ETIOLOGY AND EPIDEMIOLOGY OF HEALTHCARE-ASSOCIATED INFECTIONS

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ABSTRACT
The etiological nature of nosocomial infections is determined by a wide range of microorganisms, which includes both pathogenic and opportunistic flora, the border between which is often rather blurred. Nosocomial infection is caused by the activity of those classes of microflora, which, firstly, is found everywhere and, secondly, is characterized by a pronounced tendency to spread. Identification of developmental features and assessment of the epidemic process of nosocomial infections in hospitals of various profiles made it possible to develop a scientifically grounded complex of organizational, methodological and practical measures to improve the system of epidemiological surveillance in these hospitals.

Keywords: healthcare-associated infections (HAI), opportunistic microorganisms, antibiotics, antibiotic resistance, infectious-inflammatory, surgical infection, antibiotic sensitivity, suppurative-septic, purulent-septic infection.

I. INTRODUCTION
Healthcare-associated infection (HAI) is an infection that occurs in hospital settings; layering on the underlying disease, it aggravates the clinical course of the disease, complicates diagnosis and treatment, worsens the prognosis and outcome of the disease, often leading to the death of the patient (1,3,5, 15).

The main causative agents of nosocomial infections (85% of the total) are conditionally opportunistic pathogens: gram-positive cocci (epidermal and Staphylococcus aureus, beta-hemolytic streptococcus, pneumococcus, enterococcus) and gram-negative rod-shaped bacteria (Klebsiella, escherichia, enterobacteriaceae, proteus, pseudomonade and others) [4,8,9].

The risk group mostly susceptible to the development of nosocomial infection includes newborns (especially premature babies) and young children; elderly and debilitated patients; persons suffering from chronic diseases (diabetes mellitus, blood diseases, renal failure), immunodeficiency, oncopathology [1,6,7,8].

II. MATERIALS AND METHODS
The highlighted cultures were identified by morphological, tinctorial, cultural, and biochemical characteristics [1,4,6,15].

Microbiological studies in opportunistic infections are aimed at isolating not one but several main microbes in the test material and not at indicating one specific pathogen, as is customary in diseases caused by pathogenic microbes [8,10,11]. The main method of microbiological diagnosis of opportunistic infections is bacteriological [6,7,12].

In using this method, the followings should be considered:
• in the material from the patient, as a rule, there is an association of microbes, which includes both causative agents of the disease and species introduced from other organs and the external environment, as well as microbes that can get into the material during its collection and delivery;

• the quantitative and species composition of microflora varies in different patients and changes in the course of the disease, especially when using antibacterial drugs [9,10,12,14].

III. RESULTS AND DISCUSSION

The reliability of bacteriological research depends on: the correct collection of material from the patient; the use of an effective set of differential diagnostic and selective nutrient media; the use of quantitative inoculation of the material; stages of identification of isolated pure cultures (family, genus, species and, if necessary, option); determination of properties indicating the pathogenicity of crops and their belonging to hospital.

It should be mandatory to determine the antibiotic gram, as well as the properties of the cultures necessary for epidemiological analysis – phage var, serovar, resistance var, etc.

In order to determine the change in pathogens and changes in their properties, microbiological monitoring should be carried out every 5-7 days.

The microscopic method makes it possible to detect bacteria in smears of pathological material only in the case of their massive content (105 CFU / ml and more) and due to the closeness of the morphology of bacteria, it allows only roughly judging the pathogen, referring it to large taxa (rods, cocci, spirochetes, gram-positive or gram-negative, etc.). The results of microscopy can be used in the selection of nutrient media for further isolation of the pathogen (7, 8). When identifying fungi and the simplest, the possibilities of the microscopic method are somewhat wider. The introduction into practice of the reaction of immunofluorescence expands the possibilities of the microscopic method, but in this case it cannot replace the bacteriological method, since it does not allow determining the sensitivity of the pathogen to chemotherapeutic impairment of the immune response to antigens of opportunistic microorganisms. Nevertheless, with protracted and chronic forms of the disease, the serological method sometimes makes it possible to establish the etiology of the disease. Serological tests are performed with paired sera of the patient and autoculture. The result is assessed by serum conversion 4 times or more. To date, diagnostic preparations based on immune reactions (immuno-enzyme analysis, immunofluorescent diagnostics, monoclonal antibodies) to opportunistic microorganisms have been poorly developed.

The results of microbiological diagnostics depend on the correct choice of material and compliance with the conditions for its collection, delivery, storage and processing.

