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PRESCRIPTION WRITING

Tutorial

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This tutorial describes the prescription writing rules applied in Russian Federation for foreign students. It contains brief rules with examples and special cases, self-training tasks, tests and keys for each activity.

Textbook is recommended for students of «General medicine faculty».

TABLE OF CONTENT

FOREWORD

The tutorial is intended to optimize the study process of discipline «Pharmacology» for students (General medicine, dentistry). It comprises theoretical material and self-study tasks.

The tutorial is arranged in consistency with Order № 4н (n) The Ministry of public health Russia (14.01.2019) «About approval of the procedure of prescribing of medicines, forms of prescription on drugs, order of registration of the forms, their account and storage» and amendments). Some specific information for foreign students from abroad is given in concise form.

LIST OF ABBREVIATIONS

WHO – World Health Organization
SP – State Pharmacopoeia
IU – Internalinal units of action
INN – International nonproprietary name

INTRODUCTION

Main terms and notions

The Russian life sciences framework is primarily shaped by the Federal Law of 12 April 2010 No. 61-FZ on turnover of medicines (the Pharmaceutical Law) and the Federal Law of 21 November 2011 No. 323-FZ on principles of healthcare of citizens in the Russian Federation (the Healthcare Law) with the Ministry of Healthcare of the Russian Federation (MoH) being the primary regulatory body and its subsidiary, the Federal Service for Surveillance in Healthcare (Roszdravnadzor), as the enforcement authority.

Basic Terms Used in this Federal Law:

1) medicines are substances or combinations thereof coming in contact with the human or animal body, penetrating into the organs and tissues of the human or animal body, used for prophylaxis, diagnostics (except for substances or combinations thereof not coming in contact with the human or animal body),treatment of disease, rehabilitation, as well as for maintenance, prevention or interruption of pregnancy, as may be derived from blood, blood plasma, human or animal organs and tissues, plants and minerals by synthesis methods or using biological technologies. Medicines include pharmaceutical substances and medicinal products;

2) pharmaceutical substances are medicines in the form of active substances of biological, biotechnological, mineral or chemical origin, being pharmacologically active, meant for manufacturing and compounding of medicinal products and determining efficacy thereof;

3) medicinal products are dosage forms of medicines used for prophylaxis, diagnostics, treatment of disease, rehabilitation, as well as for maintenance, prevention or interruption of pregnancy;

4) dosage form is a condition of a medicinal product corresponding to the modes of administration and use thereof, and ensuring the required therapeutic effect;

5) narcotic medicines are medicinal products and pharmaceutical substances containing narcotic drugs and included in the List of Narcotic Drugs, Psychotropic Substances and Precursors Thereof, which are subject to control in the Russian Federation in accordance with the legislation of the Russian Federation and international treaties of the Russian Federation, including, but not limited to the Single Convention on Narcotic Drugs, 1961;

6) psychotropic medicines are medicinal products and pharmaceutical substances containing psychotropic substances and included in the List of Narcotic Drugs, Psychotropic Substances and Precursors Thereof, which are subject to control in the Russian Federation in accordance with the legislation of the Russian Federation and international treaties of the Russian Federation, including, but not limited to the Convention on Psychotropic Substances, 1971;

7) herbal medicinal raw material is fresh or dried plants or parts thereof used for manufacturing of medicines by institutions producing medicines, or for compounding of medicinal products by pharmacy institutions, veterinary pharmacy institutions and individual entrepreneurs holding pharmaceutical licenses;

8) herbal medicinal product is a medicinal product manufactured or compounded of one type of herbal medicinal raw material or several types of such raw materials and being distributed as packed in the secondary (retail) packaging.

Nomenclature of medicines

- IUPAC – chemical name
- Generic name = INN
  - Often an abbreviated version of chemical name
  - Name given to drug by first manufacturer/before drug has become official
  - The international nonproprietary name
- Trade or proprietary name
  - Name given a drug by manufacturer
- May have several trade names (multiple manufacturers)

Chemical Name	7-chloro-1, 3-dihydro-1, methyl-5-phenyl-2h-1
INN in latin	diazepamum
Official Name, USP	diazepam
Brand Name	Valium®

The international nonproprietary name (INN) is an official generic and non-proprietary name given to a pharmaceutical drug or an active ingredient INNs make communication more precise by providing a unique standard name for each active ingredient, to avoid prescribing errors. The INN system has been coordinated by the World Health Organization (WHO) since 1953.

Having unambiguous standard names for each drug (standardization of drug nomenclature) is important because a drug may be sold by many different brand names, or a branded medication may contain more than one drug. For example, the branded medications Celexa, Celapram and Citrol all contain the same active ingredient: citalopram; and the antibiotic widely known by the brand name Bactrim contains two active ingredients: trimethoprim and sulfamethoxazole. This combination of two antibiotic agents in one tablet has been available as a generic for decades, but the brand names Bactrim and Septra are still in common use.

Each drug's INN is unique but may contain a word stem that is shared with other drugs of the same class; for example, the beta blocker drugs propranolol and atenolol share the -olol suffix, and the benzodiazepine drugs lorazepam and diazepam share the -azepam suffix.

The WHO issues INNs in English, Latin, French, Russian, Spanish, Arabic, and Chinese, and a drug's INNs are often cognate across most or all of the languages, with minor spelling or pronunciation differences, for example: paracetamol (en) paracetamolum (la), paracétamol (fr) and парацетамол (ru). An established INN is known as a recommended INN (rINN), while a name that is still being considered is called a proposed INN (pINN).

Pharmacology and pharmacotherapy (like health care generally) are universally relevant around the world, making translingual communication about them an important goal. An interlingual perspective is thus useful in drug nomenclature. A drug's INNs are often cognates across most or all of the languages, but they also allow small inflectional, diacritic, and transliterational differences that are usually transparent and trivial for nonspeakers (as is true of most international scientific vocabulary). For example, although paracetamolum (la) has an inflectional difference from paracetamol (en), and although paracétamol (fr) has a diacritic difference, the differences are trivial; users can easily recognize the «same word». And although парацетамол (ru) and paracetamol (en) have a transliterational difference, they sound similar, and for Russian speakers who can recognize Latin script or English speakers who can recognize Cyrillic script, they look similar so users can recognize the «same word». Thus INNs make medicines bought anywhere in the world as easily identifiable as possible to people who do not speak that language.

Sources of Drug Information

- Pharmacopoeia
- Physician’s Desk Reference (PDR)
- Hospital Formulary (HF)
- Drug inserts
- Monthly Prescribing Reference
- AMA Drug Evaluation
- EMS Field Guide

State Pharmacopoeia [ˌfɑːməkəˈpiːə]

The main official publication regulating quality requirements l e pharmaceuticals, it methods of pharmaceutical manufacturing formulations, higher single and daily doses of toxic or potent drugs and some other Standarts and conditions is ***the State Pharmacopoeia*** **(ГФ – in Russian)** (from Greek. *Pharmacon* – drug, *poieo* – I do).

It has a legislative nature and can serve as the main argument, etc., and dealing with controversial cases in a professional, administrative or with at – judicial order.

Periodically, the Pharmacopoeia is reprinted, unfortunately, with a big lag behind the development of science and real life.

In Russia, the first General Pharmacopoeia appeared in Latin in 1778.

And the first State Pharmacopoeia in Russian was published only in 1866.

Each new edition is amended:

- eliminate obsolete funds,
- introduce new ones,
- clarify methods of qualitative and quantitative analysis of drugs etc...

At the present time remains valid 14th State Pharmacopoeia.

State Pharmacopeia contains a list of basic drugs manufactured in the country, with the approved nomenclature, the chemical structure of the compounds, as well as related standards and methods, which are controlled on the basis of the quality of medicines and regulations.

The state standard of a medicinal product in the Russian Federation is the pharmacopeia article.

Pharmacopeia article – it is the State quality standard for the drug under the International Nonproprietary Name (INN).

The Pharmacopoeia ***earlier*** lists of drugs belonging to group A and B were given:

List A (poisons – Venena) allocated medicaments purpose, use, storage and dosing of which due to the high toxicity must be made with extreme caution.

Drug addiction drugs also belong to this list.

list B (virulent – Heroica) classified as medicinal products, the purpose, application, dosing and storage handling with caution due to possible complications when used without medical supervision.

The International Pharmacopoeia

Anyone who does not have its own Pharmacopoeia can use this one. Its English text is available online at *http://apps.who.int/phint/en/p/about/*

U.S. Pharmacopeia (USP) URL: https://www.usp.org/

USP is one of the largest and most technically equipped Pharmacopoeia in the world.

USP has prepared a national drug formulary and Pharmacopoeia standards are recognized by governments in more than 35 countries.

British Pharmacopoeia (Bp) URL: https://www.pharmacopoeia.com/

The two pharmacopoeias that have legal status within the UK are the British Pharmacopoeia (BP), including the BP (Veterinary), and the European Pharmacopoeia (Ph. Eur.).

Prescription. General rules for prescription writing

A prescription – an instruction written by a medical practitioner that authorizes a patient to be issued with a medicine or treatment.

Roles:

1. therapeutic
2. juridical
3. financial
4. accountability

Orders to regulate prescription writing and drug dispensing:

1. Order of the Ministry of Health P USSIA from 14.01.2019 № 4n «On approval of the appointment and prescribing medications and prescription forms forms for drugs, the order of registration and associated forms, their recording and storage» (as amended).

