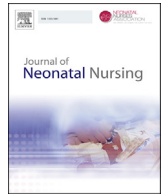




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## Review

## Necrotising enterocolitis and neonatal sepsis: A literature review

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## ABSTRACT

Necrotising Enterocolitis is a common infection and medical emergency effecting susceptible premature and low birth weight infants, cared for within Neonatal Intensive Care Units (NICU). Characteristics of the disease include fever, abdominal distention, bilious vomits and aspirates, poor enteral feeding and blood present in stool. Without prompt management, the risk of ischemia and necrosis of the infant bowel is high, leading to the likely development of Short Bowel Syndrome (SBS). Medical management of the disease includes gut rest, intravenous antibiotic and fluid resuscitation if symptoms of hypovolaemic shock are present, with surgical interventions required when bowel necrosis becomes irreversible. Neonatal nurses have an important role in early detection of the disease among at risk infants, preventing extensive and life-long bowel damage occurring among these infants. However, due to the ongoing and chronic nature of the disease, the skills of paediatric nurses are required when the baby develops SBS after extensive surgery.

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## Introduction

Necrotising Enterocolitis (NEC) is a significant medical emergency seen in low birth weight infants and premature babies cared for within the neonatal care environment, usually occurring within the first four weeks of life (Lin and Stoll, 2006). No specific cause of NEC has been determined however, risk factors for developing the disease include: very low birth weight (VLBW) infants (<1500 g at birth), premature infants (usually less than 36 weeks' gestation) and infants who have received enteral feeding throughout the neonatal period (Lin et al., 2008a,b). It has been estimated that 90% of infants who develop NEC are born prematurely, however those born full-term and near-term can also develop the disease. Approximately 12% of infants born weighing less than 1500 g will develop NEC, however of those around 30% will not survive (Gephart et al., 2012). Mortality is related to the ability of NEC to cause part of the baby's bowel to become necrotic and damaged, allowing bacteria and toxins to move throughout the baby's blood stream, leading to neonatal sepsis (Patole, 2007). The Current

evidence exists that reflects the best and most appropriate way in which this condition should be managed, in order to achieve the best outcome for the baby.

