



EDITORIAL

Device-associated Healthcare-associated Infections in the Neonatal Intensive Care Unit

Because invasive therapeutic and monitoring equipment are a part of the modern neonatal intensive care units (NICUs), healthcare-associated infections (HAIs) are among the leading causes of mortality and morbidity in NICUs. Both the incidence and causes of HAIs vary widely among NICUs. However, most HAIs in the NICU result from the instrumentation and procedures required to preserve an infant's life, namely devices-associated HAIs (DA-HAIs).¹ Central line-associated bloodstream infections (CLA-BSIs), umbilical catheter-associated bloodstream infections (UC-BSIs), and ventilator-associated pneumonia (VAP) are common DA-HAIs. Worldwide, the most common DA-HAIs in pediatric patients are CLA-BSIs. The pathogens associated with DA-HAIs vary widely among NICUs and may evolve with time.¹

To better understand the incidence, burden, and causative organisms of DA-HAIs in this vulnerable population, prospective surveillance studies are needed. These surveillance data are also essential to develop appropriate prevention strategies. Currently, there have been scant reports from Taiwan on this issue. In this issue of *Pediatrics and Neonatology*, Tekin et al² described a 4-year surveillance data regarding the rate of DA-HAIs, and distribution of causative microorganisms and etiologic factors responsible for these infections in an NICU of a state hospital in southeastern Turkey. In their NICU, during the study period from 2008 to 2011, the rate of VAP was 6.4 per 1000 ventilator days, and UC-BSI was 2.6 per 1000 catheter days, values that were lower than those reported from most developing countries^{2–6} (Table 1) but higher than that

Table 1 Comparison of rates of device-associated infections per 1000 device-days and device utilization ratios in neonatal intensive care units in five latest reports from developing countries.

Characteristics	Tekin et al (2013) ²	Yalaz et al (2012) ³	Rosenthal et al (2012) ⁴	Rosenthal et al (2011) ⁵	Dueñas et al (2011) ⁶
Unit No., country	One, Turkey	One, Turkey	15, in 10 countries	30, in 15 countries	One, El Salvador
Studied period, year	4 y, 2008–2011	3 y, 2008–2010	3 mo, 2003–2004	1 y 9 mo, 2003–2010	2 y 11 mo, 2007–2009
No. of patients	6932	600	1237	13,251	1270
Patient days	75,407	10,052	16,733	157,389	30,663
Ventilation days	11,939	2907	3153	25,753	8634
No. of VAP	76	40	56	251	139
Ventilatory utilization ratio	0.15	0.29	0.19	0.16	0.28
Rate of VAP	6.4	13.76	17.8	9.7	16.1
Umbilical catheters	1908	2363			
No. of umbilical catheter-BSI	5	9			
Umbilical catheter utilization ratio	0.02	0.24			
Rate of UC-BSI	2.6	3.8			

UC-BSI = umbilical catheter-associated bloodstream infection; VAP = ventilator-associated pneumonia.

reported from the United States.⁷ *Acinetobacter baumannii* and *Pseudomonas aeruginosa* were the most frequently isolated microorganisms from ventilator-associated pneumonia in their study, whereas *Staphylococcus aureus* and *Enterobacteriaceae* are also common pathogens reported elsewhere previously.^{3–7} However, Tekin R et al² did not collect and describe the data of CLA-BSIs.

Because the instrumentation and procedures are required to preserve an infant's life, it is not possible to lower the rate of healthcare-associated infections merely by limiting the use of procedures. Furthermore, it is no longer acceptable to consider healthcare-associated infections as a consequence of neonatal intensive care.¹ All clinicians should make every effort to reduce DA-HAIs, including in the NICUs, by performing invasive procedures only when needed and in the safest manner possible. Strategies for the reduction and prevention of DA-HAIs may include education of healthcare workers, enhancing hand hygiene compliance, conducting bundle cares, and process surveillance.^{1–4} Rosenthal et al⁴ demonstrated in their latest report that implementation of a multidimensional infection control program was associated with a significant reduction in VAP rate in NICUs in developing countries. However, more studies should be conducted to provide additional evidence for their effectiveness in preventing neonatal DA-HAIs on NICUs.

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