PEDIATRIC SEPSIS
diagnosis, etiology, evolution

SUMMARY OF THE DOCTORAL DISSERTATION

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KEY WORDS: infection, bacteremia, SIRS, sepsis, septic shock, MODS, treatment, incidence, etiology, evolution, children, pediatric, mortality.
SUMMARY

The doctoral dissertation entitled “Pediatric sepsis. Incidence, etiology, evolution.” is comprised of 212 pages and is structured according to the enforced criteria.

The dissertation begins with a list of abbreviations and a short introduction regarding patients with sepsis. Starting from chapter 1, up to chapter 9, “The Stage of Knowledge-Generalities” section regards the definitions of infection, bacteremia, SIRS, sepsis, severe sepsis, septic shock, MODS, dates of epidemiology, immunopathological mechanisms involved in manifestation, diagnosis and treatment in pediatric sepsis. The immunological mechanisms involved in the appearance of SIRS manifestations have been largely presented, insisting on the role of humoral and cellular immune answer and on the importance of cytokines. Generalities finish with the treatment of pediatric sepsis.

The “Personal Contribution” section starts with chapter 10 up until 15 and extends for 135 pages comprising six main themes: the aim of study, material and methods, results, discussions, presentation of 11 clinical cases of sepsis and conclusions.

Infection - definition: the invasion of microorganisms and their toxins into normally sterile places, “a microbial phenomenon characterized by an inflammatory response” (33).

Localized infection is the localized anatomical-pathological inflammation and its common but not mandatory response, fever. Fever is defined as the temperature increase caused by a “reset” in the thermoregulatory center in the hypothalamus through the action of cytokines (22): TNF, IL-1, IL-6, IFN. Small babies may be hypothermic in response to disease or stress (15). FWS (fever without asource) (22).

Bacteremia is the presence of viable bacteria in the circulating blood (28, 34).

Fungemia: presence of fungi in the circulatory stream (1, 28). Viremia: the presence of live viruses grown in blood (1).

Occult bacteremia was defined as bacteremia without clinical signs of sepsis. Occult bacteremia’s only manifestation is fever or a cold sensation (42) and / or a minor infection (blue otitis media) and paraclinical, positive hemocultures (4). Transient bacteremia may occur after a tooth extraction or other minor surgical manipulations (endoscopy) (42).

SIRS-systemic inflammatory response syndrome, involving at least two of the following events (1, 28, 205):
• Tachypnea than 20 breaths / min;
• Tachycardia: consider (an adult) to over 90 beats / min;
• Fever or hypothermia: over 38 degrees (armpit) or below 36 degrees Celsius;
• Leukocytosis with over 19,500/mmcc in newborns, 15,500/mmcc in infants, 13,500/mmcc in kindergartners and 12,000/mmcc in students or leukopenia with less than 4000/mmcc or the presence of more than 10% of immature neutrophils.
• Infant SIRS = systemic response to infection manifested in two or more of the following: fever > 38.5 °C (rectal) or < 36 °C, heart rate > 2 SD above normal age, respiratory rate > 2 SD above normal age, WBC> 12 000 cells / mmcc or below 4000 WBC / mmcc or more than 10% immature neutrophils (33). Tachypnea of pediatric SIRS is defined thus: PCO2 below 32 mm Hg or mechanical ventilation / assisted for an acute process in the absence of secondary respiratory depression, neuromuscular diseases or general anesthesia (84).

Tachycardia in pediatric SIRS is characterized by: HR > 2SD above the normal value of that age, in the absence of chronic HF or chronic medication and external stimulation (84). The following values are considered significant: infant HR > 180/min, 2-5 years, HR > 140/min, in children 6-12 years HR > 130/min; HR > 110/min from 13 to 18 years of age ( 190).

In pediatric practice, bradycardia (instead of tachycardia) is allowed to be a criterion of diagnosis for SIRS in infants (0-1 year old) defined as: average heart rate below 10 percent for the corresponding age in the absence of external vagal stimulation, beta-blockers, congenital heart disease or unexplained low heart rate for a period exceeding 30 minutes (150). In pediatric practice, SIRS cannot be diagnosed only on the base of cardiac and respiratory frequency change (150).