• The type of material is determined by the clinical picture of the disease and must correspond to the localization of the alleged pathogen, taking into account the pathogenesis of the disease.
• The amount of material should be sufficient to conduct the study and repeat it if necessary.
• The material is taken whenever possible in the initial period of the disease.
• The sampling of the material should be carried out before the start of antibiotic therapy or after a certain period of time after its appointment, necessary to remove the drug from the body.
• The material must be taken directly from the focus of infection or the corresponding discharge must be examined (pus from the fistula, urine, bile, etc.).
• The sampling of material must be carried out at the time of the greatest content of microbes in it.
• It is necessary to prevent contamination of the material with the normal microflora of the patient and environmental microbes.
• The possibility of getting into the material of antimicrobial drugs (disinfectants, aseptics, antibiotics) should be prevented, contact with metals with oligodynamic properties, with cotton wool containing free fatty acids should be avoided.
• Any clinical material should be considered potentially hazardous to humans. Therefore, during its collection, storage, delivery, processing in order to avoid infection, the same safety measures must be followed as when working with pathogenic microbes.
• The clinical specimen should be transported to the laboratory as soon as possible.
• The clinical sample sent to the laboratory is accompanied by corresponding document containing the basic information necessary for conducting a microbiological study (nature of the material, surname, name and
Isolation of pathogens of opportunistic infections

1st day. Sampling and delivery of material to the laboratory is carried out. The material, if necessary, is processed for the purpose of homogenization and concentration. The smears are prepared and stained according to Gram. If necessary, special painting methods are additionally used. Dilutions of pathological material are prepared from 10^-1 to 10^-6 in warm 0.5% sodium chloride solution with 0.01% gelatin (to prevent osmotic shock of bacteria) and 0.1 ml of material from dilutions are sown on Petri dishes with a nutrient medium - a lawn (for 3 cups from each dilution). In a standard set of nutrient media, it is desirable to include yolk-salt agar (for staphylococci), Endo medium or eosinmethyl agar (for enterobacteria), blood agar (for streptococci and a number of other species demanding nutrient media), Sabouraud medium (for fungi), medium for sterility control or other media for anaerobes. In cases where there are indications of a probable pathogen (clinical symptoms, type of pathological material, microscopic results), more selective media should be used.

2nd day. The nature of growth on nutrient media is determined. The number of colonies of each type are counted on plates with inoculation of dilutions of pathological material to calculate the contamination of the material according to the formula: X CFU = N * PD * CR, where N is the colony count, PD is the inoculum dose, CR is the potency.

Smears from grown colonies are microscopied. Colonies of various types are sieved onto the accumulation medium. To increase the reliability of the study, it is desirable to screen out 2-3 colonies of the same type. This measure is due to the heterogeneity of the population; it increases the cost of research, and its reliability. If there are methods and possibilities, accelerated identification is carried out.

3rd day. Establishing the purity of culture. Identification of pure cultures. Determination of the antibioticogram of the isolated cultures.

4-5th day. The results of the tests used for identification are record. Conclusion is formed (family, genus, type of selected cultures; contamination of the material, CFU / ml or CFU / g; antibioticogram; etiological significance of the isolated cultures and the composition of their populations). According to clinical and epidemiological indicators, pathogenicity factors and epidemiological markers (phago-, sero-, bacteriocinovars, etc.) in etiologically significant cultures are determined.

Criteria for the etiological role of the isolated culture

To establish the etiological role of pathogenic microbes, it is sufficient to isolate a microbe from the patient's material, detect specific antibodies in the blood serum in a diagnostic titer or seroconversion in the course of the disease by 4 times or more, and a correlation between the isolated microbe and the clinical picture of the disease.

IV. CONCLUSION

It should be borne in mind that the size of the pathogen population changes during the course of the disease: during the transition to the chronic form, during the period of recovery and remission, during chemotherapy, and in the presence of a competitor, it significantly decreases.

Treatment of opportunistic infections is difficult and must be comprehensive. Complex treatment includes adequate surgical intervention, rational antimicrobial chemotherapy, and immunotherapy. Since opportunistic infections often form suppurrative focus, their sanitation is necessary.

Given the wide spread of multidrug resistance to antibiotics among opportunistic microorganisms, it is necessary to prescribe these drugs to patients taking into account the results of determining the antibiogram isolated from a patient with opportunistic microorganisms.

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Since the spread of hospital strains is often associated with carriers, especially among hospital staff, it is necessary to identify and sanitize these carriers.

REFERENCES: