

Establishment of the efficacy of a power maintenance prototype for use with the Bedside **Safe Airway Application (SAA)** Brennan Hagan¹, Dr. Michael Dunham^{2,3}, Dr. Adele Evans⁴



LSUHSC SOM¹, LSUHSC Otolaryngology², OLOL Childrens³, Nemours Children's Hospital⁴

Background

Bedside signage in the setting of pediatric tracheostomy is used to communicate necessary information in an emergency setting. The overall program is focused on understanding trials utilizing an electronic bedside signage system: SAA. It is designed for use with patients having one of the following conditions:

Results

Figure 1. Safe Airway Application interface (Left: Create a new trach. Right: New trach display.)



The mean force required to displace the wire alone was 1.38 N (SD = 0.15, 95% CI = 1.37-

1.39), while the force required to displace the wire

- New Tracheostomy,
- Established Tracheostomy,
- Difficult Airways, and
- Airway Reconstruction (or Laryngotracheal Reconstruction).

The Safe Trach Bedside Signage addresses the patient's specific airway type, provider-selected details for airway rescue, and three basic rescue pathways: "Maskable,"

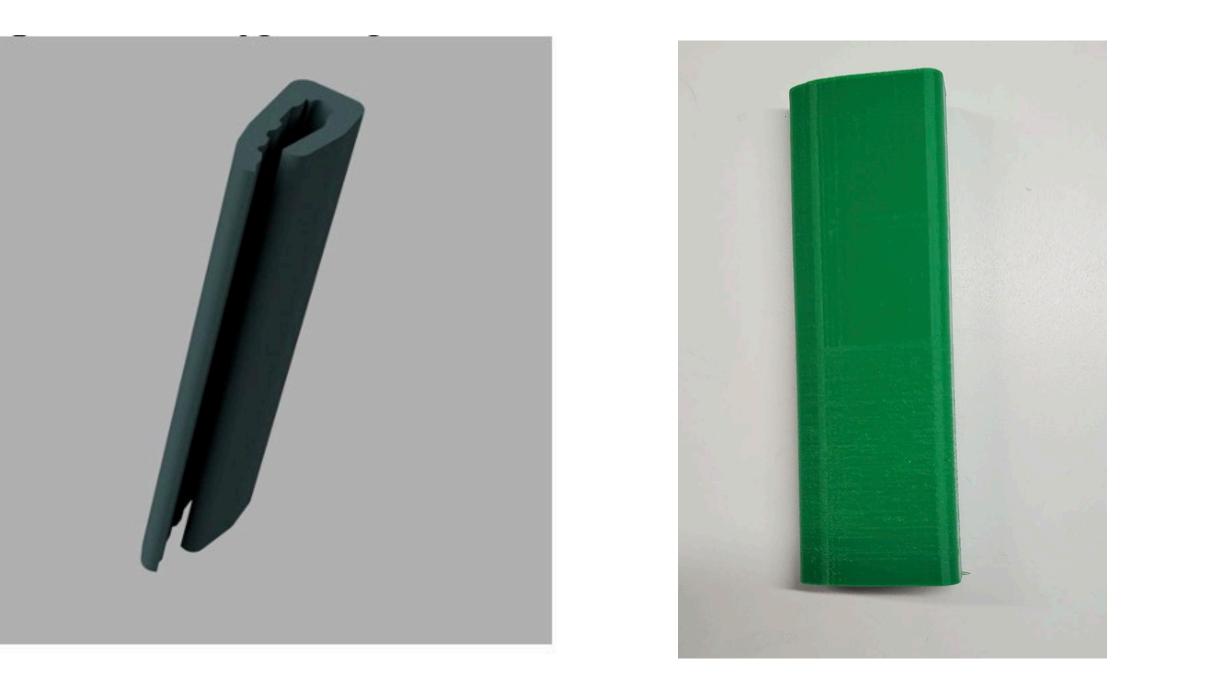
- "Intubation from Above,"
- "Intubation through Stoma."

During the routine events of patient care, the SAA would lose its connection to the power source preventing the device from providing information during an airway emergency.

The goal of this study is to establish the efficacy of a prototype, designed to remain attached to the SAA and prevent the SAA device from losing power.

First Name:	Create Case - New Tracheostomy	Precautions Patient can be ventilated by mask.	Patient: William T
Last Name:	Bacheostomy Procedues Date: 00/08/2022 * Surgeon / Emergency Contact Number: Primary Indication / Diagnostic Print Bach Change Date: 06/08/2022 * Mackable? * Insubate From Above (Oral / Nesa)? *	Patient can be intubated if necessary. Do NOT attempt to replace the trach tube!	This Patient Has A New Tracheostomy In Case Of Emergency Call: 5-5555 Tracheostomy Procedure Date: 08/08/2022 Diagnosis: SQS
	Replace Tech in Stoma? No + Retraction Sutures Present? + Stoma Sutures Present? +		Surgeon: Nelson
	Mandatum Gut	Trech Tube Dislodged	Emergency Contact Number: 777-7777
	Type: Faceplate: Straight ~ Trach Tube Size (mm ID) ~ OD (mm):	Bleeding from Trach Tube	Bivona - Pediatric - Flextend 4.0 Cuffless
	Rach Tube Length (mm): Proximal Flextend Length (mm):	Oxygen Level Falling	
enarios	Suction Catheter Tip Extension (mm): 5	Trach Tube Blocked - Can't Suction	
Decannulation	Suction Catheter Diameter (Fr):	Trach Tube Blocked - Can't Ventillate	
Hemoptysis O2 Desaturation Blocked Tube - Can't Suction Blocked Tube - Can't Ventilate	Suction Depth (cm) Derwinkil for Bach Length Cancel Feset Case Data Oreste Case		First Trach Tube Change Date: 05/15/202 Maximum Suction Size (Fr): 8 Suction Depth (cm) : 9 Additional Trach Information

Figure 2. 3D printed retention device prototype.