Infectious causes of SIRS: infections caused by bacteria, viruses, yeasts: pneumonia, erysipelas, infectious endocarditis, influenza, meningitis, pyelonephritis, appendicitis, cholecystitis, cellulitis, arthritis (33). Non-infectious causes of SIRS: trauma, burns, acute pancreatitis, poisoning (33).

In 1992, American College of Chest Physicians (ACCP) and Society of Critical Care Medicine (SCCM), in a consensus conference, set definitions for SIRS, sepsis, severe sepsis, septic shock, MODS. The terms were originally defined for the adult sepsis, but have been adapted since in the years of 2004, 2005, 2008.
for pediatrics as well (84, 182, 205).

**Sepsis** = SIRS with a documented or suspected infectious etiology (94).

**Culture-negative Sepsis** = SIRS + empirical antibiotic treatment for clinically suspected infection, but where all cultures are negative. Sepsis-pathophysiology concept, refers to those situations where a clinically proven or suspected infection, localized or disseminated, is accompanied by a systemic bodily inflammatory response (SIRS) (42).

**The severe sepsis** is defined as: sepsis associated with hypotension or signs of hypoperfusion - at least one acute organ dysfunction, such as metabolic acidosis, acute altered mental status, oliguria or ARDS - *Adult respiratory distress syndrome* (94). In July 2006, for the management of severe sepsis in pediatrics, it was recommended that (31), in addition to the already mentioned criteria of diagnosis, at least one of the following conditions was to be observed (criteria for severe sepsis taken and adapted from Bryant Nguyen (31) and Levy and collaborators (140)):

- altered mental status (lethargy or coma gr. I), significant edema or positive fluid balance (over 20 ml / kg in 24 h);
- hyperglycemia (120 mg / dl or 7.7 mmol / l) in the absence of diabetes;
- CRP> 2SD (<6mg / L) above normal age and / or Procalcitonin> 2SD above normal age.
- Hypotension: SBP <85 mmHg in older children, <65 mmHg in infants, or mottled skin and / or prolonged capillary refill time, more than 3 seconds;
- Acute oliguria (diuresis <0.5 ml / kg / h for the last 2 h and / or increased serum creatinine with more than 0.5 ml / dl);
- Clotting abnormalities (INR> 1.5 or PTT> 60 s) and / or thrombocytopenia <100000/mmc;
- Hyperbilirubinemia (total Bb) > 4mg/dl or > 70mmol / l);
- Hyperlactatemia (lactic acid > 2mmol / l);
- Ileus dynamic.
- Cardiac Index> 3.5 L / m; arterial hypoxemia (PaO2/FiO2 <300)

**Prognosis:** approximately 25-35% of patients with severe sepsis die within 30 days, others die within the next five months (94).

**Septic shock** = sepsis + hypotension despite correct intake of fluid (minimum 500 ml saline) infusion + disorders (42). SS = severe sepsis with persistent hypotension after an hour, unresponsive to parenteral administration of fluids and require the administration of vasoactive substances (32). Septic hypotension = systolic blood pressure below 80 mm Hg or 40 mm Hg blood pressure less than the base of the patient in the absence of other causes of hypotension (1) = refractory septic shock - septic shock that lasts more than an hour and is unresponsive to the administration of vasopressors (255).

An example of toxic shock syndrome is staphylococcal toxic shock, whose etiology is exotoxin synthesized by S.aureus.

**MODS** (multiguan dysfunction syndrome) is a clinical syndrome characterized by progressive development of potentially reversible dysfunction occurring in two or more organs, which constitutes an acute threat to homeostasis (1).

**Pathogenesis of MODS:** Progressive deterioration of the patient in MODS occurs as a result of the imbalance between SIRS and CARS.