2. Order № 54н (n) The Ministry of public health Russia (01.08.2012) «About approval of the form of prescription on narcotics or psychotropic drugs, order of their manufacture, distribution, registration, stock-taking and storages, well as the rules of processing» (as amended).

Prescription writing rules for different dosage forms

Types of dosage forms

Dosage form – the state of the drug, that meets administration and use requirements and ensuring the achievement of the necessary therapeutic effect. Dosage form provides a mechanism for the convenient and safe delivery of the accurate and precise dose of a given drug substance.

Types of dosage forms:

1. *According to the place of preparation:*
   - **officinal** – manufactured by pharmaceutical plants;
   - **magisterial** – manufactured in the pharmacy individually for the patient.
2. *By consistency:*
   - solid (powders, tablets, pills, etc.);
   - soft or semi-solid (ointments, pastes, suppositories, plasters, etc.);
   - liquid (solutions, suspensions, emulsions, infusions, decoctions, tinctures, liquid extracts, etc.);
   - other (aerosols, ophthalmic films).
3. *By composition:*
   - simple – consist of one medicinal substance;
   - complex – consist of several medicinal substances.
4. *Depending on the dosage method:*
   - dosed – divided into doses;
   - not divided by doses.

Forms of prescription

The full form contains definite components in the specified order:
1) Main pharmaceutical substance (Basis).
2) Adjuvant pharmaceutical substance.
3) Corrector substance.
4) Excipient (Constituents).

*The full one requires also d*escription of processing

Invocatio	INN	Individual dose	
Rp.:	***Papaverini hydrochloridi***	***0,02***	grams with decimal places without "g"
	Phenobarbitali	***0,01***	grams with decimal places without "g"
	Sacchari	***0,3***	grams with decimal places without "g"
	M. f. pulv.	Let the powder be formed	*d*escription of processing
	D.t.d. N. 30	Issue 30 pieces	
	S.	Indicate	***1 powder 3 times a day***
			How many, how often. Orally – is meant (You may omit only *oral route of administration*)

In the reduced form:
a. the name of form
b. the name of substance
c. its dose
d. and volume in the one line

Invocatio	Dosage form	Drug INN	concentration	Dash	Volume
Rp.:	***Sol.***	***Furosemidi***	***2%***	-	***1 ml***
		D.t.d. N. 30	Issue 30 pieces	What vial?	***in amp.***
		S.	Indicate		***1 ml 3 times a day intramuscularly***
					How many, how often. Orally – is meant (You may omit only *oral route of administration*)

Recipe Structure

Inscriptio – all required information on

Invocatio – with one word left – "take" *(Recipe or Rp.:).*

The main or material part of the recipe (Designatio materiarum).

In case of full form this part lists the prescription drugs in a specific sequence:

1) the main active substance is *basis;*
2) optionalindifferent substance – *adjuvans;*
3) indifferent substance to improve savor/flavor – *corrigens;*
4) form-shaping indifferent substance – *constituens.*

The name of the drug is written in Latin INN (according to the order 4н, but new Latin or just English INN from the list of WHO's recommended INN is also applicable). There is no need in ending changes when using English one (the words stay in unaltered form – Omeprazole, Labetalol etc.)

According to the Latin grammar word ending have to be altered as follows:

Ending in Latin nominative	Ending in Latin genitive case
-um	-i
-a	-ae
-as	-atis
-is	-itis

Use CAPITAL letter in the beginning of the the INN.
Labetalol or ***Labetalol***

Mass in grams is to be given with decimal places without letter "g"

10,0 or **11,8** or **0,001**
Volume is to be given in milliliters with "ml"

10 ml or ***11,5 ml***

Use "dash" symbol between dose and quantity of the dosage form

Rp.: Sol. Furosemidi 2% – 1 ml
D.t.d. N. 10 in amp.
S. 1 ml intramuscularly 2 times a day

Subscription (Subscriptio) - an indication for the pharmacist in Latin.

The full form lists all ingridients line by line in the specific order and ends with processing tutorials (Misce ut fiat or simly M.f. then goes the dosage form).

M. f. sol = let the solution be made
M. f. pulv. = let the powder be made
Then goes the order to issue the dosage form.
In the reduced form it comprises order to issue the drug.
If it is individual dosage form – use D.t.d. N. … (You can count 1 piece, 2 pieces, 10 pieces). Usually used for: tablets, dragee, ampoules. If You don't mention the dosage form before the INN it has to be mentioned after D.t.d. N. … (quantity) in ….. (e.g. amp.).
If it is not divided into individual dosage form – use only D.

Rp.: Sol. Furosemidi 2% – 1 ml
D.t.d. N. 10 in amp. (You can count ampoules)
S. 1 ml intramuscularly 2 times a day

And

Rp.: Ung. Prednisoloni 0,5% – 20,0
D.S. Apply ointment on the affected skin. **(There is no need to count).**

Designation (Signatura) – directions for the patient how to take the medication properly.

Six Rights of Medication Administration

- Right medication
- ***Right dose***
- ***Right time***
- ***Right route***
- Right patient
- Right documentation

How much	Where	How often
1 ml	intramuscularly	2 times a day

Physician signature (Nomen medici) – in this part of the prescription the doctor puts his signature and assures with personal stamp.

Brief grammar information from the Latin language required for prescribing

Abbreviation	Full spelling	Meaning
aa	ana	equally
ac., acid.	acidum	acid
aer.	aerozolum	spray can
amp.	ampulla	ampoule
aq.	aqua	water
aq. purif.	aqua purifikata	purified water
but.	butyrum	oil (solid)
caps.	capsula	capsule
comp., cps	compositus (a, um)	complicated
D.	Da (Detur, Dentur)	Issue (let it be issued, let it be issued)
D.S.	Da, Signa Detur, Signetur	Issue, designate Let it be issued, marked
D.t.d.	Da (Dentur) tales doses	Give (Let it be given) such doses
dil.	dilutus	diluted
Div. in p. aeq.	Divide in partes aequales	Divided into equal parts
emuls.	emulsio	emulsion
extr.	extractum	extract extract
f.	Fiat (fiant)	Let be made (formed)
gran.	granulum	granules
qt., qtt	qutta, guttae	drop, drops
qtt. peror.	guttae peroralis	drops for oral administration
inf.	infusum	infusion
in amp.	in ampullis	in ampoules
in tab.	in tab (u) lettis	in pills
in tab. prolong.	in tab (u) lettis prolongatis	in sustained release tablets

in tab. prolong. obd.	in tab (u) lettis prolongatis obductis	in sustained release tablets, coated tablets
lin.	linimentum	liniment
liq.	liquor	liquid
lot.	lotion	lotion
m. pil.	massa pilularum	pill mass
membr. bucc.	membranulae buccales	cheek films
M.	Misce, Misceatur	Mix (Let it be mixed)
mixt.	mixtura	potion
N.	numero	quantity
ol.	oleum	oil (liquid)
past.	pasta	paste
pil.	pilula, pilulae	pill, pills
p. aeq.	partes aequales	equal parts
ppt., praec.	praecipitatus	besieged
pulv.	pulvis	powder
qs	quantum satis	how much is needed, how much is needed
g., rad.	radix	root
Rp.	Recipe	Take
Rep.	Repete, Repetatur	Repeat (Let it be repeated)
rhiz.	rhizoma	rhizome
S.	Signa, Signetur	Designate (Let It Be Designated)
sem.	semen	seed
simpl.	simplex	plain
sir.	sirupus	syrup
sol.	solutio	solution
sol. peror.	solutio peroralis	oral solution
spr.	spray	spray

spr. nas.	spray nasale	nasal spray
supp.	suppositorium	candle
susp.	suspensio	suspension, suspension
tabl.	tab (u) letta	tablet
t-ra, tinct.	tinctura	tincture
STT	Systemata Therapeutica Transcutanea	transdermal therapeutic system
ung.	unguentum	ointment
vitr.	vitrum	bottle

Forms of prescription forms and rules for their design

Forms for prescription are controlled by 2 Orders:

1. Order of the Ministry of Health of Russia from 14.01.2019 № 4n «On approval of the appointment and prescribing medications and prescription forms forms for drugs, the order of registration and associated forms, their recording and storage» (as amended).

2. Order of the Ministry of Health of Russia from 01.08.2012 № 54n «On Approval of the forms of the prescriptions containing designated narcotic drugs or ps and hotropnyh substances, the procedure for their manufacture, distribution, registration, recording and storing and design rules» (in the current edition).

Prescriptions for drugs are written on prescription forms in the following forms:

- 107-1/y NP “preferential recipes”
- 148-1/y-88;
- 107-1/y;
- 148-1/y-04 (л) – for discount drugs (50% or 25% off price).

Types of dosage forms

Dosage form – the state of the drug, corresponding to the methods of its administration and use and ensuring the achievement of the necessary therapeutic effect.

Types of dosage forms:

1. *place of preparation:*

- officinal – manufactured by pharmaceutical plants according to SP requirements
- magisterial – are hand-made in the pharmacy.

2. *consistency:*

- solid (powders, tablets, pills, etc.);
- soft or semi-solid (ointments, pastes, suppositories, plasters, etc.);

- liquid (solutions, suspensions, infusions, decoctions, tinctures, liquid extracts);
- other (aerosols, ophthalmic films).

