

**MINISTRY OF HEALTH OF UKRAINE
DANYLO HALYTSKYI LVIV NATIONAL MEDICAL UNIVERSITY**

PEDIATRIC INFECTIOUS DISEASES DEPARTMENT

GUIDELINES

TO PRACTICAL TRAINING OF PROFILE COURSES OF CHOICE

"SURGERY"

FOR 6TH YEAR STUDENTS OF THE MEDICAL FACULTY

SPECIALTY

"GENERAL MEDICINE"

TOPIC:

**"DIFFERENTIAL DIAGNOSTICS OF INFECTIOUS
DISEASES WITH EXANTHEMA IN CHILDREN.
Prophylaxis of infectious diseases in children."**

LVIV-2021

Guidelines are made according to the Study program on Pediatric infectious diseases for students of the second (Master Degree) level of higher education in the field of knowledge 22 " Health Care " specialty 222 "General Medicine"

The Guidelines have been compiled by H. Lytvyn (MD, PhD), Associate Professor, the Head of Pediatric Infectious Diseases Department, O. Hladchenko (MD, PhD), Assistant professor of Pediatric Infectious Diseases Department, Danylo Halytskyi Lviv National Medical University

Reviewed by: D. Dobriansky, Doctor of Medical Sciences, professor, Department of Pediatrics №2 Danylo Halytskyi Lviv National Medical University
M. Shumylo Senior lecturer, of the Latin and Foreign Languages Department, Danylo Halytskyi Lviv National Medical University

The editor-in-chief – E.Varyvoda, (MD, PhD) Associate Professor, the dean of the Faculty of Foreign Students.

A. Nadraga Doctor of Medical Sciences, Professor, the dean of the medical faculty № 2, Danylo Halytskyi Lviv National Medical University

Guidelines on the course of Pediatric Infectious Diseases
for students of the 6th year of General Medicine Faculty

Approved at meeting of the

Pediatric infectious diseases department

Protocol № 229, 22.06.2021.

“Approved”

Methodical Commission of Pediatric disciplines

Protocol № 3, 07.09.2021.

Guidelines to lesson for students of the 6th year

(practical classes – 6 hours)

Differential diagnostics of infectious diseases with exanthema in children.

Prophylaxis of infectious diseases in children.

I.

Aim: to know diagnostic criteria of infectious diseases in children with exanthema; to perform differential diagnostics of them.

Professional motivation: Exanthema – rashes on the skin, which occur in many infectious diseases. Some rashes are typical only for one disease; other may be present in several diseases. They differ by the rash morphology, localization, time of appearing, and dynamics of development. That's why it is very important to differentiate them and perform proper diagnosis for adequate etiological and pathogenetic treatment.

Basic level

1. To know how to ask about complaints, history of the disease and life in children with exanthema [propedeutic pediatrics, children infectious diseases].
2. To perform clinical examination of the child with exanthema [propedeutic pediatrics, children infectious diseases].
3. To diagnose infectious exanthema after clinical, laboratory and instrumental examination of the child [infectious diseases, propedeutic pediatrics, microbiology, and pathophysiology].
4. To give etiological, pathogenetical and symptomatic treatment [pharmacology, children infectious diseases].

II. Primary aims of the study

A student should know:

1. Etiology of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).
2. Epidemiology (source of infection, ways of transmission, age receptivity and morbidity), Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

3. Pathogenesis of disease, pathomorphologic changes in the skin and organs, Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

4. Classifications of clinical forms of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

5. Clinical signs of typical form of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

6. Clinical manifestations of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

7. Complications of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

8. Clinical signs of “acute abdomen” in patients with measles.

9. Clinical signs of atypical (rudimentary and aggravated) forms of Varicella (Chicken-pox), secondary bacterial lesions in patients with Varicella (Chicken-pox).

10. Methods of laboratory research of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

11. Principles of therapy of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox) with the children doses.

12. Measures of prophylaxis of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

13. Definition and general concepts of Immunization.

14. Postexposure immunoprophylaxis.

A student should be able:

1. To follow the basic rules of work with a bed patient with measles, rubella, varicella, Herpes zoster. Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

2. To take anamnesis with the estimation of epidemiology information (taking into account seasonality, origin of febricities, polymorphism of clinical signs of illness).

3. To examine a patient and reveal the basic clinical signs of illness.

4. To represent information of anamnesis and objective inspection in a hospital chart and formulate the preliminary diagnosis.

5. To write a plan of examination.

6. To write a clinical diagnosis (form of disease, type, severity, complications, course of disease).

7. To prescribe the treatment taking into account age, mass and severity of illness.

8. To write out a prescription.

9. To organize disease measures in the focus of infection (to find out the source of infection, fill an urgent report in SES, to set the quarantine, to define the circle of contact persons).

10. To write epicrisis with the estimation of illness development, results of inspection, efficiency of treatment, prognosis, recommendations for a subsequent supervision or treatment depending on the form of Measles, Pseudotuberculosis, Scarlet fever, Varicella (Chicken-pox).

III. Educational aims of the study

- to form the deontological presentations, skills of conduct with the patients
- to develop deontological presentations, be able to carry out deontological approach to the patient
- to develop the presentations of influence of ecological and socio-economic factors on the health condition
- to develop sense of responsibility for the time of illness and loyalty of professional actions
- to be able to set psychological contact with a patient and his family.

