Ministry of health of the Republic of Belarus
Educational institution
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METHODOLOGICAL RECOMMENDATIONS

for a practical lesson on the discipline "Pharmacology"
for the third-year students of the Faculty of Foreign Students,
studying at the specialty 1-79 01 01 "General medicine"

TOPIC 1: **«PHARMACEUTICAL SCIENCES, PHARMACY, PHARMACOPEIA, STRUCTURE OF THE PRESCRIPTION. GENERAL PRESCRIPTION. SOLID DOSAGE FORMS»**

Time: 3 hours

Approved at the meeting of the department of general and clinical pharmacology
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LEARNING AND EDUCATIONAL GOALS, OBJECTIVES, MOTIVATION FOR LEARNING THE TOPIC

The current XXI century is marked by rapid development of pharmacology and pharmacy. This is associated with a dramatically increased number of new medicines entering the pharmacy or original combinations of already known medicines. In the arsenal of ready-to-use drugs there is a large number of highly effective drugs, which, however, inherent not only therapeutic, but often also undesirable (so-called side) effects. Their correct selection and prescribing require a competent physician. A prescription is a tool for cooperation between the physician and the pharmacist. Therefore, knowledge of the principles of prescribing (drug formulation) is essential for the physician of any profile.

Medicines of different origin are widely used in the form of solid dosage forms. This is due to the fact that they are convenient not only in storage, but also in use. Knowledge of drugs in solid dosage forms and the ability to write prescriptions for them is necessary for every physician, regardless of his or her chosen specialty.

Learning objective:

– formation of scientific knowledge about the main pharmacological effects, providing therapeutic and preventive effect of drugs on the topic of the class, indications and contraindications for their use, the interaction of drugs, their combined use for use in medical and preventive activities.

Educational purpose:

– to develop their value-personal, spiritual potential, to form the qualities of a patriot and citizen, ready for active participation in the economic, industrial, socio-cultural and public life of the country; to realize the social significance of their future professional activities, to learn to follow academic and work discipline, standards of medical ethics and deontology.

Tasks:

As a result of the study lesson, the student should

know:

– classification and basic characteristics of the studied drugs, pharmacodynamics and pharmacokinetics, indications and contraindications for their use, side effects;

– features of pharmacokinetics and pharmacodynamics, advantages and disadvantages of different dosage forms of these drugs;

– principles of research and testing of new drugs; information and reference and search systems;

be able to:

– analyze the effect of the studied drugs on the set of their pharmacological properties and the possibility of their use in medical practice; to write them in prescriptions;

– use different dosage forms of these drugs, based on the peculiarities of their pharmacodynamics and pharmacokinetics;

– work with scientific literature, search for information about the use and action of the studied drugs;

possess:

– skills in choice of drugs on the topic of the lesson;

– the rules of prescribing the studied drugs in the treatment of various diseases and pathological conditions, taking into account the indications;

– skills of dosage regime correction in case of pathological changes in functions of organs or systems responsible for biotransformation and elimination of drugs or in case of joint use of different drugs;

– skills to search, analyze and summarize information about the use and effects of the studied drugs.

Motivation for learning the topic:

– the specifics of training doctors in this specialty determines the need for students to purposefully study the main pharmacological effects, providing therapeutic and preventive effects of drugs on the topic of the class, indications and contraindications for their use, the interaction of drugs, their combined use, which will successfully complete the specialized disciplines of the specialty.

MATERIAL EQUIPMENT

Reference and informational literature, charts, tables, presentations, drug collections.

CONTROL QUESTIONS FROM RELATED DISCIPLINES

1. Latin terminology: dosage forms, commonly accepted abbreviations.
2. Case endings of Latin nouns I, II, III, IV, V declensions in the genitive case.

CONTROL QUESTIONS ON THE TOPIC OF THE CLASS

1. The State Pharmacopoeia, its content and purpose. International Pharmacopoeia.
2. Pharmacy. Rules of storage and release of medicines.
3. The recipe, its structure. Rules for prescribing prescriptions. Features of prescribing narcotic, poisonous and potent medicines.
4. Solid dosage forms (powders, tablets, pills, capsules): their characteristics, advantages and disadvantages, prescribing rules.

