www.jpnim.com Open Access eISSN: 2281-0692
Journal of Pediatric and Neonatal Individualized Medicine 2018;7(2):e070232
doi: 10.7363/070232
Published online: 2018 Oct 03

Abstracts

Selected Abstracts of the 8th International Congress of UENPS • Session "Nosocomial infections"

BUCHAREST (ROMANIA) • OCTOBER 3RD-5TH 2018

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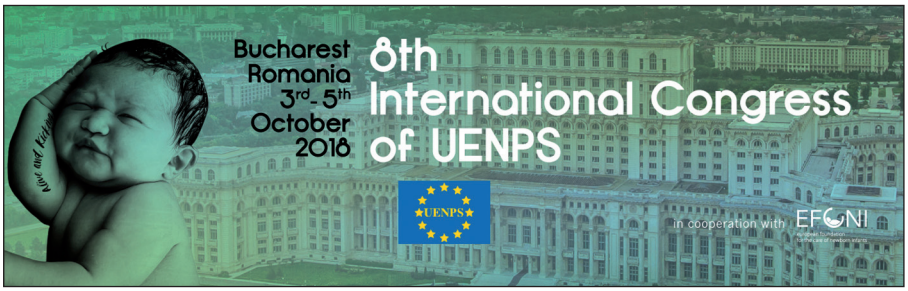

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How to cite

[Abstract's authors]. [Abstract's title]. In: Selected Abstracts of the 8th International Congress of UENPS; Bucharest (Romania); October 3rd-5th 2018; Session "Nosocomial infections". J Pediatr Neonat Individual Med. 2018;7(2):e070232. doi: 10.7363/070232.

Nosocomial infections

ABS 1

DIAGNOSTIC VALUE OF HIGH-DENSITY LIPOPROTEIN AND SERUM AMYLOID A IN NEONATAL INFECTIONS – ASSOCIATIONS WITH C-REACTIVE PROTEIN AND CYTOKINES SERUM LEVELS

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INTRODUCTION

Early diagnosis of neonatal infections is crucial as they constitute the leading causes of morbidity and mortality in neonates and may have severe long-term consequences; however, no ideal biomarker exists so far. *In vivo* and *in vitro*, High Density Lipoprotein (HDL) participates in host defense, protecting against infection and inflammation. In the acute phase of infection, the protein Serum Amyloid A (SAA) binds to HDL and becomes its major apolipoprotein by replacing ApoA1. Studies relevant to SAA are few and with contradictory results, while scarce data exist on HDL as diagnostic biomarker(s) for neonatal infections.

OBJECTIVES

To evaluate the diagnostic role of HDL-cholesterol (HDL-C) and SAA in neonatal infections and examine possible associations of HDL and SAA levels with serum C-reactive protein (CRP), IL-1a, IL-1b, IL-6 and TNF-a levels.

MATERIALS AND METHODS

Eighty-four neonates with clinical signs and symptoms of sepsis and 51 neonates, of similar postnatal age and gender distribution, as controls, were studied. Blood, urine and/or CSF cultures were positive in 38/84 septic neonates. Blood samples were drawn serially in all patients on days 1, 3-5 and 7-10 (at recovery) and once in the controls for routine blood tests (FBC, renal and liver function), serum CRP, HDL-C, SAA (by immunonephelometry) and cytokines (IL-1a, IL-1b, IL-6, TNF-a) levels (by Luminex technology).

RESULTS

Serum HDL-C levels were significantly lower in the septic patients on day 1 and day 3-5 in comparison with levels at recovery ($p < 0.001$ and $p < 0.0001$, respectively) and controls ($p < 0.0001$ and $p < 0.0001$, respectively). SAA levels were significantly higher in the septic patients on day 1 and day 3-5 in comparison with levels at recovery ($p < 0.0001$ and $p < 0.0001$, respectively) and controls ($p < 0.0001$ and $p < 0.0001$, respectively). Moreover, in patients with positive cultures, SAA levels were significantly higher than levels in patients with negative cultures on day 1 ($p < 0.0001$) and day 3-5 ($p < 0.001$). In the acute phase of infection, HDL-C levels correlated negatively with CRP ($rs = -0.393$, $p < 0.0001$) and SAA levels ($rs = -0.359$, $p < 0.0001$), whereas SAA levels correlated positively with CRP ($rs = 0.886$, $p < 0.0001$) and IL-6 levels ($rs = 0.632$, $p < 0.0001$). ROC analysis of SAA levels on day 1 resulted in significant areas under the curve (AUC) for detecting neonatal infections (AUC = 0.944, $p < 0.0001$) or culture positive infections (AUC = 0.904, $p < 0.0001$). SAA levels higher than 5 mg/L had 85% sensitivity and 100% specificity for the diagnosis of neonatal infections, whereas SAA levels higher than 42 mg/L had 89% sensitivity and 81% specificity for the diagnosis of culture positive infections. HDL-C levels lower than 28.5 mg/dl had 64% sensitivity for the diagnosis of neonatal infections.

CONCLUSIONS

SAA can be used in routine clinical practice for the diagnosis of neonatal infections, whereas HDL-C could be a complementary biomarker in the diagnostic work-up.

ABS 2

EPIDEMIOLOGY OF HOSPITAL-ACQUIRED INFECTION IN PORTUGUESE NEONATAL INTENSIVE CARE UNITS. RESULTS OF 10 YEARS OF PROSPECTIVE REGISTRATION

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INTRODUCTION

In 2008, the Portuguese Directorate General of Health implemented an online registration aiming at the surveillance of hospital-acquired infections (HAIs) in level III NICUs.

AIM

To deliver information on 10-year registry of HAIs.

METHODS

Clinicians in the 19 level III major NICUs prospectively collected data. Neo-Kiss surveillance system definitions were used. HAI was defined as clinical signs of infection starting more than 72 hours after birth or admission, with laboratory evidence supporting infection. Clinical sepsis with positive or negative blood culture, necrotising enterocolitis (NEC) and pneumonia were studied.

RESULTS

There were 48,495 admissions, 17.3% of very low birth weight (VLBW) infants, accounting for 697,468 patient-days, 45% of them from VLBW infants. Median gestational age (GA) and birth weight (BW) were 36 weeks and 2,480 g for all patients and 29 weeks and 1,105 g for patients with HAI. The percentage of patients with HAI was 10.4. The incidence of sepsis was 5.8/1,000 patient-days (VLBW 8.3); central vascular catheter (CVC)-associated sepsis 13.6/1,000 CVC-days (VLBW 15.8), NEC 0.7/1,000 patient-days (VLBW 1.4) and pneumonia 0.8/1,000 patient-days (VLBW 1.1). Incidence of clinical sepsis with positive or negative blood culture remained almost unchanged over the 10-year period (from 5.2 to 6.5/1,000 patient days). Sepsis with negative blood culture accounted for 42% of all cases of sepsis. *Coagulase-negative Staphylococcus* was isolated in 65% of culture-proven BSI, *Staphylococcus aureus* in 10.4%, gram-negative bacteria in 16% and fungus in 3%. Lethality rate was 4.6% (VLBW 6%); culture-negative infection accounted for 49% of deaths, followed by gram-negative bacteria (29%), gram-positive bacteria (18%) and fungus (2.6%).

CONCLUSION

HAIs are still a problem in Portuguese NICUs. There was no improvement in the incidence of sepsis from 2008 onwards. Implementation of better preventive measures is required.

ABS 3

ZONULIN, A MARKER OF INTESTINAL INTEGRITY, AND ITS CONCENTRATION IN PRETERM NEWBORNS IN THE FIRST DAYS OF LIFE

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INTRODUCTION

Preterm newborns are often diagnosed with gastrointestinal tract disorders, including necrotizing enterocolitis (NEC). Intestinal permeability is considered as an important factor in the pathophysiology of NEC, with zonulin (ZO) as a new biomarker of gut integrity. Our preliminary data obtained in intensive care neonates showed increased ZO concentration in comparison with term newborns without inflammatory signs or symptoms. However, there is a need to specify a reference range for preterm newborns in order to make proper interpretation of the observed values, especially in populations at higher risk of NEC.

METHODS

36 female and 44 male preterm newborns were enrolled with mean gestational age 35 weeks (range: 30-36) and mean birth weight 2,453 g (range 1,350-3,400). 46 were born by caesarean section and 34 by spontaneous delivery and their general clinical condition was good (mean Apgar score 9 points, range: 5-10). Some of them required respiratory support in the form of nCPAP, but all were hemodynamically stable, with good peripheral perfusion. Blood samples were collected between the first and third day of life for routine laboratory monitoring and additionally evaluation for ZO.

RESULTS

The mean serum ZO concentration was 5.3 ng/ml (95% CI: 4.2-6.4). Basic laboratory parameters showed mean values as follows: hematocrit 52.9% (95% CI: 51.2-54.6), 1st day bilirubin 5.0 mg/ml (95% CI: 4.2-5.9), 2nd day bilirubin 9.4 mg/ml (8.6-10.1), pH 7.34 (95% CI: 7.33-7.36), HCO_3 23.0 mmol/l (95% CI: 21.7-24.3) and glucose 56 mg/dl (95% CI: 52-61). ZO concentration analyzed in two subgroups based on gestational age revealed higher mean values for more mature newborns: 3.2 ng/ml

(95% CI: 1.9-4.6) for 30-33 weeks (n = 14) and 5.7 ng/ml (95% CI: 4.5-7.0) for 34-36 weeks. Mode of delivery, routine laboratory parameters and respiratory support showed no influence on serum ZO concentrations.