IV. Interdisciplinary integration

Table 1

<i>Subjects</i>	<i>To Know</i>	<i>To Know How</i>
<i>Human Anatomy</i>	<i>The main anatomic characteristics of respiratory system</i>	
<i>Physiology</i>	<i>Functions of the respiratory, nervous and</i>	<i>To explain a variety of clinical signs and laboratory</i>

	<i>immune systems</i>	<i>abnormalities</i>
<i>Pathological Physiology</i>	<i>Pathogenesis of disease</i>	<i>To explain the main symptoms and manifestations appearance, causes of relapses, failure of inadequate therapy</i>
<i>Pathological Anatomy</i>	<i>Pathology</i>	<i>To explain the pathogenesis of complications and causes of death</i>
<i>Microbiology</i>	<i>Etiology (classification, morphologic characteristic of the pathogen, methods of revealing and identification)</i>	<i>To culture the organism</i>
<i>Pharmacology</i>	<i>The main antiviral and antibacterial agents. Regimens of treatment. Treatment of complicated influenza. Supportive care</i>	<i>To administer treatment of specific infection including antiviral agents. To write the scheme of treatment of severe influenza.</i>
<i>Histology</i>	<i>Histological changes in different clinical forms of influenza</i>	<i>Explanation of appearance of clinical signs</i>
<i>Propedeutics of Internal Diseases</i>	<i>History of disease. Examination of a patient.</i>	<i>To gather information about patient's history and chief complaints, to distinguish the ones, most important for diagnosis of influenza. To examine the patient, to reveal the main symptoms and signs of disease. To distinguish the set of diagnostic features of influenza. To argue the diagnosis.</i>

<i>Surgery</i>	<i>Chest pain, cough, respiratory failure</i>	<i>Differential diagnostics of surgical disorders, diagnostics of complications</i>
<i>Internal Diseases</i>	<i>Chest pain, cough, respiratory insufficiency</i>	<i>To differentiate with other disorders of respiratory system</i>
<i>Neurology</i>	<i>Severe headache, vomiting, meningeal signs, delirium, altered consciousness</i>	<i>Differential diagnostics of encephalitis, meningitis, stroke</i>
<i>Clinical immunology and allergology</i>	<i>Immunologic changes as a part of pathogenesis and host defenses</i>	<i>To explain confirmative serologic tests</i>
<i>Epidemiology</i>	<i>The routes of transmission, main sources of infection</i>	<i>Epidemiological history</i>
<i>Themes integration</i>		
Encephalitis, meningitis, common cold, ARD, parainfluenza, RS-infection, leptospirosis, sepsis	To know peculiarities of manifestations, laboratory diagnostics, treatment	To differentiate influenza and other infections of respiratory tract from other infectious diseases with similar symptoms

V. The contents of the theme

Scarlet fever differs from measles by the absence of catarrh of the respiratory tract, spotty enanthem, and Belski – Filatov-Kolik’s spots. A constant symptom of scarlet fever is tonsillitis; the disease is often heralded by vomiting, and the tongue presents typical changes. The rash in scarlet fever does not break out in stages as in measles, but covers the whole body almost at once and is minutely punctuate. The circumoral region remains free of rash. There is no leukopenia or aneosinophilia typical of measles, but neutrophilia, eosinophilia and leukocytosis are found.

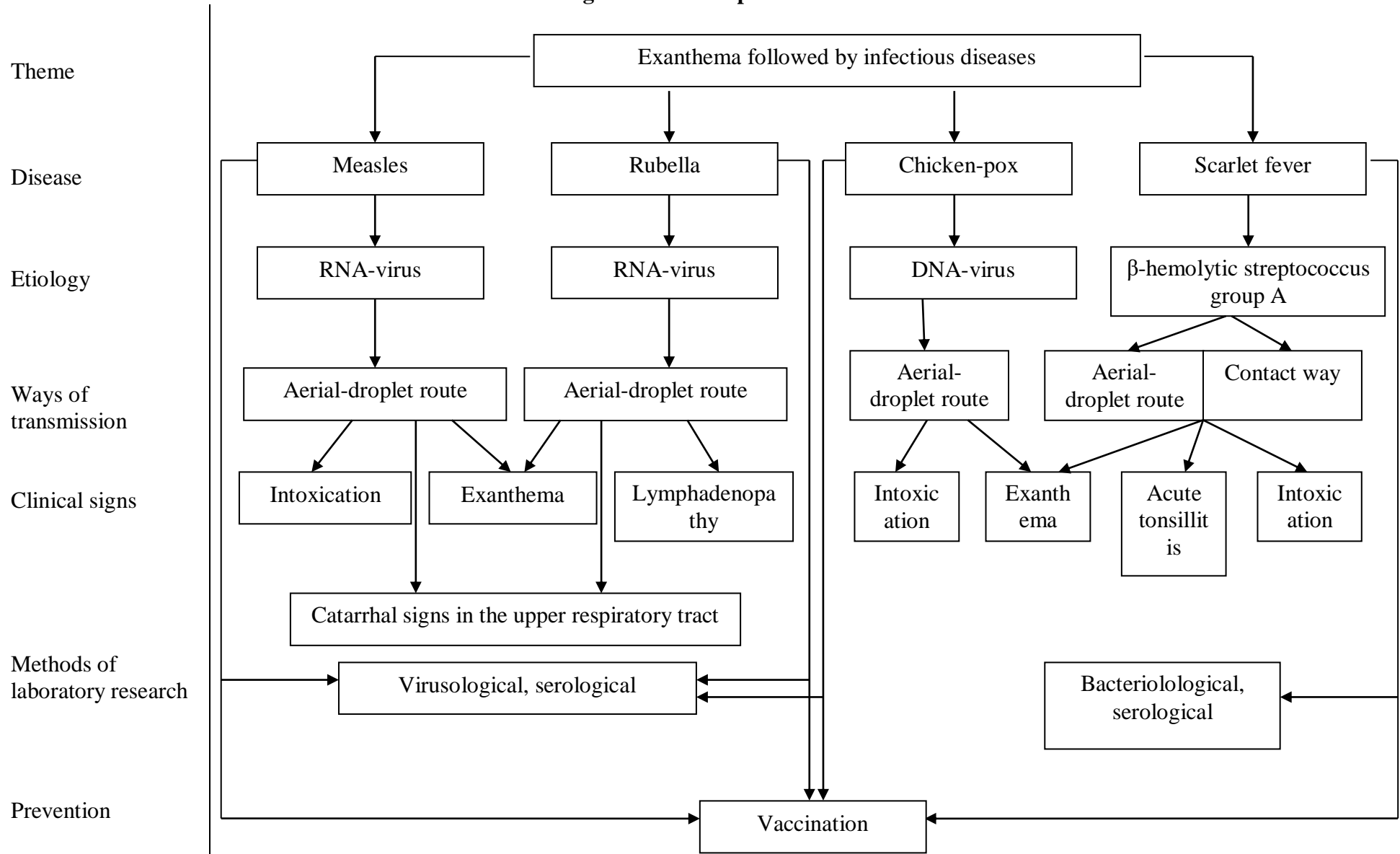
Rubella has to be differentiated from acute exanths: measles, scarlet fever (see corresponding sections).

