BENEFITS OF SPREADING GERMS IDENTIFICATION IN THE EPIDEMIOLOGICAL SURVEILLANCE OF HIGH NOSOCOMIAL RISK UNITS

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Abstract: *The identification of spreading microbial flora in patients who were admitted in units with high nosocomial risk allows that the epidemiologist initiates special supervision and control measures according to the identified Gram-positive or Gram-negative flora. The analysis of the data obtained was performed using statistical processing programs: Epi Info and WHONET. During 2017, the Clinical Observation Sheets of 7995 patients admitted to a private health facility were analyzed. The most common positive pathological products, bacteriologically investigated, are required from the obstetrics-gynaecology ward, followed extensively by the general surgery department for both screening and diagnostic purposes. Gram-negative germs can pollute the hospital environment, requiring more rigorous cleaning and disinfection measures in the wards, to prevent their circulation in the hospital. We appreciate that Gram-positive germs can be handled in the future by the caregiver unless the hand hygiene and the handling of the sterile medical instruments are intensified.*

INTRODUCTION

The microbes spreading in a health unit that were isolated from the patients, from the medical staff, from the medical devices or elements in the hospital environment could become a marker of possible epidemiological incidents.

Data on the isolated microbial agents may differ between the community environment and the hospital environment and from one hospital to another as well. Data is important not only for the patient, but it also offers the bacteriological profile of a sanitary unit, as a premise of the proliferation of germs in the hospital, their characterization as a level of microbiological alert, epidemic attitude and the application of a correct antibiotic therapy policy in the respective unit.(1,2)

Today, these findings apply in Romanian hospitals to a greater or lesser extent depending on the hospital financial resources, the recognition with which the hospital manager credits the microbiology activity of the medical analysis laboratory.

AIM

The classification of the infectious risk according to the degree of microbial resistance of the germs identified and pathogenically characterized by the bacteriology compartment versus the computer processing of the results in the WHONET system.

Objectives:

- analysis of clinical medical orientation in terms of pathological product required for bacteriological analysis, collected from patients in wards.
- analysis of germs identified according to their colonized or infected condition, depending on the purpose of screening or diagnostic.
- pathogenic characterization of microbial agents using the WHONET software.
- analysis from the epidemiological perspective of data provided by microbiological alert.

MATERIALS AND METHODS

This study is retrospective, descriptive and analytical; the research tools consist of clinical observation sheets and medical tests bulletins. The collection of data was made in accordance with medical ethics.

Between 1 January 2017 and 31 December 2017, the Clinical Observation Sheets of 7995 patients admitted to the private health facility Medlife Bucharest were analyzed to identify patients with infectious risk during hospitalization.

Criteria for inclusion in the study group: patients hospitalized in high nosocomial risk wards: obstetrics gynecology, neonatology, general surgery, intensive care anesthesia, patients with continuous hospitalization type, patients with positive bacteriological tests. Exclusion criteria from the study group: patients with mental illness; patients hospitalized in low nosoconmial risk sections: cardiology, gastroenterology, maternal medicine, patients with negative bacteriological tests, day hospitalization.

After analyzing the clinical observation sheets we have selected a total of 355 eligible patients with positive bacteriological tests.

The analysis of the data obtained was performed using statistical processing programs dedicated to medical studies, namely: Epi Info 2002, version 3.4.3. from November 2007, the Excel program and the WHONET program. The EpiInfo 2002 program provides a set of software tools for the global community of practitioners and public health researchers. It is used to build databases for clinical trials, statistical research, epidemiology in public health schools, and has an important contribution to continuing education in epidemiology. The WHONET 2017 program allows the monitoring of microbial resistance locally, nationally or globally, and is recognized as part of the infection control strategy of many national and international organizations, including the WHO.(3)

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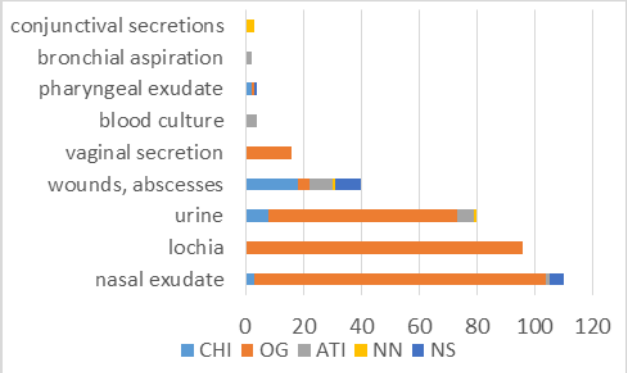
RESULTS AND DISCUSSIONS