- Clinical - MODS infection (after Dr. Angelescu) (12)
  - The patient (child) must meet one or more of the following conditions over 24 hours:
    - Cardiac: AV < 54/min, mean arterial pressure < 49mmHg, serum pH <7.24
    - or PaO2 < 49mmHg;
    - Hematology: no. WBC <1000 / mm3, platelets < 20000/mm3, hematocrit <20%, Hb <7.5 g / dl.
    - Renal: urine output <479ml/24h or <159 ml / 8 h, blood urea >100 mg / dl, serum creatinine > 3.5 mg / dl;
    - CNS: Glasgow Coma Scale < 6 (in the absence of sedation).
  - Respiratory: respiratory rate <5/min or 49/min, PaCO2 > 50 mmHg, or. Ventilator dependency > three days (Fig. 7.1).
  - These conditions can combine with at least one of the following (188):
    - Signs of gastrointestinal: up to adynamic ileus;
    - hepatic dysfunction: can manifest clinically through jaundice, hepatosplenomegaly, and paraclinically with a BBT higher than 3mg%, wave GPT twice than normal.
  - MODS evolves to death in 75% -100% of cases (94) despite aggressive treatment.

**HRA** Host response to aggression: complex and multimodal response, the host's immunity to any aggression extensively (infection, trauma, burn, ischemia-reperfusion) (94). HRA is an adaptive response,
aimed at restoring homeostasis, can be altered by the lesion factor (physical stress, biological, chemical) (134).

**Treatment of pediatric sepsis** is the last chapter of part one. Different antibiotics were analyzed, according to pediatric dose and adverse reactions in infants, especially newborns.

The practical attitude in front of a case of sepsis was described. The chapter was finished with the prevention of severe sepsis, septic shock and MODS. Children infections are prevented by vaccinations.

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**SPECIAL SECTION**

*Important problems in the study.* Sepsis is the main cause of infant mortality, especially in the first 5 years of life. It is estimated that the 10.6% severe sepsis fatality in children is lower than the one observed in adults as far as the U.S. is concerned. (11). However, in several medical centers from our country (in which the study was carried) mortality remains unacceptably high, between 15-25%, the only solution being the establishment of quick diagnosis and emergency treatment measures.

In the year of 2000 in the U.S., for the population under 16 years of age, 42,000 cases have resulted in 4,400 deaths, so mortality can be estimated a little over around 10% (256, 258). Most cases have been reported in teens (257, 258). Out of 1,586,253 hospitalizations of children under 19 years of age, there were 42,364 cases of severe sepsis which add up to a percentage of 2.6% and the percentage of hospitalizations for sepsis was 0.56 cases/1000 pediatric population (258). The conclusion of the 2004 report made by French doctor Dr. Pierre Tattevin and his crew, is that severe sepsis was responsible for 7% of the deaths of patients under 16 years old in 2003, France. (232).

The incidence of neonatal sepsis is estimated at 1-2/1000 births at term and 4-8/1000 in preterm neonates (186). Sepsis prevalence is much higher in immunosuppressed patients, admitted for Onco-Hematology, Surgery, ATI and Infectious Diseases. It is estimated that 30% of hospital surgical deaths are based off septic causes (188).

Numerous publications between 2001 and 2009 dealt with the adaptation and application of concepts regarding bacteremia, sepsis, severe sepsis, septic shock, MODS for pediatrics. This topic of great interest was debated at a conference for nurses, "New Insights / New Outlooks on Sepsis" (Virginia Sims 2004) (205). An important consensus conference to define pediatric sepsis took place in 2005: "International pediatric sepsis consensus conference: definitions for sepsis and organ dysfunction in Pediatrics" (84). However, there is a relatively small number of publications in Romanian that deal with pediatric sepsis. In Romania, the exact incidence of pediatric sepsis is not known since fatal sepsis in the infant population is not reported.

The idea of this work stemmed from the lack of knowledge in the exact incidence of sepsis, its etiology and mortality within the Craiova Emergency County Hospital Pediatrics Clinics (1 and 2) and Infectious Diseases Hospital Pediatrics Clinic, Dolj County. It is important to identify early infectious SIRS and MODS, septic shock as well as the culture-negative cases so as to be able to administer intensive treatment.

