UNIVERSITY OF MEDICINE AND PHARMACY CRAIOVA
FACULTY OF MEDICINE

DOCTORAL THESYS

ASPECTS OF BACTERIAL NOSOCOMIAL INFECTIONS
IN THE MATERNITY OF “FILANTROPIA”
CLINICAL MUNICIPAL HOSPITAL CRAIOVA
- Dolj county 1995-2005 -

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**CURRICULUM VITAE**
PART I – THE THEORETICAL STUDY

CHAPTER I. GENERAL ASPECTS OF NOSOCOMIAL INFECTIONS

The nosocomial infections are those infections (clinically manifested of emphasized only microbiologically) acquired within a hospital or healthcare unit with beds (sanatorium, maternity, convalescent unit, foster care) by the hospitalized patient or one receiving treatment, or by the medical staff. The global incidence of hospital acquired infections is thought to be 3,5-15%, with an average of 6,5%. It is estimated that 5-10% of hospitalized patients are affected by a nosocomial infection.

CHAPTER II. EPIDEMIOLOGY OF NOSOCOMIAL INFECTIONS

In general, the epidemiologic process of hospital acquired infections, irrespective of the causal agent, the clinic-epidemiologic manifestation form and profile of the healthcare unit in which it takes place, is realized by the interaction of three determining factors: the infection source, the transmission route and receptiveness of the organism, as well as contributing factors (natural and socio-economical).

The manifestation forms of the hospital acquired infections epidemiologic process are numerous and depend on the quantitative and qualitative of different determining and contributing factors.

CHAPTER III. BACTERIAL ETIOLOGY OF NOSOCOMIAL INFECTIONS

In the bacterial etiology of nosocomial infections prevail the Gram-negative bacteria in a percentage of 62,1% and the Gram-positive bacteria in a percentage of 30,4%. In a decreasing order, the most common isolated bacteria are: E. coli (25%), Staphylococcus aureus (14%), Pseudomonas sp. (12%) [28, 112]. The Klebsiella-Enterobacter-Serratia (KES) group and the opportunistic bacteria produce nosocomial infections especially in case of immunocompromised patients. The incidence of coagulase-negative staphylococcus significantly increased, especially in blood cultures, evolving from 9% to 31% in the 1990-1992 timespan.

CHAPTER IV. CLASSIFICATION OF NOSOCOMIAL INFECTIONS

The most used definitions of nosocomial infections, published by WHO (World Health Organization) and CDC (Center for Disease Control) [86, 87], also recognized and stipulated in our country in a legislative framework of the Health Ministry, contain clinical and laboratory criteria based on which the nosocomial infections are divided in 13 major infections and 49 specific localizations.

CHAPTER V. MODIFICATIONS OF THE MATERNAL ORGANISM DURING PREGNANCY

During pregnancy, a series of morphologic and functional modifications occur in the maternal body: metabolic, of the endocrine system, of the nervous system, of the psychic, of the mammary gland, of the osteoarticular system, of the skin and subcutaneous tissue, of the cardiovascular
apparatus, of the respiratory apparatus, digestive apparatus, excretory and genital apparatus (the most important modifications).

CHAPTER VI. IMMUNOLOGICAL MODIFICATIONS DURING PREGNANCY

The immunologic modifications during pregnancy refer to both the anti-infectious nonspecific defense as well as the immuno-cellular defense. Pregnancy immunosuppression is primarily conditioned by the maternal organism invasion by pregnancy hormones, by a series of specific trophoblastic substances and by faeto-trophoblastic antigens.

CHAPTER VII. MAIN CHARACTERISTICS OF THE PHYSIOLOGICAL PREGNANCY

The main characteristics of physiological pregnancy are: uterine involution, appearance of milk production in the mammary gland, appearance of puerperal infections and thromboembolic complications, elimination of lochia, closure of the orifices of the uterine cervix, return of the overstretched vagina to its former dimensions and appearance of the puerperal psychosis.

CHAPTER VIII. ADAPTATION OF THE NEWLY BORN TO EXTRAUTERINE LIFE

Immediately after birth, the newly born goes through a series of adaptations to the extra uterine life: adaptation of the respiratory, cardiovascular, gastrointestinal, renal functions, hematologic, immunologic and thermal adaptations.

