



## Prevention of post-operative pediatric tracheotomy wounds: A multidisciplinary team approach



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### ABSTRACT

**Objective:** Tracheotomy-related pressure wounds have been reported as high as 29%. All advanced stage (stage 3 or 4) wounds are reported by hospitals, and CMS will no longer reimburse healthcare costs to manage them. We present the results of an intensive, multidisciplinary wound prevention strategy starting in the operating room at the time of tracheotomy placement.

**Methods:** Prospective analysis of a tracheostomy wound care protocol at an academic, tertiary-care pediatric hospital from September 2012 to February 2016. Participants include all patients having undergone tracheostomy placement followed by protocolized daily dressing changes until the first tracheostomy tube change by team consisting of a senior level otolaryngology resident or pediatric otolaryngology fellow, certified wound care specialist, respiratory therapist, and bedside nurse.

**Results:** Post-operative tracheostomy-related wound data from 3 years prior to clinical intervention was obtained and compared to the intervention cohort. From March 2010–August 2012, 161 tracheostomy procedures were performed with 36 (22.4%) subsequent pressure wounds; 31% of these were stage 3 or 4 wounds. After multidisciplinary protocol implementation, there have been 121 additional tracheostomy procedures with reduction to 12 (9.9%) total tracheostomy-related wounds ( $p = 0.0064$ ) and none (0%) were stage 3 or 4 ( $p = 0.0014$ ). All stage 1 and 2 wounds were identified early, underwent appropriate intervention, and avoided further progression.

**Conclusions:** This protocol was successful in the elimination of all tracheostomy-related advanced stage, hospital-acquired pressure injuries and led to prompt identification of early stage wounds post-operatively.

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### 1. Introduction

Tracheostomy tube placement is a common intervention employed by otolaryngologists for various reasons. In the pediatric population, pressure wounds have been a persistent and troublesome complication of tracheostomy with rates as high as 29% reported [1]. Many of these occur early and prior to the first

tracheostomy tube change. Skin breakdown first occurs due to soft tissue damage related to prolonged pressure exerted by external medical equipment, including the tracheostomy tube itself. Many factors put the pediatric patients at risk such as a short anatomic neck, decreased post-operative manipulation, tightly secured tracheostomy collar and prolonged sedation or paralysis to prevent accidental decannulation.

There is now significant focus to minimize tracheostomy-related wounds in order to optimize outcomes and eliminate preventable harm. Furthermore, advanced stage pressure injuries (stage 3 or 4) based on the National Pressure Ulcer Advisory Panel are now

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considered serious and reportable events [2]. The National Quality Forum has introduced a list of serious safety events to include twenty-nine types of “never events.” Included in this list are “any stage 3, stage 4, and unstageable pressure ulcers acquired after admission/presentation” and are thus mandated for reporting [3]. Fig. 1 demonstrates an example of an advanced stage wound after tracheostomy tube placement.

The importance of avoiding tracheotomy-related pressure wounds is clear and cannot be underestimated as hospitals are required to report all “never events.” This data can affect reimbursement as well as the public's perception of a health care facility. At our institution, intensive efforts have been employed to eliminate all preventable harm to patients. We have developed a multidisciplinary protocol to reduce pressure-related tracheotomy wounds.

## 2. Materials and methods

Institutional Review Board approval was obtained to evaluate tracheotomy outcomes and prospective collection of related wound complications beginning in March of 2010. The stage of the wound or wounds was prospectively recorded as part of an institutional effort to determine the true baseline incidence of any type of pressure-related injury.

In an effort to reduce the number of tracheostomy wounds, a new intensive wound care regimen was instituted for all new tracheostomy patients at our institution as of September 1, 2012. All outcome data was then prospectively collected. The wound care regimen begins in the operating room at the time of tracheotomy. The neck skin is first cleansed, dried, and prepped with Cavilon™ No Sting Barrier Film (3M™, St. Paul, MN, USA). Mepilex Lite (Mölnlycke Health Care, Gothenberg, Sweden) is then used around the tracheostomy tube flanges and under to collar to protect the skin. Until the first tracheostomy tube change, a team consisting of a senior level otolaryngology resident (PGY 4-5) or pediatric otolaryngology fellow, certified wound care specialist, respiratory therapist, and bedside nurse performed daily dressing changes with circumferential neck inspection (Figs. 2–3). All wounds that occurred within the 7 days post-operatively were documented.

Any wound identified was graded by the wound care nurse using the National Pressure Ulcer Advisory Panel criteria, and



**Fig. 2.** Circumferential tracheostomy neck dressing.

**Legend:** Appearance of circumferential dressing around neck that is placed in the operating room and changed daily until initial tracheostomy tube change.

treated with Mepilex Ag (Mölnlycke Health Care, Gothenberg, Sweden) and other appropriate interventions. Comparisons between the baseline group and treatment group were performed using Chi-square and Fisher's exact test.

## 3. Results

From March 1, 2010 to August 31, 2012 a total of 161 tracheotomies were performed at Nationwide Children's Hospital prior to initiation of the standardized wound care protocol. During that timeframe, the rate of wound complications was 22% (36/161). Of these, 31% (11/36) were stage 3 or 4 wounds and thus currently reportable (Table 1). In September 1, 2012 the multidisciplinary wound protocol was instituted and 121 additional tracheostomy procedures were completed through February 2016 (Fig. 4). All patients underwent initial dressing application in the operating room followed by bedside daily care without change in protocol since that time. There have been only 12 (9.9%;  $p = 0.0064$ ) tracheostomy-related wounds identified prior to the first tracheostomy change. Most importantly, no wound was advanced stage 3 or 4 (0%;  $p = 0.0014$ ). All of the stage 1 or 2 wounds identified, underwent immediate treatment and appropriate intervention to prevent further progression (Table 1). There were no cases of accidental decannulation after implementation of the new protocol.

## 4. Discussion

Wound complications related to pediatric tracheotomy have recently attained a greater degree of attention. As the medical climate and health care reimbursements continue to evolve, aggressive strategies need to be employed to prevent hospital-acquired wounds and avoid serious reportable events. This will be important even if the serious reportable event does not result in any long-term morbidity for the patient. To our knowledge, this is the first prospective study examining a pediatric tracheotomy-related wound prevention strategy, starting at the time of initial surgical placement in the operating room.

Prior to the initiation of our new wound care prevention regimen, the baseline level of tracheotomy wound complications at our institution was 22%. At that time, no standardized wound care protocol existed, and wounds were treated on a case-by-case basis



**Fig. 1.** Advanced stage tracheostomy-related pressure wound.

**Legend:** A grade 4 pressure wound of the left neck due to pressure necrosis caused by the tracheostomy tube flange.

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