- with the attached prototype was 7.20 N (SD = 0.76, 95% CI = 7.15-7.25).
- Using a two-sample t-test, there was a statistically significant improvement in the required detachment force from the use of the prototype device (p < 0.05).

Conclusion & Applications

The digital application combined with the retention device prototype appears to resolve the power connection issue. However, further testing in a clinical setting will be done to determine the usability and effectiveness in a day-to-day patient care setting.

The SAA displays smart algorithms consistently, rapidly,

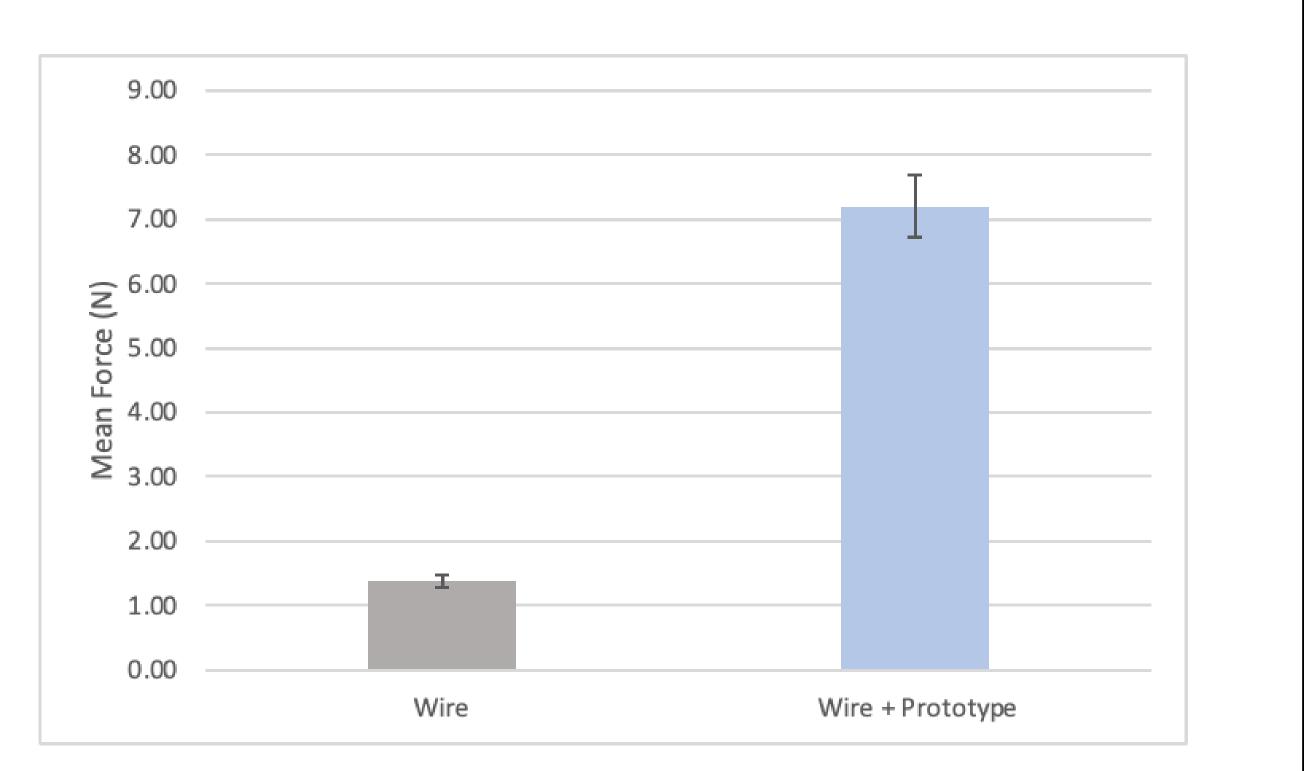
Methods

value.

The prototype was designed, and 3D printed to fully encapsulate the charger. The charger dimensions were 0.6 cm x 0.6 cm x 4.2 cm, along with 0.3 cm slack for the wire. The prototype was designed to be 10.4 cm x 3.4 cm and is open on one free edge to allow it to clip onto the SAA.

- A set of different magnitude force springs (1N, 5N, 10N) were used to determine the point at which the force exceeded the wire alone contrasted with the wire attached with the proposed prototype.
- There was 10 trials conducted for the wire alone and another 10 trials for the wire + prototype.

Figure 3. Mean force required to displace wire alone vs. with the prototype attached.



and accurately for patient-specific situations, and includes more on-demand information regarding the patient compared to current methods of problem-solving tracheostomy emergencies.

References

1.Lubianca Neto JF, Castagno OC, Schuster AK. Complications of tracheostomy in children: a systematic review. Braz J Otorhinolaryngol. 2020 Dec 30:S1808-8694(20)30247-0. doi: 10.1016/j.bjorl.2020.12.006. Epub ahead of print. PMID: 33472759 2.Price, M. J. (2021). C# 10 and .Net 6 - modern crossplatform development: Build Apps, websites, and services with Asp.Net Core 6, blazor, and Ef Core 6 using Visual Studio 2022 and Visual Studio Code. Packt Publishing

From this data, the mean force was calculated

along with SD, CI, and a two-sample t-test for P-

