CONDITION

Necrotizing enterocolitis

Necrotizing enterocolitis is a serious condition in which a newborn baby's intestine becomes inflamed and damaged.

WHAT IT IS
Inflammation and injury of a newborn baby's intestine

BODY SYSTEM
Digestive system

MAIN SYMPTOMS
Swollen abdomen, feeding problems, vomiting, bloody stools

WHAT CAUSES IT
Immature intestine, inflammation, and altered gut bacteria

HOW IT IS DIAGNOSED
Abdominal X-rays, examination, and blood tests

MAIN TREATMENT
Bowel rest, antibiotics, intensive support, sometimes surgery

CAN IT BE CURED?
Sometimes - bowel heals, but severe injury can leave complications

IS IT AN EMERGENCY?
Yes - suspected cases need immediate hospital care

LONG-TERM OUTLOOK
Most survivors recover; extensive bowel loss can cause lasting needs

Overview

Necrotizing enterocolitis, usually called NEC, is a serious condition that mainly affects premature newborns. The lining of the intestine becomes inflamed and injured. In severe cases, part of the bowel tissue dies or develops a hole.

"Necrotizing" refers to tissue death. "Enterocolitis" means inflammation of the small intestine or large intestine. The amount of bowel affected can range from a small area of lining to a larger section of the intestine.

NEC most often develops while a premature baby is being cared for in a neonatal intensive care unit, or NICU. It usually begins after milk feeds have started, often during the first several weeks of life. Full-term babies can also develop it, but this is less common and may be linked to another health problem.

NEC matters because it can worsen quickly. Early treatment reduces stress on the intestine, treats possible infection, and supports the baby while the bowel heals. Some babies recover with medical treatment alone. Others need surgery to remove badly damaged bowel.

Symptoms

The early signs of NEC can be subtle. A baby may seem less well, have trouble tolerating feeds, or need more breathing support. The neonatal team watches premature babies closely because they may not show the same signs as an older child.

Possible signs include:

These symptoms can also occur with other newborn conditions. They do not confirm NEC by themselves. A baby with possible NEC needs prompt assessment, imaging, and monitoring.

- A swollen, firm, tender, or discoloured abdomen
- Milk remaining in the stomach or difficulty tolerating feeds
- Green or yellow-green vomit
- Blood in the stool
- Reduced activity or unusual sleepiness
- Unstable body temperature
- Pauses in breathing, called apnoea
- A slow heart rate, low blood pressure, or reduced urine output

Causes and risk factors

There is no single cause of NEC. It appears to develop when several factors affect a vulnerable intestine.

A premature baby's bowel is still developing. Its protective lining, blood supply, immune responses, and ability to control bacteria are less mature than those of a full-term baby. Feeding introduces nutrients and bacteria into the bowel. In some babies, this is followed by an excessive inflammatory response that damages the intestinal wall.

Prematurity is the strongest risk factor. The risk is generally higher in babies born earlier or at a lower birth weight. Other factors associated with NEC include serious illness, reduced oxygen or blood flow to the intestine, and some heart conditions.

Human milk is associated with a lower risk of NEC than formula in premature babies. However, using formula does not mean that a parent caused NEC. Some babies cannot receive enough human milk, and NEC can occur even when a baby receives only human milk.

NEC is not caused by anything a parent did during pregnancy or after birth. It is not inherited in a simple, predictable way. Occasionally, several cases occur close together in a neonatal unit, suggesting that changes in gut bacteria or infection-control factors may contribute. NEC itself is not usually described as a contagious condition.

Diagnosis

Doctors consider NEC when a newborn develops feeding problems, abdominal changes, bloody stools, or signs of general illness. The diagnosis is based on the baby's symptoms, physical examination, abdominal imaging, and laboratory tests.

Abdominal X-rays are central to diagnosis. A characteristic finding is gas trapped within the bowel wall, called pneumatosis intestinalis . X-rays may also show enlarged bowel loops, gas in blood vessels leading from the intestine to the liver, or free air in the abdomen if the bowel has developed a hole.

Several X-rays may be taken over time because the appearance can change. Ultrasound may provide more information about bowel movement, bowel-wall blood flow, fluid in the abdomen, and areas of damaged intestine.