CONCLUSIONS

The established reference values for preterm newborns in stable clinical condition enable interpretation of ZO concentrations in pathologic conditions.

ABS 4

INCIDENCE AND RISK FACTORS FOR VENTILATOR-ASSOCIATED PNEUMONIA IN NEONATES

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INTRODUCTION

Nosocomial infections, including ventilator-associated pneumonia (VAP) represent an important public health problem and a major cause of morbidity and mortality in neonatal intensive care units. The aim of the study was to evaluate the incidence and risk factors for VAP in newborn infants.

MATERIALS AND METHODS

All newborns mechanically ventilated between 01.01.2011 and 31.12.2017 in our level III NICU Sibiu were evaluated. Infants needing assisted ventilation for less than 48 hours were excluded. Data was extracted from the neonatal and NICU charts. Statistical analysis was performed using SPSS® 10.0 for Windows®; p was considered statistically significant at values < 0.05 (95% confidence interval) and, where appropriate OR was also calculated.

RESULTS

During the study period, 271 newborns needed mechanical ventilation, 211 of them for more than 48 hours. VAP was diagnosed in 28 of the 211 neonates – 13.27%, almost half of the nosocomial infections diagnosed in this group (44.28%). *Enterobacter spp.* and *Escherichia coli* were the most frequently isolated pathogens. Compared with infants without VAP, those with VAP had significantly lower mean birth weight and gestational age ($p < 0.001$), were ventilated sooner after birth ($p = 0.039$) and for a longer period ($p < 0.001$), had an increased need of oxygen ($p = 0.042$), a higher number of intubations ($p < 0.001$) and aspirations of the endotracheal tube ($p < 0.001$), needed a longer period of parenteral nutrition ($p = 0.002$). More than 3 intubations increased the risk of VAP by 5.15 times (1.84-14.39), mechanical ventilation for ≥ 8 days increased the risk by 1.57 (CI 1.32-1.87) while ventilation for ≥ 15 days raised the risk to 3.44 (CI 1.91-6.22). *In situ* umbilical venous line for ≥ 6 days was associated with an OR for VAP of 1.23, while the line maintained ≥ 11 days increased VAP risk to 2.01 (CI 1.15-3.52). No difference was found as regards year of study, place of birth (inborn versus outborn), gender, incidence of maternal-fetal infections, time to minimal enteral nutrition. VAP diagnosis was associated with an increased risk of death (38% versus 10%, OR 2.73 [1.09-6.84]).

CONCLUSIONS

VAP is a serious complication of mechanical ventilation in both term and preterm infants. Its incidence in our study group was in the ranges described in the literature (6-32%). Smaller birth weight and gestational age, more intubations, longer duration of assisted ventilation, parenteral nutrition and use of umbilical catheter are associated both with increased severity of perinatal conditions and with increased risk of VAP. Preventing colonization, reduction of contamination during assisted ventilation, lower frequency of aspirations of the lower airways, and use of a correct technique for cleaning the respiratory tract and tracheal tube may considerably reduce the rate of VAP.

ABS 5

ARE EMA (EXPERT MEETING ON NEONATAL AND PEDIATRIC SEPSIS CONSENSUS 2010) CRITERIA ACCEPTABLE FOR PREDICTING SEPSIS IN NEWBORNS OR DO WE NEED NEW CRITERIA?

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INTRODUCTION
Absence of a standard definition for neonatal sepsis is one of the most important issues in clinical practice. In order to ensure standardization, in 2010 an 'Expert Meeting on Neonatal and Pediatric Sepsis Consensus Criteria' was conducted in a panel organized by the Pediatric Committee of the European Medicines Agency (EMA). However, there is no data to support the accuracy of these criteria.
OBJECTIVES
The main objective of our study was to evaluate whether or not EMA criteria are sufficient for predicting neonatal sepsis. For this purpose, we conducted a prospective multicentric trial to evaluate the safety and accuracy of EMA criteria in neonatal sepsis.
METHODS
Between May 2015 to October 2017, infants between 34 and 44 weeks post-conceptional ages who started antibiotic therapy for suspected sepsis according to the clinic's local protocol were included. All the infants were evaluated according to the EMA criteria, and 16S-rRNA and multiplex real time PCR were performed in addition to blood culture and routine sepsis studies. Blood culture positive and/or PCR- positive infants were diagnosed as definite sepsis. During the clinical process of infants with microbiological and molecular evidence, sensitivity, specificity positive and negative predictive value of EMA criteria and combinations of different criteria were analyzed.
RESULTS
Of 150 infants who fulfilled the study criteria, 82% were suspected to have early sepsis. EMA sepsis criteria were positive in 44.5% and the remaining infants were diagnosed according to the experienced neonatologist's suspicion. Definite sepsis was identified in 44% of those infants. Sensitivity, specificity, positive and negative predictive value of EMA criteria in predicting definite sepsis were respectively as follows: 46%, 60%, 59% and 47%.
CONCLUSIONS
Evaluating the validity and reliability of the EMA criteria on the basis of microbiologic and molecular evidence showed that the sensitivity and specificity of the EMA criteria are relatively low for predicting definite sepsis in newborns. New criteria are needed to define sepsis accurately in the early stage of the disease and avoid unnecessary antibiotic treatment.

ABS 6

HOSPITAL-ACQUIRED INFECTION AND MORTALITY IN EXTREMELY PRETERM INFANTS BORN AT < 28 WEEKS' GESTATION: DATA FROM THE CZECH NEONATAL NETWORK

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AIM
To investigate the incidence of invasive nosocomial infections and mortality in extremely preterm infants.
METHODS
Czech Neonatal Network database records of 712 infants who were born at < 28 weeks' gestation from 2015 to 2017 were analyzed. Infants were divided into five groups: 22 weeks', 23 and 24 weeks', 25 weeks', 26 weeks' and 27 weeks' gestation. The infants' mortality and invasive nosocomial infection (late-onset sepsis and late-onset meningitis) rate was analyzed. The statistical significance of result was analyzed by the Chi-square test.
RESULTS
The overall mortality rate was 21% during the study period. The hospital-acquired infection (HAI) rate was 30% and the mortality rate of infants with HAI was 20% compared to 24% in infants without HAI. The HAI rate was 60% at 22 weeks', 29% at 23 and 24 weeks', 20% at 25 weeks', 17% at 26 weeks' and 9% at 27 weeks' gestation. Mortality rates were higher in infants without infection at 22 weeks' (83% vs. 60%, $p = 0.03$), at 23 and 24 weeks' (56% vs. 29%, $p < 0.0001$) and at 25 weeks' gestation (31% vs. 20%, $p = 0.05$), but did not significantly differ at 26 and 27 weeks' gestation.
CONCLUSIONS
The HAI rate in extremely preterm infants was influenced by gestational age. The mortality rate of infants is not associated with HAIs and at < 26 weeks' gestation it was heavily influenced by other factors.

ABS 7

HOSPITAL-ACQUIRED INFECTION WITH *CANDIDA SPP.* CAN WE DO MORE?

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INTRODUCTION

The survival of extremely low birth weight infants thanks to better medical care leads by default to an increase in the cumulative incidence of neonatal candidiasis. The aim is to determine the epidemiology of candidemia in our service, by comparing risk factors, clinical manifestations, complications and outcome according to the *Candida spp.* involved.

MATERIAL AND METHODS

We reported 30 cases of *Candida* infections in a retrospective study on 10,062 neonates admitted in our service between 2012-2016, of whom 434 with body weight < 1,500 g and 168 under 28 weeks of gestation in the Neonatology Department I, Emergency County Hospital, Cluj, Romania. We evaluated several factors: duration of antibiotherapy, both prophylactic and therapeutical, lab results, manifestations and complications, in the hope of finding differences based on the *Candida spp.* involved. Informed consent was signed.

RESULTS

Incidence of candidiasis in our service is 0.23% in the global neonatal population; in prematures ≤ 1,500 g it is 2.76% and in the group of babies ≤ 28 weeks it is 5.95%. The most common *Candida* species was *C. albicans* in 15 cases followed by *C. parapsilosis* in 12 cases. We found positive correlations between the number of days spent in the incubator or on mechanical ventilation ($p = 0.044$) and certain *Candida spp.* ($p = 0.037$). No influence of prophylaxis with fluconazol on the appearance of any species of *Candida spp.* ($p = 0.057$). Lab tests revealed that *C. parapsilosis* infection was associated with the lowest platelet count.

CONCLUSIONS

Incidence of candidiasis in our service is 0.23%, in prematures ≤ 1,500 g, it is 2.76% and in neonates ≤ 28 it is 5.95%. Infection with *C. parapsilosis* was associated with the lowest platelet count in this cohort. There was no influence when comparing the duration of CVC or fluconazol prophylaxis with the different species of *Candida spp.* The duration of care in the incubator is a significant risk factor for neonatal *Candida* infection in premature babies. Mechanical ventilation is a significant risk factor for *Candida* infection.

