

## EDITORIAL

# Microbial reduction in the NICU: seeing the light

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Healthcare-associated infections in the neonatal intensive care unit (NICU) are mostly a consequence of host–environmental interactions. The relative immuno-deficient state of the premature infant, in combination with the use of invasive procedures, sets the stage up for an amalgamation of factors leading to nosocomial sepsis, with potentially disastrous outcomes. Caregivers of the susceptible neonate are well aware of the reasons behind catheter-related infections and have developed strategies to decrease them.<sup>1,2</sup> Another important contributor to sepsis-related morbidity in the NICU is associated with the use of invasive mechanical ventilation, that is, ventilator-associated pneumonia (VAP).<sup>3</sup>

VAP in the NICU has been reported to have a variable incidence from a low of 2.7 to a high of 70 per 1000 ventilator days, worldwide.<sup>4–8</sup> Part of the problem has been the lack of consensus for validation of the diagnosis of VAP in neonates.<sup>3,9</sup> Investigators have used techniques such as non-bronchoscopic bronchoalveolar lavage<sup>10</sup> and Gram staining of tracheal aspirates<sup>11</sup> to enable early diagnosis and therapy. The source of VAP is mostly secondary to endogenous oropharyngeal colonization and exogenous sources such as ventilator circuits, humidifiers and endotracheal tubes.<sup>3</sup>

In the article by Ryan *et al*,<sup>12</sup> an innovative approach was taken to impact on the exogenous sources of microorganisms that could potentially colonize the airway and contribute to VAP. The investigators hypothesized that enhanced-ultraviolet germicidal irradiation (eUVGI; also called the Pathogen Control System, Vigilair Systems, North Tonawanda, NY, USA) placed in the NICU heating ventilation and air conditioning system would decrease heating ventilation and air conditioning and NICU environmental and neonatal tracheal microbial loads and VAP. The diagnosis of VAP for this study used the CDC criteria for age-specific definition of nosocomial pneumonia. The microorganisms detected were the smorgasbord of usual suspects in a NICU environment—Gram-positive and Gram-negative bacteria, as well as fungi.

In this prospective, single-center study, eUVGI exposure resulted in a dramatic decline in the microbial load in the heating ventilation and air conditioning and NICU surfaces, within 3 days, and was sustained up to 10 months. Tracheal aspirate colonization, VAP and antibiotic use did decrease significantly too, but seemed to mostly level off after the first month of exposure to eUVGI.<sup>12</sup>

Among the limitations of the study are the facts that the intervention was not randomized or blinded to the caregivers. Although the investigators mention that several practices remained

unchanged, other clinical practices such as earlier extubation did increase during the study period,<sup>12</sup> which could impact on the results. In addition, data on presence of concomitant nosocomial sepsis and/or necrotizing enterocolitis during the study, which would influence antibiotic use in the NICU, were not available. Interestingly, in this study, the length of time of intubation did not correlate with the degree of colonization, as measured by the ‘tracheal microbial-load index’,<sup>12</sup> but data were not available on how long the same endotracheal tube was kept *in situ*.

The data reported by Ryan *et al*<sup>12</sup> is intriguing enough to warrant a multi-center randomized controlled trial with prospective collection of data on additional outcomes for a more definitive answer.<sup>13</sup> In addition, it would be important to evaluate the cost-effectiveness of such an approach to decrease nosocomial sepsis and attendant healthcare expenses. Till such time, elevation of head/lateral body positioning of ventilated infants,<sup>3,14</sup> using a non-invasive approach (‘lose the tube’) to neonatal ventilation,<sup>3,15,16</sup> and the tried and true techniques of line, tube and hand hygiene<sup>1</sup> should ‘light’ our path in the NICU.

### Conflict of interest

The author declares no conflict of interest.

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