CHAPTER IX. PARTICULARITIES OF NOSOCOMIAL INFECTIONS IN CASE OF NEWLY BORN AND NEW MOTHERS

The maternities represent institutions with a high risk of contracting septic-purulent bacterial nosocomial infections. The infections in case of pregnant women, new mothers and newly born represent a significant weight in the group of nosocomial infections. According to some authors, hospital acquired infections appear in 10-35% of newly born and in 6-9% of new mothers.

CHAPTER X. ANTIBIOTICS THERAPY OF NOSOCOMIAL INFECTIONS

Antibiotics and antimicrobial chemotherapy represent a group of drugs with selective and specific action, capable of stopping the multiplication of destroy certain pathogen microorganisms involved in the etiology of infectious diseases, without harming the host's cells. Antibiotics can be: bactericides (they produce destruction of microbes) and bacteriostatics (they stop the microbes’ multiplication, later to be destroyed and eliminated by intervention of host's defense mechanisms).

CHAPTER XI. PREVENTION AND CONTROL OF NOSOCOMIAL INFECTIONS

The complex of measures by means of which one acts on the determining and contributing factors of the epidemiologic process, aiming at reducing to a minimum the risk of their apparition and spread, is included in the prevention of hospital acquired infections. The main preventive measures
addressing the transmission routes are: ensuring corresponding functional circuits within the healthcare unit, preventive disinfection, ensuring aseptic techniques are used in medical procedures as well as creation of appropriate habits of individual and collective hygiene.

PART II – THE PERSONAL STUDY

CHAPTER XII. MOTIVATION AND OBJECTIVES OF THE STUDY

I considered that choosing this topic for the doctoral thesis is beneficial for the extensive knowledge of the clinical, epidemiological, paraclinical and therapeutic aspects of puerperal and neonatal bacterial nosocomial infections. Also, I considered this study as necessary because the puerperal and neonatal bacterial nosocomial infections have a strong connection to the obstetrics-gynecology and epidemiology specialties. Although the problem of hospital acquired infections is frequently approached and theoretically debated, the data regarding the infections that evolve in Romania's maternities are communicated to a lower extent, the research completed on this topic being materialized in a small number of papers.

From this point of view, I tried to present throughout the study the obtained data, for a better understanding and interpretation of the epidemiological, clinical, paraclinical and therapeutic aspects of nosocomial infections encountered in new mothers and newly born.

The paper presents, in its evolution, the data pertaining to bacterial nosocomial infections that evolved within the maternity of the “Filantropia” Clinical Municipal Hospital Craiova (no. 2 Clinical Hospital Craiova) in the period 1995-2005. The proposed objectives have been:
- knowing the annual evolution of the main specific hospitalization indicators
- knowing the annual evolution of the number of patients (new mothers and newly born); knowing the evolution of the incidence of puerperal and neonatal bacterial nosocomial infections; knowing the age and social status of the affected new mothers and newly born;
- the study of the clinical manifestation forms of puerperal and neonatal nosocomial infections, the study of intrinsic and extrinsic risk factors
- the study of the epidemiological manifestation forms of puerperal and neonatal infections
- the study of the identified germs’ behavior with respect to antibiotics
- the analysis of the data obtained from the epidemiological inquiry of the epidemic outbreak.

CHAPTER XIII. MATERIAL AND METHOD

I conducted this study for a period of 11 years (01.01.1995-31.12.2005), in the obstetrics and neonatology departments of the “Filantropia” Clinical Municipal Hospital Craiova (no. 2 Clinical Hospital Craiova) maternity, watching the following parameters regarding the puerperal infection, as well as the neonatal infection: the frequency of these infections, clinical forms, involved germs, evolution and disease treatment.

For the realization of the study I used the following medical documentation:
- declaration records of cases of nosocomial infections
- epidemiological inquiry of the outbreak from 1997
- clinical observation records of each patient, having a nosocomial infection
- evidence records from hospital’s Evaluation and Medical Statistics Department
- admission records of the obstetrics and neonatology departments in the January - May 1997 period
- results of periodic investigations regarding the microbiological control of surfaces, teguments and aero-micro flora at department level
- results of the bacteriological investigations conducted with the support of the Cantacuzino Institute of Bucharest in the epidemic outbreak of staphylococcus nosocomial infections

For the statistical analysis of the obtained data I used the following indicators:
- quantitative indicators
- qualitative indicators
- methods of descriptive statistics
- statistical analysis of the epidemic outbreak.

