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"Establishment of the efficacy of a power maintenance prototype for use with the bedside Safe Airway Application (SAA), a digital bedside signage model."

Safe Airway Application (SAA) was developed in the form of an interactive tablet with various situation-based treatment algorithms, or Smart Algorithms. It is designed for use with patients having one of the following conditions: 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," "Intubatable from Above," and "Intubatable through Stoma." A feasibility study conducted prior to this study found a major pitfall in the current design of the device. During the routine events of patient care, the SAA can lose its connection to the power source preventing the device from providing information and smart algorithms 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 device from losing power. The prototype was designed to fully encapsulate the charger, with dimensions of 0.6 cm x 0.6 cm x 4.2 cm, along with some slack for the wire around 0.3 cm. 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.

The first parameter used to determine the efficacy of the device was to determine the force required to remove the charger from the SAA and compare it to the force required to remove the charger from the SAA with the prototype in place. A set of different magnitude force springs were used to determine the point at which the force exceeded the wire in the control and the force required to remove the wire + prototype.

The mean force required to displace the wire alone was 1.38 ± 0.15 N, while the force required to displace the wire with the attached prototype was 7.20 ± 0.76. Using a two- sample t- test, there was a statistically significant improvement in detachment force from the use of the prototype device ($p < 0.05$).

The digital application and the charger retention prototype have the potential to display smart algorithms consistently, rapidly, and accurately for patient-specific situations, and to include more on-demand information regarding the patient than current methods of problem-solving tracheostomy emergencies. Comparison of the SAA alone and the SAA with a prototype will be done in various ICU settings to determine if the device was successful at keeping the SAA connected to the prototype device and its power source during a routine shift with the possibility the patient was moved.