ABS 8

DISORDERS OF COAGULATION IN PRETERM AND TERM NEONATES DURING THE ACUTE PHASE AND AT THE RESOLUTION OF SEPSIS: PRELIMINARY RESULTS

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INTRODUCTION

Infection is one of the most important factors that activate the coagulation cascade, a natural host defense mechanism trapping invading pathogens and preventing further dissemination. The present study aims at investigating the alterations of pro-coagulant factors and natural inhibitors of coagulation in preterm and term neonates during the acute phase and at the resolution of sepsis.

METHODS

Eighteen patients with infection classified as mild, moderate and severe according to clinical criteria and laboratory findings were enrolled in the study. Prothrombin time (PT) and activated partial thromboplastin time (aPTT), as well as pro-coagulant factors (fibrinogen, vitamin-K dependent factors, factors VIII, von Willebrand), anticoagulant proteins (antithrombin-AT, proteins C and S-PC/

PS) and D-dimers were measured during the acute phase and at the resolution of infection.

RESULTS

The mean gestational age (± standard deviation) was 32.7 (± 3.1) weeks and the median birthweight (interquartile range) was 1,435 g (1,222.5-2,685.0). Ten neonates (55.6%) were male and 8 (44.4%) female. PT and aPTT were prolonged during the acute phase of infection. The prolongation of PT was statistically significant (15.6 ± 3.4 sec vs 12.0 ± 0.9 sec, p = 0.006). Fibrinogen, factors VIII, IX, Rcof and D-dimers were notably increased in the acute phase (p = 0.007, 0.001, 0.049, 0.008 and 0.041, respectively). On the other hand, factor VII was markedly decreased during the acute phase compared to its value at resolution (p < 0.001). Similarly, AT, PC and PS were substantially reduced during the acute phase (p = 0.002, 0.055 and 0.004, respectively). Notably, the impact of infection severity on differences in coagulation factor levels was not statistically significant.

CONCLUSION

In spite of the small sample size an important disruption of the hemostatic mechanism was observed in term and preterm neonates with sepsis. The underlying alterations in specific factor levels reflect the dysregulation of coagulation in response to infection. These outcomes are expected to be intensified as more patients are recruited in the study.

ABS 9

EXTREMELY RARE DISEASE OF NEONATE MIMICKING SEPSIS AND NECROTISING ENTEROCOLITIS

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BACKGROUND

Congenital leukemia is an extremely rare disease, with an incidence of 1 to 5 cases per 1,000,000 live births. Clinical presentation, i.e. lethargy, poor feeding, respiratory distress, hepatosplenomegaly, skin nodules, lymphadenopathy and signs of abnormal bleeding right after birth can resemble sepsis or other diseases. Diagnosis of congenital leukemia is based on 3 major criteria: the presence of immature hematopoietic cells, hematopoietic cell infiltration into non-hematopoietic tissue, exclusion of other conditions (infection, hypoxia, hemolytic disease, chromosome abnormalities). Treatment of neonatal leukemia remains a topic of discussion, prognosis of the disease is usually poor, with a 20 to 30% percent overall survival rate.

CASE REPORT

A 1,880 g boy was born with Apgar score 5/7/8 at 30 weeks' gestation to a 27-year-old gravida 3 para 3 mother. The pregnancy was uneventful until the 30th week, when the mother reported reduced fetal movement. Emergency cesarean section was performed due to the progression of fetal distress. Severe respiratory distress, distended abdomen with no peristalsis was diagnosed right after birth. Laboratory tests revealed marked leukocytosis, thrombocytosis and anemia accompanied by lactic acidosis and severe hypoglycemia. Necrotizing enterocolitis (NEC) with intestinal necrosis was suspected on abdominal ultrasound examination, therefore surgical intervention was considered but was put on hold because of the poor general condition of the baby. Radiographs obtained after gastric administration of contrast material showed no contrast evacuation from the stomach. Broad spectrum antibiotics were administered in addition to artificial ventilation, parenteral feeding and cardiotonic drugs because of high suspicion of neonatal sepsis and/or NEC. Significant leukocytosis and thrombocytosis persisted in addition to signs of diffuse infiltrates in the liver and portal vein thrombosis (on ultrasound examination) after 12 hours of intensive treatment. Peripheral blood smear revealed 75 percent of blasts. Diagnosis of congenital leukemia was suspected and immunophenotyping confirmed the diagnosis of megakaryoblastic leukemia (FAB M7). Despite constant, targeted treatment, the patient died on the 2nd day of life. The autopsy findings confirmed the neoplastic infiltrations in the thymus, heart, lung (**Fig. 1**), liver, spleen, kidney, adrenal glands, pancreas, brain and meninges, bone marrow as well as in placenta, umbilical cord and fetal membranes.

CONCLUSIONS

Congenital leukemia can mimic other conditions, such as neonatal sepsis and/or NEC. Marked leukocytosis with prevalence of blast cells as well as thrombocytosis could raise the suspicion of neonatal congenital leukemia. Male sex and marked leukocytosis (> 50 x 10^9/l) at the time of diagnosis suggest negative prognosis. Early diagnosis of congenital leukemia can prevent unnecessary

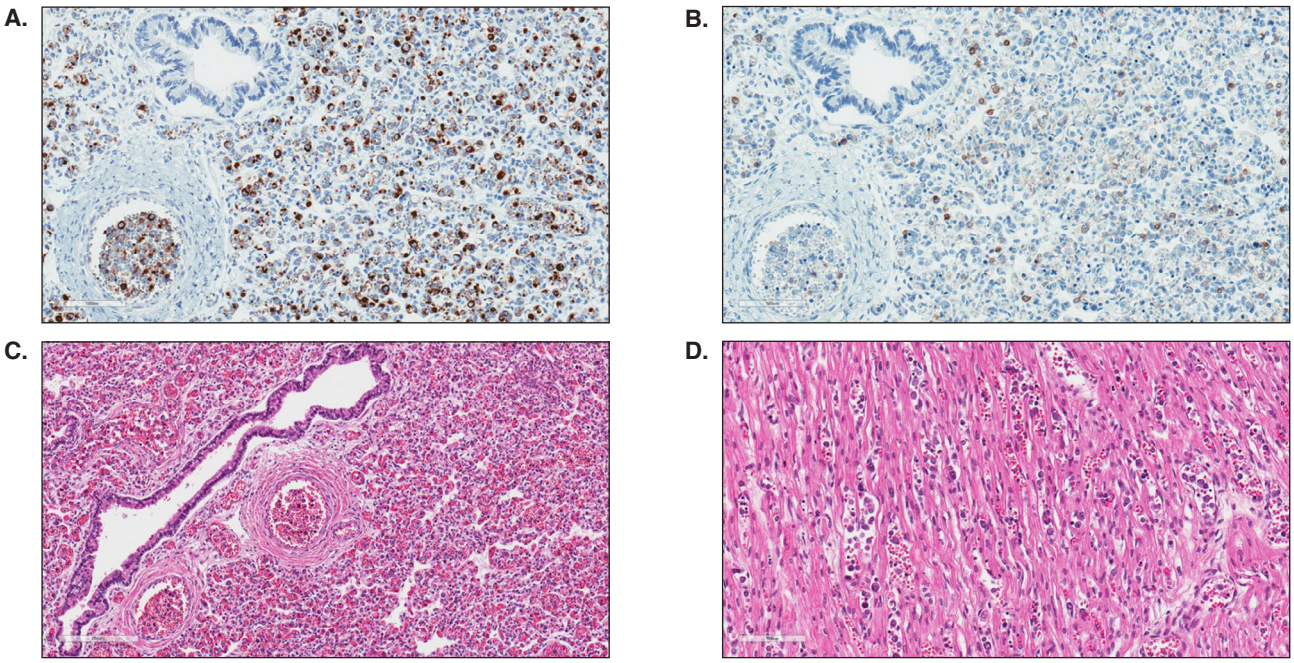

Figure 1 (ABS 9). Neoplastic infiltration of the lung and heart. **A.** Lung, CD61 infiltrates. **B.** Lung, CD117 infiltrates. **C.** Lung. **D.** Heart.

diagnostic and surgical procedures but they do not prevent the negative outcome of the disease.

ABS 10

HOSPITAL ACQUIRED INFECTIONS IN NEONATES WITH CONGENITAL HEART DISEASE UNDERGOING CARDIAC SURGERY: RISK FACTORS AND IMPACT ON EARLY OUTCOME

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INTRODUCTION

Neonates with Congenital Heart Disease (CHD) are a very specific population with increased risk of morbidity and mortality. The aim of this study was to evaluate the risk factors for the development of hospital acquired infections (HAI) after cardiac surgery in neonates and their impact on prognosis.

METHODS

We present a retrospective observational study of a single, tertiary Neonatal and Pediatric Cardiac Intensive Care Unit (NCICU). Twenty-four (24) neonates who underwent cardiac surgery due to CHD were enrolled. Patients were categorized into 2 groups, with or without HAI. Risk factors for HAI, including perinatal history, age at surgery, preoperative and postoperative factors, length of central venous catheter, nutritional support and mechanical ventilation were compared.

RESULTS

Bacteremia was the most common HAI (60%, 9/15 neonates) in our study population, with causative pathogens from the patient's colonization. The duration of prior intubation and non-cardiac co-morbidities were important risk factors for HAI after cardiac surgery. Other factors include the duration of CPB (260 vs 65 min, p 0.049), mechanical ventilation (9 vs 4 days, p 0.002), CVC days (10 vs 6, p 0.013) and TPN days (8 vs 2, p 0.003), as long as the presence of postoperative complications (73.3% vs 44.5%, p 0.049). We observed that HAI prolonged the LOS in the neonates of our study (LOS 10 days vs 7 days, p 0.026).