Rubella rash has also to be differentiated from serum and various drug rashes, and enteroviral exanthema. Epidemiological data are of value in differential diagnosis and should be taken into consideration along with clinical manifestations of the disease. The indirect immunofluorescence assay is successfully used.

An accurate retrospective diagnosis of rubella is ensured by revealing the increasing antibody titre by the hemoagglutination-inhibition reaction, the neutralization and the complement-fixation tests which are carried out twice at a ten-day interval.

The diagnosis of chickenpox is not difficult. The characteristic rash and a history of recent exposure should lead to a prompt diagnosis. Other viral infections that can mimic chickenpox include disseminated herpes simplex virus infection in patients with atopic dermatitis and the disseminated vesiculopapular lesions sometimes associated with Coxsackie virus infection, echovirus infection, or atypical measles. However, these rashes are more commonly morbilliform with a hemorrhagic component rather than vesicular or vesiculopustular.

V. Logical scheme of practical classes



VI. Planning of the lesson

Table 2

	The main stages of the lesson, contents	The methods of control	Methodical equipment	Time in % from total time of the lesson
	10-20 %			
1	Organizational stage			
2	Purposes of the lesson		Relevance of the Theme. Tutorial goals of a lesson	2-5 min
3	Control of basic knowledge and skills	Control questions	The list of control questions	15-25 min
	1. Etiology, epidemiology, classification of disease	Test-control (first grade)	Tests of the first level	
	2. Manifestations in connection with pathogenesis	Methods of the second grade: Individual questioning in oral and written form. Standard task solution. Second grade test-control	Questions Clinical cases (tests of the second grade) Theory tasks for writing answers. Second grade tests	
	3. Treatment	Methods of the third grade:	Third grade questions and tasks	

		1. Solution of complicated tasks. 2. Third grade test-control	Third grade tests	
	4. Prevention			
70-80 %				
1	Formation of professional skills	Method of formation: practical training	Patients with studied disease and similar diseases, patients' histories, medical cases.	120-140 min
	To master the skills of: a) Diagnosis b) Laboratory confirmation c) Treatment	Examination of the patients, distinguishing of the set of important signs and symptoms. Composing of a plan of laboratory confirmation. Administration of the treatment depending on the form and severity of disease.	Laboratory data of the patients, antibacterial drugs and drugs for supportive care	
	Independent work with patients	Examination of the patients with Measles, Scarlet fever and other infectious diseases with similar manifestations (differential diagnostics).	Patients, patient's histories, medical cases.	

	Differential diagnostics	Practical training	Drawing schemes of pathogenesis and clinical course of disease; making up a differential diagnostics table and list of prescriptions for intensive care.	
10 %				
1	Teacher's control, recommendations, the task for the next lesson			10-15 min

Students' self-study program.

1. Objectives for students' self-studies.

You should prepare for the practical class using the available textbook and lectures. Special attention should be paid to the following:

Differential diagnostics of viral infectious rashes (exanthemas)

Table 3

Signs	Measles	Rubella	Chicken-pox
<i>Initial symptoms</i>	catarrhal signs from upper airways, dry cough, conjunctivitis during 2-4 days, intoxication	Increase of occipital lymph nodes, minor catarrhal signs and intoxication	Acutely, observing catarrh, intoxication, rash
<i>Time of the rashe</i>	on the 4-5 days of the	1 day, seldom 2	On 1-2 days rashe

<i>appearance</i>	disease, with stages		appear, next 3-5 days – crusts
<i>Morphology</i>	maculopapulous	small-papulous	Polymorphic (spots, papules, vesicles, crusts)
<i>Sizes of elements</i>	middle, large	small, middle	Middle
<i>Localization</i>	gradual appearing of the rash: 1 day - on the face 2 - on the face, trunk; 3 - on the face, trunk, limbs	on whole body, mainly on unbending surfaces of the limbs	Throughout the whole body, on hair part of the head, seldom - on palms and soles
<i>Brightness and color of elements</i>	bright red	pale-rose	Papules are pink, vesicles – on hyperemic base
<i>Further rashes' development</i>	pigmentation, slight desquamation	disappear on the 3-4 days	After desquamation of the crusts - a slight pigmentation
<i>Catarrhal phenomena</i>	expressed in first 5-6 days	small, short for 1-2 days	Moderate,
<i>Oral mucous membranes</i>	hyperemia, friability, enanthem, Koplick's spots	clear, sometimes single elements of enanthem	On pink background - polymorphic elements
<i>Intoxication</i>	significant, lasts 5-7 days	small or absent	Small or moderate
<i>Other symptoms</i>	complications (respiratory, digestive, nervous, urinary systems, eye, ears, skin)	increased and painful posterior neck and occipital lymph nodes	Seldom: generalized visceral forms, meningoencephalitis (ataxia)
<i>Laboratory criteria</i>	leucopenia, lymphocytosis,	leukopenia, lymphocytosis,	Leukopenia, lymphocytosis,

	aneosinophyllia, serological reaction with measles antigen (+)	increase of the plasmatic cells' number, serological reactions with rubella antigen (+)	serological: binding complement reaction with Chickenpox antigen (+)
--	---	---	---

Differential diagnostics of bacterial infectious rashes (exanthemas)

Table 4

Signs	Pseudotuberculosis	Meningococemia	Scarlet fever
<i>Initial symptoms</i>	acutely with many symptoms (intoxication, intestinal changes, seldom - catarrhal signs	intoxication, develops very acutely, initial measles-like rash	Acutely - intoxication, angina, regional lymphadenitis
<i>Time of the appearance of rashes</i>	On the 2-8 day	first hours of the disease	1 day (in 20% - 2)
<i>Morphology</i>	puncture-like, small spots, erythema	hemorrhagic "star- like" with necrosis in the centre	small point-like
<i>Sizes of elements</i>	Small, middle, large	from small to significant	small
<i>Localization</i>	"hood", "mitten", "socks" signs, in skin folds, bends, around joints	buttocks, lower limbs, less - on trunk, hands, face	mainly on bending surfaces of limbs, down the abdomen, lumbar region, face, lateral surfaces of the trunk, pale nose-labial triangle
<i>Brightness and</i>	bright	hemorrhagic, bright,	bright

