Colorado Department of Public Health and Environment

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Central Line-Associated Bloodstream Infections in Neonatal Critical Care Units in Colorado

This report presents information on central line-associated bloodstream infections (CLABSI) that occur in neonatal critical care units in Colorado hospitals. Neonatal critical care units (NCCU) treat newborn babies at or below the age of one year, many of which are born prematurely. CLABSI are bloodstream infections associated with central lines that are in place at the time of infection or which develop within 48 hours after a central line is removed. A central line is a catheter or tube inserted into a large vein or artery of a patient and ends at or close to the heart (e.g., aorta). These tubes are used to give fluids, withdraw blood, or monitor pressures in the body.[1] In neonates, the blood vessels used are typically the umbilical vein or artery and the brachial vein.

NCCU infants have central lines for various reasons: 1) their stays in critical care units can be several days to months; 2) they require intravenous nutrition (fluid in a vein) and fluid replacement until their gastrointestinal systems are mature or they can tolerate feedings by another route; 3) their peripheral veins in the arms, legs and scalp are small and sites must be changed frequently to prevent harm to the vessels and subsequent infection; and 4) changing peripheral lines frequently can cause additional pain and stress for the infant.

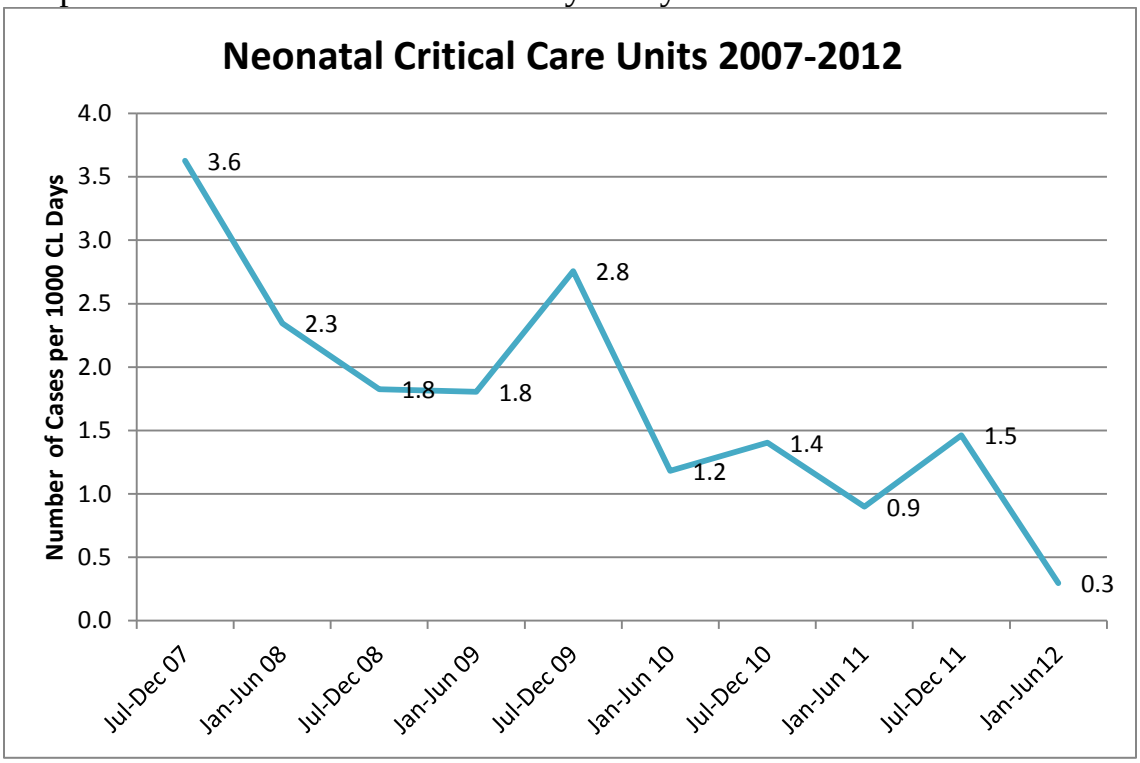
Newborns are vulnerable to CLABSI for several reasons. Their immune and gastrointestinal systems are immature; their skin is thin and fragile providing little barrier to infection; central lines are foreign objects generally in place for extended lengths of time; and their mothers can harbor infections at the time of birth that increase their baby's infection risk and need for intensive care monitoring.[2,3]

NCCU are defined as Level I, II, II/III combined, or III. Level I units care for healthy newborn infants while Level III units provide care to the sickest newborns. Level III units provide staff and equipment to ensure continuous life support and comprehensive care for high risk newborns and those with complex critical illness.