The objectives targeted by this study:

- The calculation of sepsis incidence (including severe sepsis, septic shock and MODS) at the Pediatrics Clinic 1 and Infectious Disease Hospital for the years of 2006, 2007, 2008 and 2009.
- The establishment of demographic characteristics of the analyzed child population groups (according to the average distribution, age group, sex).
- The etiology of the studied sepsis cases.
- The elucidation of the risk factors for sepsis and the establishment of negative prognostic factors (risk factors for septic death).
- The evaluation of diagnostic criteria for sepsis, severe sepsis, septic shock and MODS for the studied cases, the proposal of a diagnostic score for severe sepsis, septic shock and MODS.
- The evaluation of the studied cases as far as evolution, complications and mortality are concerned.
- The evaluation of treatment in the studied cases.

### 1. WORKING MATERIAL

We conducted a comprehensive study, which refers to four groups of patients hospitalized in the Pediatrics Clinics of Craiova Emergency Hospital and in the Infectious Disease Hospital, Pediatrics Clinic at various times in the 2001-2009 year interval.

Within the study, one main group of 575 patients aged between 0 and 16 years old was observed. Between 01-01-2006 and 31-2-2009, there were a total of 578 hospitalizations with sepsis in the Pediatric Clinics and Infectious Disease Hospital. This group was analyzed as a prospective study.
L.nr.2 composed of 41 children between 0 and 16 years of age with a diagnosis of "septicemia", admitted between 01-01-2001 and 31-12-2005 in the Pediatrics Clinics. The study of this group had a retrospective character.

L.nr.3 consists of 23 cancer patients aged 0-16 years old who were hospitalized from 01-01-2001 to 30-06-2008 in Pediatrics Clinic 2, having sepsis as secondary disease; they totaled 25 hospitalizations, because two of them had two septic episodes.

L.nr.4, 0-16 years of age, included 47 patients with osteomyelitis, septic onset, abrupt or insidious, hospitalized and treated in the Pediatrics Surgery Clinic between 2001 and 2007. The study of the last two groups had both a retrospective and a prospective character. Parameters evaluated in the patients of the study:
- sex, age, place of origin of patients;
- patient hospitalization period (month, year) and number of hospitalization days;
- criteria for diagnosis of sepsis, resulting from: clinical examination on admission and development, laboratory investigation: radiological images;
- treatment;
- patient evolution;
- anatomopathological examination of the dead.

2. WORK METHOD
Statistical means were used: clinical data was entered into the computer and various calculations using arithmetic operations, percentages and ratio statistics were performed.

RESULTS
Results for L1 group. The group of 575 children, with 578 admissions of which 279 hospitalizations for sepsis were made in the Infectious Diseases Hospital, while the rest of 299 infectious SIRS admissions were made in the Pediatrics Clinics.

The incidence of sepsis by year of study. Out of the 20859 admissions (the total number in four years), we found 578 cases of sepsis. The incidence of sepsis was 2,77%. The incidence per each year: 1,15% (60 cases) in 2006; 1,37% (70 cases) in 2007; 2,4% (127 cases) for 2008; 6% (321 cases) for 2009.

Out of the cases there were: 3% - newborns, 1-12 month infants- 34%, 1-3 year old children - 30%, kindergartners - 21%, students - 12% (8% between 7 and 12 years old, 4% between 12 and 16 years old). For the four years, the average percentage of positive cultures of all patients diagnosed with sepsis is only 18%.