CONCLUSIONS

Postoperative HAI are the main complication in neonates with CHD who undergo cardiac surgery and they play a critical role in their outcome.

ABS 11

INCIDENCE OF HOSPITAL-ACQUIRED INFECTIONS IN VERY LOW BIRTH WEIGHT NEONATES IN A NEONATAL INTENSIVE CARE UNIT DURING A 15 MONTH PERIOD

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INTRODUCTION

Very low birth weight (< 1,500 g) neonates are more vulnerable to hospital-acquired infections due to their immature immune system, exposure to invasive procedures and increased length of hospital stay. The objectives of this study are to highlight the incidence, risk factors and etiologic agents of hospital-acquired infections in VLBW neonates in the level 3 neonatal intensive care unit (NICU) of General Hospital "Elena Venizelou" in Athens, Greece.

METHODS

All VLBW infants who were hospitalized in the NICU between December 2016 and February 2018 were prospectively observed for evidence of hospital-acquired infection. The unit admitted 35 VLBW neonates (31.4% female, 68.6% male). Mean gestational age was 28.7 ± 3.9 (28.6: 24-53.2) weeks, mean birth weight was 1,092.4 ± 245.7 (1,100: 650-1,500) g, mean length of hospital stay was 58.48 ± 27.9 (56: 2-159) days.

RESULTS

Of 35 VLBW neonates, 4 neonates among them developed hospital-acquired infection, the incidence rate being 14.3%. Demographic, clinical and laboratory data on all VLBW infants were collected. The hospital-acquired infection among the study population was predominantly (60%) caused by *Staphylococcus epidermidis*. *Klebsiella pneumoniae* was the causal microbe in 20% of all culture-positive cases. During the study period, one fungal infection was isolated (20%) caused by *Candida albicans*. On multivariate logistic regression, long duration of invasive mechanical ventilation 5.6 ± 12.3 (1: 0-53) and non-invasive ventilation (SiPAP) 3.26 ± 3.4 (3: 0-18 , low birth weight, male gender (OR = 1.1; 95% ΔE: 0.6-2.1) and caesarean section (OR = 1.1; 95% ΔE: 0.6-1.9) were associated with increased risk of hospital-acquired infections (OR = 1.1, 95% CI 0.6-1.9) in VLBW.

CONCLUSIONS

The incidence of hospital-acquired infection among 35 VLBW was 14.3%. Risk factors associated with increased rates included long duration of ventilation, low birth weight, male gender and caesarean section.

ABS 12

KARYOLOGICAL INDICES OF THE BUCCAL EPITHELIUM CELLS IN PRETERM CHILDREN WITH NEONATAL SEPSIS DEPENDING ON THE GEOCHEMICAL FEATURES OF THEIR MOTHERS' PLACE OF RESIDENCE

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INTRODUCTION

The micronucleus test of the buccal epithelium as a non-invasive method is becoming increasingly popular and widely used as a biomarker of genetic disorders in the human body. The peculiarity of the buccal epithelium is that it can act as a reflection of the body's condition, which is or was influenced by xenobiotics. The purpose of the research is to study the karyological indices of the buccal epithelium in newborns who suffer from neonatal sepsis, depending on the geochemical features of their mothers' place of residence.

METHODS

The study involved 64 newborn babies with neonatal sepsis. The geochemical characteristics of the places of residence of the mothers, whose children were born and developed neonatal sepsis, were received as a result of studying soils in Chernivtsi. Two groups of observation were formed, depending on the geochemical characteristics of the place of residence of the mothers whose children developed neonatal sepsis. The first one (I) consisted of 36 children whose places of birth and residence belonged to the territories contaminated with heavy metals (CHM). And the second group (II) included 28 cases of birth in the families, whose place of residence was attributed to relatively clean living conditions (CLC). The data obtained were analyzed by statistical methods using the STATISTICA computer packages of StatSoft Inc. on a personal computer using parametric and nonparametric computation methods.

RESULTS

In group I, the number of cells with "vesicle" protrusion prevailed and constituted 0.04 ± 0.006‰ against group II with 0.03 ± 0.003‰ (< 0.05). Proliferation rates in the form of cells with two nuclei in the comparison groups were not reliably different. The incidence of cells with karyorrhexis and karyolysis was 0.02 ± 0.001‰ and 0.12 ±

0.03‰, respectively, and was observed only in group I. The apoptotic index in group I was reliably higher and constituted 0.21 ± 0.041‰ versus 0.001 ± 0.002‰ in group II.

CONCLUSION

The index of accumulation of cytogenetic lesions in newborns with neonatal sepsis in the CHM group was 2.6 times reliably higher than that in the representatives of the comparison group.

ABS 13

NOSOCOMIAL INFECTION IN THE NEONATAL INTENSIVE CARE UNIT OF MONASTIR (TUNISIA)

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OBJECTIVE

The epidemiology of hospital-acquired infections (HAI) in neonatal intensive care units in developing countries has been poorly studied. The objectives of our study were to determine the epidemiological, clinical, paraclinical and evolution characteristics of neonatal HAI, to identify risk factors, to identify prognostic factors and analyze methods of treatment.

MATERIAL AND METHODS

The investigation was conducted in the Newborn and intensive care unit of Monastir. A retrospective case-control study was implemented from June 12, 2009 to June 30, 2010, all patients remaining in the ICU were included. Nosocomial infections were identified according to the CDC definition. Data were analyzed with descriptive statistics.

RESULTS

Among 240 hospitalized newborns in intensive care, 63 patients presented with 74 HAI. The incidence and the density incidence rates were 26.25% and 29 per 1,000 patient-days, respectively. There was a male predominance, the sex ratio was 1.7. Two thirds of infections had occurred during the first week of hospitalization. The average time between admission and the development of HAI was 7 days. The average time between the instrumental operation and the development of HAI was 6 days. Clinical signs were polymorphic and nonspecific dominated by respiratory signs. Risk factors identified in our study as statistically significant were: prematurity, low birth weight, mechanical ventilation, central catheterization, lack of breastfeeding, surgery and prolongation of hospital stay. Sepsis was the most common location (50.6%). The germs isolated were dominated by *Klebsiella pneumoniae* (70%), followed by *coagulase-negative Staphylococcus* (14%). Imipenem-Amikacin was the most-used combining first-line antibiotic in 95% of cases. Mortality associated with HAI was 16% and the lethality rate was 55.5%.

CONCLUSION

The profile of newborns susceptible to developing a HAI in our ICU was: prematurity, low birth weight, immunologically incompetent subjected to multiple invasive cares and subtracted from breastfeeding. Prevention at the individual and collective means is necessary to fight against the scourge of neonatal HAI.

ABS 14

VENTILATOR-ASSOCIATED PNEUMONIA IN NEONATES BORN BEFORE 28 WEEKS OF GESTATION AT A NEONATAL INTENSIVE CARE UNIT: A RETROSPECTIVE STUDY

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INTRODUCTION

Ventilator-associated pneumonia (VAP) is one of the most common healthcare-associated infections among ventilated patients. The aim of this study was to determine the clinical characteristics and risk factors for the development of VAP in infants born before 28 weeks of gestation admitted to the Neonatal Intensive Care Unit (NICU) Department of Neonatology, Poznan University of Medical Sciences from January 2015 to December 2016.

MATERIALS AND METHODS

153 children were admitted to the NICU over this period. 41 (26.8%) newborns (F/M = 18/23; inborn/outborn = 38/3; vaginally) developed VAP. The average age at onset of VAP was 23.5 days. Mean gestational age was 25.4 ± 1.7 weeks, which was significantly lower than the mean gestational age in the group without VAP. Mean body weight at birth was 824.5 ± 235.8 g. Mean total ventilation time was 65.8 ± 27.8 days; mean conventional ventilation time was 32.1 ± 19.1 days.

RESULTS

14 (34.1%) strains of isolates were Gram-negative bacteria: *E. coli* (5 strains, 35.7%), *Enterobacter cloacae complex* (3 strains, 21.4%), *Klebsiella pneumoniae* (2 strains, 14.3%), *Acinetobacter baumannii* (2 strains, 14.3), *Stenotrophomonas maltophilia* (1 strain, 7.1%.), *Proteus mirabilis* (1 strain, 7.1%.), followed by Gram-positive (13 strains, 31.7%), fungi (4 strains, 9.7%) and mixed bacterial flora (10 strains, 24.4%). The isolation rates of Gram-negative bacteria with positive extended-spectrum beta-lactamases (ESBL) were 14.2%. Among patients with VAP there were 4 (9.7%) deaths. Single-factor analysis showed that body weight, mechanical ventilation, parenteral nutrition and hospitalization time were risk factors for VAP in the infants studied.

CONCLUSIONS

Extremely preterm infants were at higher risk of hospital-acquired infection. It is important to identify the high-risk factors for hospital-acquired infections in extremely premature infants. Shortening the duration of mechanical ventilation, parental nutrition and hospitalization days would be conducive to reducing the incidence of VAP.

ABS 15

CANDIDA SEPSIS AND MYCOTIC ENDOCARDITIS IN AN EXTREMELY PREMATURE NEWBORN, A CASE REPORT AND LITERATURE REVIEW

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INTRODUCTION

Fungal endocarditis in neonates occurs as part of a disseminated fungal infection, following cardiac surgery, and as a result of a central venous catheter-induced intracardiac thrombus or valvular injury. Prognosis is improving due to advances in intensive and operative care, but the survival rate remains less than 25%.