Blood tests cannot confirm NEC on their own. They help assess inflammation, infection, anaemia, low platelets, acid levels, kidney function, and how unwell the baby is. Blood cultures may identify bacteria in the bloodstream.

Doctors sometimes describe NEC using stages. A suspected early case has less specific signs. Definite or advanced NEC has clearer imaging findings or complications such as a bowel perforation. Staging helps guide monitoring and treatment, but each baby's overall condition remains important.

Treatment and management

Treatment begins as soon as NEC is suspected. The baby is cared for in a NICU, where breathing, heart rate, blood pressure, temperature, urine output, and abdominal changes can be monitored closely.

Milk feeds are stopped temporarily to rest the bowel. Fluids and nutrition are given through a vein. A soft tube is usually passed through the nose or mouth into the stomach to remove air

and fluid, reducing pressure on the intestine.

Antibiotics like amoxicillin or doxycycline are given through a vein to treat or prevent the spread of bacteria from the injured bowel. The choice and length of treatment are based on the baby's findings and the neonatal unit's protocols.

Other care may include oxygen or a breathing machine, medicines to support blood pressure, and blood products when needed. Repeated examinations, blood tests, and imaging help show whether the bowel is healing or the condition is worsening.

A paediatric surgeon is often involved early, even if an operation is not immediately needed. Surgery may be necessary when there is a hole in the intestine, dead bowel tissue, worsening illness despite medical treatment, or other evidence that the bowel cannot recover safely without an operation.

During surgery, the surgeon examines the intestine and removes sections that are no longer healthy. The bowel may be joined together, or the surgeon may create a temporary opening on the abdomen called a stoma. Stool then passes into a small bag. A temporary stoma can often be closed during a later operation after the baby has grown and recovered.

In some very small or critically ill babies, a drain may first be placed through the abdominal wall to remove infected fluid or air. Some babies later need a larger operation.

Feeds are restarted gradually when examinations, imaging, and blood results suggest that the bowel has recovered. The timing is individual and is managed by the neonatal and surgical teams.

Complications

A severely injured bowel can develop a perforation, meaning a hole. Bacteria and intestinal contents may then enter the abdominal cavity, causing inflammation called peritonitis. Infection can spread into the bloodstream and cause sepsis.

Possible later complications include:

If a large amount of small intestine must be removed, the remaining bowel may not absorb enough fluid and nutrients. This is called short bowel syndrome. A baby with short bowel syndrome may need specialised feeding, intravenous nutrition, medicines, and long-term intestinal rehabilitation. The remaining intestine can adapt over time, but the degree of adaptation cannot be predicted for an individual baby.

NEC can be life-threatening, especially when it is extensive or requires surgery. Outcome is also influenced by how premature the baby was and whether there are other serious health

problems.

- Narrowing of the intestine, called a stricture
- Blockage caused by scar tissue or surgical adhesions
- Problems absorbing nutrients
- Slow growth or difficulty gaining weight
- Liver problems during prolonged intravenous nutrition
- Feeding difficulties after a long period without oral feeds

Prevention

NEC cannot always be prevented. It can occur despite careful feeding, infection control, and close monitoring. Parents should not blame themselves if their baby develops it.

Human milk, including expressed breast milk or screened donor milk, is associated with a lower NEC risk in premature babies. Neonatal units may also use structured feeding plans and careful monitoring as feeds increase.

Probiotics are live microorganisms intended to support healthy gut bacteria. Research suggests that certain probiotic preparations may reduce NEC in some premature babies, but products are not interchangeable and their quality can differ. Policies therefore differ between neonatal units. Parents should not give a premature baby an over-the-counter probiotic unless the neonatal team has specifically recommended and supplied it.

Good hand hygiene and neonatal-unit infection-control measures help limit the spread of harmful bacteria. These measures cannot remove every risk because NEC is not caused by infection alone.

Living with it and what to expect

For a baby treated without surgery, the bowel may heal over days to weeks. Feeds are then increased slowly while the team watches for abdominal swelling, vomiting, blood in the stool, and poor feed tolerance. Hospital stay is often shaped as much by prematurity as by NEC.

