"The Orenburg state medical University"

**METHODICAL DEVELOPMENT**

**FOR THE TEACHER TO CONDUCT PRACTICAL LESSON #10**

Theme " Hospital epidemiology. Healthcare-associated infections "

**DISCIPLINE "EPIDEMIOLOGY"**

**WITH STUDENTS OF THE 5TH COURSE   
OF THE FACULTY OF FOREIGN**

Methodical recommendations are developed

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**Module 2. Epidemiological control**

# 1. The competence generated:

|  |  |  |
| --- | --- | --- |
| Cipher  competence | №  competence | Elements of competence |
| Cultural competence | СС-1 | ability for abstract thinking, analysis, synthesis; |
| General professional competence | GPC-1 | willingness to solve standard tasks of professional activity with the use of  information, bibliographic resources, biomedical terminology, information and communication technologies and taking into account the basic requirements of information security; |
| Professional competence | PC-3 | ability and willingness to undertake anti-epidemic measures, organisation of protection  the population in the foci of particularly dangerous infections, the deterioration of the radiation situation, natural disasters and  other emergencies |

## Practical lesson № 10

# 2. Subject:

Hospital epidemiology. Healthcare-associated infections

# 3. Objective:

Acquire knowledge about of the definition, causes of healthcare-associated infections, determine the main preventive measures.

# 4. Tasks:

***Training:***

* To study the definition of healthcare-associated infections;
* To study the causes of healthcare-associated infections;
* To study main preventive measures of healthcare-associated infections.

***Educational:***

* To form the ability to implement preventive measures against healthcare-associated infections.

***Raising:***

* To be able to carry out preventive measures against healthcare-associated infections.

# 5. Questions for consideration:

* Problem HAIs
* Definitions of HAIs
* Registration and notification of HAIs
* HAIs incident rate
* Classification of HAIs
* Etiology of HAIs
* Epidemic HAI process
* Risk factors of HAIs development
* The strategy of HAIs prophylaxis
* Surveillance of HAIs and control measures

# 6. Basic concepts of the theme

* Healthcare-associated infections
* HAI - Urinary tract infections; Upper respiratory tract infections; Lower respiratory tract infections; pneumonia; Surgical site infections; Bone & Joint infections; Skin & soft tissue infections; Cardiovascular system infections; Bloodstream infections;
* Device-associated infections; Procedure-associated infections;
* Endemic HAIs; Amplification of infections; «self- infections»; «cross- infections»; «environmental infections».

# 7. Recommended reading:

1. Main literature:

* Methodical recommendations «Modern epidemiological methods in medical practice» of the Department of Epidemiology and Infectious Diseases
* Rothman, Kenneth J.; Greenland, Sander; Lash, Timothy L. Modern epidemiological. 3rd edition. 2008 Lippincott Williams & Wilkins. 1581 p.

2. Additional literature:

* O.V. Kovalishena, V.V. Shkarin, N.V. Saperkin, M.M. Khramtsov. Epidemiology of inflectional disease. Учебник. Издательство: «Смоленская городская типография», 2016. 284 с.

# 8. Activity and time of lesson

|  |  |  |  |
| --- | --- | --- | --- |
| № | The stages and content of the classes | The methods used | time |
| 1 | The organizational part.  The announcement of the theme, the objectives of the class.  Readiness assessment of the classroom, equipment and students.  Brief description of the stages and content of work of students in the class. |  | 5 minutes |
| 2 | Incoming control of knowledge, abilities and skills of students.  The terminological dictation | Handout  A written answer to the question | 5 minutes |
| 3 | Updating of theoretical knowledge | Analysis of theme elements and the construction of logical graphs on the board. | 1 hour 15 minutes |
| 4 | The development of practical skills. Case solving. | Cases | 30 minutes |
| 5 | Quality control of the formed competence /elements of competence (knowledge and skills) students on lessons  Output control | Written test | 15 minutes |
| 6 | The final part of the class:  Summarizing, the findings on the topic.  Homework | - | 10 minutes |

# 9. Form of organization class

instructional workshop (workshop)

# 10. Learning tools:

- logistics (multimedia projector)

## Incoming control

|  |  |
| --- | --- |
| **Task** | **Answer** |
| HAIs according to the group of contracted people (affected cohort) include… | 1)  2) |
| According to the conditions of medical service HAIs are classified as… | 1)  2)  3) |
| Classification of HAIs by a reservoir of a causative agent… | 1)  2)  3) |
| Sources of HAI are… | 1)  2)  3) |
| Risk factors of HI development (three groups)… | 1)  2)  3) |

## Output control

**Case 1**. Patient K., 72 yrs, from 15.12. to 15.01. was in surgical department of hospital with the diagnosis “Gastric ulcer complicated by hemorrhage and decompensated stenosis”.

