

Reducing Central Venous Catheter-Related Bloodstream Infections in Children With Cancer

Brandi Horvath, BSN, RN, CPON[®], Robbie Norville, MSN, RN, CPON[®],
Deborah Lee, BSN, RN, CPON[®], Annie Hyde, BSN, RN, CPON[®],
MaryAnn Gregurich, PhD, MPH, and Marilyn Hockenberry, PhD, RN, PNP, FAAN

Children with cancer who have a central venous catheter (CVC) are at increased risk for bloodstream infections. Aseptic technique when using and caring for a CVC can decrease the chance of contamination in this patient population. Staff education on adherence to aseptic technique and strict CVC care guidelines are essential to decreasing bloodstream infections.

Background

Central Venous Catheters and Children With Cancer

CVCs are essential to the treatment and supportive care of children with cancer. The devices have greatly improved the quality of life of children with cancer and increased family satisfaction by minimizing the need for venipunctures and the associated emotional trauma. In addition, CVCs facilitate the long-term delivery of chemotherapy, parenteral fluids and nutrition, blood products, antimicrobials, and analgesics. However, the insertion and maintenance of CVCs are not without associated complications. Potential complications associated with catheter insertion include pneumothorax, air embolism, nerve injury, and catheter malposition. Infection and occlusion remain the two most common complications associated with use and maintenance of central lines (Bagnall-Reeb & Perry, 2002; O'Neill, 2005).

Incidence of Central Venous Catheter Infections

Catheter-related bloodstream infection rates vary widely among patient populations. Differences occur within the pediatric specialty and with catheter type. In the pediatric population, the National Nosocomial Infections Surveillance System (2004) reported that hospital pediatric intensive care units experience the

Purpose/Objectives: To determine whether a comprehensive educational program influenced the incidence of hub colonization of central venous catheters (CVCs) and bloodstream infection rates in children with cancer, to identify risk factors related to infection rates, and to determine the impact of an educational program on nurses' knowledge of CVC care for children with cancer.

Design: Prospective, longitudinal.

Setting: Pediatric cancer center in a large children's hospital in the southwestern United States.

Sample: 51 catheter hub cultures were obtained from 27 children with cancer, and 121 nurses participated in the educational intervention.

Methods: CVC hub cultures were obtained prior to and three months after an educational intervention. A written pre- and posteducation assessment was used to evaluate the nurses' learning.

Main Research Variables: Hub colonization and bloodstream infection rates.

Findings: Post-test mean score of 87% was significantly higher than the pretest mean score of 72%. Prior to the education program, 57% of the hubs were culture positive, and after the educational program, the proportion of culture-positive hubs was reduced to 36%.

Conclusions: A comprehensive educational program increases nurses' knowledge of CVC care and reduces CVC hub colonization and catheter-related bloodstream infections in children with cancer.

Implications for Nursing: Patient and family participation in practice changes is very important because they have the most to gain. Additional research evaluating the relationship between hub colonization and subsequent bloodstream infection in a larger sample is warranted.

highest rates of infection at 6.6 per 1,000 catheter days. The neonatal intensive care areas have slightly lower rates of catheter infections at 4.7 per 1,000 catheter days (Mahieu, De Dooy, Lenaerts, Ieven, & De Muynck, 2001). Infection rates for CVCs placed in children with cancer range from 1.0–4.58 per 1,000 catheter days (Hengartner,