A baby who has surgery may need longer support with nutrition and feeding. If there is a stoma, parents are taught how to protect the skin, empty the bag, and recognise changes that need attention. A later operation may reconnect the bowel, although timing differs for each baby.

After discharge, follow-up usually covers growth, feeding, stool patterns, wound or stoma care, hearing, movement, and development. Premature babies may already qualify for specialist developmental follow-up. Dietitians, feeding specialists, surgeons, gastroenterologists, and community nurses may also be involved.

Many babies who recover from limited NEC later eat and grow without bowel-related restrictions. Others have ongoing feeding, growth, or absorption problems. Babies with short bowel syndrome may need support for months or years, and a small number need long-term intravenous nutrition.

Routine appointments are important even when a baby seems well. They allow the care team to monitor weight gain, nutrition, bowel function, and development. They are different from urgent assessment for new vomiting, swelling, bleeding, or signs that the baby is becoming unwell.

When to get medical help

Possible NEC in a newborn is an emergency and needs immediate hospital assessment. In the NICU, tell a nurse promptly if you notice a change in your baby's abdomen, vomit, stool, activity, breathing, or colour.

After discharge, seek emergency medical care if your baby has:

Contact your baby's usual care team promptly for less sudden concerns, such as repeated vomiting, worsening feed tolerance, poor weight gain, changes in stool output, ongoing wound problems, or irritated skin around a stoma.

Keep routine neonatal, surgical, nutrition, and developmental appointments. These visits are intended to track recovery and identify growth or feeding problems before they become urgent.

- Green vomit
- A rapidly swelling, firm, tender, or discoloured abdomen
- Blood in the stool
- Severe sleepiness, floppiness, or difficulty waking
- Trouble breathing, blue or grey colour, or repeated breathing pauses
- Very few wet diapers or other signs of dehydration
- A stoma that becomes dark, very pale, severely swollen, or stops working with abdominal swelling

Common questions

Can a full-term baby get NEC?

Yes. NEC is much more strongly associated with prematurity, but full-term babies can develop it. In a full-term baby, doctors may look for factors such as a heart condition, reduced blood flow, infection, or another cause of intestinal injury.

Can NEC be cured?

Many babies recover after bowel rest, antibiotics, and supportive care. Surgery can remove bowel that cannot recover. However, severe NEC may leave lasting problems such as strictures, feeding difficulties, or short bowel syndrome, so recovery is not the same for every baby.

Will my baby need surgery?

Not every baby with NEC needs an operation. Surgery is more likely if the bowel has perforated, tissue has died, or the baby continues to worsen despite intensive medical treatment. A paediatric surgeon can be involved even when the plan is careful observation rather than immediate surgery.

Can NEC come back?

NEC can recur, but this is not common. Similar symptoms may also result from a bowel stricture, blockage, milk intolerance, or infection. New abdominal swelling, green vomiting, or bloody stool needs urgent assessment rather than being assumed to be a recurrence.

Is NEC contagious?

NEC is not generally considered contagious. Changes in gut bacteria may contribute, and clusters can occur in neonatal units, but one baby does not simply "catch NEC" from another. Hand hygiene and infection-control measures remain important.

Does breast milk completely prevent NEC?

No. Human milk is associated with a lower risk, but it cannot guarantee prevention. NEC can occur in babies receiving human milk, formula, or a combination. Feeding decisions in the NICU are based on the baby's health and the milk available.

Sources

- National Institute of Diabetes and Digestive and Kidney Diseases - Necrotizing Enterocolitis

- MedlinePlus Medical Encyclopedia - Necrotizing enterocolitis
- Merck Manual Professional Edition - Necrotizing Enterocolitis
- Neu J, Walker WA. "Necrotizing Enterocolitis." New England Journal of Medicine . 2011;364(3):255-264. doi:10.1056/NEJMra1005408
- Jones IH, Hall NJ. "Contemporary Outcomes for Infants with Necrotizing Enterocolitis: A Systematic Review." The Journal of Pediatrics . 2020;220:86-92.e3. doi:10.1016/j.jpeds.2019.11.011
- Poindexter BB, Cummings J; American Academy of Pediatrics Committee on Fetus and Newborn. "Use of Probiotics in Preterm Infants." Pediatrics . 2021;147(6):e2021051485. doi:10.1542/peds.2021-051485