Associated diseases: diabetes mellitus.

24.12. the patient was operated (upper-median laparotomy, anterior gastroenteroanastomosis with Brown anastomosis) within an hour and 35 minutes.

The postoperative period: the patient was in intensive care unit for 24 hours, and during 10 hours artificial lung ventilation was performed

. In early postoperative period (first 24 hours after the operation) there was hemorrhage that required reintervention.

From 27.12. to 02.01. the patients temperature rose up to 37.5°C. On 30.12. infiltrate in postoperative wound site was observed in palpation.

02.01. in wound revision 5 ml of purulent sanioserous fluid was taken away. As a result of bacteriological analysis of wound discharge, Staphylococcus epidermidis was revealed.

* How can you assess the complications occurred in patient in postoperative period?
* What are risk factors o f the complication in this case?

**Answer (Case 1)**. The present state is to be classified as hospital-acquired infection, be more precise - hospital purulent septic infection. Clinical form - in surgical site infection (postoperative wound suppuration), caused by Staphylococcus epidermidis.

Risk factors related to patient’s initial state:

* severe principal disease;
* severe associated pathology accompanied by patients reduced immunity (diabetes mellitus);
* elderly age.

Factors of diagnostic and treatment process contribute fing to hospital-acquired infection development risk:

* long stay in hospital before surgery (9 days);
* the character of operation (complex and traumatic surgery);
* prolonged operationstay in intensive care unit;
* artificial lung ventilation;
* early postoperative complication;
* reintervention.

**Case 2**.Patient L. was administered out-patient treatment under the care of a surgeon from polyclinic after scheduled surgery in hospital on papilloma of scalp (resection of papilloma under local anaesthesia on 23.11.).

When seen by the doctor of out-patient department on 24.11. the patient complained of moderate pain in site of postoperative wound.

On examination: clean wound, no inflammatory signs, with slight serous discharge, stitches had been put well. Discharge was taken for bacteriological analysis.

26.11. The patient complained of the pain in the area of postoperative scar; edematous suture lines; slight hyperemia;

29.11.— complaints of throbbing pain in operative intervention site, sleep disorders. Subfebrile temperature.

Objective signs: wound edges under sutures moved apart, edematous and hyperemic suture lines, slight seropurulent discharge form wound.

The surgeon from polyclinic made the diagnosis “postoperative wound infection”.

Bacteriological test findings of wound discharge (dated 24.11.): Pseudomonas aeruginosa (10s CFU/ml) resistant to Gentamicin, Kanamycin, Cefalotin and Polymyxin was revealed.

* Refer the case to one of three PSI groups according to occurrence conditions.
* Prove your answer.

**Answer (Case 2)**. The present case can be referred to the second group of “PSI brought in polyclinic from hospital”.

Evidences:

* present history (infection occurrence immediately after being discharged from hospital);
* clinical signs of infection (complaints of tenderness in the region of postoperative scar, the presence of discharge from the wound);
* bacteriological test findings of wound discharge taken on the patient’s first visit to polyclinic after being discharged from hospital (blue pus bacillus in etiologically significant amount was revealed).

The characteristic of the strain revealed let us to suppose its hospital nature (multi-resistant strain of blue pus bacillus).

Required measures:

* record and report of the case as HAI in hospital where the patient was operated;
* filling in the record of prospective observation of HAI case;
* hospital epidemiologist informing; microbiological examination of the patient along with obligatory basteriophages of P.aeruginosa and/or pyobacteriophage sensitivity test as well as antibioticogram;
* administration of adequate antibiotic therapy relying on the sensitivity of the strain revealed to antibiotics;
* usage of bacteriophage of P.aeruginosa or pyobacteriophage in complex therapy of PSI.