PROCESS OF THE STUDY

1.
2.
3.
4.
5.

Theoretical part

Terminology

Pharmaceutical sciences are a group of interdisciplinary areas of study concerned with the design, action, delivery, and disposition of drugs. They are subdivided into pharmacology, pharmacy, pharmacognosy, and pharmaceutical chemistry.

Pharmacology (Greek: pharmakon — medicine; logos — science) is the science of drug action on biological systems.

*Pharmacy i*s the science and technique of preparing and dispensing drugs.

The general prescripton is a section of medicine about the general rules for drugs prescribing, about the manufacture of various dosage forms, their merits and demerits.

Dosage form is a convenient drug form in which it is marketed for use.

Classification of dosage forms:

1. By consistency:

– solid: powders, tablets, dragees, granules, caramels, pastilles, etc.;

– soft: ointments, pastes, liniments, suppositories, patches;

– liquid: solutions, infusions, decoctions, tinctures, extracts, mucus, emulsions, suspensions.

2. by route of administration:

– topical;

– oral;

– parenteral;

– inhalational.

3. by composition:

– monocomponent;

– complex.

Medicinal substance is a chemical compound interacting with biological systems, having a specific effect on the body and used to treat, diagnose or prevent diseases.

Medicinal product (drug*)* is any substance or combination of substances used for the purpose of diagnosis, prevention and relief of symptoms or cure of disease.

Efficacy is the extent to which a drug has the ability to bring about its intended effect under ideal circumstances, such as in a randomised clinical trial. So it is a measure of the ability of the drug to treat whatever condition it is indicated for. A drug may have very good efficacy but its actual utility can be extremely limited.

Effectiveness is the extent to which a drug achieves its intended effect in the usual clinical setting. It can be evaluated through observational studies of real practice. So it is a measure of how well the drug works.

Therapeutic benefit *is* a good or helpful result or effect *(*curing a disease, slowing its evolution, or alleviating its symptoms).

The risk of drug use is the likelihood of unwanted effects.

Benefit-risk balance is review of the benefits and the risks associated with a drug. The dimension of benefits is measured primarily in terms of therapeutic efficacy, ie, the successful treatment of the condition lor which the drug is indicated. The dimension of risks includes the **safety profile** observed in the form of the sum of all adverse drug reactions.

Sources and methods of obtaining medicinal substances

Sources of medicinal substances (medicinal raw materials):

1. *Plant*: Atropa belladonna gives atropine, Poppy papaver somniferum gives morphine.

2. *Animals*: pancreas is a source of insulin, used in treatment of diabetes, blood of animals is used in preparation of vaccines, cod liver is used as a source of vitamin A and D;

3. *Microbiological*: Penicillium notatum is a fungus which gives penicillin; Actinobacteria give Streptomycin.

4. *Mineral/Earth*: iodine is an antiseptic, iron for iron deficiency anemia, petroleum is used in preparation of liquid paraffin.

5. *Semi synthetic/synthetic*: most of the drugs used nowadays (such as antianxiety drugs, anti convulsants). New molecules or modified natural molecules.

6. *Recombinant DNA technology*: the desired gene is coupled to rapidly replicating DNA (viral, bacterial or plasmid). The new genetic combination is inserted into the bacterial cultures which allow production of vast amount of genetic material. Human recombinant insulin is made this way.

Methods of obtaining medicinal substances:

1. Simple processing: drying and grinding of medicinal raw materials. The drugs obtained in this way are called simple.

2. Extraction of biologically active components with partial release of them from impurities (ballast substances). Medicines obtained in this way are called complex or galenic (after Claudius Galen, a 2nd Century AD Greek physician, who codified the preparation of drugs using multiple ingredients). These include tinctures and extracts. Disadvantage: existing impurities (dyes, proteins, mucus) can weaken the action of drugs and prevent their parenteral use.

3. Extraction of biologically active components in the chemical-pharmaceutical industry with almost complete removal of ballast substances. These drugs are administered parenterally and called neogaleni (for example, adonizid, lantozid, etc.). They contain a complex of chemical substances determining biological activity of raw materials and medicines made from it.

4. Method of synthesis – for example, synthesis of bioamines (adrenaline, noradrenaline, prostaglandins).

5. Genetic engineering methods – the direct manipulation of an organism's genome using biotechnology (insulin, somatostatin).