3. *in composition:*
- simple – consist of one medicinal substance;
- complex – consist of several medicinal substances.

4. *depending on the dosage method:*
- dosed – divided into doses;
- undosed – the patient can vary the amount of the dosage form indivadually.

5. *depending on the duration of action*:
- prolonged;
- not prolonged.

Solid dosage forms

Solid dosage forms include tablets, pills, powders and dragee.

Powders

Powders – Pulveres (pulv. – abbreviated)

Powder – *a firm, granular dosage form obtained by grinding and sieving the solid drug substance.*

Advantages of powders:
- convenience;
- the possibility of individual dosing;
- the possibility of using the smallest powders for inhalation, etc., and powders;
- easy storable.

Disadvantages of powders:
- slow absorption when taken orally;
- partial destruction in the stomach;
- reduced bioavailability of the drug;
- irritative;
- easily absorb moisture.

Types of powders

1. *Composition*:
- simple – consisting of one medicinal substance;
- complex – consisting of two or more medicinal substances.

2. *According to the degree of grinding*:
- subtle,
- small,

- average,
- large.

3. *According to the method of application*:
- for internal use,
- for external use,
- for inhalation,
- for the preparation of dosage forms for injection.

4. *Depending on the dosage method:*
- divided into doses,
- not divided into doses.

Prescription Rules

Powders for internal use

In this case, a medicinal substance is indicated in the prescription with a single dose designation. Then the number of powders is given: **D.t.d. N. ...** (issue such doses as…).

Invocatio	Dosage form	Drug INN	Individual dose
Rp.:	---- it is implied to be a powdered form	Dimedroli	1,0

In the case of prescribing complex powders in the Prescription list all pharmaceuticals substances and the single dose, and indicate **M. f. pulv.** (Misce ut fiat pulvis – Mix to form a powder).

Powders from plant materials (plant parts)
Minimum permissible mass – 0,05
Average mass – 0,3–0,5
Maximal permissible mass – 1,0
Powders from non-plant materials
Minimum permissible mass – 0,1
If less – ad sugar (Sacchari)
Average mass – 0,3–0,5
Maximal permissible mass – 1,0

When issuing powders of drug substances which dose is less than the minimum weight, for increasing the mass of powder add sugar (Saccharus), as well as glucose and starch) in an amount of usually 0,3.

Prescription examples:

1. Simple divided powder prescription

a) Prescribe the powder and for internal use. Drug name – Pancreatinum (Pancreatinum – INN latin). 1 dose = 0,6g. Administer 1 powder 3 times a day before meals.

Rp.: Pancreatini 0,6
D.t.d. N. 24
S. 1 powder 3 times a day before meals.

b) Prescribe powders for internal use. Drug name – caffeine (Coffeinum – INN latin). 1 dose = 0,05g. Administer 1 powder 2 times a day.

Rp.: C*offeini 0,05*
Sacchari 0,3
M.f. pulv.
D.t.d. N. 30
S. 1 powder 2 times a day.

2. Prescription of complex divided powder

Prescribe powder for internal use comprising papaverine hydrochloride (Papaverini hydrochloridum – INN latin) 0,02 g and fenobarbital (Phenobarbitalum – INN latin) 0.01g. Administer 1 powder 3 times a day.

Rp.: Papaverini hydrochloridi 0,02
Phenobarbitali 0,01
Sacchari 0,3
M. f. pulv.
D.t.d. N. 30
S. 1 powder 3 times a day.

3. Not divided powders

Prescription example:

Prescribe 30,0 g of powder for internal use. Drug – magnesium sulfate (Magnesii sulfas – INN latin). Administer to dissolve in ½ cup of water, take 1 times, drink 2 cups in a day.

Rp.: Magnesii sulfatis 30,0
D.S. Dissolve in ½ cup of water, take 1 time, drink 2 cups of water.

Tablets

Pills – Tablets (Tabl. or in tab. – latin abbreviations)

Tablet – *A powdered drug compressed into a hardsmall disk; some are readily broken along a scored line; others are enteric coated to prevent them from dissolving in the stomach.*

These are most common forms of drugs available in the market. They are economical, easy to handle and consume by the patient. They can be swallowed

with a glass of water. They are of different shapes like circular, rectangular etc. They are also of different type like film coated, sugar coated ones etc.

The disadvantages of tablets:

- slow solubility;
- slow absorption;
- interaction with food components;
- unstable in the GIT.

Types of pills based on

1. *Composition:*
   - simple;
   - complex.
2. *According to the method and features of use:*
   - gastro – resistant (enteric);
   - for use in the oral cavity;
   - with modified released and eat;
   - effervescent.
3. Coated, uncoated.

Gastro – resistant, or *enteric, tablet.* A gastro-resistant tablet is designed to temporarily withstand attack by stomach acid.

Effervescent – Effervescent tablets break down quickly when they are dropped into water or another liquid. Effervescent tablets are uncoated tablets containing substances that react in the presence of water and give off carbon dioxide.

Prescription Rules

1. The most common is a Prescription in which we indicate the name of the drug and a single dose, followed by prescribing the number of tablets – D.t.d. N. ... in tab. (issue such number of tablets...).

Invocatio	Dosage form	Drug INN	Individual dose
Rp.:	***Tabl.***	***Dimedroli***	***1,0***
	D.t.d. N. 12		

1st option

Rp.: Digoxini 0.00025

D.t.d. N. 12 in tab.

S. 1 tablet 2 times a day.

2. Prescription begins with the medication form then followed by INN

Prescription examples:

Invocatio	Drug INN	Individual dose
Rp.:	***Dimedroli***	***1,0***
	D.t.d. N. 12 in tab.	

2nd option
Rp.: ***Tabl*** *. Digoxini 0.00025*
D.t.d. N. 12
S. 1 tablet 2 times a day.

Coated tablets
Prescription examples:
1st option
Rp.: Imipramini 0,025
D.t.d. N. 10 ***in tab. obd.***
S. 1 tablet 3 times a day.

2nd option
Rp.: ***Tabl.*** *Imipramini* ***obd.*** *0,025*
D.t.d. N. 10
S. 1 tablet 3 times a day.

Tablets *comprising two or more medicinal substances* (complex) *in their composition are* prescribed using the above prescription options.

Prescription examples:
1st option
Rp.: Paracetamoli 0.3
Coffeini 0.03
Codeini 0.08
D.t.d. N. 10 in tab.
S. 1 tablet for headache.

2nd option
Rp.: Tabl. Paracetamoli 0.3
et Coffeini 0.03
cum Codeino 0.08
D.t.d. N. 10
S. 1 tablet for headache.

Some tablets which include several compounds are known under the commercial name ("Allochol"). The prescription begins with the name of the dosage form (tablets – ***Tabl.*** in latin) followed by trade name in quotes and their number respectively.

Prescription example:
Rp.: Tabl. "Allocholum" N. 20
D.S. 1 tablet 2 times a day.

Dragee

Dragee – Dragée (Dragee – in latin)

Dragee – *a medicinal formulation coated with sugar to disguise the taste*.

There is only one form of prescription dragee.

Prescription begins with the name of dosage form (Dragee) followed by name of the drug, its single dose and number of dragees (D.t.d. N. …) .

Prescription example:

Rp.: Dragee Mebhydrolini 0,05
D.t.d. N. 20
S. 1 dragee 2 times a day.

Invocatio	Dosage form	Drug INN	Individual dose
Rp.:	***Dragee***	***Aminazini***	***0,05***

Capsules

Capsules (Caps. Latin abbreviation)

Capsules – *A gelatinous container to hold a drug in powder, liquid, or oil form.*

Prescription examples:

Rp.: Bromcamphorae 0,1
Chinidini sulfatis 0,05
M. f. pulv.
D.t.d. N. 20 in caps. gel.
S. 1 capsule 2 times a day.

Rp.: Ol. Ricini 1,0
D.t.d. N. 15 in caps.
S. Take all capsules within 30 minutes.

Invocatio	Drug INN	Individual dose
Rp.:	***Omeprazoli***	***0,02***
	D.t.d. N. 12 in caps.	

Soft (semi-solid) dosage forms

Ointments

Ointment – Unguentum (Ung. – latin abbreviation)

Ointment is a semisolid preparation of one or more drugs used for application to the skin and mucous membrane. They usually contain medicament which is either dissolved or suspended in the base.

Ointments have emollient and protective action.

Ointment bases

The ointment base is that substance or part of an ointment preparation which serves as carrier or vehicle for the medicament.

An ideal ointment base should be inert, stable, smooth, compatible with the skin, non-irritating and should release the incorporated medicaments readily.

The advantage of ointments:

- direct action at the site of administration.

The disadvantages of ointments:

- restricted usage by applying within body surface.

Types of Ointments based on

1. composition:

- simple – ointments, consisting of one active and one formative substance;
- complex – ointments, which include two or more active substances.

2. *At the place of preparation:*

- officinal;
- magesterial.

Rules for prescription writing:

Ointments generally are *undosed* dosage forms, so they are issued:

- for skin application: 20,0–100,0 g;
- eye ointment 5,0–10,0 g.

In the reduced form of the prescription – indicate the dosage form and medicinal substance in the genitive case of the singular, the concentration (often percentage) and the amount of ointment.