METHODS

We report on an extremely premature newborn (27^{+2} GW) delivered by C-section following prolonged rupture of the membranes and prolapse of the umbilical cord. The birth parameters were: BW 1,020 g, BL 35, and Apgar score at the first minute – 5. The child was put on mechanical ventilation, the umbilical venous catheter was placed, surfactant, dopamine and first-line antibiotic regimen was prescribed as well as parenteral nutrition and blood products. Due to ongoing signs of sepsis, antibiotics were shifted to a late-sepsis regimen with meropenem and vancomycin and respiratory support was increased which sequentially lead to clinical improvement and extubation on the 7th day of life with non-invasive respiratory support thereafter. On the 12th day, the child was once more septic and suffered respiratory insufficiency. A percutaneous central venous catheter was positioned through the subclavian vein and ventilator support, surfactant, antibiotics and fluconazol were instituted.

RESULTS

The blood culture revealed *Candida albicans*. Echocardiography showed filamentary formation (vegetation) in the RV outlet part directed to the pulmonary valve as well as a hyperechogenic fixed formation (dimensions 5.7 x 7.7 mm) at the entrance of the lower vena cava to the right atrium, both suspected to be signs of mycotic endocarditis. The filamentary formation quickly disappeared, whereas the hyperechogenic formation persisted for a month, gradually shrinking in size until complete disappearance. The treatment with fluconasol was continued for 10 days after the first negative hemoculture or for a total of 42 days. The child's CNS ultrasound was monitored continuously, with no apparent signs of acute intracranial hemorrhage or inflammation. At discharge, the child was 46 weeks of age, corrected GA with appropriate somatic and neurological status; weight was 3,900 g, length 53 cm and head circumference 35 cm.

CONCLUSIONS

We have presented a rare and extremely difficult-to-treat case of neonatal *Candida albicans* sepsis and mycotic endocarditis with favorable outcome and good prognosis. A review of the literature revealed mortality rates of 75-90% due to the difficulty in making the diagnosis, lack of effective antifungal antibiotics, frequent need for surgical intervention, presence of underlying conditions, and frequent comorbid conditions in these typically critically ill neonates.

ABS 16

DIAGNOSTIC UTILITY OF DELTA NEUTROPHIL INDEX AS A MARKER FOR NEONATAL SEPSIS

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INTRODUCTION

There has been significant interest in the determination of hematologic indices or specific biomarkers for the early diagnosis of neonatal sepsis. Timely diagnosis is essential both for initial appropriate treatment and to prevent complications. The diagnosis of sepsis in neonates is challenging due to nonspecific clinical symptomatology. Delta neutrophil index (DNI) is the difference between leukocyte subfractions identified by myeloperoxidase and nuclear lobularity channels. In this study, we aimed to determine the diagnostic value of DNI for the detection of neonatal sepsis.

METHODS

A retrospective study was conducted at a tertiary hospital in Turkey between 2015-2017. DNI and blood culture were obtained at the onset of clinical signs of sepsis in patient groups. DNI was calculated using an automatic hematology analyzer. Receiver operating characteristic (ROC) curve analysis was used to determine cut-off values of serum leukocyte, C-reactive protein, platelet count and DNI levels, and sensitivity and specificity values were calculated (**Fig. 1**). In all analyses, 0.05 was considered as the significance level.

RESULTS

A total of 154 neonates met the study criteria; of these, 59 were assigned to the confirmed sepsis group, 46 were assigned to the clinical sepsis group and 49 age-matched neonates formed the control group. The groups were similar in gestational age, birth weight, gender, mode of delivery and frequency of intrauterine growth retardation. DNI was significantly elevated in the confirmed and clinical sepsis groups. The median value of DNI was found to be 2.9% (0-41) in the confirmed sepsis group, 0.9% (0-9) in the clinical sepsis group and 0.2% (0-3) in the control group ($p < 0.001$). DNI had a sensitivity of 70%, a specificity of 96%, a PPV of 95% and an NPV of 72% with a cut-off value of 1.35% in the confirmed sepsis group. The cut-off value of DNI was detected at 0.45% with a sensitivity of 67%, a specificity of 76%, a PPV of 72% and an NPV of 75% in the clinical sepsis group.

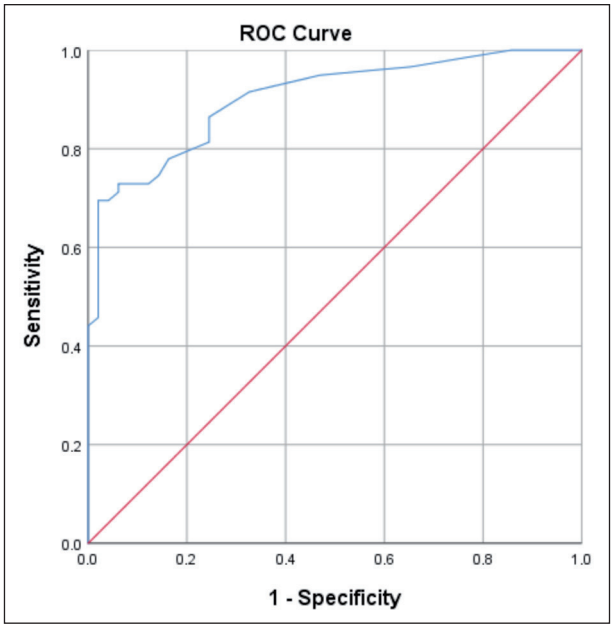

Figure 1 (ABS 16). Receiver operating characteristic (ROC) curve of delta neutrophil index (DNI) in confirmed sepsis group.

CONCLUSIONS

DNI is a reliable hematologic marker for distinguishing septic from non-septic neonates, especially in the early phase of disease. Moreover, it can be used as a marker for bacteremia since it can predict the results of blood cultures. It can be checked by complete blood count, a test whose results can be obtained within minutes and which does not require additional cost and labor.

ABS 17

INCIDENCE OF HEALTHCARE-ASSOCIATED INFECTIONS IN A LEVEL III NICU: A FIVE-YEAR SURVEILLANCE STUDY

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INTRODUCTION

Hospital-acquired infections (HAIs) are a major complication and a significant cause of preventable death in NICUs. Surveillance has proven to be an effective method for reducing the frequency of nosocomial infections. The aim of this study was to describe the incidence of HAIs, the most frequently isolated microorganisms and antimicrobial susceptibility patterns in a level III NICU at Centro Hospitalar Entre-Douro-e-Vouga, Santa Maria da Feira, Portugal.

METHODS
The data collected is part of the Portuguese national surveillance program for neonatal hospital-acquired infections, initially based on the NEO-KISS Protocol. The patients enrolled were the 993 neonates admitted to our NICU during the 5 years of the study, from 2013 to 2017.
RESULTS
The overall incidence of NICU infections was 27.8%. There were 74 neonates who developed a total of 84 HAIs (8.5% HAIs per admission). Amongst very low birth weight (VLBW) neonates, HAI prevalence was 43.3%. The incidence density rate for HA sepsis was 6.4 per 1,000 days of hospital stay (similar to the national registry of 6.9/1,000). Nosocomial sepsis was the most frequent HAI (72.6%) followed by NEC (21.4%) and ventilator-associated pneumonia (6%), with a rate of 8.4/1,000 days of endotracheal tube (ETT). The mortality rate was 2.4/100 HAI. Central venous catheter (CVC)-associated sepsis per 1,000 CVC-days was 22.7 (26.9 for VLBW neonates). CVC-associated sepsis included not only laboratory-confirmed bloodstream infection (BSI), but also clinical sepsis. The median time to CVC-associated sepsis was 11 days. The years with the highest incidence of HAIs were those with more days of CVC use per 1,000 days of hospital stay. The most frequently isolated microorganisms were: coagulase-negative *Staphylococci* (22.9%), *MSSA Staphylococcus aureus* (6.8%), *Klebsiella spp.* (6.8%), *Enterobacter* (5.4%), *Enterococcus* (4.1%), *Serratia spp.* (2.7%) and *Pseudomonas aeruginosa* (1.4%). No serious resistances were found concerning the antibiotics used.
CONCLUSIONS
We showed that VLBW neonates are the most susceptible group for HAIs in our NICU. Adjusting procedures involving CVC insertion, monitoring and reducing days with medical devices, and preventing improper use of antibiotics are some of the strategies for infection-control intervention, whose importance was emphasized by our surveillance program.