6. Cell engineering methods – monoclonal antibody production for cancer treatment.

Pharmacopoeia

Pharmacopoeia (Greek «drug-making») is a book containing directions for the identification of compound medicines, and published by the authority of a government or a medical or pharmaceutical society. Pharmacopoeias provide standards for pharmaceutical substances and medicinal products. This book isn’t for the doctors but for organizations engaged in the manufacture, storage and use of medicines.

Countries have their own pharmacopoeias. The European Union has a supranational pharmacopoeia, the European Pharmacopoeia; it has not replaced the national pharmacopoeias of EU member states but rather helps to harmonize them. The World Health Organization has produced the International Pharmacopoeia (Ph.Int.).

Drug nomenclature

Each drug has three names: chemical, generic or non-proprietary and trade (brand) names.

The chemical names are the scientific names, based on the molecular structure of the drug. Chemical names are typically very long and too complex to be commonly used in referring to a drug. (like 1-(Isopropylamino)-3-(1-naphthyloxy) propan-2-ol for propranolol). Acetylsalicylic acid is a simpler example.

Nonproprietary (generic) names are unique names that are globally recognized

and are public property (example – aspirin for acetylsalicylic acid). Names are given by the relevant national regulatory agency like FDA (Food and Drug Administration) in the USA or the World Health Organization (it gives International Nonproprietary Name – INN). The name is the same in all the countries. Drugs from the same group often have the same endings: rituxi**mab**, abcixi**mab**, and belimu**mab** for therapeutic monoclonal antibodies (mAbs), capto**pril**, enala**pril**, lizino**pril** for angionensin-converting enzime inhibitors.

Trade (trademark) names are names given by the pharmaceutical company for the market. To avoid confusion, trade-marks cannot be derived from generic names and, in particular, must not include their common stems. Example: Aspir 81, Bayer Aspirin for aspirin (it's acetylsalycilic asid as you already know).

Pharmacy

A pharmacy (also called "**drugstore**" in American English or "**community pharmacy**" or "**chemist's**" in Commonwealth English) is a retailshop which provides prescription drugs.

Types of pharmacy:

1. *community pharmacy* – the most well known, type of pharmacy. A community pharmacist usually works in a store that provides the community with access to the medications they need, as well as advice to promote the safe and effective use of the medicines they provide;
2. *hospital pharmacy* – the place where the management of medications occurs in a hospital, medical clinic or nursing home. They often work in close collaboration with other health professionals to ensure that the medication regimen for each patient is optimized to achieve the best outcomes;
3. *clinical pharmacy* – exists in a number of settings, including hospitals, nursing homes and other medical centers. The aim of clinical pharmacy is to ensure the optimal use of medications for the best outcomes through the provision of drug information and monitoring for drug safety and efficacy;
4. *industrial pharmacy* – involves the pharmaceutical industry and includes the research, production, packaging, quality control, marketing and sales of pharmaceutical goods. An industrial pharmacist may work as a representative for a particular pharmaceutical company;
5. *compounding pharmacy* – involves the production and preparation of medicines in new forms (eg, reformulating a powder tablet to a solution);
6. *consulting pharmacy* is relatively new branch of pharmacy, born in 1990. It focuses on the theoretical review of medications rather than dispensing medicines. Consultant pharmacists often work in nursing homes or visit patients in-home to provide their services;
7. *ambulatory care pharmacy* – provides healthcare services to many patients in rural areas, particularly to geriatric populations;
8. *regulatory (government) pharmacy* – responsible for creating rules and regulations for the safe use of medicine to promote positive health outcomes;
9. *home care pharmacy* – involves the preparation and delivery of injectables to critically ill patients in the home environment.

Medical prescription

Prescription *(*"pre-" ("before") and "script" ("writing, written") is a health care provider's written authorization for a patient to purchase a prescription drug from a pharmacist.

Nowadays prescriptions may be entered into an electronic medical record system and transmitted electronically to a pharmacy. This option becomes more and more widespread all over the world but a good doctor should be able to write a classical handwritten prescription on preprinted prescription forms.

Rules of prescribing*:*

The prescription is written in a special form in Latin, explanations how to use the medication are in a national language.