<i>color of elements</i>		sometimes cyanotic	
<i>Further rashes development</i>	gradually disappear for 2-5 days, small, lamellar shelling	Small, disappear gradually, significant, leave "dry" necrosis	gradually turn pale for 4-5 days, small, lamellar desquamation
<i>Catarrhal phenomena</i>	Not typical	are absent, in 30-40% on previous 2-3 days – nasopharyngitis	Not typical
<i>Oral mucous membranes</i>	Possible hyperemia of the pharynx, tonsils	hyperemia and swelling of back pharyngeal wall, hypertrophy of follicles	marked off, bright hyperemia, enanthen on palate, tonsillitis (catarrhal, follicular, necrotic forms)
<i>Intoxication</i>	expressed, long-lasting (2-3 weeks)	acutely expressed	proportional to local signs, short for 1-3 days
<i>Other symptoms</i>	arthritis, myocarditis, diarrhea, hepatitis, abdominal syndrome, lymphoproliferative symptom, kidneys, nervous system damage, pneumonia	meningitis, encephalitis, arthritis, iridocyclitis, endocarditis, aortitis, pneumonia, pleurisy	angina, changes on the tongue (from 4-5 days "strawberry"), complications on the 2-3 weeks
<i>Laboratory criteria</i>	leucocytosis, shift to the left, high ESR, Indirect hemoagglutination reaction with special diagnosticum (+), separation of Y.	leucocytosis, shift to the left, neutrophilosis, high ESR in nasopharyngeal swab, thick drop of blood –	leucocytosis, shift to the left, neutrophilosis, increased ESR, in pharyngeal, nasal swabs - streptococci

	pseudotuberculosis from excrements	meningococci	
--	---------------------------------------	--------------	--

In some occasions, in patients with measles, lesions of the mesenteric lymph nodes may be realized in clinics of “acute abdomen”. At the beginning of the disease there is pain, most often it is acute, localized on the right in the lower abdomen, mimics an attack of acute appendicitis. Some children with measles may develop cortical appendicitis, a very serious condition.

Atypical forms of chickenpox are divided into rudimentary and aggravated. The rudimentary form is characterized by a mild course, single rashes, normal or subfebrile body temperature (usually typical for patients who received immunoglobulin). The aggravated form is characterized by a very intense clinical picture of the disease. It includes visceral, gangrenous and hemorrhagic forms, which are treated in hospital.

At a hemorrhagic form of a disease at the patient high temperature, strong intoxication, defeat of internals is noted, blood appears in bubbles, they bleed. There is hematuria, hemorrhage into the skin and tissue, mucous membranes and internal organs.

Visceral form of chickenpox is mainly found in premature infants, newborns and children with immunodeficiency. It is characterized by prolonged intoxication, abundant rashes, severe fever, lesions of the nervous system and internal organs (kidneys, lungs, liver, heart).

The gangrenous form is diagnosed very rarely, mainly in patients with immunodeficiency. There is a pronounced intoxication. The bubbles in this form are large, quickly covered with a crust with a zone of tissue necrosis. When the crust falls off, deep ulcers appear on the skin, which heal very slowly.

In patients with chicken pox, in the case of secondary infection of the vesicles, with their improper care or damage, there are abscesses, phlegmons, erysipelas, bullous streptoderma, stomatitis, lymphadenitis caused by *S.aureus* and

S.pyogenes. Sometimes hematogenous spread of pathogens leads to the development of sepsis, pneumonia, arthritis and osteomyelitis.

Evidences to obligatory hospitalization of patients with infectious exanthema

1. severe form of the disease, when there is need in intensive therapy; patients with moderate forms at the age under 3 years
2. ill children from families with bad social-home conditions, especially in the event of impossibility of their isolation to prevent transmission of infections
3. obligatory isolation of children with different manifestations of meningococcal infection
4. absence of conditions for examination and treatment at home
5. ill children from closed children establishments

Advantages of home treatment

1. possibility of additional infection with hospital bacteria is completely excluded
2. realization of individual care principle for ill child is more complete
3. avoiding stressful reactions, which could appear in case of hospital treatment

Treatment in home conditions is possible

1. in conditions of isolated apartment
2. in case of satisfactory financial condition of the parents
3. in case parents desire to organize individual care and treatment at home

Treatment of measles 1. Adequate hydration, bed rest; 2. Antipyretics as needed for fever; 3. Vitaminized nutrition; 4. Nasal decongestants; 5. Mucosolvents and cough suppressants; 6. Antihistamine medicine; 7. Oral cavity hygiene. In case of *bacterial complication* – antibacterial therapy should be used. In case of *severe episodes* –corticosteroids (1-2 mg/kg for 2-3 days). In case of *croup*: mist tent with 25-30 % oxygen inhalation, anti-anxiety medicines, steroids and mechanical ventilation in severe cases. In case of *meningitis*: steroids, dehydrates, parenteral detoxication (albumin, plasma), anticonvulsants.

Treatment of scarlet fever 1. Recommended treatment for scarlet fever is penicillin either orally (penicillin V) or intramuscularly (penicillin G) for 10 days

50000-100000 EU/kg/day divided in 3-4 doses. Erythromycin is alternative antibiotic (30 –50mg/kg/day).

2. Vitamins, calcium medicine, antihistamines.

3. Local treatment with antiseptic fluids.

Patient may be discharged from infection department not earlier the 10th day of the illness, in 10 days blood analysis, urinalyses, ECG must be done.

Treatment of Chicken-pox in most cases is only symptomatic – antiseptic fluids for skin lesions; antihistamines for pruritus; acetaminophen for fever control. *Acyclovir* – for immunocompromised children. Also for them – *varicella-Zoster immunoglobulin*, given as prophylaxis within 72 hours of exposure. Acyclovir (1500 mg/sq/m/day for 7 days in patient under 12 years of age; 30 mg /kg/day in adults). In case of *encephalitis* – acyclovir, parenteral detoxication, dexamethasone, dehydration, symptomatic treatment.

Prevention of measles

1. Specifically active immunization by MMR vaccine (measles, mumps, rubella) at age 12 months. Revaccination at the age 4 to 6 years or 10 to 11 years.
2. Specifically passive prophylaxis with immune serum globulin in the dose of 0.25 ml/kg as a postexposure prophylaxis.
3. Nonspecifically: – isolation of ill person until 5th day of the exanthema period, isolation of contact person from the 8th to 21st days after exposure.