Invocatio	Dosage form	Drug INN	concentration	dash	Mass in grams
Rp.:	***Ung.***	***Lyncomycini hydrochloridi***	***2,0%***	***-***	***10,0***

Ointments with commercial names are prescribed (for example, Unguentum “Mycoseptinum”) in the nominative case in quotes.

The full form of prescription contains list of all ingredients and their amount. Prescription ends with processing manipulations ***M. f. ung.*** (Misce ut fiat Unguentum – Mix to form an ointment).

Prescription examples:
Officinal ointment for skin application
Reduced form
Rp.: Ung. Lyncomycini hydrochloridi 2% – 10,0
D.S. Apply to affected skin.

Full form
Rp.: Lyncomycini hydrochloridi 0,2
Vaselini ad 10,0
M. f. ung.
D.S. Apply ointment on the affected skin.

In some special cases the total amount of active substance is given in International Units.

Prescription example:
Full form
Rp:. Nystatini 5 000 000 IU
Vaselini ad 50,0
M. f. ung.
D.S. Apply on affected skin.

In ophthalmic ointments one tenth of the excipient shall consist of lanolin.
Prescription example:
Full form
Rp.: Sulfacyli – natrii 1,0
Lanolini 0.4
Vaselini ad 5.0
M. f. ung.
D.S. Put under the eyelid 3 times a day.

Reduced form
Rp.: Ung. Sulfacyli – natrii 20% – 5,0
D.S. Put under the eyelid 3 times a day.

Pastes

Paste – Pasta (Past. – latin abbreviation)

Pasta – *A preparation like an ointment, but thicker and stiff, that penetrates the skin less than an ointment (contains 25 to 65% of finely powdered solids).*

When applied to the skin pastes adhere well, forming a thick coating protects and soothes inflamed and raw surfaces and minimizes the damage done by scratching in itchy conditions such as chronic eczema.

The composition of the pastes:
1. Active substance.
2. And an indifferent powder (thickener) – starch, talc.
3. Ointment base.

Prescription Rules

Pastes are prescribed in total amount from 20,0g to 100,0g.

Officinal pasta issues with reduced Prescription forms. There is no need in concentration indication as it is under State Pharmacopeia control.

Prescription example:

Rp.: Past. Zinci salicylatae 20,0
D.S. Apply on the burns.

Magisterial paste requires full form. If the thickness degree is not given add as much powder as it is about 50% of total paste mass

Prescription example:

Rp.: Zinci oxydi 5,0
Talci 50,0
Vaselini ad 100.0
M. f. past.
D.S. Apply on affected skin.

Suppositories

Suppository – Suppositorium (Supp. – latin abbreviation)

Suppository – *One or several drugs mixed with a firm base such as gelatin and shaped for insertion into the body (e.g., the rectum, vagina); the base dissolves gradually at body temperature, releasing the drug.*

These come in solid or semi-solid dosage forms intended for insertion into a body cavity or orifice other than the mouth (e.g. rectal or vaginal). The vehicle either melts or dissolves following insertion. They are used for local effect (e.g. as a laxative, or treatment for colitis) or for systemic absorption when the individual cannot easily take medication orally (e.g., vomiting or unconscious).

The composition of the suppository:
1. *Medicinal substance* (one or more).
2. *Base substance*.

Types of Suppositories

According to the method of application:
- rectal;
- vaginal.

According to the effect:

- local effect;
- systemic effect.

Rectal suppositories are usually a cone or cylinder shaped with a pointed end. *Their weight varies from 1,1 to 4,0 (average 3,0). Rectal suppositories used in pediatric practice should have mass 0,5–1,5 g.*

The mass of vaginal suppositories is from 1,5 to 6,0 (average 4,0).

In the form of rectal suppositories, drugs are produced both local and resorptive.

Locally applied rectal suppositories for reducing pain, bleeding.

Vaginal suppositories usually contain a drug for local action. Vaginal suppositories are used to treat vaginitis or for contraception

The route of administration is to be obligatory mentioned!

Prescription Rules

1. *Officinal suppositories* require reduced form of prescription:

1.1. Officinal simple suppositories.

The Prescription starts with the name of the form (Supp. – latin abbreviation) followed by name of drug (with preposition ***cum*** or ***c, -um is to be altered to – o in the Latin INN***) and its single dose.

Then goes ***D.t.d. N.*** and number of pieces.

Invocatio	Dosage form	preposition	Drug INN	Individual dose
Rp.:	***Supp.***	***cum***	***Ichthammolo***	***0,2***

Prescription examples:

a) *Rp.: Supp. cum Ichthammolo 0,2*
D.t.d. N. 10
S. 1 suppository into rectum 2 times a day (morning and night).

b) *Rp.: Supp. cum Procaino 0.1*
D.t.d. N. 10
S. One suppository ***into rectum*** *for pain relieving.*

c) *Rp.: Supp. cum Miconazolo 0,1*
D.t.d. N. 10
S. 1 suppository ***into vagina*** *at night.*

1.2. *Offincial complex suppositories.*

In some cases, suppositories have a commercial name, e.g. suppositories “Anuzol”, “Bethiolum” and others. The prescription starts with Supp. Followed by the trade name in quotes (“Bethiolum”) and number of pieces in one line!

Prescription example:

Rp.: Supp. «Bethiolum» N. 10
D.S. 1 suppository into rectum 2 times a day.

Cutaneous (transdermal) therapeutic systems

Transdermal Patch

This is a rapidly developing dosage formulation for topical application of medication for systemic absorption. They look very much like a Band-Aid and typically have the following composition.

- ***Backing***: The backing is often an aluminized polyester film.
- ***Drug Reservoir***: The drug reservoir commonly includes the active ingredient and a vehicle such as mineral oil, polyisobutylene, silicone or ethanol.
- ***Control Membrane***: The control membrane may be microporus polypropylene or an ethylene/vinyl acetate copolymer.
- ***Protective Liner***: The contact adhesive may contain mineral oil or a hypoallergenic silicone adhesive.

- This formulation is increasingly popular because:
    - it reduces the number of doses required to only once a day (e.g. nicoderm® patch), or once a week (e.g. Ortho Evra® contraceptive patch or the clonidine patch shown above)
    - it doesn't require ingestion of the drug, this bypasses gastrointestinal absorption and potential first-pass metabolism
    - it provides a zero-order rate of delivery of drug to maintain a stable plasma concentration
    - it is convenient – thus better compliance
- Formulations that have been developed include:
    - Catapres-TTS®: clonidine patch for hypertension
    - Climara Pro®: estrogen plus progestin contraceptive
    - Duragesic®: fentanyl patch for pain management
    - Nicoderm®: nicotine patch for smoking cessation
    - Transderm Nitro: nitroglycerin patch for angina pectoris
    - Transderm Scop: scopolamine patch for motion sickness

Liquid dosage forms

Solutions

Solutions – Solutio (Sol. – latin abbreviation)

Solution – *liquid preparations that contains one or more chemical substances dissolved in a suitable solvent or mixture of mutually miscible solvents.*

Advantages

1) homogeneous doses

2) immediate availability for absorption, miscible with body fluids

2) most routes of administration can be used
3) good for patients who can't swallow tab/caps
4) easy dose adjustment
5) eneteral feeding
6) nursing home, psychiatric and incarcerated patients: ease delivery
Disadvantages
1) less stability than dry form
2) potential for microbial contamination
3) solubility in acceptable solvents only
4) taste + smell: additives required
5) bulk and weight of package: increase cost
6) bulk containers: dosage measurement errors

The composition of the solution:
1. The main active substance.
2. Solvent.
Solvents used:
- distilled water (Aqua destillata);
- purified water (Aqua puficata);
- Ethyl alcohol (Spiritus aethylicus) 70%, 90%, 95%;
- Glycerin (Glycerinum);
- Liquid oils: olive, peach (Oleum Vaselini, Oleum Olivarum, Oleum Persicorum).

As a special case there are colloidal solutions (for example, solutions of protargol, collargol) – solutions of high molecular weight compounds.

Types of solutions:
- *for external use,*
- *for internal use,*
- *for injection.*

Solutions for external use

Types of solutions for external use:
1. Solutions for rinsing, douching, lotions, rinsing, etc.
2. Solutions for eye, ear drops, as well as drops for instillation into the nose.

Prescription Rules

1. Solutions for gargles, douches, lotions, washes – 50 to 500 ml.

Prescribing aqueous solutions after the designation “Rp.” (Take) indicate: Sol. ... (Solution ...), name of the drug, the concentration of the solution and the quantity in milliliters (100 ml) or grams (10,0 – always with decimal places without “g”). Then follow the D.S. (Issue. Designate) and the signature.

Invocatio	Dosage form	Drug INN	concentration	dash	Volume in ml
Rp.:	***Sol.***	***Calcii gluconatis***	***10%***	**-**	***180 ml***

The concentration of the solution is indicated in one of three ways:

1) in percentage ; shows how many grams of X drug in 100 g of the form

Rp.: Calcii gluconatis 18,0
Aq. purif. ad 180 ml
D.
M. f. sol.
S. 1 tablespoon 3 times a day.

*Rp.: Sol. Calcii gluconatis **10% –** 180 ml*
D.
S. 1 tablespoon 3 times a day.

2) in a mass-volume ratio (for example, 0,1 – 200 ml; 0,5 – 180 ml, etc.);

*Rp.: Sol. Calcii gluconatis **18,0** – 180 ml*
D.
S. 1 tablespoon 3 times a day.

3) solubility (for example, 1: 1000 – 1000 ml; 1: 5000 – 100 ml etc.).

Rp.: Sol. Kalii permanganatis 1:1000 – 500 ml
D.
S. For washing wounds.

Prescription examples:

Prescribe 500 ml of solution for external use. Drug – nitrofural (Nitrofuralum), concentration 0,02%. Administer for washing wounds.

Calculations

Mass-volume concentration shows how if honors substance is contained in a total amount prescribe direct solution.

It is known that the total volume of solution is 500 ml. Percentage shows how many grams in 100 ml. We use “cross rule”

0,02 – 100 ml (0.02%)
x – 500 ml
x = (0,02 × 500) : 100 = 0,1.

Reduced form

*Rp.: Sol. Nitrofurali **0,1 –** 500 ml*
D.
S. For washing wounds.

Full form
Rp.: Nitrofurali ***0,1***
Aq.destill. ad 500 ml
M. f. sol.
D.
S. For washing wounds.

Oily and alcoholic solutions

Prescription after a specified dosage form (Solutionis) and the nameof the drug should indicate definition «oleosae» (oily) or «spirituosae» (alcoholic), then concentration and the volume of solution, D.S. and designation.

Example Prescription:
Rp.: Sol. Camphorae oleosae 10% – 100 ml
D.S. For rubbing the joint area.

Solutions for eye and nasal drops are prescribed under the same rules as other solutions for external use in volume of 5–10 ml , and should be administered as follows: eye drops – instill 2 drops in the eye, ear drops and *drops for instillation into the nose* – instill 5 drops into the ear canal.

Solutions for eye drops are made to be sterile!

Prescription example:
Reduced form
Rp.: Solutionis Sulfacyli-natrii 20% – 5ml
D.
S. Instill 2 drops in both eyes.

Full form
Rp.: Sulfacyli-natrii 0,5
Aq. purif. ad 5 ml.
M. f. sol.
Steril.!
D.
S. Instill 2 drops in both eyes.

Solutions for internal use

Liquid pharmaceuticals for oral administration are usually formulated such that the patient receives the usual dose of the medication in a conveniently administered volume, as 5 ml (one teaspoonful), 10 ml or 15 ml (one table-spoonful).

It can be stored not more than 3–4 days.

Prescription Rules

Dosing Method:

- toxic substances dosed by drops.

1 ml of a aqueous solution contains 20 drops:

- other solutions are administred by measure cups (for children up to 3 years – teaspoon; from 3 to 11 years – dessertspoon; over 11 years and adults – tablespoon).

The amount of solution prescribed depends on the dosing method:

A spoon	*The amount of solution in one spoon*	*Total amount of solution*	
		on the number of receptions	*ml*
tablespoon	*15 ml*	*10*	*150*
		12	*180*
		13	*200*
dessertpoon	*10 ml*	*10*	*100*
		12	*120*
		15	*150*
teaspoon	*5 ml*	*10*	*50*
		12	*60*
		20	*100*

In reduced form of prescription, the concentration of the solution is:

- in percent;
- in mass – volume ratio.

Prescription Examples

The solution dosed in drops:

Rp.: Sol. Atropini sulfatis 0,1% – 10 ml
D.S. Take 9 drops 3 times a day.

Spoon-dosed solution:

The oral solution for 4 days course for the adult. Single dose of calcium gluconate – 1,5 grams. Administer1 tablespoon 3 times a day.

*Rp.: Calcii gluconatis 18,0 1,5**3times a day*4days*
*Aq. purif. ad 180 ml 15 ml*3times a day*4days*
M. f. sol.
D.
S. 1 tablespoon 3 times a day.

Calculations

1 tablespoon (15 ml) contains 1.5 g of calcium salt, i.e. 10%. Calculate the total amount of solution: 15 ml (tablespoon) × 3 times a day × 4 days = 180 ml.

a) The concentration of the solution in a mass-volume ratio:

Rp.: Sol. Calcii gluconatis 18,0 – 180 ml

D.S. 1 tablespoon 3 times a day.

Cross rule for percentage concentration.

18 g in 180 ml

Xg in 100 ml

X=10%

a) The concentration of the solution in percentage:

Rp.: Sol. Calcii gluconatis 10% – 180 ml

D.S. 1 tablespoon 3 times a day.

Injections

There are injections of small volume (up to 100 ml) and large volume (100 ml or more) (infusion).

Acceptable volumes for administration:

- subcutaneous (1–2 ml),
- intramuscular (1–10 ml),
- intravenous (10–20 ml bolus simultaneously; by drip 200–400 ml).

Subcutaneous (or Hypodermic) injection

These injections are made under the skin, into the subcutaneous tissue. The drug is deposited in the loose subcutaneous tissue which is richly supplied by nerves (so irritant drugs cannot be injected) but is less vascular (so absorption is slower).

Body sites of injection: Usually on the most portions of arms, legs and abdomen.

Advantages:

1. Self injection is possible because deep penetration is not required.
2. Oily solutions or aqueous suspensions can form a depot which will release drug slowly for a prolonged period.

Disadvantages:

1. Since skin is richly supplied by nerve-endings hence irritant drugs cannot be injected.
2. Drugs administered in this route produce slower onset of action than i.m. or i.v. route.
3. This route should be avoided in shock patients.

e.g. Insulin injection.

Intramuscular injection

The drug is injected in one of the large skeletal muscles that lie below the subcutaneous layer.

Body sites of injection: Deltoid (upper arm), gluteal (buttock), vastus lateralis (lateral thigh) msucles.

It is important to aspirate before injection to ensure that the needle does not enter into a vein.

Advantages:

1. Muscle is less richly supplied with sensory nerves, hence mild irritants can be injected.
2. Muscle is more vascular hence absorption is faster (onset of action 15 to 30 mins) than subcutaneous route.
3. It is less painful.
4. Depot preparations can be injected by this route and the action of the drug may be prolonged.

Disadvantages:

1. Since deep penetration is needed hence self-medication is not possible.
2. Large volume cannot be given.

e.g. Low volume injections – Vitamin A, hydrocortisone acetate, tetanus toxoid, antibiotic etc.

Intravenous injection

The drug is injected as a bolus (*venipuncture*) or infused slowly over hours (*venoclysis*) in one of the superficial veins (generally medial basilic vein).

Drug must be administered through this route slowly because irritation or an excessive drug concentration at sensitive organs such as the heart and brain (*drug shock*) may occur.

The duration of action of a drug depends on the pharamcokinetic parameters (rate of distribution and elimination).

Advantages:

1. The drug directly reaches the blood stream and effect is produced immediately, hence, this route can be used in emergencies.
2. The inside of the veins is insensitive (because no nerve endings are there) and drug gets diluted with blood quickly, therefore, even highly irritant drugs can be injected intravenously.
3. Large volumes can be infused (e.g. normal saline).
4. It is useful in unconscious patients.
5. Desired blood concentration can be achieved.

Disadvantages:

1. Drugs that precipitate in the blood cannot be administered. Only aqueous solution can be administered.

2. If the needle puncture the vessel (i.e. extra vasation) then thrombophlebitis of the injected vein and necrosis of the adjoining tissues may occur.

3. No drug can be given in depot form – so the action is not prolonged compared to other parenteral administrations.

4. Untoward reactions if occur are immediate.

5. Once administered, withdrawal of the drug is not possible.

Intra-arterial injection

1. The intra-arterial route involves injecting a drug directly into an artery.

2. It is important that the artery not be missed, since serious nerve damage may occur to the nerves lying close to the arteries.

3. Dose given through this route must be minimum and given gradually, since, once injected, the drug effect cannot be neutralized.

4. This route of injection is used to administer radiopaque contrast media for viewing an organ, such as the heart or kidney, or to perfuse an antineoplastic agent at the highest possible concentration to the target organ.

Official injection solutions

Issued in ampoules and other vials.

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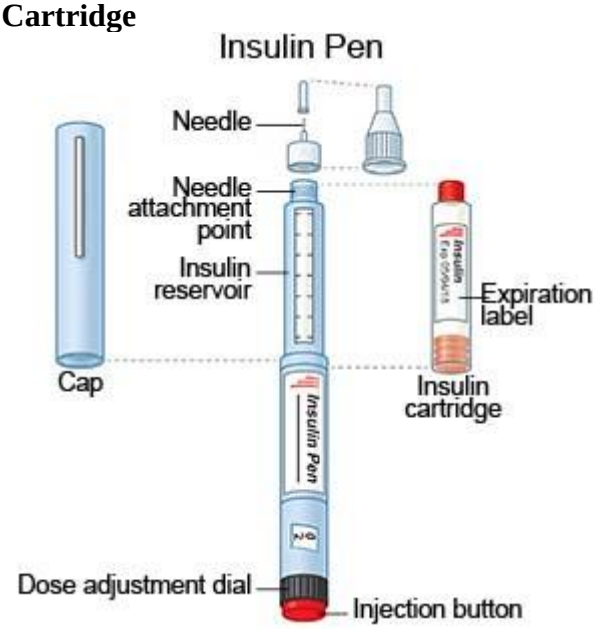
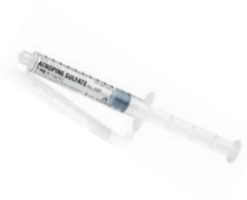
<td>Cartridge
 
</td>
</tr>
<tr>
<td>Bottle  </td>
<td>Prefilled syringe
 

 </td>
</tr>
</table>

Form of prescription Prescription – *Reduced.* After "Rp." write the name of the dosage form (Sol.), the name of the drug, the concentration in percent (%) and indicate the volume. Then goes D.t.d. N. …. and available vial … in amp.