The first rule is a good handwriting. Illegible handwriting can delay treatment and lead to unnecessary tests and inappropriate doses which, in turn, can result in discomfort and death. In 1999, an American cardiologist caused the death of a 42-year-old patient when his prescription of 20 mg Isordil, an antianginal drug, was misread by the pharmacist as 20 mg Plendil, an antihypertensive drug. Poor handwriting undoubtedly contributes to the high incidence of medical errors, in Britain, for example, it is estimated to cause the deaths of up to 30 000 people each year.

Corrections are not allowed.

The patient's age is indicated when the drug is prescribed to a child under 18 years old or a patient over 60 years old.

The composition of the medicinal product, dosage form and directions according to which the medicament is to be prepared are written in Latin.

The Latin text begins with an appeal to a pharmacist **«Recipe:»** meaning «Take:». In a short form it's **«Rp.».** Then substances are listed in the genitive case with the indication of their quantities.

There are abbreviated and expanded prescriptions. When prescribing medicines **for short**, the prescription first indicates the dosage form (Solutionis..; Suspensionis...; Unguenti...etc.), then ─ the name of the drug, the concentration (if necessary) and the quantity.

In the **expanded form** all the ingredients of a medical product and their quantities are enumerated. If there are a few components, the basic medicinal substance is written – *Basis*, then the auxiliary substances – *Adjuvans*. Sometimes substances that improve the taste and smell of the drug are prescribed; they are called correcting – *Corrigens*.

Somethimes we need *Constituens* – substance providing the drug a certain consistency. In this case Constituens are listed after basic and auxiliary substances. Next, with the notations used, the dosage form to be prepared is noted, for example, *Misce ut fiat unguentum* (M. *f.* unguentum) – Mix to make up an ointment.

The quantity of liquid substances is given in milliliters (ml), grams or drops. The amount of drops is denoted by a Roman numeral, before which we write **gtts** («drops» in Acc.), example, **gtts. V** (5 drops). When prescribing drugs dosed in **international units** of action (IU, international units), we indicate the number of IU in 1 ml. **Insulin, heparin, vitamins and hormones** are prescribed this way.

Sometimes we do not write the amount of Constituens (example, for suppositories) and give the pharmacist the right to take it as much as necessary; in this case we write **q. s.** (quantum satis= as much as necessary), but it's appliable only to indifferent substances.

The smallest dosage is written first. If there are few substances in the same dose we **do not repeat it** on every line. We write it once after the last substance given in this dose and write **aa (**ana=equally). Example: **aa 5 ml.**

The amount of substances is indicated on the right side of the prescription close to the name of the substance. In those cases where the maximum dose of toxic or potent substances is exceeded it is necessary to indicate their amount in words and add an exclamation mark (!) and a signature in support of the fact that a large dose wasn't written out by chance.

Designation **S.** (Signa. – Mark.) in the end of the prescription describes how to take the drug. This part is called **Signatura**. Here we note:

1) dosage (1 powder, 1 tablet, 1 tablespoon, 20 drops, etc.);

2) rout of administration (orally, intravenously, subcutaneously, etc.).

3) duration and frequency of drug administration (How many times a day, before meals or after meals, for a week, etc.);

Example: *1 tablet 3 times daily orally for a month.*

Then the doctor signs a prescription and puts his personal seal.

If the patient's condition requires the drug immediately we write write **Cito** (Soon) or **Statim** (Immediately) on the left above. In this case, the medicinal product must be manufactured and released out of turn.

When the doctor prescribes the medicine for himself he writes **Pro autore** – For the author or **Pro me** – For me.

Duration of treatment is usually indicated by denominators: 7 = days, 12 = months and 52 = weeks. For example, 1/7 = one day, 2/12 = two months and 1/52 = one week.

Example: Paracetamol 500 mg tabs II tds x 3 days.

The prescription is clear as it states:

- The dosage form of the paracetamol – tablets,
- The strength of the paracetamol tablets – 500 mg per tablet,
- The number of days for which the paracetamol tablets have been prescribed,
- The number of times the tablets should be taken each day,
- The number of paracetamol tablets to be taken each time.