Prevention of scarlet fever: isolation of the patient for 10 days, but he mustn't visit school until 22nd day of the disease. Contact persons (children under 8 years) must be isolated for 7 days (period of incubation).

Prevention of Chicken pox:

1. To isolate ill person until the 5th day after the last vesicles appeared.
2. To isolate contact persons from the 9th till 21st days after exposure.
3. VZ immunoglobulin in immunocompromised children.

Self study

Diseases	Measles	Rubella	Chicken pox	Scarlet fever
----------	---------	---------	-------------	---------------

Signs				
<i>Intoxication</i>				
<i>Conjunctivitis</i>				
<i>Dry cough</i>				
<i>Koplick's spots</i>				
<i>Enanthem on the soft palate</i>				
<i>Gradual appearing of the rash</i>				
<i>Localization of the rash:</i> <i>mainly on bending surfaces of limbs</i> <i>on unbending surfaces of the limbs</i> <i>on the whole body</i> <i>scalp</i>				
<i>Sore throat</i>				
<i>“Strawberry” tongue</i>				
<i>Rash:</i> <i>maculopapular rash</i> <i>small papular rash</i> <i>polymorphic (spots, papular, vesicles, crusts)</i> <i>small point-like</i>				
<i>Pigmentation</i>				
<i>Pastia’s lines</i>				

<i>Desquamation large (major)</i>				
<i>Desquamation small (minor)</i>				

Tasks and assignments for self-assessment

Task 1

1. The Physician is called to the boy, 5 years old. Patient is ill during 4 days: the temperature increased to 38.2° C, rash appeared on skin since the first day of the disease. On examination polymorphic rash (the papules, vesicles, crusts) is observed on the whole body, there are several vesicles with purulent contents and hyperemia around them. What complication is possible?

- A. Phlegmona
- B. Furunculosis
- C. Pustulosis
- D. Paronychia
- E. Eczema

2. The child, 7 years old, is ill for 5 days. He complains of rashes that appear on the nose back. He became acutely ill, when the body temperature increased to 38 °C, the liquid discharge from nose appeared. On the third day of the disease temperature fell to 37 °C. Objectively: the general condition is moderate; the temperature is 38 °C. Hyperemia of the child is weak, sleepy. The face is puffy, conjunctival hyperemia and edema are observed. The back pharyngeal wall. On soft palate - single small rose spots. On cheeks - white spots with red corolla. The skin of the face and neck is covered with large amount of small rose spots, places overflow, irregular form, on unchanged basis. What diagnosis is the most probable?

- A. Measles, catarrhal period.
- B. Measles, rash period.

C. Infectious mononucleosis.

D. Scarlet fever.

E. Meningococemia.

3. The child, 5 years old, was admitted to the infectious department. The complaints are: increasing of the body temperature to 39° C, headache, sore throat, vomiting. Objectively: in skin folds, lateral surface of the trunk and neck - small macula rash. Circumoral pallor is noted on the background of bright colored cheeks. Anterior cervical lymphatic nodes are enlarged. The tongue is covered with white stratification, hyperemia of the. What is the diagnosis?

A. Rubella.

B. Chickenpox.

C. Pseudotuberculosis.

D. Scarlet fever.

E. Haemorrhagic purpura.

4. In a girl, 10 years old, pediatrician diagnosed "Pseudotuberculosis". It is known that 1.5 months ago she had maculous rash on lateral surface of the trunk, lower part of the abdominal wall, pain in the throat, increased body temperature to 38,5 °C. The girl was treated at home. At the moment the patient complains of the rash around knees and feet, with expressed pain, with breach of the joint function. Name the severity of the disease:

A. Mild.

B. Moderate.

C. Severe.

D. Acute.

E. Prolonged.

5. The Child, age 2 years, with meningococcal infection, is examined by the group of students together with physician. Typical rash is present on skin of the whole body, especially on the buttocks and lower limbs. Name which sign is not present at meningococcal rash:

A. Hemorrhagic nature.

- B. The elements are mildly increased on the skin level of the skin.
 - C. The necrosis in the centre.
 - D. Disappears at pressure.
 - E. In scraper it is possible to find meningococci.
6. What does not apply to atypical forms of chickenpox?
- A. hemorrhagic;
 - B. ulcerative-necrotic
 - C. nodal;
 - D. jaundice.
 - E. gangrenous

Correct answers – Task 2: 1 – C, 2 – B, 3 – D, 4 – B, 5 – D. 6

Task 2

Case 1

A girl 13 years old, who had received steroid hormones for a long time before, was hospitalized because of disseminated spots, respiratory distress for 5 days. Two weeks ago, she was exposed to her young brother with varicella. On admission: P 120, RR 40, temperature 39⁰C, crop of vesicular lesions present at various stages of maturation, including the soft palate; bibasilar bubbling rale. Chest film showed diffuse, bilateral lower lobe interstitial infiltrates.

What is the diagnosis, including clinical form? What is the most appropriate antiviral drug? Why the infection disseminates?

Case 2

A boy 6 years old acutely developed headache, throat pain when swallowing, submandibular lymphatic nodes markedly enlarged, body temperature 39,0⁰C, vomited twice. On the 1st day of the disease rash occurred: small red macules on hyperemic skin, more intensive on flexion surface, Pastia's signs.

Your is your presumed diagnosis? How to confirm the diagnosis? Which pathognomonic signs can be found in mouth cavity on 5th day after the onset of disease?

Case 3

A 4-year-old child has been in contact with a patient experienced vesicular lesions on the chest unilaterally with severe local pain, increased body temperature to 37,4°C. On the 13th day of the contact the child's body temperature raised to 38,4°C. On the second day of the disease macular, papular and vesicular lesions were found on the trunk, face, limbs and scalp.

Your assumptive diagnosis? What is in common between Shingles and presumptive disease? What is possible source of infection? What can be found in vesicles?

Case 4

A child of 1 year suffered from chickenpox. On the medical examination: along with the elements of vesicular rash, black areas of necrotized skin and underlying tissues of 0.5 to 2 cm in diameter were detected.

