

# Sepsis Neonatal: Epidemiology, Etiology and Risk Factors



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## Abstract

Neonatal sepsis, a clinical disorder developed by bacterial blood stream infections in neonates, is one of the serious global public health problems that must be addressed. More than one million of the estimated global newborn deaths per year are occurred due to severe infections. Neonatal sepsis is divided into early-onset sepsis and late-onset sepsis of the disease. The clinical complications of neonatal sepsis may be associated with broncho pulmonary dysplasia, ductus arteriosus and necrotizing enterocolitis. The clinical diagnosis and treatment of neonatal sepsis is highly complicated. Microbiological surveillance and assessment of antimicrobial resistance is a key component in decreasing the rate of neonatal sepsis and the associated mortality. There are a number of important gaps in our knowledge and a lack of studies looking at simple and sustainable interventions to reduce the burden of neonatal sepsis. The lack of culture driven antimicrobial therapy and limited consistent infection control practices are likely responsible for the high incidence rates of neonatal sepsis and mortality.

**Keywords:** Sepsis; Critically neonates; Risk factors; Surveillance

## Introduction

Healthcare-associated infections are frequent and critical complications associated with hospitalization of neonates, especially very low birth weight neonates, in neonatal intensive care units (NICU) [1]. Neonatal infections currently cause about 1.6 million deaths per year in developing countries. Sepsis and meningitis are responsible for most of these deaths [2]. Neonatal infections annually claim lives of 1.4 million neonates worldwide. Early-onset neonatal sepsis occurs within 72h of birth, while late-onset neonatal sepsis occurs after the first 72h of life and both are major causes of infant mortality [3].

The clinical signs and symptoms associated with neonatal infections are nonspecific because of an overlapped disease out comes with infections occurred by other diseases, and hence prior detection and treatment becomes crucial for the better neonatal outcomes. Over diagnosis of neonatal infections results in an ill-suited and inappropriate usage of antibiotics, causing risks of antibiotic resistance [4]. Additionally, sepsis is a challenging complication that affects other morbidities, length of hospitalization, cost of care, and mortality rates.

Improvements in outcome and successful treatment depend largely on early initiation of appropriate antibiotic therapy.

The aetiology of neonatal sepsis in developing countries differs from that in developed countries in the pattern of etiological bacteria and their antibiotic susceptibility [5]. Bacteria, such as *Streptococcus*, *L. monocytogenes*, *E. faecalis*, *E. faecium*, group D *Streptococci*,  $\alpha$ -hemolytic *Streptococci* and *Staphylococci*, *S.pneumoniae*, *H. influenza* type B, are recognized as the principal cause of early neonatal sepsis. Less commonly, *N. meningitides* and *N. gonorrhoeae* have been also reported as a cause of neonatal septicemia and Gram-negative enteric organisms predominantly *E. coli*, *Klebsiella* species are included [6]. On the other hand, late-onset sepsis is predominantly caused by *Staphylococci* species and *Escherichia coli*. Sometimes *Enterobacteriaceae* or *Citrobacter freundii* from blood may be due to contaminated feedings.

Contaminated respiratory equipment is suspected in outbreaks of hospital-acquired *Pseudomonas aeruginosa* pneumonia or sepsis [7]. A neonate may be at risk of infection through one or many intrinsic and extrinsic factors, such as gestational age and presence of a single or multiple invasive devices. In developed and developing countries, most nosocomial infections in NICUs are related to a longer duration of hospitalization, low birth weight and gestational age, respiratory

diseases, invasive interventions, and medical treatments [8]. *S. epidermidis* emerged in the last several years as a pathogen in a growing number of serious nosocomial infections in neonatal intensive care units, particularly as bloodstream infection, and is a common complication of the prolonged hospitalization of preterm newborns [9].

Candidiasis is one of the leading causes of blood stream infections in neonatal intensive care units (NICUs) and associated with high morbidity and mortality. It has been estimated that 2.4-9.0% of mortality and 25.0% of morbidity in the NICU setting may be attributable to *Candida* infections [10]. *Candida albicans* and *Candida parapsilosis* are the leading causes of invasive fungal disease in premature infants, with the intestinal tract being an important site for *Candida* invasion. Life-threatening gastrointestinal tract diseases that occur in premature infants such as necrotizing enterocolitis and spontaneous intestinal perforation are highly associated with concurrent diagnoses of invasive candidiasis. *C. albicans* and *C. parapsilosis*, along with other fungi, are prevalent commensals of the intestinal tract of infants, with high amounts of *Candida* colonization within the intestine being correlated with an increased risk for invasive disease [11].

Finally, microbiological surveillance and assessment of antimicrobial resistance is a key component in decreasing the rate of neonatal sepsis and the associated mortality. There are a number of important gaps in our knowledge and a lack of studies looking at simple and sustainable interventions to reduce the burden of neonatal sepsis. The lack of cultured driven antimicrobial therapy and limited consistent infection control practices are likely responsible for the high incidence rates of neonatal sepsis and mortality [12].

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