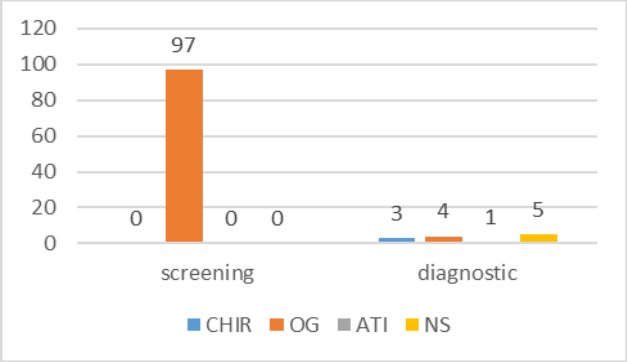
The most common positive pathological products, bacteriologically investigated, are required from the obstetrics gynecology ward, followed extensively by the general surgery department for both screening and diagnostic purposes. For both situations, pathological products actually come from the germ access pathways, which the patient can easily acquire during hospitalization or which the patient can bring from the community. Hemoculture and bronchial aspiration are bacteriological investigations required in the hospital only in the intensive care ward, marking the evolution of the case from colonization or infection to an infectious condition. Most surgical wounds, bacteriologically investigated, are found in the general surgery department, followed by the intensive care unit and, according to expectations, few samples from the gynecology obstetrics department, which could suggest the order in which infectious localizations actually occur, which could raise the problem of an healthcare associated infection over time (figure no. 1).

Figure no. 1. The distribution of pathological products in wards



Of the total nasal exudates (2200 samples), 110 were positive, representing 4.95%.Out of the positive samples, 11% were collected for diagnostic purposes and 89% for screening. Most positive screening results were recorded in the obstetric department, 101 nasal colonized patients. The laboratory results were combined with the clinical examination and allowed the colonization of patients and their treatment. The other 9 positive samples were required for diagnosis of general surgery and intensive care unit (figure no. 2).

Figure no. 2. The aim of the bacterial test



The germ identified in the 110 positive nasal exudates was exclusively Staphylococcus aureus, of which one single sample was nominated as MRSA.

In the study group, there were a total of 1767 births, of which 291 natural births and 1476 caesarean births. 322 cultures of lochia were made. In our hospital, women who have natural birth, besides active clinical surveillance, are tested based on lochia culture as well. As result we found out that out of the 291 natural births to which it was performed a lochia culture for screening purposes, 26.46% were positive. For diagnostic purposes for women with a clinically and biologically modified status, 31 lochia cultures were performed, of which 61.29% were positive. In our study, Gram negative bacilli (54.16%) prevailed in the positive samples, with high percentage difference of Gram-positive bacteria (26.04%) and Candida spp. (19.48%) (table no. 1).

Table no. 1. The bacteria identified in lochia cultures in 2017

	Screening		Diagnostic	
Escherichia coli	36	46,75%	6	31,57%
Streptococcul B	10	12,98%	6	31,57%
Streptococcul haemolitic	5	6,49%	0	0
Stapylococcus aureus	3	3,89%	1	5,26%
Klebsiella spp	4	5,19%	2	10,52%
Proteus mirabilis	1	1,29%	0	0
Citrobacter	2	2,59%	0	0
Enterobacter	1	1,29%	0	0
Candida spp	15	19,48%	4	21,05%
Total	77	100%	19	100%

In our hospital, out of the total number of urine tests collected for bacteriological examination only 44.31% were positive, and from the analysis of the cases all the patients investigated for diagnostic purposes had a urinary catheter for a period of time greater than 96 hours, which increases the risk of an infection. For 81.81% of patients, the urinary catheter was assembled for less than 24 hours, the urine sample being given during this interval.