If it is in a bottle or other vial than ampoule **don't write it down**

Invocatio	Dosage form	Drug INN	concentration	dash	Vial volumes
Rp.:	***Sol.***	***Furosemidi***	***2%***	***-***	***10 ml***

Prescription examples:

a) Prescribe the injection solution. Drug – clonidine hydrochloride (Clonidinum – latin INN), concentration 0.01%, in ampoules (1 ml each). Administer 1 ml under the skin daily.

Rp.: Sol. Clonidini 0.01 % – 1 ml
D.t.d. N. 10 in amp.
S. 1 ml under the skin once a day.

b) Prescribe the injection solution. Drug – calcium chloride (Calcii chloridum – latin INN), concentration 10%, in ampoules (10 ml each). Administer 10 ml to the vein slowly.

Rp.: Sol. Calcii chloridi 10% – 10 ml
D.t.d. N. 10 in amp.
S. 10 ml into the vein slowly daily.

If you want to deliver the solution of concentrated drug intravenously (e.g., norepinephrine tartrate, ouabain), it requires dilution before the injection. Use sterile glucose solution or isotonic sodium chloride solution, as indicated in the signature.

Prescription example:

Prescribe the injection solution. Drug – Norepinephrine (Norepinephrini hydrotartratis – latin INN), concentration 0,1%, in ampoules (2 ml each). Administer intravenously. Dilute before use with glucose 5% solution.

Rp.: Sol. Norepinephrini hydrotartratis 0,1% – 2 ml
D.t.d. N. 10 in amp.
S. 1 ml into the vein daily. Dilute before use with glucose 5% solution.

Larger volumes of solutions for parenteral administration.

Prescription example:

Prescribe the injection solution. Drug – sodium chloride (Nairii chloridum – latin INN), concentration 0,9% in 400 ml bottles. Administer 400 ml to the vein by drip.

Rp.: Sol. Nairii chloridi 0.9% – 400 ml
D.t.d. N. 10
S. 400 ml in the vein by drip.

Some *official solutions* have the fixed name, for example cordiamine – 25% solution of nicotinic acid diethylamide. They are prescribed without indicating the dosage form and concentration of the solution.

Prescription example:

Prescribe official solution of Cordiaminum (Cordiaminum – latin INN) in 1 ml ampoules. Administer 1 ml under the skin 2 times a day.

Rp.: Cordiamini 1 ml
D.t.d. N. 10 in amp.
S. 1 ml under the skin 2 times a day.

Making liquid medicine for an injection

Sometimes you need to make liquid medicine from powder to give your patient an injection.

You do this by mixing the powder for the shot with a liquid – suitable solvent.

This powder prescribed as a powder in an ampoule or another vial

Describe the way of dissolving and type of solvent

Prescription examples:

a) Prescribe acetylsalicylic acid (freeze-dried powder for preparation of solution for injections 0,05 g)

Rp.: Ac. acetylsalicylici 0,05
D.t.d. N. 10 in amp.
S. Add 5 ml water for injection to the content of an ampoule with the preparation and stir up to complete dissolution. Inject 5 ml of the solution in a parabulbar way every other day.

b) Prescribe 12 vials containing benzylpenicillin sodium (*Benzylpenicillini – natrium-latin INN*) of 500 000 IU. Administer for intramuscular injection of 500,000 units 4 times a day. First, dilute the contents of the vial in 2 ml of a 0,5% solution of novocaine.

Rp.: Benzylpenicillini – natrii 500,000 IU
D.t.d. N. 12
S. Dilute the contents of the vial in 2 ml of a 0,5% novocaine solution. Intramuscularly 2 ml of the preparation 4 times a day.

When prescribing *oil solutions*, this is to be indicated in the prescription.

Prescription example:

Prescribe the oil solution for injection. LV – tocopherol acetate (Tocopheroli acetas – latin INN), concentration 10%, in ampoules 1 ml. Administer 1 ml intramuscularly daily.

*Rp.: Sol. Tocopheroli acetatis **oleosae** 10% – 1 ml*
D.t.d. N. 10 in amp.
S. 1 ml intramuscularly daily.

Suspensions

Suspension – Suspensio (Susp. – latin abbreviation).

Suspension is a liquid form in which insoluble drug particles have been dispersed. Oral suspensions make the administration of insoluble drugs in liquid format feasible.

Shake the medication bottle to ensure even dispersal of medication particles.

Use calibrated spoons and measuring cups.

Suspension is not administered intravenously because of the risk of embolism!!!

The suspension consists of a dispersion media (water, liquid oil, glycerin, etc.) and a dispersed phase (particles of a solid, insoluble drug substance in this liquid).

Suspensions differ from colloidal solutions by large sizes of suspended particles (more than 0,1 microns). There are thin (particle size 0,1 – 1 μm) and coarse (more than 1 μm) suspensions.

Suspensions are unstable dosage forms, their particles settle down due to force of gravity.

Therefore, before using the suspension, it must be shook well!!!

Positive properties of suspensions:

1) chemical stability protects drug being suspended even if it interacts with solvent;

2) liquid preparation allows ease of swallowing, range of doses, flexible administration;

3) bioavailability: 2nd best to solutions (then capsules, tablets, coated tablets);

4) taste: flavor preference of patient because drug is coated by solvent and patient cannot taste.

Disadvantages:

- can not be administered intravenously

Prescribing Rules

Prescription starts with the dosage form name Susp. Followed by the drug INN then goes concentration and volume.

Invocatio	Dosage form	Drug INN	concentration	dash	Vial volumes
Rp.:	***Susp.***	***Hydrocortisoni acetatis***	***2,5%***	***-***	***5 ml***

Prescription examples:

a) Prescribe suspension of hydrocortisone acetate (Hydrocortisoni acetas – latin INN), concentration 2,5%, each bottle contains 5 ml. Administer 1,5 ml into the cavity of the affected joint weekly.

Rp.: Susp. Hydrocortisoni acetatis 2,5% – 5 ml
D.t.d. N. 6
S. Inject 1,5 ml into the cavity of the affected joint weekly.

b) Prescribe suspension of dexamethasone (Dexamethasonum – latin INN), concentration 0,1%, in bottles 10 ml each. Administer 2 drops into the eye every 4 hours. Shake well before use!

Rp.: Susp. Dexamethasoni 0,1% – 10 ml
D.S. Instill 2 drops into the eye every 4 hours. Shake well before use!

c) Prescribe griseofulvin suspension (Griseofulvinum – latin INN), concentration 2,5%, flask contains 150 ml. Administer 1 dessert spoon 3 times a day. Shake well before use!

Rp.: Susp. Griseofulvini 2,5% – 150 ml
D.S. 1 dessert spoon 3 times a day. Shake well before use!

Biologically active drugs of animal, human and other origins. Gene engineering analogues

A biopharmaceutical, also known as a biological medical product, is any pharmaceutical drug product manufactured in, extracted from, or semisynthesized from biological sources. Different from totally synthesized pharmaceuticals, they include vaccines, blood, blood components, allergens, somatic cells, gene therapies, tissues, recombinant therapeutic protein, and living cells used in cell therapy. Biologics can be composed of sugars, proteins, or nucleic acids or complex combinations of these substances, or may be living cells or tissues. They (or their precursors or components) are isolated from living sources-human, animal, plant, fungal, or microbial.

Major kinds of biopharmaceuticals include:
Blood factors (Factor VIII and Factor IX)
Thrombolytic agents (tissue plasminogen activator)
Hormones (insulin, glucagon, growth hormone, gonadotrophins)

Haematopoietic growth factors (Erythropoietin, colony stimulating factors)
Interferons (Interferons-α, -β, -γ)
Interleukin-based products (Interleukin-2)
Vaccines (Hepatitis B surface antigen)
Monoclonal antibodies (Various)
Additional products (tumour necrosis factor, therapeutic enzymes)

Biologics or biological products are medicines made from living organisms through highly complex manufacturing processes and must be handled and administered under carefully monitored conditions. Biologics include a wide variety of products such as gene and cell therapies, therapeutic proteins, monoclonal antibodies, and vaccines. Biologics are used to prevent, treat or cure a variety of diseases including cancer, chronic kidney disease, diabetes, cystic fibrosis, and autoimmune disorders.

A biosimilar is exactly what its name implies – it is a biologic that is "similar" to another biologic medicine (known as a reference product) which is already licensed by the U.S. Food and Drug Administration (FDA).

Biosimilars are highly similar to the reference product in terms of safety, purity and potency, but may have minor differences in clinically inactive components. In approving biosimilars, the FDA may require that manufacturers conduct a clinical study (or studies) sufficient to establish safety, purity or potency in one or more uses for which the reference product is licensed and the biosimilar seeks licensure.

Prescription of biologics often requires special forms. Concentration of the biologics is given per 1 ml or 1 gram.

