

Neonatal Hospital-Acquired Infection

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Some infections are acquired after admission to the nursery rather than from the mother in utero or intrapartum. For some infections (eg, group B streptococci, herpes simplex virus [HSV]) it may not be clear whether the source is maternal or the hospital environment.

Hospital-acquired (nosocomial) infection is primarily a problem for premature infants and for term infants with medical disorders requiring prolonged hospitalization. Healthy, term neonates have infection rates < 1%. For neonates in special care nurseries, the incidence increases as birth weight decreases. The most common nosocomial infections are central line-associated bloodstream infections (CLABSI) and [hospital-acquired pneumonia](#).

(See also [Overview of Neonatal Infections](#).)

Etiology of Neonatal Hospital-Acquired Infection

In **term neonates**, the most frequent hospital-acquired infection is

- Skin infection due to [Staphylococcus aureus](#) (both methicillin-sensitive and methicillin-resistant)

Although nursery personnel who are *S. aureus* nasal carriers are potential sources of infection, colonized neonates and mothers also may be reservoirs. The umbilical stump, nose, and groin are frequently colonized during the first few days of life. Often, infections do not manifest until the neonate is at home.

In **very-low-birth-weight** (VLBW; < 1500 g) infants, gram-positive organisms cause about 70% of infections, the majority being with coagulase-negative staphylococci. Gram-negative organisms, including [Escherichia coli](#), [Klebsiella](#), [Pseudomonas](#), [Enterobacter](#), and [Serratia](#), cause about 20%. Fungi ([Candida albicans](#) and *C. parapsilosis*) cause about 10%. Patterns of infection (and antibiotic resistance) vary among institutions and units and change with time. Intermittent “epidemics” sometimes occur as a particularly virulent organism colonizes a unit.

Infection is facilitated by the multiple invasive procedures VLBW infants undergo (eg, long-term arterial and venous catheterization, endotracheal intubation, continuous positive airway pressure, nasogastric tubes or nasojejunal feeding tubes). The longer the stay in special care nurseries and the more procedures done, the higher is the likelihood of infection.

Prevention of Neonatal Hospital-Acquired Infection

- Measures to reduce *S. aureus* colonization
- Prevention of colonization and infection in special care nurseries and neonatal intensive care units (ICUs)
- Hand hygiene
- Surveillance for infection
- Sometimes antibiotics
- Vaccination

Colonization reduction

Using a topical antiseptic agent during routine bathing or skin preparation for sterile procedures can help reduce bacterial skin colonization in newborns. Chlorhexidine-based products are increasingly used for this purpose, but the U.S. Food and Drug Administration warns of risk of skin irritation and chemical burns in infants < 2 months of age. The American Academy of Pediatrics recommends dry umbilical cord care, but this practice may result in high rates of colonization with *S. aureus*, and epidemics have occurred in some hospitals. During disease outbreaks, application of triple dye to the cord area or [bacitracin](#) or [mupirocin](#) ointment to the cord, nares, and circumcision site reduces colonization. Routine cultures of personnel or of the environment are not recommended.

Special care nurseries and neonatal ICUs

Prevention of colonization and infection in special care nurseries requires provision of sufficient space and personnel. In intensive care, multipatient rooms should provide 120 square ft (about 11.2 square m)/infant and 8 ft (about 2.4 m) between incubators or warmers, edge-to-edge in each direction. A nurse:patient ratio of 1:1 to 1:2 is required. In intermediate care, multipatient rooms should provide 120 square ft (about 11.2 square m)/infant and 4 ft (about 1.2 m) between incubators or warmers, edge-to-edge in each direction. A nurse:patient ratio of 1:3 to 1:4 is required.

Proper techniques are required, particularly for placement and care of invasive devices and for meticulous cleaning and disinfection or sterilization of equipment. Active monitoring of adherence to techniques is essential. Formal evidence-based protocols for inserting and maintaining central catheters have significantly decreased the rate of central line-associated bloodstream infection.

Similarly, a group of procedures and protocols that reduce healthcare-associated pneumonia in the neonatal ICU have been identified; these include staff education and training, active surveillance for healthcare-associated pneumonia, raising the head of an intubated neonate's bed 30 to 45°, and providing comprehensive oral hygiene. Placing the neonate in a lateral position with the endotracheal tube horizontal with the ventilator circuit also may be helpful.

Hand hygiene

Other preventive measures include meticulous attention to hand hygiene. Cleansing with alcohol preparations is as effective as soap and water in decreasing bacterial colony counts on hands, but if hands are visibly soiled, they should first be washed with soap and water. Incubators provide limited protective isolation; the exteriors and interiors of the units rapidly become heavily contaminated, and personnel are likely to contaminate their hands and forearms. Universal blood and body fluid precautions add further protection.

Infection surveillance

Active surveillance for infection is done. In an epidemic, establishing a cohort of diseased or colonized infants and assigning them a separate nursing staff are useful. Continuing surveillance for 1 month after discharge is necessary to assess the adequacy of controls instituted to end an epidemic.

Antibiotics

Prophylactic antimicrobial therapy is generally not effective, hastens development of resistant bacteria, and alters the balance of normal flora in the neonate. However, during a confirmed surgical epidemic

and alters the balance of normal flora in the neonate. However, during a confirmed nursery epidemic, antibiotics against specific pathogens may be considered—eg, penicillin G for prophylaxis against group A streptococcal infection (see Table: [Recommended Dosages of Selected Parenteral Antibiotics for Neonates](#)).

Vaccination

Inactivated vaccines should be given according to the routine schedule (see Table: [Recommended Immunization Schedule for Ages 0–6 Years](#)) to any infant who is in the hospital at that time. Live viral vaccines (eg, rotavirus vaccine) are not given until the time of discharge to prevent spread of vaccine virus in the hospital.

Key Points

- Nosocomial infection is primarily a problem for premature infants and for term infants with disorders requiring prolonged hospitalization.
- The lower the birth weight, the higher the risk of infection, particularly in neonates with central catheters, endotracheal tubes, or both.
- Meticulous technique for inserting and maintaining catheters, tubes, and devices is essential for prevention; formal protocols improve adherence.
- Prophylactic antibiotics are not recommended except possibly during a confirmed nursery epidemic involving a specific pathogen.

Drugs Mentioned In This Article

Drug Name	Select Trade
Bacitracin	BACIIM
Mupirocin	BACTROBAN