Solid dosage forms

Tablets *(Tabulettae)* are solid unit dosage form prepared either by molding or by compression. Tablets are intended primarily for internal use. Some types of tablets are used for external use (after preliminary dissolution or for resorption in the oral cavity, for example, in dentistry or in ENT diseases).

As auxiliary substances, sugar, starch, sodium bicarbonate, sodium chloride, talc, cocoa, gelatin solution, water, alcohol, etc. are used (no more than 20% of the weight of the tablet). The weight of tablets can be up to 1 g (1.0). Tablet usually contains filler, diluents, binders, lubricants, glidants, disintegrants, antiadherent, colouring agents and flavouring agents as excipients.

Tablets disintegrate in the gastrointestinal tract on average for 15 min; coated tablets - for 30 minutes.

Advantages:

– Unit dosage forms with accurate, stable dose.
– Cheapest oral dosage form, easy to handle, use and carry out.
– Easy to swallow and production does not require and additional processing steps.
– Provide prolonged stability to medicaments.
– Administration of minute dose of drug in accurate amount.
– Unpleasant taste can be masked by sugar coating.
– Easy to divide into halves and quarters whenever fraction dose is required.
– Formulate as a special release products such as enteric or delayed release products.

Disadvantages:

– Possible mechanical and chemical irritation of the esophageal and stomach mucosa.
– Can't be used in uncounscient patients.
– Can't be used in little babies.

How to prescribe

There are 2 options:

– the name of the drug and its single dose are indicated, followed by the prescription of the number of tablets to be given – D. t. d. N. ... in tabulettis (Give such doses by number ... in tablets);

– when you write out tablets that contain several medicinal substances known under a special commercial name, the list begins with the name of the dosage form. Tabulettas (Tablets-accusative plural), then indicate the name of the tablets and their number.

Osmotic controlled-release oral delivery system is an advanced controlled release oral drug delivery system in the form of a rigid tablet with a semi-permeable outer membrane and one or more small laser drilled holes in it. As the tablet passes through the body, water is absorbed through the semipermeable membrane via osmosis, and the resulting osmotic pressure is used to push the active drug through the openings in the tablet.

Effervescent or carbon tablets are tablets which are designed to dissolve in water, and release carbon dioxide. Ingredients are usually difficult to digest or disruptive to the stomach or esophagus; or pH–sensitive, such as amino acids and antibiotics; or requiring a large dose or susceptible to light, oxygen, or moisture.

Examples:

1) 60 tablets containing 5 mg of enalapril. 1 tablet 2 times a day.

Rp.: Enalaprili 0.005
D.t.d.N.60 in tab.
S. Take 1 tablet bid orally

2) 20 tablets containing 500,000 units of nystatin. 1 tablet to be dissolved in the mouth 4 times daily.

Rp.: Nystatini 500000 IU
D.t.d.N.20 in tab.
S. 1 tablet to be dissolved in the mouth qid.

3) 20 tablets containing 0.1 of theophylline, 0.05 of caffeine, 0.2 of paracetamol, 0.02 of phenobarbital and ephedrine, 0.0001 of cytisine, 0.003 of belladonna extract. To be administered 1 tablet orally in the morning or afternoon.

Rp.: Cytisini 0.0001
Extr. Belladonnae 0.003
Phenobarbitali
Ephedrini aa 0.02
Coffeini 0.05
Theophyllini 0.1
Paracetamoli 0.2
D.t.d.N.20 in tab.
S. 1 tablet od in the morning.

(*Note that phenobarbital and ephedrine have the same dosage).*

4) Prescribe 100 tablets "Nakom". 1 tablet 3 times a day during or after a meal.

Rp.: Tab. «Nacom» N.100
D.S. 1 tablet tid during or after a meal.

Dragee are solid dosage form made by covering the core by multiply layers of medicinal and auxiliary substances. The weight of the dragee should not exceed 1 g (1.0).

Dragee dissolves in the gastrointestinal tract for 30 min.

Advantages and disadvantages are similar to tablets.

How to prescribe – see the tablets.

Microdrage are small granules coated with a thin protective film. As a separate dosage form, microdrage is usually not used. They are used mainly in the manufacture of tablets, spansules and some other dosage forms.

Examples:

1) 10 dragees containing 0.05 diazoline. 1 tablet 2 times a day after meals.

