4th International Conference on Pediatrics and Neonatal Care

July 23-24, 2025 | Paris, France

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The Challenge to Diagnose Late-onset Neonatal Sepsis

Late-onset neonatal sepsis (LOS), associated with the postnatal nosocomial milieu, is a substantial contributor to neonatal morbidity and mortality. It is an ongoing problem for neonatal intensivists because of the increasing survival of preterm infants, prolonged hospitalization, broader use of life-sustaining invasive medical devices and emerging aggressive pathogens with antibiotic resistance. An ambispective (January, 2021 – June, 2023) clinical-epidemiological study was conducted in a third level NICU in Pleven, Bulgaria. Five hundred and nineteen patients with NICU stay above 72 hours were included (72 with nosocomial sepsis; 447 healthy controls). Twenty-one indicators were tested for influence on the occurrence of LOS. The administration of 4 probiotic preparations was evaluated as a possible preventive measure. This was followed by a quantitative assessment of the identified risk factors and threshold values establishment. A predictive model for the likelihood of developing LOS in newborns was created based on risk and preventive factors. Comparative analysis, ROC curve analysis and multiple binary logistic analysis were applied. Data were entered and processed with the statistical packages IBM SPSS Statistics 27.0.1.0 and MedCalc Version 19.6.3. and Office 2021 Excel. A significance level rejecting the null hypothesis was taken as $p < 0.05$. Seventeen indicators were significantly associated with the risk of LOS, of which 15 were risk factors and only two (probiotic prophylaxis and type of probiotic) were protective factors. With the greatest risk influence were total duration of parenteral nutrition (PN), chronic lung disease (CLD) and birth weight (BW), which increase the risk about 54-64 times. The administration of a probiotic reduces the risk of the pathology by about 40-70%. A predictive equation was obtained, combining the factors total duration of PN ≥ 9.5 days, CLD, BW≤ 1530 g and probiotic supplementation. Based on this data, we formed an easy-to-use tool called Calculator P. Thorough analysis of risk factors, preventive measures like probiotic supplementation and development of a useful prognostic model can be beneficial to the particularly challenging problems such as effective prevention, early diagnosis and timely and proper treatment of hospital-acquired infections.

Keywords: late-onset neonatal sepsis, NICU, diagnosis, risk factors, probiotics

Biography
Master of Medicine since 2016 – Medial university Pleven; Neonatologist since 2024; Assistant Professor since 2018, PhD theme of dissertation "Nosocomial infections of the newborn"