What clinical form of chickenpox is the child ill with? Enumerate other atypical clinical forms of chickenpox. What is the causative agent of this disease?

Case 5

A child was borne on term to a young mother, he presented bilateral cataract, microcephaly, Patent Duct Anterior. During pregnancy the mother had viral hepatitis A and rubella. The following medications were taken in tablets: trimethoprim sulfamethoxazole, mefenamic acid.

What is the most probable reason of the inborn defects? Which kind of defects they are according to gestational period: embryopathy or fetopathy? How this inborn defects could be prevented?

Case 6

In the period of crusta drying a 10 year old boy with varicella developed headache, lethargy, loss of balance probes, Kernig and Brudzinsky signs were negative. Lab tests: WBC 4,600 x 10⁹ with 6% Bands, 27% PMN, 64% LC, 3 M, ESR 8 mm/hr.

Which complication developed? Which kind of brain lesion this neurological syndrome is characteristic for? What antiviral drug should be used for treatment?

Case 7

The child is 5 years old, suffers from chickenpox. On the fifth day from the onset of the disease, the child had a fever to 38.5, in the area of the anterior surface of the neck, around the chickenpox element, a reddening area is visualized, the skin is swollen to the touch. Lab tests: WBC $18,600 \times 10^9$ with 15% Bands, 67% PMN, 15% LC, 3 M, ESR 28 mm/hr.

Which complication developed? What other secondary bacterial complications may occur? What strategy of management of the diseases should be chosen by the doctor?

Case 8

A 4-year-old child, ill for the second day, complains of severe abdominal pain localized on the right in the lower abdomen, fever up to 38.5. On examination, the abdomen is sharply painful on palpation in the iliac region on the right. Examination of the oral cavity revealed enanthema on the soft palate, small-spotted spots near the canines (Koplik's spots). Lab tests: WBC $3,900 \times 10^9$ with 6% Bands, 27% PMN, 64% LC, 3 M, ESR 8 mm/hr.

What is the preliminary diagnose? How do you explain the acute abdominal pain? What are the tactics of treatment? What possible complications should be expected from the patient?

Diseases Signs	Measles	Rubella	Chicken pox	Scarlet fever
<i>Intoxication</i>	+		+	+
<i>Conjunctivitis</i>	+	±		
<i>Dry cough</i>	+			
<i>Koplick's spots</i>	+			
<i>Enanthem on soft palate</i>	+		+	+
<i>Gradual appearing of</i>	+			

<i>the rash</i>				
<i>Localization of the rash:</i>				
<i>mainly on bending surfaces of limbs</i>				+
<i>on unbending surfaces of the limbs</i>		+		
<i>on the whole body</i>	+	+	+	+
<i>scalp</i>			+	
<i>Sore throat</i>				+
<i>“Strawberry” tongue</i>				+
<i>Rash:</i>				
<i>maculopapular rash</i>	+			
<i>small papular rash</i>		+		
<i>polymorphic (spots, papular, vesicles, crusts)</i>			+	
<i>small point-like</i>				+
<i>Pigmentation</i>	+			
<i>Pastia’s lines</i>				+
<i>Desquamation large (major)</i>				+
<i>Desquamation small (minor)</i>	+			+

Student’s practical activities:

I. Treatment of patients with infectious exanthema at children infectious department.

1. Ask complaints, anamnesis and life history.
2. Examine the patients; find clinical features of infectious exanthema.
3. Prescribe laboratory investigations to prove the diagnose.

II. To perform the diagnosis:

1. Make previous diagnosis due to complaints, disease history, epidemiological anamnesis, clinical objective features.
2. Make complete diagnosis based on previous diagnosis, laboratory dates, differential diagnosis.

III. Provide the treatment (diet, medicine) depending on patient's age, severity of the disease.

IV. Prescribe measures in the focus of infection, specific prevention of the disease.

V. Clinical analyzing of the case.

Students must know:

1. Diagnostic features of infectious exanthema in children.
2. Differential diagnosis of infectious exanthema in children.
3. Indications to hospitalization of children with infectious exanthema.
4. How to organize home treatment in case of Measles, Rubella, Scarlet fever, Varicella.
5. Common treatment of infectious exanthema in children.
6. Prevention of infectious exanthema in children.

Student should be able to

1. Find diagnostic clinical criteria of infectious exanthema during examination of patients.
2. To perform differential diagnosis among diseases having the same clinical features.
3. To organize home treatment in case of Measles, Rubella, Scarlet fever, Varicella.
4. To prescribe measures in the focus of infection, specific prevention of the disease.

Students' independent study program.

1. Objectives for students' independent studies.

You should prepare for the practical class using the existing textbook and lectures.

Special attention should be paid to the following:

The immunoprophylaxis task is management by immunological answer to prevent the disease beside separate persons and groups of the population.

The ways of the immunoprophylaxis:

Active - stimulation of own antibodies production,

Passive - introduction of ready antibodies.

Vaccinal preparations characteristic

1. Vaccines, which include complete killed microorganisms (pertussis, typhoid, cholera) or inactivated viruses (influenza, poliomyelitis Salk vaccine)
2. Anatoxins, which contains inactivated toxin of the bacteria (diphtheria, tetanus)
3. The vaccines from alive attenuated viruses (measles, mumps and others.)
4. Vaccines, which contains crossing alive microorganisms (BCG)
5. Chemical vaccines from fraction of killed microorganisms (pneumococcal, meningococcal)
6. Gene-engineering recombinant, chemical synthesized (hepatitis B, influenza)
7. Associated (in composition of which enters several vaccines)

Composition of vaccines:

1. Active or immunizing antigens
2. Fluid base
3. Preservatives, stabilizers, antibiotics
4. Auxiliary facilities

Ways of the vaccination

1. Intramuscular (DTP, DT, DT-M, antirhabic, meningococcal B)
2. Subcutaneous (measles, mumps, rubella, meningococcal A+C)
3. Intracutaneous (BCG)
4. On skin (plague, tularemia, brucellosis)
5. Peroral (poliomyelitis)
6. Intranasal (Influenza, inactivated)