Table no. 1.: The evolution of cases in 2006, 2007, 2008, 2009

<table>
<thead>
<tr>
<th>Year / Condition at discharge</th>
<th>Healed</th>
<th>Improved</th>
<th>Transferred</th>
<th>Dead</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>18(30%)</td>
<td>27(45%)</td>
<td>7(12%)</td>
<td>8(13%)</td>
<td>60</td>
</tr>
<tr>
<td>2007</td>
<td>25(30%)</td>
<td>28(40%)</td>
<td>9(13%)</td>
<td>8(11%)</td>
<td>70</td>
</tr>
<tr>
<td>2008</td>
<td>60(47%)</td>
<td>47(37%)</td>
<td>11(9%)</td>
<td>9(7%)</td>
<td>127</td>
</tr>
<tr>
<td>2009</td>
<td>182(57%)</td>
<td>118(37%)</td>
<td>11(3%)</td>
<td>10(3%)</td>
<td>321</td>
</tr>
<tr>
<td>Total</td>
<td>285(49%)</td>
<td>220(30%)</td>
<td>30(7%)</td>
<td>32(6%)</td>
<td>578</td>
</tr>
</tbody>
</table>

Distribution of hospitalization group 2006-2009 by SIRS criteria.
Fever (hypothermia in newborns) and leukocytosis (or leucopenia or exceeding 10% of young elements in LF) were diagnosis criteria for 356 out of 578 patients; a major criterion along with the other criteria observed in only 56 children was pediatric SIRS.

Distribution of admissions by other laboratory investigations:
Most of the children had a normal amount of platelets. 27% of the patients had thrombocytosis (even thrombocytopenia in ten of them) in the context of severe sepsis. Patients whose platelet count was not calculated were mainly those who died in the first two days of hospitalization, who had been collected and undergone fewer tests. Patients with thrombocytopenia had septic shock and MODS (with obvious DIC).

The number of cases with increased ESR (301) is bigger than the number of children who had leukocytosis, and / or the elements of young blood count: 288. Most children had an increased sedimentation rate: 52%. Out of 165 patients with increased ESR in 2009, 10 had a very high one: over 100 mm in one hour.

Radiographs with interstitial matter have predominated in all years. Out of 578 admissions, 240 (42%)
had radiological aspects of interstitial pneumonia. 87 patients (15%) had radiological confirmation of bronchopneumonia, with the appearance of micro and macronodulars opacities. Other radiological aspects included: reticular appearance, reticulo-nodular, diffuse decrease in lung transparency, etc.

Table No. 2. Distribution of the hospitalization group depending on the severity sepsis between 2006 – 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Uncomplicated sepsis</th>
<th>Severe Sepsis</th>
<th>Septic shock</th>
<th>MODS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>25(41.5%)</td>
<td>25(41.5%)</td>
<td>3(5%)</td>
<td>7(12%)</td>
<td>60</td>
</tr>
<tr>
<td>2007</td>
<td>30(52%)</td>
<td>22(31%)</td>
<td>5(7%)</td>
<td>7(10%)</td>
<td>70</td>
</tr>
<tr>
<td>2008</td>
<td>74(58%)</td>
<td>40(32%)</td>
<td>5(4%)</td>
<td>8(6%)</td>
<td>127</td>
</tr>
<tr>
<td>2009</td>
<td>249(78%)</td>
<td>52(16%)</td>
<td>13(4%)</td>
<td>7(2%)</td>
<td>321</td>
</tr>
<tr>
<td>Total</td>
<td>364(66%)</td>
<td>139(24%)</td>
<td>26(5%)</td>
<td>29(5%)</td>
<td>578</td>
</tr>
</tbody>
</table>

The complicated sepsis (severe sepsis, septic shock, MODS) was in 34% of cases. In L1, the percentage of children fully developed well psychosomatic is small (13%). Frequency of criteria defining sepsis complicated (severe sepsis, septic shock and MODS) in the years of 2006 to 2009. The most common criterion was hypotension (clinical, TRC> 3 and "mottled") found in 67 children. Coma in varying degrees, hypoxia, lactatemia and hepatocytolisis were then, in sequence, the most common criteria for sepsis complicated registered.