Rp.: Diazolini 0.05
D.t.d.N.10 in dr.
S. 1 dragee bid after meals.

2) 50 dragees "Revit". 1 dragee 3 times a day for 10 minutes before meals.

Rp.: Dr. «Revit» N.50
D.S. 1 dragee tid in 10 minutes before meal.

Capsules *(Capsulae)* are shells for oral powders, pastes, granules or liquid medicinal substances. Capsules contain substances with an unpleasant taste, smell or irritating effect.

Types:

– *Hard capsules* (two-peace gel incapsulation), which are typically made using gelatin and contain dry, powdered ingredients or miniature pellets. These are made in two halves: a lower-diameter "body" that is filled and then sealed using a higher-diameter "cap".

– *Soft capsules* (peace gel incapsulation), primarily used for oils and for active ingredients that are dissolved or suspended in oil.

When prescribing medicinal substances in capsules, it is necessary to specify *in capsulis*.

Examples:

1) Prescribe 50 capsules of nifedipine 0.01. 1 capsule 3 times a day.

Rp.: Nifedipini 0.01
D.t.d.N.30 in caps.
S. 1 cap. tid orally.

Microcapsules are tiny particles or droplets surrounded by a coating to give small capsules. Microcapsuling is a modified-release dosage – it delivers a drug with a delay after its administration (delayed-release dosage) or for a prolonged period of time.

Spansules are capsules containing medicines, coated with materials having slow dissolving rates so that the medicine is delivered ata time after the capsule is taken a capsule designed to release drugs at a steady rate over a period of hours.

***Powders** (Pulveres)* are a solid dosage form, a dry mass of particles, as that obtained by grinding or rubbing a solid.

Hygroscopic substances, substances that, when mixed, form wet masses and liquids, easily decompose or give explosive mixtures are not prescribed in the form of powders.

Types:

1. simple powders (monocomponent);
2. complex powders (policomponent).

How to prescribe:

1. Powders for *topical* use aren't divided into doses. 5.0 to 100.0 g dosage is prescribed. The name of the drug substance and its total quantity are indicated in the prescription.

2. *Oral* powders can be devided or not devided into doses. They are not devided if the dosage isn't important (for example, sodium sulfate, magnesium sulfate).

3. In other cases powders are devided into individual doses. In the prescription, a drug substance with a single dose is indicated. Then the amount of powders is given: D. t. d. N. ... (Dentur tales dosus numero. – Let such doses be given by the number...). The average weight is 0.3-0.5 g. *The mass of the powder should be not less than 0.1 and not more than 1.0 g.*

4. When prescribing complex powders, a substance with a lower dose is indicated first. Then we note **M. f. pulvis** – Mix to make up a powder.

5. If the substance dosage is *less than 0.1 g*, indidderent substanses (usually sugar, 0.3-0.5 g) are added.

6. Indifferent substances are added to *vegetable* powders (leaves, roots, etc) if the mass of the powder is less than 0.05 g. First we right **Pulveris**, then the part of the plant and its name (eg, **Pulveris radicis Rhei**) and dosage.

7. Volatile and hygroscopic powders are released in a package of parchment, waxed (Charta cerata) or paraffined paper (Charta paraffinata), as indicated in the recipe.

Examples of powders for topical use:

1) 20.0 g of powder containing zinc oxide and talc equally, to sprinkle affected skin areas 2 times a day.

Rp.: Zinci oxydi
Talci aa 10.0
M.f.pulv.
D.S. To sprinkle affected skin areas bid

Examples of powders for oral use:

1) 6 powders of azithromycin in capsules (each is 0,25). 2 capsules in the 1st day, 1 capsule during 2nd-5th day 1 hour before meals.

Rp.: Azithromycini 0.25
D.t.d.N.6 in caps.
S. 2 cap. in the 1st day, 1 cap. during 2nd-5th day 1 hour before meals.

2) 100 powders containing 0.1 isoniazid, 0.3 rifampicin and 0.4 ethambutol in capsules. 1 capsule 2 times a day.

Rp.: Isoniasidi 0.1
Rifampicini 0.3
Ethambutoli 0.4
M.f.pulv.
D.t.d.N.100 in caps.
S. 1 cap. bid.

