

tocography in the obstetric outcome is low<sup>20</sup> and that the use of this equipment was reduced dramatically in the maternity hospital after the results of the inquiry.

In conclusion, the NU is thought to have been the tip of the iceberg during this outbreak. We hypothesize that the majority of babies were colonized fecally during the epidemic period. Only neonates with risk factors for infection (prematurity, low birth weight, critical care) developed symptoms, especially those hospitalized in the NU. A prospective study was needed to suggest that the colonization of babies occurred mainly in the delivery rooms. AP-PCR was a useful tool to demonstrate the circulation of only two clones of *S. marcescens* during the outbreak and to help the understanding of the different means of *S. marcescens* transmission. The focus of infection control measures to the delivery rooms led to the end of the outbreak. These findings strengthen the recommendation that the quality of hygiene in delivery rooms needs to be as high as in surgery rooms.

## REFERENCES

- Cimolai N, Trombley C, Wensley D, Leblanc J. Heterogeneous *Serratia marcescens* genotypes from a nosocomial pediatric outbreak. *Chest* 1997;111:194-197.
- McNaughton M, Mazinke N, Thomas E. Newborn conjunctivitis associated with triclosan 0.5% antiseptic intrinsically contaminated with *Serratia marcescens*. *Canadian Journal of Infection Control* 1995;10:7-8.
- Christensen GD, Korones SB, Reed L, Bulley R, Laughlin B, Bisno AL. Epidemic *Serratia marcescens* in a neonatal intensive care unit: importance of the gastro-intestinal tract as a reservoir. *Infect Control* 1982;3:127-131.
- Grandsen WR, Webster M, French GL, Phillips I. An outbreak of *Serratia marcescens* transmitted by contaminated breast pumps in a special care baby unit. *J Hosp Infect* 1986;7:149-154.
- Zaidi M, Sifuentes J, Bobadilla M, Moncada D, Ponce-de-Leon S. Epidemic of *Serratia marcescens* bacteremia and meningitis in a neonatal unit in Mexico city. *Infect Control Hosp Epidemiol* 1989;10:14-20.
- Oie S, Kamiya A, Hironaga K, Koshiro A. Microbial contamination of enteral feeding solution and its prevention. *Am J Infect Control* 1993;21:34-38.
- Bosi C, Davin-Regli A, Charrel R, Rocca B, Monnet D, Bollet C. *Serratia marcescens* nosocomial outbreak due to contamination of hexetidine solution. *J Hosp Infect* 1996;33:217-224.
- Ghandi PA, Sawant AD, Wilson LA, Ahearn DG. Adaptation and growth of *Serratia marcescens* in contact lens disinfectant solutions containing chlorhexidine gluconate. *Appl Environ Microbiol* 1993;59:183-188.
- Cêtre JC, Baratin D, Tissot-Guerraz F, Nicolle MC, Reverdy E, Parvaz P, et al. Septicémies nosocomiales et pseudo-bactériémies à *Serratia marcescens*. *Presse Med* 1988;17:1255-1258.
- Miranda G, Kelly C, Solorzano F, Leanos B, Coria R, Patterson JE. Use of pulsed field gel electrophoresis typing to study an outbreak of infection due to *Serratia marcescens* in a neonatal intensive care unit. *J Clin Microbiol* 1996;34:3138-3141.
- Gaynes RP, Edwards JR, Jarvis WR, Culver DH, Tolson JS, Martone WJ, et al. Nosocomial infections among neonates in high-risk nurseries in the United States. *Pediatrics* 1996;98:357-361.
- Grattard F, Berthelot P, Reyrolle M, Ros A, Etienne J, Pozzetto B. Molecular typing of nosocomial strains of *Legionella pneumophila* by arbitrarily primed PCR. *J Clin Microbiol* 1996;34:1595-1598.
- Grattard F, Tabard L, Petit M, Ros A, Gaudin OG. Characterization of nosocomial strains of *Enterobacter aerogenes* by arbitrarily primed-PCR analysis and ribotyping. *Infect Control Hosp Epidemiol* 1995;16:224-230.
- Passaro DJ, Waring L, Armstrong R, Bolding F, Bouvier B, Rosenberg J, et al. Postoperative *Serratia marcescens* wound infections traced to an out-of-hospital source. *J Infect Dis* 1997;175:992-995.
- Stephen M, Lalitha MK. An outbreak of *Serratia marcescens* infection among obstetric patients. *Indian J Med Res* 1993;97:202-205.
- Vandebroucke-Grauls CM, Baars AC, Visser MR, Hulstaert PF, Verhoef J. An outbreak of *Serratia marcescens* traced to a contaminated bronchoscope. *J Hosp Infect* 1993;23:263-270.
- Kühn I, Ayling-Smith B, Tullus K, Burman LG. The use of colonization rate and epidemic index as tools to illustrate the epidemiology of faecal *Enterobacteriaceae* strains in Swedish neonatal wards. *J Hosp Infect* 1993;23:287-297.
- Fujita K, Muroto K. Nosocomial acquisition of *Escherichia coli* by infants delivered in hospitals. *J Hosp Infect* 1996;32:277-281.
- Braver DJ, Hauser GJ, Berns L, Siegman-Igra Y, Muhlbauer B. Control of a *Serratia marcescens* outbreak in a maternity hospital. *J Hosp Infect* 1987;10:129-137.
- Chia YT, Arulkumaran S, Soon SB, Norshida S, Ratnam SS. Induction of labour: does internal tocography result in better obstetric outcome than external tocography? *Aust N Z J Obstet Gynaecol* 1993;33:159-161.

## Efficacy of Antiseptic-Impregnated Central Venous Catheters

Gina Pugliese, RN, MS  
Martin S. Favero, PhD

Central venous catheters impregnated with chlorhexidine and silver sulfadiazine have been introduced recently for the prevention of catheter-related infections. However, there remains some uncertainty regarding the efficacy of these catheters because of conflicting reports in the literature. Veenstra and colleagues from the Department of Pharmacy, University of Washington, Seattle, evaluated the efficacy of chlorhexidine-silver sulfadiazine-impregnated central venous catheters in the prevention of catheter-related bloodstream infection (CR BSI). Data were collected from studies identified from a computerized search

of the MEDLINE database from January 1966 to January 1998, reference lists of identified articles, and queries of principal investigators and the catheter manufacturer. Randomized trials comparing chlorhexidine-silver sulfadiazine-impregnated central venous catheters with nonimpregnated catheters were included. The outcomes assessed were catheter colonization and CR BSI confirmed by catheter culture.

Twelve studies met the inclusion criteria for catheter colonization and included a total of 2,611 catheters. Eleven studies with a total of 2,603 catheters met the inclusion criteria for CR BSI. Most patients in these studies were from groups considered to be at high risk for catheter-related infections. The summary odds ratio

for catheter colonization was 0.44, indicating a significant decrease in catheter colonization associated with impregnated catheters. The studies examining the outcome of primary interest, CR BSI, had a summary odds ratio of 0.56.

It was concluded that central venous catheters impregnated with a combination of chlorhexidine and silver sulfadiazine appear to be effective in reducing the incidence of both catheter colonization and CR BSI in patients at high risk for catheter-related infections.

FROM: Veenstra DL, Saint S, Saha S, Lumley T, Sullivan SD. Efficacy of antiseptic-impregnated central venous catheters in preventing catheter-related bloodstream infection: a meta-analysis. *JAMA* 1999;281:261-267.