Recommended immunization schedule for infants and children

Table 3

Age	Recommended immunizations
4 months	Diphtheria, tetanus, and pertussis (DTP) Polio (OPV or IPV) Hepatitis B (HBV) Haemophilus influenzae type B (HiB) (1)
6 months	Diphtheria, tetanus, and pertussis (DTP) Hepatitis B (HBV) Haemophilus influenzae type B (HiB)
12-15 months	Haemophilus influenzae type B (HiB) Tuberculosis test (2)
12-18 months	Diphtheria, tetanus, and pertussis (DTP) Polio (OPV or IPV) Varicella zoster (chicken pox) vaccine (VZV)
15 months	Measles, mumps, and rubella (MMR) vaccine Hepatitis B (HBV)
4-6 years	Diphtheria, tetanus, and pertussis (DTP) Polio (OPV or IPV) Measles, mumps, and rubella (MMR) vaccine (3)
12-14 years	Varicella zoster (chicken pox) vaccine (VZV) (4)
14-16 years	Tetanus-diphtheria booster (5)

Ukrainian Immunization Schedule

Table 4

Immunization	Age										
	1 day	3-5 days	2 months	4 months	6 months	12 months	18 months	6 years	14 years	16 years	Adults
Hepatitis B	+		+		+						
Tuberculosis		+									
Measles, mumps, and rubella						+		+			
Diphtheria, tetanus			+	+	+		+	+		+	Every 10 years
Pertussis			+	+	+		+				
Polio			+	+	+		+	+	+		
Hib-infection			+	+		+					

Vaccinal process - is a change of homeostasis, which appear in organism in response to introduction of vaccinal preparation and include the complex of reactions to which belongs: formation of antibodies, adaptation and postvaccinal reactions, postvaccinal complications.

Vaccinal reactions appear in response to entering the vaccines, are characterized by appearance of clinical manifestations typical to this type of vaccine, which have a round-robin duration, are short, do not cause serious changes of vital activity in the organism.

Postvaccinal complications - all pathological phenomena, which appear after vaccination and are not inherent to the usual vaccinal process, but obvious, their relationship with performed vaccination:

1. Postvaccinal unusual reactions and complications, caused strictly by vaccine ("true").
2. Joining of intercurrent infections in postvaccinal period.
3. Exacerbation of chronic diseases and primary manifestations of latent diseases.

Table 5

Postvaccinal reactions	Postvaccinal complications
DTP-vaccination	
<ol style="list-style-type: none"> 1. Temperature 37.5-39 °C, anxiety, poor sleeping, rarely - vomiting. 2. Local reaction (more often on revaccination) - in the manner of hyperemia, infiltration. 3. Febrile seizures (on background of the quick ascent of the temperature). 4. Reinforcement of the allergic manifestations (in children with exudative-catarrhal diathesis) 	<ol style="list-style-type: none"> 1. Kvinke's edema. 2. Anaphylactic shock, collapse. 3. "Croup" (on background of ARVI). 4. Prolonged cry more than 4-5 hours. 5. Afebrile seizures, absences. 6. Encephalitis (stratification of the disease)
OPV-vaccination	
Does not call any reactions	<ol style="list-style-type: none"> 1. Reinforcement of the allergic manifestations (in children with exudative-catharrhal diathesis) 2. Kvinke's edema, urticaria. 3. Vaccinassociated poliomyelitis in immunised and in contact persons (on background of immunodeficiency) - 1:1,500000.
Vaccination against measles	
<ol style="list-style-type: none"> 1. Specific vaccinal reaction from 4 to 14 days: <ul style="list-style-type: none"> - temperature 37,5-38 °C, - catarrhal manifestations, conjunctivitis, - pale-rose rash in a small amount, - duration - 2-3 days, - is not contagious 	<ol style="list-style-type: none"> 1. in children with exudative-catarrhal diathesis: Kvinke's edema, urtica 2. Lymphadenopathy. 3. Hemorrhagic vasculitis. 4. Hyperthermia 39-40 °C with febrile seizures
Vaccination against mumps	
<ol style="list-style-type: none"> 1. In some cases from 4 to 12 days - fever, catarrhal manifestations. 2. Rare - a short increase of parotid glands. 	<ol style="list-style-type: none"> 1. Hyperthermia. 2. Febrile seizures. 3. Abdominal syndrome. 4. Allergic rash. 5. Very rare - serous meningitis.
BCG-Vaccination	

1. Local reaction: papule, vesicle, rib; lymphadenitis	<ol style="list-style-type: none"> 1. Subcutaneous cool abscess (BCGitis). 2. Purulent lymphadenitis. 3. Kelloid scars. 4. Lymph nodes calcification. 5. Generalized BCG-infection on background of immune deficiency (4: 1000000). 6. Osteites with dominating damage of long bones.
--	---

LIST OF THE MEDICAL CONTRAINDICATIONS TO THE PREVENTIVE VACCINATIONS

Table 6

Vaccine	Contraindications
All vaccines and ns	<ul style="list-style-type: none"> • Severe complications on previous dose in the manner of anaphylactic shock. • Allergy on any component of the vaccine. • Progressing diseases of the nervous system, hydrocephalus and hydrocephalic syndrome in stage of decompensation, epilepsy, epileptic syndrome with seizures 2 times per month and more. • Anemia with level of hemoglobin below 80 g/l (preventive vaccinations are conducted after hemoglobin level increasing).
All alive vaccines	<ul style="list-style-type: none"> • Congenital combined immune deficiencies, primary hypogammaglobulinemia (giving of the vaccines is not contraindicated at selective immune deficiency of Ig A and Ig M), hemoblastoses and malignant tumors, pregnancy, AIDS
BCG	<ul style="list-style-type: none"> • Weight of the child less than 2,000 g: prematurity of the 2nd degree (the weight is 1,500 - 1,999 g) vaccination do not performed before 1 month of life, prematurity of the 3rd degree (the weight 1,000 - 1,499 g) - vaccination do not performed before 2 months of life, complicated reactions on previous vaccination (lymphadenitis, cool abscess, ulcer of the skin more 10 mm in diameter, kelloid scar, osteomyelitis, generalized BCG-infection, tub. infection)
OPV	<ul style="list-style-type: none"> • Children, whom alive vaccines are contraindicated, as well as members of their families are recommended to be vaccinated by inactivated poliomyelitis vaccine (IPV)
DTP	<ul style="list-style-type: none"> • Seizures in anamnesis (instead of DTP enter DT or vaccine with acellular component)
living vaccine against measles, living mumps vaccine, vaccine against rubella or trivaccine (measles, mumps, rubella)	<ul style="list-style-type: none"> • Allergic reactions on Aminoglucozides • Anaphylactic reactions on eggs protein

Passive immunization is indicated

1. To children with insufficient antibodies syntheses as a result of congenital or acquired cellular defects of B-lymphocytes.
2. At absence of vaccines against infection, when single way of protection is introduction of ready antibodies.
3. If required immediate preventive maintenance of the disease for epidemiological causes (the contact with sick on measles, preventive maintenance of rabies, tetanus).
4. For neutralization of the antigen-toxin by specific antitoxic antibodies.
5. With medical purpose at the beginning of the diseases (at diphtheria, botulism, tetanus).