Invo-catio	Dosage form	Drug INN	Vial volumes	Bracket opens	activity	dash	1 ml or 1 g	Bracket closes
Rp.:	***-----***	***Hepa-rini***	***5 ml***	***(***	***1000 IU***	***-***	***1 ml***	***)***

Prescription examples:

a) Prescribe insulin lispro (Insulinum lispro – latin INN), activity 100 IU per 1 ml, each cartridge contains 3 ml. Administer 8 IU subcutaneously after meals.

Rp.: Insulini lispro 3 ml (a 100 IU – 1 ml)
D.t.d. N. 5
S. 8 IU subcutaneously after meals.

b) Prescribe 10 g of ointment with nystatin (Nystatinum – latinabbreviation), each gram contains 100 000 IU of the drug. Apply on the affected skin.

Rp.: Ung. Nystatini 10,0 (a 100000 IU – 1,0)
D.S. Apply on the affected skin.

Dosage forms from herbal (plant) origin

Dosage forms from herbal origin include infusions, decoctions, extracts etc.

Infusions and decoctions

Infusions and decoctions – Infusa (Inf. – latin abbreviation) et Decocta

Infusions and decoctions – *is the liquid dosage forms of plant origin, with common characteristics and some features.* They are not stable and can be stored no more than 3–4 days.

Herbal teas

These are preparations meant for infusion or preparation to be taken as tea. Prepared infusions should be taken immediately after preparation since they do not store well due to the use of water in the extraction process. They normally come as tea bags for hot infusion or as powdered herbal materials (normally pulverized leaves) for boiling in hot water for a few minutes before straining and drinking as tea. The stability of the powdered plant material used in the preparation depends on the type and nature of the herbal material as well the moisture content of the powder in the bags and packaging. The shelf life also depends on the extent the herbs have been crushed and storage conditions. Teas stored in airtight containers may last for up to a year whist those stored in tea bags may last for a shorter period.

Decoctions

Decoctions are made by boiling the herb in water for a period of time to extract soluble constituents. The water decoction of a mixture of 2–12 herbal materials is the commonest traditional herbal dosage form. Decoctions are normally suitable for hard plant materials such as barks and roots and may also be prepared from herbs with sparingly soluble constituents. Decoctions are normally intended for immediate use, ideally within a 24-hour period, with about a 72-hour maximum limit if stored in a very cool place. Excipients such as preservatives may be used in decoctions to prevent spoilage if long term storage is desired. In this case, the stability of the preparation should be conducted to determine the shelf-life of the product at a particular storage condition.

Prescription Rules

Infusions and decoctions are prescribed only in the reduced form. The regimen (e.g. 1:10) means 1 gram of plant material needs volume of extragent (10 ml of water). Please calculate mass and volume!

Invocatio	Dosage form	part	Herb	Mass in grams	dash	Volume in ml
Rp.:	***Inf.***	***fol.***	***Sennae***	***10,0***	***-***	***100 ml***

Names of plant's parts used to prepare infusions and decoctions

Name of the part of the plant	Latin full name	Recommended abbreviation
bark	corticis	
roots	radicis	Rad.
rootstock	rhizomatis	Rhiz.
leaves	folii	
herb	herbae	
blossom	floris	

Prescription examples:

a) Prescribe the infusion of spring adonis herb (herba Adonidis vernalis-latin) in the ratio of 1:30, for 3 days. Administer1 tablespoon 4 times a day.

Rp.: Inf. herbae Adonidis vernalis 6,0 – 180 ml

D.S. 1 tablespoon 4 times a day.

Calculations

1 tablespoon ×4 times a day × 3 days = 12 tablespoons. 1 tablespoon = 15 ml = 12 ×15 ml = 180 ml. Then it is necessary to calculate the amount of adonis herb weight in grams.

The ratio is 1 : 30 means that 1 gram of the herb requires 30 ml of water. 180 ml of water will require X g of the herb. We use "cross rule".

1.0 – 30 ml

x – 180 ml

x = 6,0 g

Tinctures

Tincture – Tinctura (Tinct. – latin abbreviation)

Tinctures are normally alcohol and water extracts of plant materials. Many plant constituents dissolve more easily in a mixture of alcohol and water than in pure water. The preparation of tinctures by maceration of herbal parts in water-ethanol solutions results in the extraction of many structurally diverse compounds with varying polarities. The wide chemical diversity of the chemical constituent's demands quality control analytical tools optimized for the detection of single chemical compounds or a specific group of compounds. There is the added advantage of the alcohol in a tincture being a preservative, allowing the extract to be kept for several years. The alcohol content of the finished extract needs to be at least 20%v/v to adequately preserve it. Most commercially produced tinctures have a minimum alcohol content of 25%v/v. An alcohol content of 25%v/v is recommended for water-soluble constituents like tannins, mucilage and certain flavonoids and some saponins, while an alcohol concentration of 45–60%v/v is required for alkaloids, essential oils, some glycosides and most saponins, and 90%v/v alcohol for resins and oleoresins. The use of the right ethanol concentration

is important in maximizing the quality of the herbal preparations. When kept properly, most tinctures have a shelf life of around five years.

Prescription Rules

Only reduced form is used, the main part of the prescription begins with the name of the dosage form (Tinct.) then goes the name of the medicinal substance and the amount of tincture in ml.

Designate tinctures in drops:

- strong tincture – less than 10 drops (for example, 6–9 drops);
- weak – more than 10 drops (for example, 20–30 drops).

Tinctures are prescribed in the following total amount:

- potent – 10 ml;
- weak – 20, 25, 30 and 50 ml.

Invocatio	Dosage form	Herb	Volume in ml
Rp.:	***Tinct.***	***Schizandrae***	***200 ml***

Prescription examples:

a) Prescribe tincture of Valerian (Valeriana-latin), in amount of 25 ml. Designate 25 drops 4 times a day.

Rp.: Tinct. Valerianae 25 ml

D.S. 25 drops 4 times a day.

b) Prescribe tincture of belladonna (belladonna). Designate 9 drops 3 times a day.

Rp.: Tinct. Belladonnae 10 ml

D.S. 9 drops 3 times a day.

Extracts

Extract – Extract (Extr. – latin abbreviation)

Extracts – *concentrated extract obtained from the dosage of the first plant or biological materials.*

Types (by consistency):

- *liquid* (fluidum,i)
- *thick (spissum,i)*
- *dry (siccum,i)*

- for oral administration;
- for topical application.

Soft and dry extracts are used as a substance for production of various medicinal products, fluid extracts can be used for making medicinal product and directly as a medicinal product.

Prescribing Rules

Reduced form only

Liquid extracts are prescribed as weak tinctures.

Invocatio	Dosage form	Herb	type	Volume in ml
Rp.:	***Extr.***	***Urticae***	***fluidi***	***25 ml***

Administer liquid extracts by drops.

Thick and dry extracts are available frequently in capsules or in tablets.

Invocatio	Dosage form	Herb	type	Dose in g
Rp.:	***Extr.***	***Rhei***	***sicci***	***0,5***
	D.t.d.N. 10	Issue 10 pieces	***10 in tab***	In the form of tablet

When prescribing any extracts, the type of extra to be sure to be indicated.

Prescription examples:

a) Prescribe liquid viburnum extract. Degnate 30 drops 3 times a day.

Rp.: Extr. Viburni fluidi 30 ml

D.S. 30 drops 3 times a day.

b) Prescribe valerian thick extract in coated tablets. Each tablet contains 0,02 g of the extract. Designate 2 tablets 3 times a day.

Rp.: Extr. Valerianae spissi 0.02

D.t.d. N. 20 in tab. obd.

S. 2 tablets 3 times a day.

c) Prescribe dry rhubarb extract in tablets. Each tablet contains 0,5 g of the extract. Prescribe 1 tablet 3 times a day.

Rp.: Extr . Rhei sicci 0.5

D.t.d. N. 10 in tab.

S. 1 tablet 3 times a day.

Aerosols

Aerosol – Aerosolum (Aer. – latin abbreviation)

Aerosol drug administration is the administration of a drug via air particles delivered by an appropriate device that is inhaled and absorbed into the patient's body via the lung.

Aerosol administration of drugs is indicated in circumstances where rapid absorption and localization effects of the drug are required to produce the appropriate response. Aerosol administration methods are most commonly used in asthmatic conditions or specific lung conditions that cause difficulty in breathing. Diseases including emphysema, asthma, chronic obstructive pulmonary disease (COPD), and other similar conditions warrant and necessitate the use administration of drugs by this route of administration.

Aerosol administration in itself is generally a safe practice, as long as the health care provider or client is well educated in its use. It is contraindicated in conditions where complete obstruction of the airway is present, as the administration route is completely blocked. Such conditions, however, are usually resolved rapidly in emergency situations.

Aerosol drug administration, also known as inhalation therapy, or in some cases, nebulized drug therapy, is the method by which drugs are dispersed into the lungs or bronchial airways in the form of tiny droplets – often bound to water, oxygen, or another gaseous substance. Drugs are generally delivered by two means. The first is via a device called a nebulizer. The nebulizer is a mechanical pump (of which there are many types) that produces a fine mist in which the drug is dispersed via an appropriate nebulizer-compatible face mask. This fine mist is inhaled deep into the lungs for maximum effect. The second method of delivery is via a hand-held, nebulized aerosol device. These devices, also known as «puffers», use the effects of a pressurized gas to create and disperse the drug into a fine mist or spray, which is then inhaled.

