

# Pediatric Tracheotomy Complications: Proposal of a Novel Wound Classification System

Jill D'Souza, MD<sup>1</sup>; Katherine McKee-Cole, MD<sup>2</sup>; Abigail Strang, MD<sup>3</sup>; Patrick Barth, MD<sup>2,4</sup>; Aaron Chidekel, MD<sup>3,4</sup>; Udayan Shah, MD<sup>2,4</sup>

<sup>1</sup>Department of Otolaryngology – Head and Neck Surgery, Thomas Jefferson University Hospital, Philadelphia, PA;

<sup>2</sup>Division of Pediatric Otolaryngology, Nemours/Alfred I. duPont Hospital for Children, Wilmington, DE;

<sup>2</sup>Division of Pediatric Pulmonology, Nemours/Alfred I. duPont Hospital for Children, Wilmington, DE;

<sup>4</sup>Department of Pediatrics, Thomas Jefferson University Hospital, Philadelphia, PA



## ABSTRACT

**Objective** The recognition of wound-related complications following pediatric tracheotomy is on the rise. These complications can have a significant impact on clinical course as well as on hospital healthcare costs to the tracheotomy dependent child and family

**Methods** A tracheotomy database was created in 2000 and reviewed for incidence of major and minor complications.

**Setting** Tertiary Care Pediatric Referral Center

**Results** We identified a post-tracheotomy complication rate of 19.9%, of which the most common complication was wound breakdown (65% of complications).

**Conclusion** Rate of post-tracheotomy wound-care complications is 12.9%. Wound description is subjective and prone to inter-observer variability. A wound classification scheme is proposed to promote consistent evaluation of these complications.

## INTRODUCTION

Pediatric Tracheotomy complications have been reported at varying rates. With the increasing safety associated with tracheotomy, devastating complications such as tracheoinnominate fistula, accidental decannulation, and death have decreased over the years; however, wound related complications are increasingly recognized as a significant burden for the tracheotomy dependent child and their family. 315 tracheotomies were captured in our database; of these, 60 (19.9%) had a reported complication. 39 (12.9%) had a wound-care related complication (Figure 1).

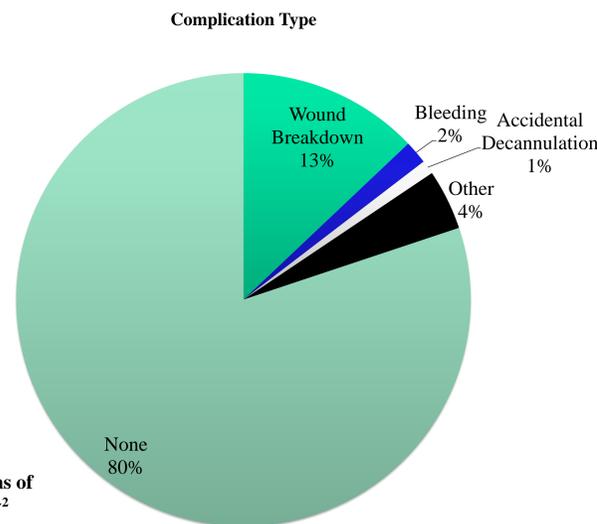


Figure 1. Complications of Pediatric Tracheotomy<sup>2</sup>

## CLASSIFICATION SCHEME

There is no current standardized classification system for tracheotomy wounds, further complicating communication between various teams caring for tracheotomy patients, although one has been proposed by Jaryszak et al.<sup>1</sup> To promote uniformity of wound description, Nemours/A.I. duPont Hospital for Children multidisciplinary tracheotomy team has proposed a novel wound care classification scheme (Table 1).

Nemours/A.I. duPont Hospital for Children Proposed Pediatric Tracheotomy Wound Classification System	
Stage I	non-blanching erythematous skin surrounding the stoma or underlying tracheotomy flange
Stage IIA	loss of epidermal layer with dermis visible; less than or equal to 1cm diameter
Stage IIB	loss of epidermal layer with dermis visible; greater than 1cm in diameter
Stage IIIA	loss of epidermis and dermis with subcutaneous tissue exposed; less than or equal to 1cm diameter
Stage IIIB	loss of epidermis and dermis with subcutaneous tissue exposed; greater than 1cm diameter
Stage IV	full thickness loss of tissue with exposed muscle, any diameter

Table 1. Wound Classification System following Pediatric Tracheotomy

## DISCUSSION

Wound care issues are currently the most common post-tracheotomy complication facing tracheotomy dependent children and their care teams, accounting for 12.9% of adverse events in a recent study at our institution.<sup>2</sup> In addition, tracheotomy wounds may be classified as pressure ulcers, and, less often as surgical site infections, and have thus undergone more scrutiny. The potential for financial repercussions for health care institutions must also be recognized in addition to the clinical impact to patients who develop skin breakdown and ulceration.

While attention to the tracheotomy wound is critical, priority must be given to maintaining a secure airway for the tracheotomy dependent child. Classifying tracheotomy wounds simply as “pressure ulcers” fails to account for this critical reality. Given the life-threatening consequences of a poorly secured airway in an active infant or toddler, a certain amount of ulcers related to tracheotomy placement are predicted.

## CONCLUSION

A balance between preventing wound complications and maintaining a safe and secure airway for tracheotomy dependent children is essential. A wound classification system is proposed in order to facilitate communication between care teams and provide consistent description of wounds and their healing process. Further multi-center interdisciplinary wound assessment analyses are indicated.

## REFERENCES

- Jaryszak EM, Shah RK, Amling J, Peña MT. Pediatric tracheotomy wound complications: incidence and significance. Arch Otolaryngol Head Neck Surg 2011; 137:363–366.
- D'Souza, J; Levi, J; Park, D; Shah, U. Complications Following Pediatric Tracheotomy: a 13-Year Review. JAMA Otolaryngol Head Neck Surg 2016; 142(5):1-5
- Zaratkiewicz S, Whitney JD, Lowe JR, Taylor S, O'Donnell F, Minton-Foltz P. Development and implementation of a hospital-acquired pressure ulcer incidence tracking system and algorithm. J Healthc Qual 2010; 32: 44–51