ABS 18

NEONATAL INFECTIONS IN TWINS BORN UNDER 32 WEEKS OF GESTATION

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INTRODUCTION
Prematurity is the most important predisposing factor for neonatal infection, with high mortality rate.
OBJECTIVE
The purpose of this study was to evaluate the risk of developing a neonatal infection in twins born under 32 weeks of gestation.
METHODS
We included 16 premature twins under 32 weeks of gestational age (GA) admitted to the Neonatal Intensive Care Regional Center of Târgu Mureş during January 2017 - March 2018.
RESULTS
Mean GA was 29 ± 2.29 weeks, mean birth weight (BW) was 1,164.66 ± 328.08 g. An extremely significant correlation was found between GA, BW and neonatal infection ($p < 0.0001$). 67% of the neonates had a neonatal infection. Of the 8 pairs of twins, 50% had infection, 25% had no infection and in 25% of cases only one of the twins had infection. 30% of the infections were with unidentified germs, 20% with *Klebsiella pneumoniae*, 20% with *Streptococcus pneumoniae*, 20% with *Streptococcus agalactiae* and only 10% with *Acinetobacter spp.* Of those with neonatal infection, 40% had early-onset bacterial infection, 30% had hospital-acquired infection and 30% had clinical signs of infection with negative cultures. Of the total of 16 twins included in the study, 33% were males and 80% of them had a neonatal infection; 67% were females and 60% of them had a neonatal infection. Paraclinical findings: 30% of the newborns presented leukopenia, 60% presented leukocytosis, 60% presented thrombocytopenia and only 10% presented thrombocytosis. We found significant correlations between neonatal infection and: positive cultures ($p < 0.0017$), maximum level of C-reactive protein ($p < 0.001$), the duration of umbilical catheter maintenance (mean: 14.86 ± 7.44, $p = 0.0003$), the duration of newborn hospitalization in the Neonatal Intensive Care Unit (mean: 18.2 ± 12.9, $p < 0.0001$). We had only one case of death. The major limitations of our study are its retrospective nature and limited number of cases.
CONCLUSIONS
The most difficult control of infection is in well-appearing co-twins, especially in cases with unidentified germs, where antibiogram is not available.

ABS 19

A NEWBORN CASE DIAGNOSED WITH OSTEOMYELITIS DUE TO LATE NEONATAL SEPSIS

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INTRODUCTION

Acute osteomyelitis is uncommon and serious in the neonatal period and occurs most frequently in prematures with critical illnesses such as sepsis, skin infections or with umbilical or peripheric venous catheterization. Here, we report a rare case of osteomyelitis due to *Staphylococcus aureus* septicemia in a 22-day-old premature neonate.

CASE REPORT

A female neonate weighing 1,900 g was born at 34 gestational weeks because of preterm labour. She was hospitalized at the neonatal intensive care unit (NICU) for respiratory distress developing soon after birth and discharged at postnatal day 3. At postnatal day 12, she was admitted to the NICU again with fever, apnea, poor feeding and worsening of general condition. Laboratory tests indicated late neonatal sepsis (WBC 15,600/μL, CRP of 26.2 mg/dl, platelet 36,000). Immediate antibiotherapy was initiated with intravenous vancomycin and meropenem. Blood cultures were obtained on the day of admission and grew *methicillin-sensitive Staphylococcus aureus* (*MSSA*). Chest radiograph was interpreted as normal and spinal fluid did not reveal pleocytosis. Urine and CSF cultures were sterile, and the abdominal ultrasonography was unremarkable. She became afebrile within two days and thereafter her clinical condition improved. On the tenth day of antibiotic therapy, she had tachypnea and fever. Physical examination showed swelling in the right hip, and her passive leg movements were painful. A plain radiograph revealed periosteal reaction and cortical destruction in the right femur and soft tissue swelling. The clinical and laboratory findings were attributed to osteomyelitis of the right femur.

CONCLUSIONS

Hematogenous osteomyelitis should be suspected in newborns who develop painful joint movements/limb swelling or new symptoms despite antibiotic treatment at appropriate doses and duration. Daily detailed physical examination, including the limbs, should be performed in all of the septic patients until discharge, even if initial findings have improved. Early diagnosis is essential to prevent catastrophic sequelae in such cases. Patients require long-term follow-up in terms of skeletal morbidity.

ABS 20

AUDIT OF COMPLIANCE WITH ASEPTIC TECHNIQUES IN THE NEONATAL INTENSIVE CARE UNIT OF EL-RAML PEDIATRIC HOSPITAL

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INTRODUCTION

Improper practice of aseptic techniques can lead to healthcare associated infections. Clinical audit is a quality improvement process that seeks to improve patient care and outcomes. Despite updated guidelines, compliance with aseptic precautions is still suboptimal. This audit aims at assessing healthcare providers' compliance with aseptic technique protocols during neonatal procedures in the El-Raml hospital neonatal intensive care unit.

PATIENTS AND METHODS

Auditing of healthcare providers' compliance with the application of neonatal procedure aseptic technique protocols for percutaneous peripheral venous line (PPVL), umbilical venous catheterization (UVC), endotracheal intubation (ETT), nasogastric tube (NGT), central venous line, bladder catheter, lumber puncture, emergency evacuation of air leaks (EEAL), and chest tube drainage were assessed for 6 months. The audit was performed by direct observation of practices, using designated checklists for each procedure.

RESULTS

The current audit study included 1,893 procedures (**Tab. 1**). There is poor adherence/low compliance by health care workers with the total steps of neonatal procedure aseptic technique checklists. The best doctor adherence was 66.7% in LP and TNA, followed by 52.4% in central line placement, 50% in UVC and urinary catheter, 44.4% in chest tube, 38.3% in NGT and lastly 14% in ETT. The doctors' adherence to the checklist steps for PPVL was higher than the nurses' but no significant difference between doctors and nurses was found in adherence to the NGT checklist.

CONCLUSION

Audits are valuable methods to evaluate healthcare providers' adherence to aseptic technique protocols. There is a defect in applying aseptic techniques during performance of most of the neonatal procedures; therefore, a training program is essential.

Table 1 (ABS 20). Distribution of the performed procedures.

		No of procedures	%
Gestational age	Full term	995	52.6%
	Preterm	898	47.4%
Birth weight (gm)	< 750	60	3.2%
	750-1,000	108	5.7%
	1,001-1,500	357	18.9%
	1,501-2,500	552	29.2%
	2,500-4,000	707	37.3%
	> 4,000	109	5.8%
Neonatal procedures	PPVL	926	48.9%
	UVC	185	9.8%
	CVL	21	1.1%
	LP	6	0.3%
	EEAL	9	0.5%
	Chest tube	9	0.5%
	ETT	250	13.2%
	Bladder catheter	6	0.3%
	NGT	481	25.4%

PPVL: percutaneous peripheral venous line; UVC: umbilical venous catheterization; CVL: central venous line; LP: lumbar puncture; EEAL: emergency evacuation of air leaks; ETT: endotracheal intubation; NGT: nasogastric tube.

ABS 21

SEPSIS-LIKE MANIFESTATION IN PARATESTICULAR ABSCESS – CASE PRESENTATION

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INTRODUCTION

Differential diagnosis of an acute scrotal swelling in a premature infant is often difficult. Testicular torsion, strangulated inguinal hernia and infectious pathologies have common symptoms on clinical examination. Laboratory work may be helpful in guiding management; however, it has low and limited sensitivity especially in premature infants; therefore, surgical exploration is mandatory.

METHODS

Herein, we report on a 28-day-old extremely low birth weight preterm infant who was admitted with late onset sepsis and developed swelling and erythema of the left hemiscrotum. His previous abdominal and scrotal examination was unremarkable. Emergency surgical exploration of the left hemiscrotum was undertaken. During surgery, well defined purulent tunical fluid was found. Exploration of the abdominal cavity due to a possible spread through the patent processus vaginalis was considered to be necessary. The abdominal cavity was clear. A sample taken from the paratesticular abscess was cultured and *Enterococcus faecalis* was isolated. His antibiotic therapy including ciprofloxacin was changed based on antibiotic susceptibility testing. He completed a course of 12 days imipenem/cilastatin with good outcome. He was discharged in good general condition at a weight of 2,150 grams.

RESULTS

As our patient was admitted to the intensive care unit due to clinical and paraclinical signs of late onset sepsis, we concluded that he had developed paratesticular abscess via hematogenous spread.

CONCLUSION

Acute neonatal scrotal processes are considered major emergencies, needing prompt diagnosis and treatment in order to achieve a good outcome.

ABS 22

SEPSIS IN INFANTS – CASE PRESENTATION

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INTRODUCTION

Sepsis is defined as Systemic Inflammatory Response Syndrome (SIRS) of a certain or probable infectious cause with a mortality rate of about 10%. In order to be able to define a SIRS, at least two of the following criteria are required: temperature ≥ 38°C or < 36°C, tachycardia (over 90/min), respiratory rate higher than twice the normal age frequency, leukocytosis over 12,000/mm^3 or leucopenia below 4,000/mm^3.

CASES REPORT

The authors present 4 cases of sepsis in young infants admitted to our clinic between May 2017 and May 2018. Three cases of infants aged between 2 and 3 months without a history of pathological hospitalization, with high fever, 39-40°C, psychomotor agitation, tachypnea, refusal to eat and intense pallor. Paraclinic investigations revealed neutrophilic leukocytosis, increased acute phase reactants, increased procalcitonin, positive urine cultures with *E. coli* and positive blood cultures with *Staphylococcus lentus*, *Staphylococcus aureus* (MRSA) and *E. coli*. The fourth case is a

4-month-old baby who was admitted to our clinic for vomiting, refusal to feed and psychomotor agitation. The diagnosis of preperforated suppurative otitis was established, and tympanotomy was performed. After 24 hours, the general condition worsened; paraclinical investigations revealed leukocytosis with neutrophilia, high acute phase reactants, positive blood culture with *Staphylococcus aureus* (MRSA).

CONCLUSIONS

Sepsis is an important cause of infant mortality, requiring early diagnosis and correct treatment.