3) Powered digitalis leaves 0.04 to be taken at once. Release in wax paper. 1 powder 3 times daily during 4 days.

Rp.: Pulv. fol. Digitalis 0.04
Sacchari 0.26 (*cause powder mass is <0.1 g!)*
M.f.pulv.
D.t.d.N.12 in charta cerata
S. 1 powder tid orally.

Granules (Granula) are a solid dosage form representing homogeneous particles (grains, granules) to be taken with a small amount of food.

Granules disintegrate in the digestive tract on average for 15 min.

How to prescribe:

1. Granules are prescribed in a short form: we write the dosage form, medicinal substance and its amount.

2. If granules aren't divided into doses *the total amount* of granules is given. Most often granules are taken by teaspoonful. Some granules should be dissolved in water before use.

3. If granules are divided into doses we write the name of medicinal substance and its *single dose*, then – amount of doses and signature. Examples of such drugs are sucralfate (1.0), plantex (5.0), and nimesil (2.0).

4. **Examples:**

1) 10 sachets of nimesulide granules 2.0. To take 2.0 having dissolved in a small amount of water 2 times a day after meals.

Rp.: Nimesulidi 2.0
D.t.d.N.10
S. 1 sachet contents to be dissolved in a small volume of water and taken bid after meals.

2) 100,0 urodan in granules. 1 tablespoonful 4 times daily (before meals, havimg dissolved in ½ cup of water).

Rp.: Granulorum Urodani 100.0
D.S. 1 tbsp qid orally (before meals, havimg dissolved in ½ cup of water).

or Rp.: Urodani 100.0

D.S. 1 tbsp qid orally (before meals, havimg dissolved in ½ cup of water).

Caramels (Caramel) are solid dosage forms, prepared by mixing medicinal substances with sugar and molasses. They are used mostly to treat thtoat amd mouth. For example, antifungal and antibacterial drug dekamine is produced in the form of caramel.

Examples:

1) Prescribe 100 caramels each containing 0.00015 decamins. 1 caramel under the tongue until completely absorbed every 3 hours.

Rp.: Carameli Decamini 100.0 (aa 0.00015)

D.S. 1 caramel sublingually until completely absorbed every 3 hours.

Pastilles or *troche* (Trochiscius) ─ a type of medicinal pills made of a thick liquid that has been solidified and is meant to be consumed by light chewing and allowing it to dissolve in the mouth like candy. Example: various **cough sweets are used to** temporarily stop coughs and lubricate and soothe irritated tissues of the throat.

Practical part

1. Take notes on theoretical material demonstrated by the teacher.
2. Master the methods of solving the tasks and writing out prescriptions on the topic of the class.

Theme learning control

Conducted in the form of independent written work (solution of practical problems and prescriptions for individual task).

METHODOLOGICAL RECOMMENDATIONS FOR ORGANIZATION AND EXECUTION OF STUDENTS' INDEPENDENT WORK (SIW)

The time given for independent work can be used by students for:

– preparing for the practical classes;
– completing the tasks on the topic of the class in the workbook;
– preparing thematic reports, essays and presentations;
– taking notes from academic literature.

The main methods of organizing independent work:

- completing tests and practical tasks of the electronic educational-methodical complex (EEMC) for self-monitoring and self-assessment.

The list of tasks of the SIW:

- solving practical problems in the EEMC;
- completing the test tasks of the EEMC.

Control of the SIW is carried out in the form of:

- assessment of an oral answer to a question, report, report, or solution of a task in a practical class;
- individual conversation.

METHODOLOGICAL RECOMMENDATIONS FOR ORGANIZATION AND EXECUTION OF CONTROLLED INDEPENDENT WORK OF STUDENTS (CIWS)

Recommended forms of CIWS organization:

- doing exercises on the topic of the class in the workbook;

- writing an essay on a given topic;
- preparing a report and a multimedia presentation on a given topic.

The list of tasks of the CIWS:

Topics of essays / multimedia presentations:

1. Sources of medicinal raw materials.
2. Pharmacy business: history and modernity.
3. The history of prescription prescription.

Forms of control of CIWS realization:

- checking and grading an essay on a given topic;
- checking and grading a multimedia presentation on a given topic.

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