Most positive urocultures were required by the obstetric department for screening, given that caesarean delivery, bladder catheterization, epidural aesthesia, increased body mass index are just a few of the risk factors for postpartum urinary infection (table no. 2).(4)

Table no. 2. Positive urocultures

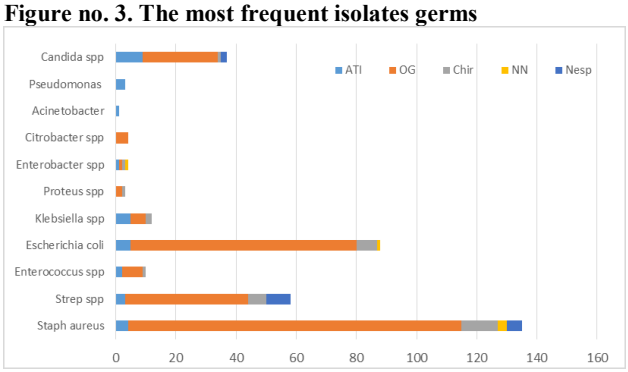
	Positive urocultures			
	Screening	%	Diagnostic	%
E coli	33	45,83	5	62,5
Streptococcus B	23	31,94	0	0%
Klebsiella spp	3	3,89	2	25%
Proteuss spp	1	1,38	0	0%
Enterococcus	9	12,5	0	0%
Citrobacter koseri	2	2,77	0	0%
Staphylococcus hemoliticum	1	1,38	0	0%
Pseudomonas aeruginosa	0	0%	1	12,5
Total	72	100%	8	100%

In our research, the most common isolated germ was Escherichia coli, as it is mentioned in the literature.(5) We draw attention to colonization with Streptococcus group B, Klebsiella spp and the presence of Pseudomonas aeruginosa found in a suspicion of urinary tract infection, referring to their potential to pass from colonization, to bacteraemia and infection, and the possibility of disseminating these germs in the hospital environment.(6)

Out of the total wound secretions and abscesses investigated, 44.94% were positive. Most test requests come from the surgery department, 45%, followed by intensive care unit, 20% and obstetrics gynecology department, 10%. The purpose of the tests was, in all cases, for diagnosis, which warns us about the isolated germs, many of them with nosocomial potential.

The most frequent isolates of wounds and abscesses were Staphylococcus aureus in the surgical department - Gram positive and Escherichia coli - Gram negative. In the intensive care unit, Staphylococcus aureus, Streptococcus haemolytic and Escherichia coli predominated (figure no. 3).

Figure no. 3. The most frequent isolates germs



Starting from the premise that these patients have a hospital stay longer than 4 days, we appreciate that Gram-positive germs can be spread in the future by the caregiver, unless the hand hygiene and the handling of the sterile medical instruments is intensified. Instead, gram-negative germs can pollute the hospital environment, requiring more rigorous cleaning and disinfection measures in the compartments where these patients are treated, in order to prevent their proliferation in the hospital.

The secretions tests from the cervix and vagina were required by the obstetrics gynecology department just for diagnostic purposes. Out of these, 21.62% of the examined samples were positive. The identified microorganisms were Streptococus agalactiae and Candida albicans.

Out of the 13 hemocultures collected for diagnostic purposes, all from intensive care unit, from patients with a hospital stay exceeding 96 hours, 30.76% were positive. The incriminated germs were Klebsiella spp, Pseudomonas aeruginosa, Escherichia coli ESBL and Candida parapsilosis, according to the data provided by the literature.

Out of the total number of pharyngeal exudates collected for diagnostic purposes, only 3.57% were positive, tests required by the intensive care unit and gynecology obstetrics department. The identified germs were Group A Streptococcus, Group B Streptococcus and Candida albicans. For these patients the physicians established the appropriate therapy.

Five tracheobronchial aspirates were collected in sterile conditions by bronchial aspiration, from patients hospitalised in intensive care unit. Out of these, only 2 were positive, Acinetobacter baumanii was isolated from one of the samples, and from the other sample Candida albicans.

Fluid secretion by conjunctival cells were collected from newborns in the neonatology department for diagnosis purposes, with the percentage of positivity being lowered to 7.68%, posing the problem of their transmission from mother to fetus.

CONCLUSIONS

1. The germ identified in the 110 positive nasal exudates was exclusively Staphylococcus aureus, out of which one single sample was nominated as MRSA.
2. Gram-negative germs can pollute the hospital environment, requiring more rigorous cleaning and disinfection in the wards where these patients are treated in order to prevent their proliferation in the hospital.
3. The germs identified in the uroculture tests taken for screening purposes increase the ascendant infection risk for the patient due to the invasive manoeuvres of setting the urinary catheter.
4. We believe that Gram-positive germs can be spread in the future by the caregiver, unless the hand hygiene and the handling of the sterile medical instruments are intensified.

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