ABS 23

NEONATAL CANDIDEMIA IN ELBW AND VLBW NEONATES IN A UK TERTIARY NICU – 8 YEAR REVIEW

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INTRODUCTION

Extremely low birth weight (ELBW < 1,000 g) and very low birth weight (VLBW < 1,500 g) neonates are at high risk of invasive candidemia. We aim to identify the risk factors and outcomes associated with invasive candidemia.

METHOD

Retrospective review of neonates (7 days) candidiasis had parenchymal brain lesions and died. One neonate had fungal balls in the kidneys and survived.

CONCLUSION

Candida albicans was the commonest cause of neonatal candidemia. 73% (11/15) presented as late onset sepsis. In our series invasive central nervous candidiasis was associated with high mortality amongst the VLBW neonates.

Nosocomial infections – antibioresistance antibiotic management

ABS 24

EPIDEMIOLOGY AND HEALTHCARE FACTORS ASSOCIATED WITH COAGULASE NEGATIVE STAPHYLOCOCCAL INFECTIONS AND RESISTANCE PATTERN OVER 9 YEARS

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INTRODUCTION

Neonatal infection is a significant cause of mortality and morbidity especially in preterm and low birth weight (LBW) infants. Culture-proven sepsis before and after 48 hours of life is termed as early (EONS) or late onset neonatal sepsis (LONS). LONS is associated with prolonged hospitalisation and poor neurodevelopmental outcome. *Coagulase Negative Staphylococci* (CoNS) are responsible for LONS and catheter-associated bloodstream infection (CABSI).

We contribute our culture-proven sepsis data to the Neonatal Infection Surveillance Network (neonIN) database. The aim of this study is to find out the incidence of CoNS and its resistance pattern in this BAPM designated Neonatal Intensive Care Unit (NICU).

METHODS

This is a retrospective analysis of prospectively collected data for the period Jan 2009 - Dec 2017 on all culture-proven sepsis from blood, CSF and aseptically collected urine samples from the neonIN database. Total number of live births, neonatal admissions, number of babies born < 28 weeks, weighing < 1,000 grams, total catheter days, blood culture positive with central line *in situ*, and CABSI data were collected from the Badgernet database. Matching Michigan was introduced in 2011 and the NICU Quality Improvement central line care bundle in 2017. The unit practice is to start teicoplanin and gentamicin for suspected LONS if there is a central line *in situ*. We wanted to study the sensitivity pattern of CoNS during the study period.

RESULTS

Total numbers of live births and neonatal admissions were 44,626 and 8,764 respectively over the 9-year period. Babies born at less than 28 weeks and weighing less than 1,000 grams were 6% and 5.2% of all admissions. 370 episodes of neonatal infections were reported (106 non-CoNS + 264 CoNS). The incidence of neonatal infections was 2.3/1,000 live births and 12.1/1,000 neonatal admissions, if CoNS were excluded. CoNS infection rates were 5.9/1,000 live births and 30.1/1,000 neonatal admissions. 45 and 219 CoNS episodes were reported in early and late onset sepsis respectively. Total catheter days ranged between 1,303 and 1,811 per year, CABSI

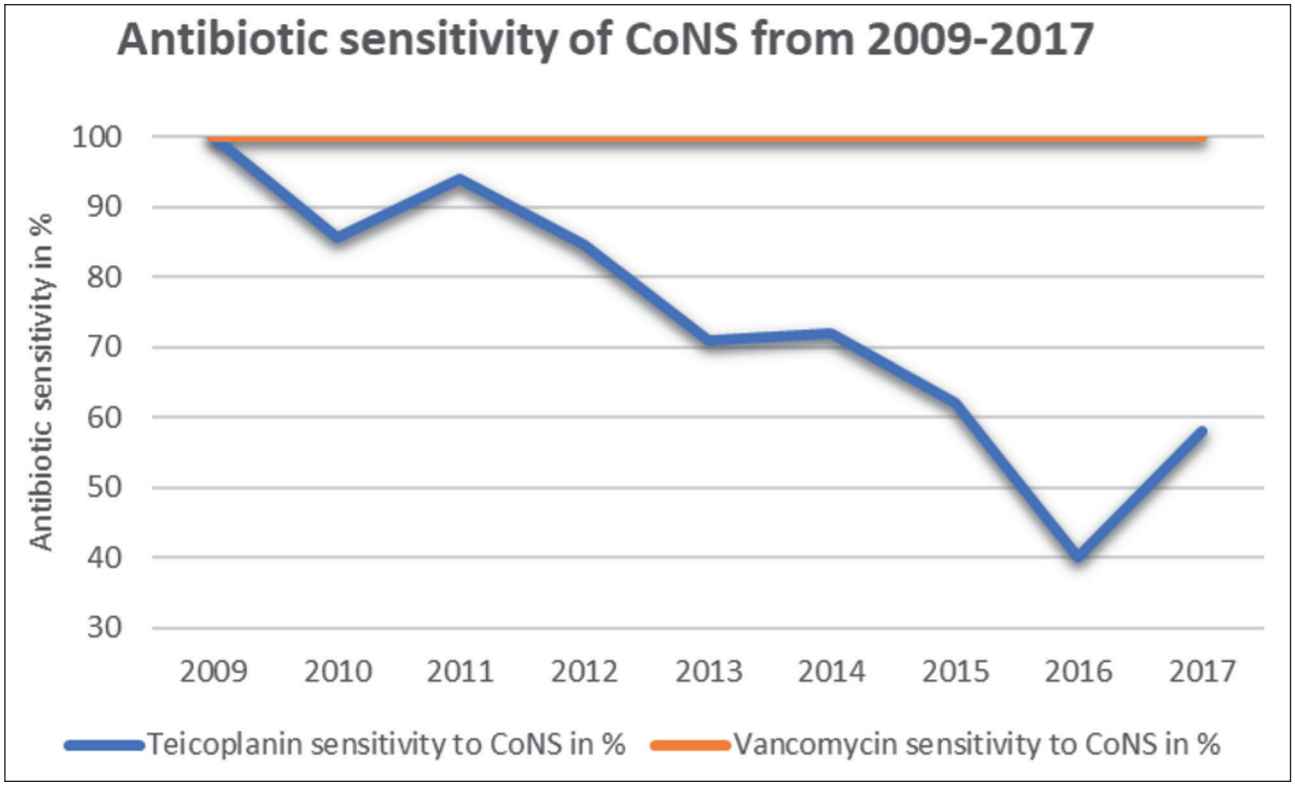

Figure 1 (ABS 24). Antibiotic sensitivity pattern of *Coagulase Negative Staphylococci* (CoNS) over the period 2009-2017.

rate between 4.6% and 22.3%. The sensitivity pattern of all CoNS, mainly *St. capitis*, *St. epidermidis*, *St. haemolyticus*, *St. hominis*, *St. warneri* were studied in the study period. The overall sensitivity to teicoplanin fell from 100% in 2009 to 58% in 2017, while vancomycin sensitivity was maintained at 100% for all CoNS infections during the study period (**Fig. 1**).

CONCLUSION

Though the non-CoNS infection rates are comparable to other UK neonatal units, overall CoNS infection rate is higher particularly in EONS. Stringent infection control policies and NICU quality improvement in the central line care bundle will be crucial to reduce the CoNS infection and CABSI rates. teicoplanin sensitivity has progressively declined over the years, particularly *St. capitis* is currently resistant to teicoplanin.

ETHICS APPROVAL

neonIN received ethics approval in 2005, renewed in Dec 2013 for 5 years (05/Q0806/34+5).

ABS 25

INTRAPARTUM ANTIMICROBIAL PROPHYLAXIS AFFECTS EARLY-GUT BIFIDOBACTERIUM POPULATIONS IN HEALTHY NEONATES

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INTRODUCTION

Bifidobacteria are one of the predominant members of the core gut microbiota in healthy infants and are one of the first strict anaerobes establishing in the gut at the beginning of life. Their composition undergoes a succession to an adult-like species over time. Several authors have considered the presence and abundance of *Bifidobacteria* as a potential microbial biomarker of good health status. An aberrant number or composition of *Bifidobacteria* is frequently observed in intestinal microbial alterations. It is known that various factors, such as antibiotics, mode of delivery or type of feeding, affect the process of establishment of the intestinal microbiota; however, it is not clear how these factors affect the specific *Bifidobacterium* populations.

The main objective of this study was to assess the effect of the intrapartum antimicrobial prophylaxis (IAP), present on over 30% of total deliveries, on the *Bifidobacterium* populations in full-term babies during the first three months of life.

METHODS

The study enrolled 31 babies born after an uncomplicated pregnancy at the Central University Hospital of Asturias (Northern Spain). Eight of the mothers received IAP (Penicillin iv 5 million IU, followed by 2.5 million IU iv, every 4 hours until the end of labor) due to confirmed vaginal colonization by *Group B Streptococci* (IAP group). With the objective of avoiding possible confounders, the enrolled cohort of babies was in all cases delivered at full-term and vaginally. DNA was extracted from stool samples collected at 2, 10, 30 and 90 days. The extracted DNA was used for PCR-amplification of the ITS region (intergenic region between the 16S and 23S rRNA genes) using specific primers and an improved bifidobacterial ITS database.

RESULTS

The bifidobacterial population distributions were found to be altered between IAP-exposed babies and non-IAP-exposed babies. Babies whose mothers had received IAP showed a significant increase in the relative abundance of *B. dentium* during the first days of life and a reduced relative abundance of *B. breve* (statistically significant at 10 and 30 days), *B. longum* and *B. bifidum*.

