the feeling of tiredness and drowsiness. Combination of e.g. Allegra with alcohol is not recommended due to the possibility of dizziness, drowsiness and psychomotor impairment.
- Other drugs that should not be combined with alcohol include: Neurovit, because there is a reduced absorption of the drug, Maxon due to a delay in reaction time, or Zinnat due to the reduction of the drug's effect and the possibility of seizures.

Introduction

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Drug administration

The process of administering the drug includes collecting it and preparing it for use. It may consist of a drug countdown, dose calculation, measurement, labeling or, for example, dissolution. Each person preparing the drug must **check it at least 3 times**. In addition, in the literature on the subject, you can find recommendations / rules for administering drugs.

The **5W principle** (5 rights of the medication use process) indicates a procedure that involves checking possible drug allergies, compliance with the right drug name, right dose, drug form, right route and time (right time) for administering the drug with the order to the right patient.

6W principle emphasizes the need to document the administration of the drug (right documentation).

Rules for the preparation and administration of drugs

- Check the drug three times before administration
- Check that the user is not allergic to the drug
- Document the administration of the drug
- Guarantee the right to refuse
- Be knowledgeable about the drug
- Apply medications properly
- Take care of the proper treatment result
- Provide advice / information to the mentee
- Monitor the user's response to the drug administered

Activities regarding the monitoring of drugs administered to users include:

- observing that the user:
 - has taken the drug correctly,
 - feels well,
 - does not feel discomfort,
 - feels the therapeutic effect of the drug (s),
 - there are no side effects (side effects and toxic effects),
- documenting this stage of the pharmacotherapy process.

Monitoring stage errors include:

- lack of or insufficient monitoring of users for the presence of adverse / toxic effects; these errors occur when drug levels are not measured or measured, but the result is not checked or ignored,
- administering the drug after the end of the prescribed treatment or after it has been found not to be effective,
- not paying attention to the fact that the user has not completed the prescribed treatment,
- no reporting of adverse drug reactions to the Office for Registration of Medicinal Products, Medical Devices,
- no knowledge of the rules for reporting adverse events,
- no knowledge of the rules for reporting adverse effects, which are listed in the Summary of Product Characteristics (SmPC),
- errors in communication, e.g. in the event of a change of the entity providing services health when the user leaves the hospital and reports to the general practitioner / specialist or vice versa.

Drug related adverse events

Adverse effects of drugs (formerly - side effects) are all negative effects that occur after therapeutic doses. It is a relative concept. A dry feeling in the mouth after administration of atropine to stop an asthma attack is an undesirable effect, while in a patient suffering from drooling, it is a beneficial effect. We distinguish between **direct** and **secondary** side effects. The latter is a consequence of long-term consequences of the drug's action - e.g. hypovitaminosis B and K after the use of oral antibiotics with a wide range of antibacterial activity (a consequence of disturbance of the biocenosis, i.e. the balance between microorganisms in the intestines).

Toxic effect - is a consequence of administration of doses higher than the therapeutic ones (a consequence of overdose).

Drug related adverse events

The definition of adverse drug events or side effects includes any harm caused to a patient in connection with the use of drugs as a result of correct, misuse, or lack of access to essential drugs. Drug-related adverse events can be prevented when they are related to medication errors or are inevitable when they are related to the body's responses to drugs. Adverse events are more common than you might think.

Causes and types of side effects of drugs

The reasons that influence side effects are varied. For example: lack of information, easy access to medicines, administrative errors, self-treatment, interference from relatives and friends, including difficulties in accessing health services. Problems can also arise from a lack of data accumulated during the drug development stages, which are inevitably incomplete. There are several common types such as side effects, in addition to indication of use, drug interactions, and poisoning.

Adverse drug reactions are unexpected effects of the drug on the patient's body and one of the most common causes of hospitalization. Cardiovascular, gastrointestinal and central nervous system drugs are the major causes of adverse reactions in the population.

Some drugs are used for purposes other than those approved, the so-called off-label use, off-label, as they are sometimes the only treatment option available, exposing the patient to side effects and therapeutic ineffectiveness. If used incorrectly, the drug can also cause poisoning.

Geriatric iatrogenic syndrome

The geriatric iatrogenic syndrome is referred to, among others, by when in an elderly person a new disease appears due to improper treatment of other, previously diagnosed, diseases.



Geriatric iatrogenic syndrome: symptoms

- imbalances
- fluctuations in blood pressure
- abnormal heart rhythm
- gastrointestinal bleeding
- deterioration in the daily functioning of a senior
- weight loss
- cognitive impairment



Geriatric iatrogenic syndrome - causes

Iatrogenic can be experienced in any age group. Older people, however, are simply especially predisposed to it. This is due to several factors. First of all, the body of an elderly person functions differently than that of a young person. For example, kidneys or liver work worse in it, which affects the metabolism and excretion of drugs, and ultimately is associated with the fact that taking various pharmaceuticals by an elderly person may be associated with a greater risk of their side effects. Elderly people often suffer from many different disease entities, as a result of which they take quite large amounts of various pharmaceuticals. This can also cause the geriatric iatrogenic syndrome.

The more drugs a patient takes, the greater the risk that there will be some adverse interactions between them. A particularly high risk of such a situation arises when the senior attends many different medical specialists and at the same time does not inform them about the exact medications prescribed to him by each of them.

Geriatric iatrogenic syndrome - causes

Geriatric iatrogenic syndrome may also appear more often in patients:

- hospitalized - various health consequences may result from the patient being immobilized, in addition there is also a risk of, inter alia, nosocomial infections,
- undergoing any surgery,
- people who take various types of herbal preparations on their own - many seniors believe that herbs are completely safe, while many of them (eg. St. John's wort) may interact significantly with the medications they take.

Due to the availability of many **generics** on the market, patients often use two preparations under a different trade name, containing the same active compounds.

Generic drugs are preparations that resemble the original drugs. These are pharmaceuticals containing the same active substance as the original drug, having the same therapeutic effect, and produced after the license expires.

Geriatric iatrogenic syndrome - diagnosis

The diagnosis of geriatric iatrogenic syndrome is not really easy. Usually new ailments occurring in a senior are considered simply a symptom of a new disease entity that requires additional treatment. Due to the fact that the symptoms of the geriatric iatrogenic syndrome, which have not been previously seen in an elderly patient, it is always necessary to carefully analyze all the illnesses he suffers when he begins to complain about problems other than before. also look at the medications he's taking.

Geriatric iatrogenic syndrome - treatment

In the treatment of geriatric iatrogenic syndrome, the most important modifications are usually the pharmacotherapy conducted so far in the elderly. An example is a situation where a person taking antiarrhythmic drugs (so far working properly) develops cardiac arrhythmias. Then, when it turns out that the patient was taking St. John's wort infusions with them, discontinuation of the drug may result in the resolution of cardiac arrhythmias.

In the case of other geriatric iatrogenic syndromes, it may be helpful to reduce the doses of drugs or replace some of the medications taken by the elderly with those that will not interact with other medications taken by him.

Geriatric iatrogenic syndrome - prevention

Geriatric iatrogenic syndrome is not easy to recognize and prevent. However, it is possible.

The most important in this case is the exact planned pharmacological treatment in the elderly. Before starting any new drug, you should pay attention to what drugs you have taken so far and choose a preparation that will not interact with them. Attention should also be paid to the dosage of pharmaceuticals. In the elderly, especially those suffering from renal or hepatic dysfunction, drug doses should often be appropriately reduced. In the case of those patients who are hospitalized, it is always necessary to avoid their immobilization for too long. They should be induced to be physically active. And when the patient is unable to move alone, the risk of geriatric iatrogenic syndrome can be reduced through rehabilitation.



Polypragmasy, polytherapy, insufficient treatment

- **Polytherapy** is a combination therapy, multi-drug therapy or polypharmacotherapy. Its essence is to treat the patient with several pharmacological agents at the same time. The therapy carried out in this way may refer to one disease or several diseases at the same time, but also to many drugs with different effects or to one preparation containing several different, properly selected active substances. The use of multiple drugs in a patient allows the therapeutic effect to be optimized. Some preparations administered together show what is known as hyperadditional synergism, that is, the enhancement of the action shown by each of them separately. **Polytherapy is a method of proper application of treatment, usually carried out under the supervision of a physician.** In the context of multi-drug use, **the term polypragmasy also appears. This is inappropriate multi-drug therapy. Polypragmasy most often includes self-medication**, i.e. taking many drugs at the same time, usually over the counter (e.g. painkillers or non-steroidal anti-inflammatory drugs, often with different trade names, but also other drugs).

Polypragmasy, polytherapy, insufficient treatment

- Taking more than 5 medications at the same time by a patient is known in medicine as **polypragmasy**. It is one of the most common medication errors, leading to a significant increase in drug-drug and drug-food interactions. Bad prescription of drugs may cause serious and irreversible therapeutic complications.
- The most common cause of polypragmasy is the patient's age and the number of medical consultations. Many health problems of the elderly result from the simultaneous use of many different medications. Polish population research PolSenior has shown that elderly people take more than 5 drugs on average, and over 90% of elderly patients take drugs every day. The risk of drug interactions increases the more drugs the patient is taking. A very important term in the phenomenon of polypragmasy is **the pharmacological cascade**, i.e. the treatment of ailments resulting from side effects of drugs by including another drug.

Polypragmasy, polytherapy, insufficient treatment

- One example of a **pharmacological cascade** is, for example, edema associated with the use of calcium channel blockers that are treated with diuretics. These drugs, in turn, contribute to hyperuricemia and gout attacks, for which pain medications are used. Compounds from the group of non-steroidal anti-inflammatory drugs (NSAIDs), used long-term, cause dyspepsia and may lead to the development of peptic ulcer disease, therefore it is recommended to take proton pump inhibitors (PPIs) at the same time. In this way, the use of one group of drugs causes the inclusion of three more in the therapy. Each of them may additionally cause other side effects, such as headache, diarrhea or vomiting, which in most cases will cause the patient to take over-the-counter (OTC) medications.



Polypragmasy, polytherapy, insufficient treatment

- Some factors that contribute to **insufficient treatment** include early discontinuation of treatment, inadequate drug dosing, user non-compliance, lack of medication in stock, misdiagnosis, and co-morbid psychiatric disorders. It may include treatment-resistant depression (TRD), people are resistant to SSRIs, selective serotonin reuptake inhibitors, a group of psychoanaleptic antidepressants that inhibit neuronal reabsorption of serotonin.

Drug Dispensing and the Caregiver

- One of the common issues that caregivers have to deal with on a daily basis is the need to dispense their care recipient's medication in a safe and timely fashion. Navigating the dangerous waters of different pill sizes, colors and dosages can be an intimidating experience as most family members and caregivers possess neither an in-depth knowledge of these medications nor the ability to discern when a problem with the pills may be developing. It can be exhausting for a caregiver to track and sort all pills, liquids, creams, nasal sprays and eye drops and administering them all.
- Elderly, infirm, chronically ill users often seem to be on a never ending slew of pills that need to be doled out on a regular basis. It doesn't matter that the users have accumulated them honestly, usually a few at a time during each hospital admission; but the sum total is what the caregiver, must face every day on the job. There are many medication organizers and dispensers, as well as high technology, that can assist the caregiver to organize / manage / stack medication to the user over an extended period of time. You can make the drug list easily accessible at all times by creating it as a Word or Excel file on your computer that your caregiver can access on a smartphone or tablet via a cloud storage application (eg Dropbox). Some care apps facilitate the drug management process by allowing you to add tablet information by taking a picture of your medicine bottles. There are also smart electronic pillboxess and dispensers that sound an alarm when it's time to take them, and send alerts to caregivers when medication has been taken or not taken.