Both methods of aerosol inhalation are very effective when used correctly. In cases of extreme breathlessness or dyspnea (labored or difficult breathing), the mechanical pump nebulizers are generally more effective, as they disperse the drug over a longer time period; this, in turn, gives the recipient a longer time period, allowing the airways to open more effectively.

In terms of medical treatment costs and medication costs, aerosol drug administration is relatively inexpensive. Nebulized therapy via a mechanical pump is usually completed within five to ten minutes. Delivery of drug via hand-held devices is completed within a few seconds.

Prescription Rules

Reduced form only. Designate by puffs or otherwise.

Invocatio	Dosage form	Drug INN	volume
Rp.:	***Aer.***	***Salbutamoli***	***10 ml***

If the aerosol is complex and has the *trade name*, it is written in quotes.

Prescription example:

Rp.: Aer. «Ingaliptum» N. 1

D.S. For irrigation of the oral cavity. Shake the bottle before use.

Aerosol providing release of the package contents with the power of the air is called “spray”.

Prescription example:

Rp.: Spray Xylometazolini 10 ml

D.S. For irrigation of the nasal mucosa.

Test tasks
Choose one correct answer

1. STATE PHARMACOPOEIA IS
    1) study guide
    2) a collection of national standards
    3) tutorial
    4) rule
2. MEDICINES ARE
    1) a dosage form convenient for patients
    2) state of the drug
    3) substances or combinations thereof coming in contact with the human or animal body, penetrating into the organs and tissues of the human or animal body, used for prophylaxis, diagnostics (except for substances or combinations thereof not coming in contact with the human or animal body),treatment of disease, rehabilitation, as well as for maintenance, prevention or interruption of pregnancy
    4) two or more medicinal substances
3. SOLID DOAGE FORM
    1) tablet
    2) solution
    3) paste
    4) ointment
    5) tincture
4. FOR DECOCTION … CAN BE USED
    1) grass
    2) root, rhizome
    3) leaves
    4) flowers
5. DIFFERENCE BETWEEN OINTMENT AND PASTE
    1) the presence in the composition of the excipient
    2) the presence in the composition of the solvent
    3) the presence of powdered substances
    4) the content of powdered substances is less than 25%
6. FOR DRUGS ISSUED WITH DISCOUNT WE USE PRESCRIPTION FORM
    1) No. 148-1/y-04 (Л)
    2) No. 148-1/y-88
    3) No. 107-1/y
    4) No. 107/y-НП
7. LIQUID DOSAGE FORM
    1) ointment
    2) solution
    3) dragees
    4) powder

8. SEMI-SOLID DOSAGE FORM
    1) spray
    2) ointment
    3) aerosol
    4) none of these
9. MASS OF THE DRUD IS INDICATED
    1) in milligrams
    2) in tablespoons
    3) in grams with decimal places without “g” letter
    4) in pieces
10. VOLUME OF LIQUID DOSAGE FORM IS INDICATED IN
    1) in milligrams
    2) in pieces
    3) in milliliters
    4) none of these
11. 1 TABLESPOON CONTAINS
    1) 20 drops
    2) 1 liter
    3) 1 ml
    4) 15 ml
12. WHAT IS TO BE MENTIONED IN THE DESIGNATION OF THE PRESCRIPTION?
    1) right dose, right time, right route of application
    2) name of the patient
    3) expiry date
    4) nothing
13. TYPES OF SUPPOSITORIES
    1) dry, thick
    2) rectal, vaginal
    3) small, big
    4) none of these
14. THE PROHIBITED ROUTE OF ADMINISTRATION FOR OILY SOLUTIONS
    1) topical
    2) oral
    3) intravenous
    4) subcutaneous
15. SOLUTIONS CAN BE
    1) only alcoholic
    2) water, alcoholic, oily
    3) only oily
    4) none of these

16. TYPES OF EXTRACTS
    1) liquid, dry, thick
    2) solid
    3) aerodisperse
    4) soft
17. MEDIUM POWDER WEIGHT
    1) 0,3–0,5
    2) 0,3–0,6
    3) 0,3–0,7
    4) 0,3–0,8
18. EXAMPLES OF BIOLOGIC DRUGS
    1) heparin
    2) sodium chloride
    3) talc
    4) sugar
19. WHAT DRUG NAME IS TO BE USED IN THE PRESCRIPTION
    1) any convenient name
    2) only trade name
    3) INN
    4) there is no need in definite name
20. WHAT THE SHELF-LIFE CAN DECOCTIONS HAVE?
    1) 3–4 days
    2) 5 years
    3) 1 hour
    4) 6 months

Test keys

Task No.	correct answer
1.	2
2.	3
3.	1
4.	2
5.	4
6.	1
7.	2
8.	2
9.	3
10.	3
11.	4
12.	1
13.	2
14.	3
15.	2
16.	1
17.	1
18.	1
19.	3
20.	1

Tasks for self-study: prescription writing

INN USP	**INN in Latin**	**Dosage forms and mode of use**
1. Benzocaine	1. Benzocainum	ointment 5%; full form
2. Iodoform	2. Iodoformium	paste 20%
3. Trichomonacide	3. Trichomonacidum	single dose 0,05; prescribe officinal vaginal suppositories; prescribe 1 suppository into vagina at night
4. “Anaesthesol”	4. “Anaesthesolum”	suppositories of complex composition, officinal rectal; designate 1 suppository into rectum 2 times a day
5. Crataegus (hawthorn) tincture	5. Tinctura Crataegi	Prescribe 20 drops 3 times a day
6. Calcium chloride	6. Calcii chloridum	Solution for internal use (single dose 1,5). Prescribe 1 tablespoon 3 times a day after meals
7. Bemegride	7. Bemegridum	A solution 0,5%, in ampoules of 10 ml. Designate to the vein
8. Herb of goldenbanners	8. Herba Thermopsidis	Infusion 1:400. Designate 1 tablespoon 3 times a day
9. Nitrofurazone	9. Nitrofuralum	Solution for external use 1:5000. For gargling
10. Sodium bromide	10. Natrii bromidum	A solution for internal use (single dose of 0,3), administer 1 tbsp. 3 times a day
11. Trimeperidine	11. Trimeperidinum	single dose 0,025; prescribe 1 tablet 2 times a day
12. “Allochol”	12. “Allochloum”	authorized N. 10 tablets; prescribe 1 tablet 3 times a day
13. Chlorpromazine	13. Chlorpromazinun	single dose 0,025; prescribe 1 dragee 3 times a day after meals
14. Insulin glargine	14. Insulinum glarginum	Liquid dosage form of biologics, administer 10 IU at 22 oclock subcutaneously. Each cartridge contains 3 ml, each milliliter – 100 IU

Keys for prescription writing tasks

Rp.: Benzocaini 2,5
Vaselini ad 50,0
M. f. ung.
D.S. Apply on the affected skin.

#

Rp.: Iodoformii 10,0
Amyli 12,5
Vaselini ad 50,0
M. f. past.
D.S. Apply on the affected skin.

#

Rp.: Supp. cum Trichomonacido 0,05
D.t.d. N. 10
S. 1 suppository into vagina before bed.

#

Rp.: Supp. «Anaesthesolum» N. 10
D.S. 1 suppository 2 times a day into rectum.

#

Rp.: Tinct. Crataegi 10 ml
D.S. 20 drops 3 times a day.

#

Rp.: Sol. Calcii chloridi 10% – 180 ml
D.S. 1 tablespoon 3 times a day after meals.

#

Rp.: Sol.Bemegridi 0,5% – 10 ml
D.t.d. N. 10 in amp.
S. 10 ml intravenously daily.

#

Rp.: Inf. herbae Thermopsidis 0,45 – 180 ml
D.S. 1 tablespoon 3 times a day.

#

Rp.: Sol. Nitrofurali 1:5000 – 500 ml
D.S. for gargling.

#

Rp.: Sol. Natrii bromidi 2% – 180 ml
D.S. 1 tablespoon 3 times a day.

#

Rp.: Trimeperidini 0,025
D.t.d. N. 10 in tab.
S. 1 tablet 2 times a day.

#

Rp.: Tabl. «Allocholum» N. 10
D.S. 1 table 3 times a day.

#

Rp.: Dragee Chlorpromazini 0,025
D.t.d. N. 20
S. 1 dragee 3 times a day after meals.

#

Rp.: Insulini glargini 3 ml (a 100 IU – 1ml)
D.t.d. N. 5
S. 10 IU at 22 o'clock subcutaneously.

Literature

Essential text books

1. Kharkevitch D.A. Pharmacology [Online resource] / Kharkevitch D.A. – M.: GEOTAR-Media, 2008. – 672 p. ISBN 5-9704-0264-8 – access http://www.studmedlib.ru/book/ISBN5970402648.html

Optional

1. Guidance on the use of international nonproprietary names (INNs) for pharmaceutical substances. – Geneva: World Health Organization; 2017. – 55 p.

2. The United States Pharmacopeia (USP) – access https://www.usp.org/

3. The International Pharmacopeia (Ph.Int) – access http://apps.who.int/phint/en/p/about/

4. British Pharmacopoeia chemical reference substances (BPCRS) – access https://www.pharmacopoeia.com/

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