The most common illness associated diagnosis for admission throughout the four years (46% of the batch) is hypochromic (iron deficiency) infectious anemia. Protein-energy malnutrition (including stagnation of height-weight increase) was recorded in 172 children (approximately 30% of the batch). Calculated frequency of obesity in the group: 1.57%. Common rickets (RCC) was recorded in 181 of the children, representing 31.31% of the group. Isolated hypocalcemia in children older than 3 years, was noted in 50 patients, so for 8.65% of the grand total, or 29% from the group of children over 3 years old. Congenital malformations and chronic diseases were in large numbers (119). It was found that 89 children were hospitalized with secondary diagnoses, while 18 were multimalformed.

Infections that had a lethal outcome were later on anatomopathologically confirmed: there were three cases of meningoencephalitis at the same time with with bronchopneumonia and pericarditis and one case of endocarditis were also associated with bronchopneumonia “in confluent foci”. Six patients had two serious, fatal infections. Out of 35 who died, one alone had no chronic psychosomatic development.

**DISCUSSIONS**

The incidence of sepsis. Interpretation of survey results for group no. 1.

- Admissions for sepsis were 299 in the Pediatrics Clinics and 279 at the Infectious Diseases Hospital.
- The average incidence of sepsis calculated for the Infectious Diseases Hospital, with regard to all the 10016 hospitalizations for the years 2006-2009 was 2.78%.
- The average incidence of sepsis, for the same years, in the Pediatrics Clinics was 2.76%.

C) Dynamics of the incidence of sepsis per year in the two clinics

The incidence of sepsis doubled in 2008, as compared to 2006 (2.4% vs. 1.15%) within the two clinics, with a very close number of hospitalizations (5307 and 5299). Pediatric sepsis incidence in 2009 was nearly triple its value in 2008 and four times higher than its 2007 value, five times higher than the incidence in 2006. The value of 6% is close to the minimum estimated incidence of sepsis in Intensive care units of Infectious Diseases: 6.3% in the U.S.A. (208).

The incidence of sepsis in the U.S. increased between 1979 and 2000 from 82.7 to 240.4 per 100,000 inhabitants (149). The average incidence we found: 2.77% is close to that of the American medical literature, found by R. Scott Watson and his colleagues in 2003: 2.67%-for the severe pediatric sepsis (258).

Incidence peaks of sepsis cases in the years 2006-2009 for the summer months were observed in July and August(73 admissions). The incidence was high in November, too (55 children).

For bacteremia, the peak is early spring to late autumn in children of all ages, due to viral respiratory and gastro-intestinal infections. Another trend is usually observed in summer, when bacteremia peaks due to enterovirus infections, and deficits of thermoregulation during the hot weather (59).

Demographic characteristics of the child population groups

a) The structure of hospital patient groups by sex

Hospitalization batch 2006 - 2009 by gender: 333 boys and 245 girls; 58% boys and 42% girls. The ratio
between the total number of boys and the total number of girls is 1.35, similar with the results of French doctors who also found a predominance of male patients with septicemia B / F = 1.3 (232).

b) The distribution of patients by area of origin
For L1: 55% in urban areas and 45% in rural environment. For 2008, cases of sepsis distribution by area was identical to the current population distribution in Dolj County: 54% in urban areas and 46% in rural areas (population distribution was that of 01/01/2010).

c) Number of cases of sepsis was inversely proportional to age. The category under three years old was 67% out of the total registered cases, infants making for 37%.

The risk of contracting bacterial infection is higher in young children of 0-3 years old (268): they are deficient in immunoglobulin G, bacteria encapsulating antibodies; macrophage function was insufficient and neutrophil activity reduced (15).

The etiology of sepsis. Underlying factors

For the studied years, the average percentage of culture-positive cases of all patients diagnosed with sepsis was only 18%. 112 bacteria were detected in 105 cases (7 of the septicemia with double etiology): 62 gram positive, 48 gram negative, two Candida albicans. Among those with septic shock, only one’s etiology was clarified, who also survived.
- 55% of the detected germs are Gram positive: Staphylococcus Aureus, Staphylococcus White hemolytic, streptococcus, pneumococcus. Out of the resistant staphylococci (56 of 62), the most important was Staphylococcus Aureus. Among gram-negative, the most significant percentage were E. coli and Klebsiella: 64.6% (31 of 48).