Drug Dispensing and the Caregiver

- In past years, medications were often dispensed three or four times per day or worse. Thankfully, in our modern day, each medication only has to be taken once or twice every twenty-four hour period. The downside is that there are a lot more diseases we can treat and consequently a lot more pills people can consume. In an effort to decrease the angst this process can cause and keep the user on a safe and effective regime, there are several simple rules one can follow.
- First of all, it's a good idea to keep all medications in a safe and secure place. Playful grandchildren, nosy visitors and even confused users will get into the pill bottles if they're left unattended. Some medications have to be refrigerated, but most can be safely stored in a secure cupboard. Pharmacies, in an effort to keep business, have developed blister packs that link the pills with specific days of the week. So, in the middle of a busy day, if the caregiver suddenly wonders "Did I give him his morning pills?" all it takes is a quick look at the package to confirm that, yes, it was given. In the same vein, all medications should be administered at the same time every day. Modern pills have been designed for specific durations and maintaining a regular dosing schedule will decrease the risk of adverse reactions.



Drug Dispensing and the Caregiver

- Not to overstate the obvious, but dosages of drugs should not be changed without first consulting the user's physician. The old adage "If one is good, two is better" does not apply in these situations. Playing with the dosages of blood thinners, heart pills and pain killers can easily have unforeseen and unfortunate side effects.
- Despite what the infomercials say, don't start using over-the-counter products, herbs, vitamins and supplements without first discussing it with a physician. Not only is quality control for these products somewhat lacking (as compared to prescription medications), but they may interact with the user's normal medications by increasing or decreasing the medicinal concentration in the body.
- Check the expiry date on the prescription bottle. Medications that are only used on an as-needed basis may become ineffective if left too long on the shelf. A good example would be nitroglycerin pills for chest pain or a ventolin inhaler for an asthma exacerbation. The one time you need it could be the time you discover it's out of date. Likewise, it's prudent to double check the prescriptions that are picked up from the pharmacy against a home list of medications being given. The employees filling the prescription are human too and can make mistakes.

Drug Dispensing and the Caregiver

- Create and maintain a drug list. Thanks to the list, it is less likely that you will forget about anything when filling pillboxes, or when visiting a doctor or hospital with a patient. The list also helps ensure that additional caregivers or an emergency responder can easily find information. **The list of drugs should include categories such as:**
- Drug name (generic names, trade names), dose, dosing frequency (for example: 600 mg, 1x / day; 25 mg, 2x / day)
- Start and end dates
- What a pill / capsule / liquid looks like
- A record of any side effects you've experienced
- What the drug treats (blood pressure, thyroid, dementia, blood thinning, pain, etc.)
- Instructions: how and when to take the drug, what not to do while taking the drug
- Over-the-counter medications and supplements along with their dosages
- Drugs and other allergies
- Drugs to which the user experienced a negative reaction (could not tolerate)
- Recently filled recipes
- Name / contact details of prescribers (doctor / nurse)
- Name and surname / contact details of the pharmacy that filled the prescription (prescriptions)

Drug Dispensing and the Caregiver

- Caregiver dispose of unused medications safely. Return unused drugs in person or by mail, e.g. to a pharmacy, look for a drug dispensing machine or neutralize them (e.g. buy special bags for drugs activated with charcoal, put drugs in them, add water, seal, drugs will become inert and inactive, in including opioids, then put them in the bin and rest assured that drugs will not enter the water or be diverted).
- There are also options to consider if the condition of the person you are caring for begins to deteriorate. For example, if problems develop with his or her ability to swallow, there may be some pills that can be changed to a liquid or even given through a small butterfly needle in the skin. Some newer medications are actually a combination of two or three different drugs and using them could decrease the total number of pills consumed daily.

Drug Dispensing and the Caregiver

- Another aspect to consider, especially if his or her condition is worsening, is whether they really require all those medications. If user, who is well into her ninth decade, is truly failing, does she really need that cholesterol pill or that Alzheimer's drug? Maybe it's time to have a family discussion with the physician and ask the question, "Have we reached the point where we are treating the disease instead of the patient?" One of the benefits of modern medicine is that we have so many wonderful drugs to combat the detrimental aspects of aging and disease. However, just because these drugs now exist doesn't always mean it's in the best interest of the user to use them.
- **The use of medicines is one aspect of caregiving that will not disappear in the foreseeable future. It is a complicated and precise job that requires concentration and adherence to a rigorous schedule. The aforementioned tips are meant to simplify this task and make life that much easier for the caregiver.**



Thank you!

Teachers's name

Teachers's e-mail

Date of the session