In Colorado, NCCU have been reporting CLABSI data since August 2007. CLABSI rates have shown a steady decline over the past five years (see Graph 1). It is believed that the application of evidence-

based prevention strategies by health care personnel, the dedication of personnel to infection prevention, and mandated public reporting of health care associated infections by healthcare facilities are critical factors contributing to this decline.

Graph 1: Colorado CLABSI Rates* by half years



Note: Facilities have until Jan. 31 2013 to report data for Dec. 2012; therefore, no data have been presented for latter half of 2012. Colorado NCCU CLABSI rates for Jul 2011-Jun 2012 were statistically equivalent to the national rate.

Prevention of CLABSI involves the application of evidence-based practices by health care personnel. These practices have continually improved over recent years with a demonstrated decline in CLABSI rates in facilities that consistently apply prevention strategies. The Centers for Disease Control and Prevention (CDC) and other renowned organizations such as the Institute for Healthcare Improvement (IHI) and the Association of Professionals in Infection Control and Epidemiology (APIC) promote checklists and prevention bundles to remind health care workers to consistently apply evidence-based practices in their prevention strategies. [4, 5, 6, 7] A bundle is a set of individual infection prevention practices that have shown to reduce infection individually. Using this set of practices together has demonstrated a substantially greater improvement in reducing infections. The science supporting the bundle component is sufficiently established to be considered standard of care.[8]

In addition to using bundles and checklists, facilities may utilize the Comprehensive Unit-Based Safety Program (CUSP) designed by Peter Pronovost, MD. CUSP is evidence-based and focuses on improving teamwork and communication as part of a culture of safety, facilitates the development of safety cultures in facilities, and emphasizes learning from mistakes and integrating safety practices.[9]

Beyond the longstanding medical ethical standard, "Do No Harm," there are three major reasons to implement prevention strategies. First, critically ill patients that develop infections are more likely to die. Second, preventing infection reduces overall harm to a patient. Third, there is less cost to families, health care facilities and insurance companies when infections are prevented.[10]

The CDC checklist below is based on the *2011 Guideline for Prevention of Intravascular Catheter-Associated Bloodstream Infections*, and is considered one of the most comprehensive CLABSI prevention checklists to date. It includes bundles for central line insertion, maintenance practices and general infection prevention practices to ensure that health care staff and management follow proper procedures and have easy access to appropriate supplies.[11, 12]

CDC Checklist

Promptly remove unnecessary central lines

□ Perform daily audits to assess whether each central line is still needed

Follow proper insertion practices

□ Perform hand hygiene before insertion
□ Adhere to aseptic technique
□ Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full body drape)
□ Perform skin antisepsis with >0.5% chlorhexidine with alcohol
□ Choose the best site to minimize infections and mechanical complications; avoid femoral site in adult patients
□ Cover the site with sterile gauze or sterile, transparent, semi-permeable dressings

Handle and maintain central lines appropriately

□ Comply with hand hygiene requirements
□ Scrub the access port or hub immediately prior to each use with an appropriate antiseptic (e.g., chlorhexidine, povidone iodine, an iodophor, or 70% alcohol)
□ Access catheters only with sterile devices
□ Replace dressings that are wet, soiled, or dislodged
□ Perform dressing changes under aseptic technique using clean or sterile gloves

For Facilities:

□ Empower staff to stop non-emergent insertion if proper procedures are not followed
□ "Bundle" supplies (e.g., in a kit) to ensure items are readily available for use
□ Provide the checklist above to clinicians, to ensure all insertion practices are followed
□ Ensure efficient access to hand hygiene
□ Monitor and provide prompt feedback for hand hygiene adherence;
□ Provide recurring education sessions on central line insertion, handling and maintenance

Supplemental strategies for consideration:

- 2% Chlorhexidine bathing
- Antimicrobial/Antiseptic-impregnated catheters
- Chlorhexidine-impregnated dressings

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