CHAPTER XIV. RESULTS AND DISCUSSIONS

In the 01.01.1995-31.12.2005 period, there have been recorded 23300 births in the maternity of the “Filantropia” Clinical Municipal Hospital Craiova, of which 18945 were normal vaginal births (81,31%) and 4355 were births via cesarean section (18,69%). In the same period, of the 23300 new born, 23268 babies were born alive (99,86%) and 32 were born dead (0,14%). From the total of recorded alive new born babies, 2003 were preterm (8,61%) and 21265 were full term (91,39%). From the total of 619 cases of nosocomial infections, 447 infections have been annually reported, evolving sporadically and endemically (72,21%), and 172 infections evolved epidemically (27,79%) in the outbreak of staphylococcal infections that mainly affected the newly born department in 1997. During the 11 years of study there were recorded no deaths caused by puerperal or neonatal infections. The severe infection cases, numerically reduces, have been transferred either in other sections of the hospital, or in other health care units.

THE STUDY OF BACTERIAL NOSOCOMIAL INFECTIONS IN CASE OF NEW MOTHERS

In the 01.01.1995-31.12.2005 period there were recorded in the maternity 152 puerperal infections following births via cesarean section (64,14%) and 85 infections following normal births (35,86%).

Mostly, the puerperal infections were represented by endometritis in 74 cases (31,22%), the smallest number being of acute mastitis and gingivitis (each with 6 cases - 2,53%).

Following cesarean section births, there were signaled the following clinical forms of puerperal infections: infections of surgical incision area – 72 cases (30,78%); endometritis – 57 cases (24,05%); symptomatic urinary tract infections – 21 cases (8,86%); acute mastitis – 2 cases (0,84%).

Following normal vaginal births, there evolved the following clinical forms of puerperal infections: infections of the episiotomy – 28 cases (11,81%); endometritis – 17 cases (7,17%); symptomatic urinary tract infections – 11 cases (4,64%); vaginal wall infections – 19 cases (8,02%); acute mastitis – 4 cases (1,69%); gingivitis – 6 cases (2,53%).

The microbial strains isolated in the highest percentage were obtained from purulent secretions out of surgical cuts (100 samples, 42,19% of the positive samples total), lochia cultures (74 samples, 31,22%) and urine cultures (13,50).
THE STUDY OF BACTERIAL NOSOCOMIAL INFECTIONS IN CASE OF NEWLY BORN

In the studied period, there were affected by hospital acquired infections a number of 123 premature newly born, with a gestational age at birth under 37 weeks (58,57% of the total of affected newly born) and 87 full term newly born, with a gestational age between 37 and 42 weeks (41,43 of the total of sick newly born). The highest number of premature newly born affected by neonatal nosocomial infections (17 cases, 8,09% of the total number of newly born affected by infections) was reported in 1995.

The neonatal nosocomial infections of bacterial etiology had, during their evolution in the 01.01.1995-31.12.2005 period, a diverse localization, affecting predominantly the ocular conjunctive tissue in 38 cases (18,10%), immediately followed by the middle ear in 31 cases (14,76%), the blood circulatory stream in 25 cases (11,90%), lungs and upper respiratory tract (nasopharynx) in 21 cases each (10%).

The intrinsic risk factors (figure 60) incriminated in the appearance of the studied nosocomial infections, were represented by: extremely low weight and other extremes at birth (49 cases, 23,34%), existence of a twin (6 cases, 2,86%), the male sex (73 cases, 34,76%) and congenital malformations (4 cases, 1,91%).

The most important extrinsic risk factors (figure 61) incriminated in the appearance of the neonatal infections, were represented by: cesarean section operation (70 cases, 33,34%), abandonment of the newly born in the maternity by the mother – social cases – in 36 cases (17,14%), prolongation of the hospitalization duration in 111 cases (52,86%), artificial nourishment in 54 cases (25,71%) and the umbilical vein catheterization in 26 cases (12,38%).

Enterobacteriaceae members were isolated in 110 laboratory samples (52,38%), being represented by: Escherichia Coli – 69 samples (32,86%), Klebsiella – 12 samples (5,71%), Pseudomonas aeruginosa – 19 samples (9,05%), Proteus – 6 samples (2,86%) and Enterobacter - 4 samples (1,90%).