- There were seven cases of sepsis with dual etiology, in 4 of which staphylococci were associated with gram-negative and in 2 blood cultures with C. albicans; only one association noted between the gram negatives (E. coli to Klebsiella).

- There were three cases of chickenpox infection, two in 2009 and one in 2008; all of which being infected with Staphylococcus aureus (detected in blood culture). We could say that chicken pox, rotavirus enterocolitis, (two in 2009) and, respectively, AH1N1 influenza (one case in December 2009) were all favored by transient immunosupression Staphylococcus aureus sepsis.

Lower respiratory tract infections (interstitial pneumonia, bronchopneumonia) were the main initiator of sepsis in this study (43%). Erythematous-purulent acute tonsillitis accounts for 14% and then, most importantly, gastroenterocolitis(11%). Urinary tract infections and meningencephalitis follow suit in the etiology of the analyzed pediatric SIRS cases. Mucocutaneous infections, septic arthritis and cellulitis were a few cases. Pneumonia, endocarditis, and meningencephalitis are all cited in the etiology of SIRS. (33).

In order to better evaluate diagnosis criteria for severe sepsis, septic shock and MODS, a diagnostic score system for complicated sepsis was proposed.

Useful examples used in the study: Sepsis+ coma gr.1 or sepsis + hepatocytolysis or sepsis+ dynamic ileus or sepsis + PF were diagnosed as "severe sepsis" (score 4). To diagnose a septic shock, we needed a score of at least 6. For example:
Severe sepsis + hypotension >1 hour or Sepsis +coma-I degree + hypotension >1 hour.

In order to diagnose MODS a score of at least 7 was needed. For example:
- Sepsis + average coma + RA (creatinine > 3.5 mg / dl, urea > 100mg/dl) or
- Sepsis + average coma.+ mechanical respiratory.

CONCLUSIONS

- A slight increase in the incidence of pediatric sepsis was noted in 2007 as compared to 2006 (1.37% vs. 1.15%). Cases of sepsis were particularly complicated, the incidence increasing from 1.15% to 1.37% (dr.Tattevin and collaborators reported for septicemia, estimated at 1-2%).
- The incidence of sepsis in 2008 (2.4%) is the closest to the average value of the years and most similar to that reported in 2001 by Angus and his crew in the U.S.: 2.26% for infectious SIRS.
- The average incidence of sepsis in the years 2006-2009 was found in L1-2.77% which is close to that reported by Scott Watson and his collaborators: 2.6%, with severe pediatric sepsis.
- The diagnosis and incidence of sepsis in the Pediatrics Clinics within the Dolj County study, in agreement with medical literature data, is increasing due to the continous postgraduate research of doctors, improved methods of diagnosis and, possibly, also due to the endurance of extremely virulent microbial strains, nosocomial or communitary through excessive antibiotics.
- There have been many cases in the summer months, the peak incidence was in August (73 admissions
with sepsis) because of enteroviral infections and deficits in thermoregulation during hot weather.