**Case 3**.Patient T. consulted a surgeon in polyclinic on 4.10. on trophic ulcer of left calf. On examination on inner surface of the left calf there was extensive ulceration, 10x4 cm in size, with slight purulent discharge.

Diagnosis: varicose disease, thrombophlebitis, trophic ulcer of left calf. Wound discharge was taken for bacteriological analysis.

Bacteriological test findings of wound discharge (dated 4.10.): Staphylococcus aureus (10J CFU/ml) resistant to benzylpenicillin.

The patient was administered capsular Troxevazin, toilet of the wound and aseptic dressing with Laevomecolum ointment every other day. From 4.10. to 10.10. the patients wound was treated in pus dressing room of the surgical department of polyclinic according to doctor’s administrations.

10.10. There was aggravation of symptoms: subfebrile temperature, edema and hyperemia of left calf.

Objective signs: the wound of the same size, with “sapped” edges and profuse cacodorous purulent discharge.

Pathological material from the wound was taken for repeated bacteriological test.

Bacteriological test findings of wound discharge (dated 10.10.):

1) Staphylococcus aureus (103 CFU/ml) resistant to Benzylpenicillin;

2) Pseudomonas aeruginosa (104 CFU/ml) resistant to cephalosporins, Gentamicin, Polymyxin, Ciprofloxacin;

3) Escherihia coli (105 CFU/ml) resistant to Ampicillin, Ciprofloxacin, Tetracycline and Gentamicin.

The association of microorganisms revealed was pyobacteriophage-sensitive.

* Refer the case to one of three PSI groups according to occurrence conditions.
* What is the doctor’s action?

**Answer (Case 3)**. The present case can be referred to the third group of PSI on occurrence conditions (HAIs). The change of agent in pathological focus gives evidence of intra-polyclinic infection: antibioticsensitive Staphylococcus revealed on the first examination was associated on the 10th day of treatment by antibiotic resistant strains of Pseudomonas aeruginosa. Agent change was accompanied by associated changes (burdening) of clinical presentation of the disease.

The doctor’s actions:

* record and report of the case as intra-polyclinic purulent septic infection;
* filling the record of prospective observation of HAI case;
* polyclinic epidemiologist informing;
* further microbiological examination of the patient in dynamics;
* administration of adequate antibiotic therapy relying on the sensitivity of the strain revealed to antibiotics;
* use of pyobacteriophage in com plex PSI therapy.

**Case 4**. Patient A. consulted a surgeon in polyclinic on 19.01. complaining of the tenderness in big toe of left foot.

Diagnosis: ingrow I toenail of left foot without inflammatory signs.

The patient was scheduled an operation in out-patient department.

21.01. onychectomy was performed under local anesthesia. 'Ihe surgery was made in pus dressing room of the surgical department of polyclinic.

23.01. During regular dressing the patient complained of constant severe pain in postoperative wound.

On examination: edematous wound, with profuse sanious discharge.

The patient was administered toilet of the wound, and aseptic dressing was applied.

On 25.01. the patient complained of acute throbbing pain in left foot; I toe was hyperemic, there was profuse seropurulent discharge form wound, edema of the back of the foot.

The patient was directed to the department of purulent surgery for inpatient treatment.

* What mistakes were made by the doctor in his management of the patient?
* What measures are to be taken?
* Refer this case to one of three PSI groups according to occurrence conditions.

**Answer (Case 4)**. When treating the patient the following mistakes were made. Onychectomy and subsequent dressings (before inflammation) were to be performed in “clean” operating room as there were no infection signs. When first inflammation signs occurred (23.01.) it was necessary to take wound discharge for bacteriological test (with obligatory testing of antibiotic resistance and sensitivity to staphylococcal and/or pyobacteriophage) and before the results obtained broad-spectrum antibiotic was to be administered. The present case can be referred to the third group of “Intrapolydinic PSI" on the base of the following criteria: absence of infection sings before surgery; clinical manifestation of infection In 48 hours after the operation performed in out-patient department. The doctor's behavior: see Task 2.