CHAPTER XV. CONCLUSIONS

1. The puerperal infection continues to be in the top spots regarding maternal and fetal morbidity. The majority of the puerperal infections are nosocomial, with germs contracted in the hospital that are resistant to normal antibiotics (the maternities are busier in the last years, with students and patient relatives).

2. The anatomical and physiological particularities of the pregnant women’s body places the obstetrical infection among the severe infections. The septic complications increase significantly in births via cesarean section, thus being recommended administration of antibiotics during the surgical intervention.

3. It has been noted that in the last few years the puerperal infections’ forms are more complex and more pernicious (faint at the beginning but unpredictably severe). The clinically faint ones are the most frequent, but also the most unpredictable regarding the severe evolution, thus requiring careful monitoring in time.

4. Antibiotics therapy during cesarean section, although sometimes controversial, is recommended. New forms of puerperal infections appeared in the last years, such as gingivitis, caused by the traumatism of the oral apparatus during the expulsive labor.

5. In the majority of cases there were no other infections in parallel with the nosocomial infections in a direct causality relation with the isolated pathogen germs.

6. During the studied period, the puerperal infections were present at a number of 237 new mothers, and
7. The highest incidence of puerperal infections was signaled in case of pregnant women giving birth via cesarean section, as well as in case of premature and low weight newly born and those born via cesarean section, information recorded also by the specialty literature.

8. The risk factors the most involved in the appearance of the studied bacterial nosocomial infections have been: obesity, chorioamnionitis, difficult labor, prematurely ruptured amniotic membranes and cesarean section for pregnant women and, respectively, prematurity, low birth weight, male sex, existence of twins, cesarean section birth, abandonment, prolongation of the hospitalization duration, artificial nourishment and umbilical vein catheterization for newly born.

9. The clinical forms more frequently encountered in the studied nosocomial infections have been the endometritis and surgical cuts infections in pregnant women, but also conjunctivitis, otitis, infections of the respiratory tract and septicemia in newly born.

10. The more severe clinical forms were recorded in premature newly born and those with low and very low body weight at birth.

11. The most frequent isolated germs, in both types of nosocomial infections were represented by: Gram positive cocci (staphylococcus aureus, stafilococ albus), Gram negative cocci (meningococcus) and in the highest proportion by Gram negative bacilli pertaining to the Enterobacteriaceae class (E. Coli, Pseudomonas Aeruginosa, Proteus, Enterobacter, Klebsiella).

12. The behavior of the isolated germs towards antibiotics with respect to sensitivity and especially resistance to those showed an increase in the proportion of multi resistant bacterial agents belonging to the hospital microbial flora.

13. It is worth mentioning the appearance in new mothers of nosocomial forms with newer anatomical localizations such as pharyngitis and gingivitis, probably due to local structural modifications developed during expulsion because of the intense physical effort.

14. There were no deaths recorded, the severe forms of nosocomial infections of bacterial etiology being transferred either in other hospital departments or in other healthcare units.

15. In the majority of neonatal sepsis cases the initial diagnose was clinical, out of necessity, because it was imperative for the treatment to be started, even before results of the cultures were available.

16. In case of nosocomial infections that evolved in new mothers, preventive antibiotics therapy has been started in all cases with increased risk of infection (prematurely ruptured membranes, chorioamnionitis, prolonged labors), especially in case of surgical interventions, following the general rules of this prophylaxis.

17. With a partial reporting as background, staphylococcic nosocomial infections manifested epidemically (affecting mostly the normal weight newly born), constituted as a serious attention sign on the non-signaled deficiencies. This fact emphasized the importance of tighter team collaboration (epidemiologists, clinicians, microbiologists, hospital management personnel) for the organization of the surveillance and control mode of nosocomial infections that represent a present and future problem of the healthcare system.

18. At medical practice level, the most important principle has been, is and will remain the hygiene of the hands.
CURRICULUM VITAE

GENERAL DATA

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POSTUNIVERSITY EDUCATION

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5. “Training for operation in the DRG system”, 10.03.-26.05.2006
7. “Organizational management in healthcare”, 19.05.-28.05.2006
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PUBLISHED PAPERS

2. “Clinical and therapeutic considerations in puerperal mastitis” – Jan Pîrgaru, Nicolae Râcă – Emergency Clinical County Hospital Craiova
3. “Diagnostic and therapeutic particularities of puerperal infections” – Jan Pîrgaru, Nicolae Râcă - Emergency Clinical County Hospital Craiova