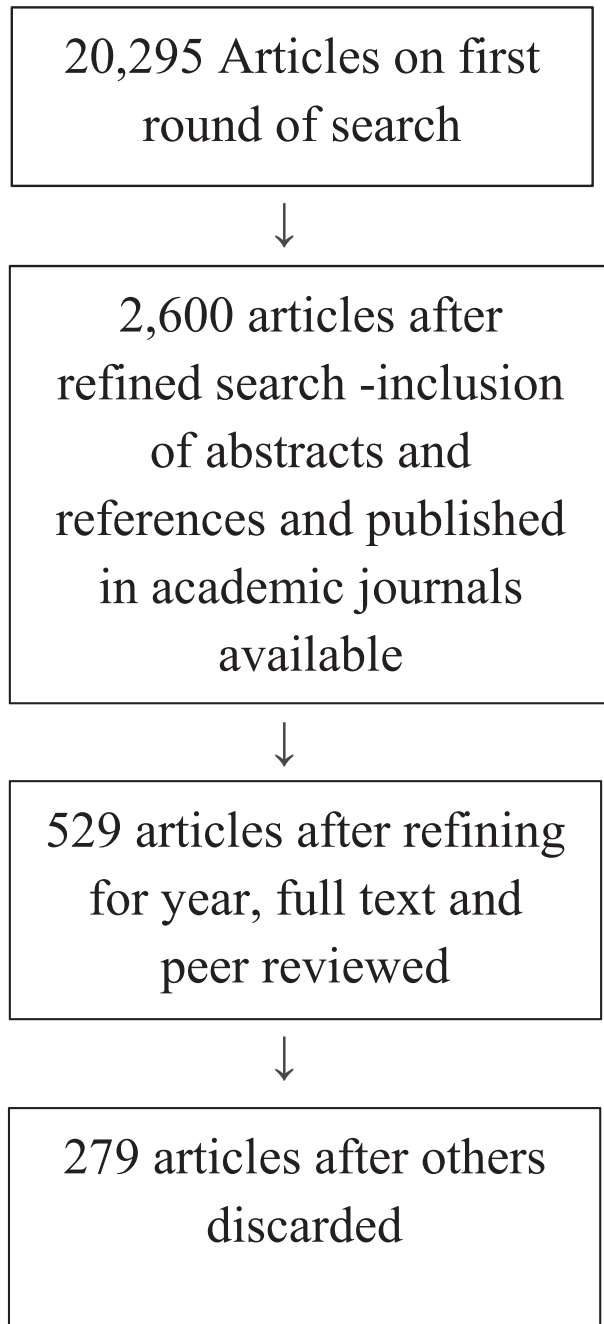
## Methodology

The research question asked "what is the link between neonatal NEC and sepsis". Recent and relevant literature was obtained through the use of medical subject heading terms, from a variety of appropriate databases, including Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline and ProQuest-Health & Medicine. Terms such as 'neonate', 'necrotizing', 'enterocolitis', 'Management' and 'Treatment' were used. Approximately 20,295 were retrieved utilizing these key words. The search was refined to only those articles related to NEC specifically in the neonatal population, those with abstracts and references available and published in academic journals and 2600 articles were retrieved. The search criteria was refined to include only articles published within the last 10 years, availability of full text and their peer-review status, and 529 articles were retrieved. Despite the search being about NEC and related issues, the terms 'management' and 'treatment' meant that articles with these those sub-headings were included, and 250 articles were discarded because they were not

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related to the topic, leaving 279 articles. Articles were then selected based on relevance to the subject topic. The first author is not a neonatal nurse, but is a surgical nurse in a large children's hospital in Australia. This unit cares for children with SBS.



### Pathophysiology

The cause of NEC is unknown, although there are many risk factors associated with its development among babies cared for within the neonatal care environment. These factors include the

presence of intestinal ischemia and intestinal inflammation, introduction of enteral feeding, and bacteria colonisation leading to infection (Lin et al., 2008a,b).

### Ischaemic injury and intestinal inflammation

Ischaemic injury of the premature bowel is seen to be an important factor in the diagnosis of NEC within premature and LBW infants. Ischaemic injury refers to injury within the epithelial cells of the bowel, leading to intestinal inflammation (Berman and Moss, 2011). Contributing factors of ischemia include enteral feeding and infection within the bowel, as well as infant gut prematurity. Prematurity relates to the immature nature of the infant's intestinal system, in relation to its ability to digest and absorb nutrients, normal gut motility and immune response (Berman and Moss, 2011). This is due to the development of such functions within the foetus are not complete until the 3rd trimester, at about 34 weeks' gestation, where migrating motor complexes responsible for normal gut motility have fully developed (Gregory et al., 2011).

Immaturity of intestinal epithelial tissue in conjunction with the neonatal immune system leads to bacterial invasion and the development of intestinal inflammation, among susceptible infants at risk of NEC (Petrosyan et al., 2009). With this process, microorganisms infect the immature gut, resulting in damage to intestinal epithelial tissue. This process stimulates the production of immunocytes and the secretion of pro-inflammatory mediators (e.g. nitric oxide and prostanooids), resulting in further damage to the intestine, increasing bacterial colonisation, bowel necrosis, infection and ultimately sepsis (Petrosyan et al., 2009).

Normal effective gut motility is essential for the digestion and absorption of nutrients, required for effective growth and development of the infant (Neu and Walker, 2011). Without this, neonates can be predisposed to delayed growth and development, which can cause adverse effects for both the child and family involved (Gephart et al., 2012). As premature babies have not fully developed coordinated peristalsis, their exposure to microorganisms and bacteria during the neonatal period may not be effectively processed through the gut (Lin et al., 2008a,b). NEC may ultimately impair the baby's ability to meet appropriate growth and developmental milestones, if essential nutrients are not able to be utilised by the body (Lin et al., 2008a,b).

### Enteral feeding

The introduction of enteral feeding during the neonatal period is linked with a disruption of mucosal tissue, blood flow and gut motility, leading to the development of NEC within the infant. With enteral feeding, an immature gut may not be able to adequately digest and absorb nutrients from this process (Lin et al., 2008a,b; Neu and Walker, 2011). Unabsorbed nutrients within the intestine can lead to accumulation of gas, causing pressure and distention and decreased blood flow within the bowel leading to necrosis (Berman and Moss, 2011).

### Bacteria and infection

At birth, a newborn intestine is sterile and free from bacteria and infection, due to the protective mechanism of amniotic fluid and the in-utero environment. Once born, the infant is exposed to environmental organisms, which inhabit the infant's gut and predispose them to the development of infections relating to the bowel (Sherman, 2010). An immature bowel comes with an immature immune response to defend against the presence of unwanted bacteria and infection, thus leading to the likely development of NEC and neonatal sepsis (Neu and Walker, 2011). The neonatal ICU

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