CONCLUSIONS

ITS region analysis made it possible to identify the different species of *Bifidobacterium* colonizing the early gut microbiota. This work indicates an effect of IAP on bifidobacterial population establishment during the first month of life. These observations pave the way for the development of *Bifidobacteria* as probiotics for microbial modulation aimed at minimizing the effect of IAP.

ABS 26

METAGENOMICS ANALYSIS DISCLOSES THE IMPACT OF INTRAPARTUM ANTIMICROBIAL PROPHYLAXIS IN THE EARLY MICROBIOME

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INTRODUCTION

The correct establishment of the intestinal microbiome at the beginning of life plays a key role in infant and later health. This process is affected by several factors, some of them (delivery and feeding type or gestational age) are well-known. However, other factors such as the intrapartum antimicrobial prophylaxis (IAP), in spite of being present in over 30% of total deliveries, have been much less studied. Given the increasingly evident relationship between early microbiota and later disease risk and the rising worries regarding antimicrobial resistances, there is an urgent need to assess the potential adverse consequences of IAP on the establishment of intestinal microbiota.

The main objective of this study was to assess the effect of the IAP on intestinal microbiome composition in full-term 30-day-old infants by metagenomics approach.

METHODS

Nine one-month-old babies, five of whom were born from mothers receiving IAP, were recruited for this study. With the objective of avoiding possible cofounders, the enrolled cohort of babies were in all cases full-term and vaginally delivered. Their gut microbial DNA was extracted from faecal samples. Illumina shotgun sequencing of total gut DNA was performed, and reconstruction of the microbiomes allowed taxonomic and functional characterization.

RESULTS

Babies whose mother had received IAP showed slight microbiota differences when compared with non IAP-exposed babies. Beneficial microbial groups, such as bifidobacteria and bacteroides, were the most affected. The functional classification of coding reads by means of different databases allowed us to identify differences in the abundance of transporters and enzymes involved in antibiotic resistance in infants exposed to IAP compared with their non-exposed counterparts.

CONCLUSIONS

Metagenomics analysis on healthy babies confirms an impact of IAP treatment on the correct establishment of their intestinal microbiota. These observations highlight the need to develop new dietary strategies based on microbial modulation

with the objective of minimizing the effect of IAP in the early stage of life.

ABS 27

POINT PREVALENCE SURVEY ON ANTIBIOTIC USE IN PORTUGUESE NEONATAL INTENSIVE CARE UNITS

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INTRODUCTION

Through the Portuguese Neonatal Society, a point-prevalence survey (PPS) was performed in Portuguese NICUs to evaluate antibiotic prescription.

METHODS

Inquiry on antibiotic prescription covering seven days (October 2017, 16th to 22nd) was sent to 18 NICUs. Their participation was voluntary and anonymous. All patients had to be enrolled.

RESULTS

Participation rate was 77.8% (14/18 NICUs). Out of the 234 patients enrolled (median of gestational age and birth weight 33 weeks and 1,825 g), 67 were under antibiotics (28.6%) for a total of 128 individual antibiotic prescriptions in 53 associations; 4 patients had two cycles of antibiotics during the week; 4 patients had only one antibiotic – acyclovir, meropenem, amoxicillin + clavulanic acid, vancomycin; 43 had association of two antibiotics, the most frequent being ampicillin + gentamicin (n = 32); 8 had 7 different combinations of three antibiotics among ampicillin, gentamicin, metronidazol, meropenem, cefotaxime and vancomycin. In 31 out of the 67 patients, prescription was intended to treat early-onset infection/infectious risk (47%). Days free of antibiotics were calculated to be 1,104 out of 1,471 in-hospital days (75.1%). Rate of antibiotics use was 25%. Four out of the 53 prescriptions in association may be considered as inadequate. Eleven patients had positive cultures: *Coagulase Negative Staphylococcus*, *Enterobacter cloacae*, *E. coli*, *S. aureus*, *K. pneumoniae* ESBL.

CONCLUSION

Prevalence of antibiotic prescription was low and days free of antibiotics were at a good level. As was to be expected according to the main reason for prescribing antibiotics, the most common association was ampicillin and gentamicin. Four out of the 53 associations could be subject to discussion.

ABS 28

ANTIBIOTIC USE IN A LEVEL III NEONATAL INTENSIVE CARE UNIT: WHAT CAN BE DONE TO DO BETTER

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INTRODUCTION

Antibiotics are the most prescribed medication in neonatal intensive care units. The prolonged or unnecessary use of antibiotic therapy is associated with higher risk of hospital-acquired infections, necrotizing enterocolitis, infections due to multi-drug resistant microorganisms and death. Clinical guidelines improve prescription by stimulating adherence to the best practices and reducing individual variability. The aim of this study was to analyze antibiotic exposure in a level III neonatal intensive care unit (NICU) and demonstrate the expected reduction in unnecessary prescriptions after the implementation of a new guideline for antibiotic use.

METHODS

Retrospective study including all newborns admitted in 2017 and treated with antibiotics. We

analyzed clinical and laboratory justification for treatment initiation, antibiotic regimens, length of therapy (LOT), and days of therapy (DOT) per 1,000 patient-days (PD). Results were compared against the proposed protocol, and the reduction of antibiotic exposure was calculated.

RESULTS

A total of 216 neonates were admitted and 45.8% of them received antibiotics at any point. Culture-proven sepsis accounted for 11% of infants being treated. Ninety-one percent of infants received only one course of antibiotics. Total antibiotic use was 1,865 DOT (647.8 DOT/1,000 PD; 8.6 DOT/infant). Ampicillin plus gentamicin was the most frequent regimen (59.6%) followed by regimens that included vancomycin (18.2%); penicillin regimens were used only in 10% of cases (one for suspected syphilis). Only 16.2% of antibiotics prescribed were discontinued at 5 days or less, despite sterile cultures. No antibiotics were discontinued at less than 5 days.

When compared to the proposed guidelines, antibiotics use would decrease 18% and we would observe a decline of 435.9 DOT/1,000 PD, representing a reduction of 610 days of antibiotics.

CONCLUSIONS

The overuse of antibiotics in NICUs is mostly due to uncertainty in the diagnosis of neonatal infections. This leads to empiric antibiotic prescription and treatment of culture-negative sepsis. Also, practice habits are often difficult to change. Our results demonstrate that improving antibiotic usage is possible.

ABS 29

EXTENDED SPECTRUM BETA-LACTAMASES PRODUCING STRAINS OF *KLEBSIELLA* – COLONISATION VERSUS INFECTION. EXPERIENCE OF A TERTIARY CENTER

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INTRODUCTION

Overuse of antibiotics, especially third generation cephalosporins led to the emergence of extended spectrum beta-lactamases producing (ESBL+) gram-negative bacteria, with increased antibiotic resistance. Over the last decade, ESBL+ *E. coli* and *Klebsiella pneumoniae* have emerged as pathogens causing severe nosocomial and community infections. Patients with sepsis determined by ESBL-producing organisms have a significantly higher mortality rate compared to those in whom non-ESBL strains have been isolated.

METHODS

We conducted a retrospective study based on the analysis of peripheral, central venous catheters and blood cultures sampled from newborns admitted to our unit over a period of 6 years (2012-2017). We evaluated the prevalence of colonisation with ESBL+ species of *Klebsiella* and the risk factors for colonisation, the rate of infection with ESBL+ *Klebsiella* among the colonised neonates and the antibiotic resistance pattern.

RESULTS

Out of a total of 38,598 newborns in the study group, 2.57% had positive cultures for *Klebsiella* and 0.41% for ESBL+ strains. The highest prevalence of *Klebsiella* positive cultures was recorded in 2013 (4.64%/0.45% ESBL+), while for ESBL+ strains the prevalence was highest in 2016, even if the rate of *Klebsiella* positive cultures was significantly lower (2.04%/0.88% ESBL+). ESBL+ *Klebsiella* strains were almost exclusively isolated from neonates admitted to the intensive care unit. Out of the total cultures positive for *Klebsiella*, the most common location for ESBL+ strains was gastric aspirate (3.55%), followed by endotracheal tubes (2.23%), while 0.26% of ESBL+ strains were isolated from blood cultures and 0.13% from central lines. Isolated *Klebsiella* strains had increased resistance to ampicillin, ampicillin-sulbactam, amikacin, third generation cephalosporins and meropenem, but were still sensitive to colistin. Colonisation with ESBL+ *Klebsiella* was significantly correlated with low gestational age, need for resuscitation at birth, need for respiratory support, parenteral nutrition, gavage feeding and prolonged hospitalisation. The rate of congenital and nosocomial infections with ESBL+ strains among the newborns with isolates positive for *Klebsiella* species was 5.73% and 18.47%, respectively. The most frequent form of manifestation of congenital infection was pneumonia, followed by early onset sepsis and necrotizing enterocolitis (NEC), while nosocomial infections most frequently manifested as NEC, late onset sepsis and central catheter associated infection. The mortality rate in newborns with nosocomial infection was 16.66% of those who had positive cultures with ESBL+ *Klebsiella* species.

CONCLUSIONS

Given the high mortality rate and limited therapeutic options for these pathogens, prevention remains the main priority in the attempt to control the emergence and spread of ESBL-producing gram-negative bacteria.