- Boys predominated in all of the sepsis charts (58%), as well as in reports of American and French researchers. The ratio between the total number of boys and the total number of girls is 1.35, according to French medical outcomes in patients with sepsis who have found a predominance of male B / F = 1.3.
- The 0-3 years of age group added up to 67% of all cases (of which 37% were infants). In the L2 group cases, patients under 3 years old accounted for 83% of the total.
- Most admissions from the L1 group were in urban areas (53%) because more than half of the children residents from Dolj County live in cities (54.02% of the population is urban, the remainder live in rural areas). Within the lots 2, 3 and 4 (most severe) patients from rural areas predominated because of the low level of healthcare and education in rural areas.
- For L1, the average percentage of cases with specified etiology is 18%. Out of 35 deaths, the etiology was established at a rate of 17%. Out of 26 with septic shock, the etiology was only determined for one, who also survived. In group L3, the etiology was clarified in 65% of the patients.
- The etiology of sepsis in the years 2006-2009 (L1) is dominated by gram-positive microbes: 55% of the germs were detected, the most important being Staphylococcus. Also, for L2, L3, L4, the most common germ was Staphylococcus aureus, detected in a percentage of 66-73%.
- Antibiotic to which staphylococci were most sensitive (> 50%) was Linezolid, followed by Oxacillin. In group L3, staphylococci were primarily sensitive to cephalosporins.
- Respiratory infections (interstitial pneumonia, bronchopneumonia) are the main initiator of sepsis (43%), followed by mixed respiratory infections, then digestive (18%). These results are consistent in the findings of U.S. researchers, who were first to report pneumonia as etiology of sepsis in children older than a month.
- The main predisposing factors for sepsis were malignancy-caused immunodepression, age under 3 years and anemia. Secondary factors were dystrophy, rickets, congenital diseases, male sex.
- Negative prognostic factors were: granulocytopenia, age less than 1 year, anemia, birth defects, male sex, patients diagnosed with bronchopneumonia and / or meningoencephalitis. 15% of children with sepsis were associated with congenital diseases. Out of these, 11 children had single or multiple heart malformations which represents a 1.9% incidence of MCC in L1. Out of the 35 children who died, 18 (51%) had congenital malformations.
- Major Diagnostic criteria for sepsis were fever and leukocytosis > 12000 (above normal age), in the presence of infection in 61% of the studied children. 10% were admitted on two major criteria related to fever and increased PMNs over 10% and 29% based on the combination of a major criterion with two minor ones(tachypnea and tachycardia clinically evaluated only).
- Complications in the most important statistics, which constituted the criteria for complicated sepsis were: hypotension (diagnosed in 67 cases), coma (noted in 63 children), severe hypoxia was found in 45 patients and hepatocytolisis, highlighted paraclinically in 43 children.
- The least complicated cases were noted in groups 1 and 4. Complicated sepsis dominated the L2 and L3 groups.
- Complicated sepsis in L1, with a 34% rate, included: severe sepsis (24%), septic shock (5%) and MODS (5%). In the L2 group, septic shock accounted for 24% of cases, while in L4, only 7% of the admissions presented osteomyelitis, with a sepsis onset. Mortality of 6% in L1, is close to that registered by Burdette. We found a mortality of 69% in cases of MODS. In medical literature, MODS mortality is estimated at 75-100%. Mortality due to septic shock in our study we, however, recorded to be 58%, which is higher than expected overall mortality due to septic shock (40-50%). Complicated sepsis mortality rate was 18% (35 deaths of 194 complicated sepsis patients) in L1.
- Bronchopneumonia was the most frequent anathomopathological diagnosis (26 out of 35 deaths). Purulent meningoencephalitis as anathomopathological diagnosis came in second (10 out of 35). The L2 group registered a 19.5% rate of fatality. Mortality was the highest in L3 group: 32%. Finally, L4 group had a mortality of 7%.
- The most effective antibiotics were III and IV generation Cephalosporins combined with aminoglycosides and the Carbapenems.
- Severe infections remain a significant pathology even in the era of antibiotics.
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CURRICULUM VITAE

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2. Educational background
From Sep 2000-Primary Medicine Pediatrics Doctor; from Oct 1996 University Assistant at UMF Craiova.
Dec 1996- Pediatrics Specialist Physician (Internal Medicine, children department);
1992 - Passed Medical Residency Exam – Bucharest on the 38th position;
1985-1991- studied at University of Medicine and Pharmacy “Carol Davila”- Bucharest - Faculty of General Medicine graduated in Sep 1991;
1979-1985- Craiova “Nicolae Balcescu (Carol I) National High School”;
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3. Competences, member in societies, courses, congresses, papers
Courses:
- 2 (two) long term courses: in one year Psychopedagogy (graduated in Sep 2009); Medical Computer Science (4 months, finished in 2008); 5 (five) 1-3 month crash courses.
Congresses:
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From jan. 1999 – part-time within Pediatrics Clinic 1 of Craiova Emergency County Hospital, from 1996 University Assistant in UMF Craiova.