

# Comparison of Pediatric Tracheostomy Stoma Cleaning Solutions

Advances in medical care have increased the survival of preterm infants and children with an array of congenital medical conditions. Many have complex medical needs and require ongoing care as they make the transition from the hospital to home or to long-term care settings. Those with chronic lung disease, congenital airway abnormalities, neurologic conditions, and neuromuscular disorders often require a tracheostomy tube to maintain airway patency, facilitate secretion removal, or provide long-term mechanical ventilatory support.<sup>1,2</sup> However, there are risks associated with the surgical procedure and with postoperative care that contribute to morbidity and mortality in infants and children requiring a tracheostomy. Complications from the surgical procedure and those associated with long-term use are higher among children compared to adults.<sup>3</sup> Complications range in severity and include those associated with the stoma and the surrounding area, such as irritation, abrasion, infection, pressure injury, and granuloma formation, as well as device-related airway complications like granuloma formation in the trachea, obstruction of the cannula lumen, inadvertent decannulation, accidental reinsertion into a false track, and tracheocutaneous fistula following elective decannulation.<sup>4,5</sup> Mortality rates also vary. The literature reports that mortality associated with the surgical procedure ranges from negligible to 5.9%, and overall mortality rates are as high as 59%.<sup>6</sup> Although most children succumb to their underlying disease process, those < 2 y of age carry a higher risk of death from device-associated complications.<sup>5</sup>

A comprehensive management strategy is needed to safely and effectively manage this heterogeneous population with complex health needs across the continuum of care. Elements of daily care to maintain health are multifaceted and include stoma and skin hygiene, secretion clearance, humidification use, and facilitation of speech and language development.<sup>7</sup> Stoma and skin hygiene are important elements of daily care to maintain skin integrity, prevent infection, and reduce device-associated complications. Clinical guidelines<sup>8</sup> and quality-focused research<sup>9</sup> report

the importance of inspecting the peristomal area for signs of infection or inflammation, cleansing the stoma and sur-

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## SEE THE ORIGINAL STUDY ON PAGE 1090

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rounding skin, and use of a moisture-wicking material to maintain skin health and minimize the propensity for harm. However, a dearth of evidence exists regarding the type and concentration of solution that can be used to cleanse the stoma and surrounding skin adequately without the risk of irritating a child's sensitive skin.

In this issue of RESPIRATORY CARE, Zustiak and colleagues<sup>10</sup> conducted a retrospective study of hospitalized infants < 1 y of age requiring a tracheostomy to evaluate the effectiveness of 3 solutions; (1) 0.25% acetic acid, (2) sterile water, and (3) sterile saline used for twice-daily stoma and skin cleansing. To focus on the impact that these cleaning solutions had on acute postoperative wound management and the prevention of signs of infection, the authors limited data collection to those treated in the neonatal ICU in the first 30 d following the tracheostomy procedure. Peristomal surveillance was used to detect signs of infection defined as redness, rash, odor, increased secretions, and unusual tissue observations.<sup>10</sup> Subjects were divided into natural groupings by the type of cleaning solution the provider prescribed, and no variation to the twice-daily prescribed cleansing routine were noted.

The authors have reported no differences in peristomal signs of infection when sterile water and sterile saline were used for cleaning ( $P = .63$ ).<sup>10</sup> However, significantly fewer signs of infection were noted among subjects for whom acetic acid was used to clean the tracheostomy stoma site compared to sterile water ( $P = .043$ ) and sterile saline ( $P = .007$ ).<sup>10</sup> The use of 0.25% acetic acid was not observed to irritate the peristomal area or compromise skin integrity.<sup>10</sup>

This study contributes to the literature in an area where there is a significant gap, and the results can be impactful. The authors' description of signs of infection are consistent with those reported in the literature,<sup>11,12</sup> and practice of skin surveillance and peristomal cleansing aligned with better practices.<sup>6,8</sup> However, it is important to interpret these results with caution. Outcomes were reported for a small sample (102 subjects) of infants cared for in the neonatal ICU in a single institution. Therefore, it is difficult to

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Ms Volsko has disclosed relationships with First Energy Corporation, Actuated Medical, and Prosperia.

Correspondence: Teresa A Volsko MHHS RRT FAARC, Children's Hospital Medical Center Akron, Ohio. E-mail: tvolsko@akronchildrens.org.

DOI: 10.4187/respcare.08155

extrapolate these results to a broader population of medically fragile children requiring a tracheostomy. Because the study was time-limited, the effect of long-term use of 0.25% acetic acid on skin integrity and infection is unknown.

This study highlights the importance of continued research in this understudied area. More research, particularly prospective clinical trials, are needed to determine best practices for cleaning tracheostomy stoma in infants and children. The impact that the type and concentration of different cleansing solutions have on skin integrity and infection prevention needs to be studied at a higher level, so that evidence-based clinical practices can be recommended with confidence.

### **Teresa A Volsko**

Akron Children's Hospital  
Department of Nursing Administration  
Akron, Ohio

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