Tests and assignments for self-assessment

Choose the correct answer / statement:

1. To the child, 1 year old, was diagnosed transitory hypogammaglobulinemia. Define how he should be vaccinated against poliomyelitis.
 - A. It is absolute contraindication to vaccination
 - B. vaccination according to immunization calendar
 - C. vaccination according to immunization calendar by alive OPV (the oral poliomyelitis vaccine)
 - D. vaccination according to immunization calendar by IPV inactivated poliomyelitis vaccine)
 - E. vaccination after normalization of immunoglobulins' level
2. The child, 1 year old, during 2.5 months was receiving immunosuppressive therapy. His mother has addressed to immunologist with the question about vaccination of the child according to calendar. Vaccination against what disease is contraindicated to this child?
 - A. Tuberculosis
 - B. Measles
 - C. Mumps
 - D. Rubella
 - E. Poliomyelitis

3. The child, 7 years old, came to district pediatrician for vaccination against tuberculosis. What examination must be done before this vaccination?

- A. General blood test
- B. General urinalysis
- C. Biochemical blood test
- D. ECG
- E. Mantu Test with 2 tuberculin units

4. The Child has recovered from diphtheria of the pharynx. How to immunize this child against diphtheria later?

- A. Vaccination should be done through 6 months after the disease
- B. Vaccination should not be done
- C. Vaccination should be done by antidiphtherial serum
- D. Vaccination should be done to children, which did not receive the specific treatment
- E. Vaccination should be done after stimulation of the immune system

5. The girl, 4.5 months, was in contact with child who had whooping cough. It is known that the girl was immunized according to calendar. What is her further immunization against whooping cough?

- A. To give her human immune globulin immediately
- B. Vaccination should not be done
- C. Vaccination should be done according to calendar
- D. Vaccination should be done by acellular pertussis vaccine
- E. Vaccination should be done on background of the chemotherapy

Answers for the self-control:

Tests: 1-D, 2-A, 3-E, 4-A, 5-B.

Task 1

Suddenly, the temperature in the refrigeration chamber, where the unlawful serum, tetanus toxoid, AKDP, polio vaccines and hepatitis B were stored, dropped to -20°C .

Which of these drugs can eventually be used for vaccinations? 2. What is the

procedure for writing off unsuitable IIBPs? 3. How should IAPB be disposed of?

Task 2

You need to take part in organizing an office for preventive vaccinations at a children's district clinic.

1. What is the amount of space required for the proper organization and optimal operation of such an office?
2. What equipment should be in the office?
3. Who is responsible for organizing the vaccinations?

Task 3

A child of 3 years of age at the time of administration of the DTP vaccine had suffocation, severe acrocyanosis, cold, sticky sweat, nausea, dizziness. Pulse filiform, blood pressure - 60/30 mm Hg

1. What is your diagnosis?
2. The emergency care algorithm.

Aids and material tools: Charts “Immunization schedule”.

Student’s practical activities:

- I. Writing of individual Immunization schedule to healthy children.
- II. Writing of individual Immunization schedule to children in case of contraindications, late immunization and other problems.
- III. Prescribe epidemiological measures in the focus of infection, specific prevention of the disease.
- IV. Diagnosing, treatment and prevention of postimmunization reactions and complications.

Students must know:

1. Recommended immunization schedule for infants and children.
2. Ukrainian immunization schedule.
3. DTP Vaccine: characteristics, immunization schedule, risks, contraindications.
4. MMR vaccine: characteristics, recommendations, precautions and contraindications, adverse reactions.
5. Polio vaccine: characteristics, immunization schedule, risks, contraindications.

6. Varicella zoster (chicken pox) vaccine: characteristics, immunization schedule, risks, contraindications. Varicella-zoster immune globulin.
7. Hepatitis B virus vaccine: characteristics, immunization schedule, risks, contraindications.
8. Hepatitis A virus vaccine: characteristics, indications, contraindications, side effects.
9. Influenza vaccine: characteristics, immunization schedule, risks, contraindications.
10. Normal postimmunization reactions and complications: clinical features, treatment prevention.
11. epidemiological measures in the focus of infection,
12. Specific passive prevention of diseases by immune globulin.

Student should be able to

1. Write individual Immunization schedule to healthy children.
2. Write individual Immunization schedule to children in case of contraindications, untimed immunization and other problems.
3. Prescribe epidemiological measures in the focus of infection, specific prevention of the disease by immune globulin.
4. Diagnose, treat and prevent of postimmunization reactions and complications.

References:

1. Kramarev B. B. Pediatric infectious diseases / B. B. Kramarev, O. B. Nadraga. – Kyiv, 2015. – 238 c.
2. Long S. S. Principles and Practice of Pediatric Infectious Diseases / S. S. Long, K. L. Pickering, G. C. Prober. – Churchill Livingstone, 2017. – 1618 c. – (Fifth edition).
3. Textbook of Pediatric Infectious Diseases / [J. Cherry, G. G. Demmler-Harrison, S. L. Kaplan та ін.], 2018. – 1618 c. – (Eight edition).
4. Nelson Textbook Of Pediatrics - Volume 1 & 2 (International Edition) Edition: eighteenth by Robert M Kliegman Richard E Behrman Hal B Jenson Bonita F Stanton. – 21th Edition. – 2018. – 3250 p.

5. Наказ МОЗ України від 23.04.2019 № 958 "Про внесення змін до Календаря профілактичних щеплень в Україні"
6. <http://www.who.int/immunization/documents/positionpapers/>