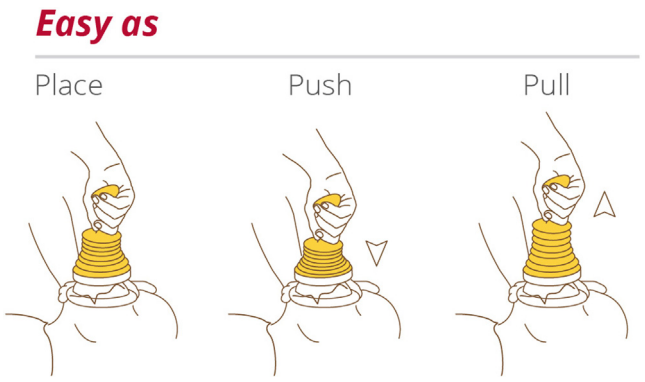
will remove the obstruction (call the point estimate "S") shown for three scenarios depending on how you define success: success 1 attempt: $0.91 \leq S \leq 0.97$, success 2 attempts: $0.98 \leq S \leq 1.0$, success 3 attempts: $0.99 \leq S \leq 1.0$.

Conclusions: The Lifevac is an apparatus that can successfully remove a hot dog, which is a food that commonly leads to choking, lodged in an adolescent choking victim's airway in this simulator model. This apparatus deserves further study as there is potential to save lives if abdominal thrusts fail to resuscitate the choking victim.



383 A Novel Technique for Improving Fluid Resuscitation in Septic Shock

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Study Objectives: Rapid fluid delivery is commonly required in sepsis and other conditions leading to shock and hypotension. Since gravity flow and infusion pumps are unable to deliver a fluid bolus rapidly, pressure bags are commonly used to increase flow rates. Disadvantages of this technique include progressive decrease in flow rate without continuous re-inflation of the bag, difficulty administering accurate doses, particularly with smaller volumes, and the risk of inadvertent air embolism. LifeFlow is an intuitive single-use device that provides rapid and controlled infusion, enabling a health care provider to administer a measured fluid bolus and quickly assess clinical response. This study will compare the LifeFlow to pressure bag in simulated out-of-hospital and hospital settings.

Methods: Registered nurses and paramedics participated in a simulated septic shock resuscitation and were randomly assigned to administer repeated fluid boluses with the LifeFlow or pressure bag. Training was provided if the participant was not familiar with either method. Participants were given a clinical sepsis scenario that required administration of three, 500 ml boluses (totaling 1500 ml) through a 20G IV catheter into simulated patient. The scenario involved a variety of clinical tasks including a physical exam, vitals assessment, delivery of oxygen via nasal cannula, medication administration, manual charting, and fluid administration. Total scenario time and fluid infusion times were determined by video recording of the scenario. Fluid volume was measured by weight to determine the accuracy of each bolus. Variance was defined as difference between actual and desired fluid bolus volume.

Results: Fourteen providers (8 RNs, 6 Paramedics) delivered three 500 ml normal saline boluses during the septic shock scenario. Average time to completion of each bolus was 2.5 minutes for LifeFlow vs. 7.6 minutes for pressure bag. Total infusion time for 1500 ml was almost 3 times as fast for LifeFlow vs pressure bag (7.8 vs 22.8 minutes). Total time to completion of the sepsis scenario was 1.8 times as fast for LifeFlow compared pressure bag (20 vs. 36.3 minutes). Total fluid amount variance, above or below 1500ml, was greater for pressure bag infusion (1500 + 39.1 vs 184 ml, p=0.04).

Conclusions: When compared to pressure bag, use of the LifeFlow device resulted in significantly faster time to completion of the septic shock resuscitation scenario. Times to completion of each bolus, and infusion time for the total 1500 ml, were significantly faster. The LifeFlow also reduced variance in the size of fluid bolus administered, indicating that clinicians can more accurately deliver the correct fluid volume and avoid inadvertently providing more fluid than is needed. This technique may offer a faster and more efficient method of fluid resuscitation in sepsis and septic shock.

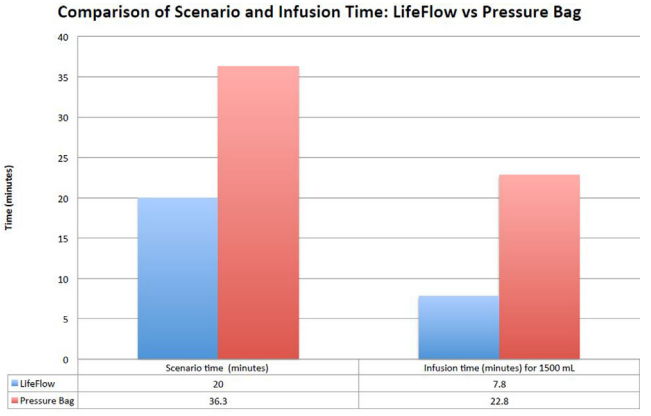

Figure 1. Comparison of Scenario and Infusion Time: LifeFlow versus Pressure Bag.

384 Delineating the Value-Added Inclusion of the Impedance Threshold Device During Head-Up CPR

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Study Objectives: Previous experimental studies have determined that a "head-up CPR" approach is capable of improving cerebral perfusion pressure (CerPP) and, in turn, blood brain flow. In those early studies, however, a whole-body tilt was performed and simultaneous application of automated CPR (using the LUCAS^{TM} technique) and an impedance threshold device (ITD) were both used with the intent of further augmenting circulatory flow into and out of the heart and brain. Preclinical and clinical CPR studies have now indicated that the ITD can be very effective when used with high-quality CPR but ineffective when applied with suboptimal performance of CPR. Therefore, the purpose of the current study was to determine if the ITD maintains a specific value-added contributory effect in terms of helping to maintain systolic blood pressure (SBP), coronary perfusion pressure (CorPP), CerPP and end-tidal CO2 ($ETCO_2$) during "head-up CPR" conditions.

Methods: Using additional data that were gathered (per routine) during implementation of a previously published swine study (Debaty et al. *Resuscitation* 2015; 87:38-43), SBP, CorPP, CerPP and $ETCO_2$ values were determined for the +30° whole body tilt position (head-up) and those measurements taken when an ITD (ResQPOD-16^{TM}) was in place were compared to those taken when it was removed. In the study, female farm pigs (n = 8) each weighing ~40 kg were anesthetized with isoflurane and instrumented to measure aortic (Ao), right atrial (RA), and intracranial (ICP) pressures. All subjects were treated with a LUCAS^{TM} CPR device (100 compressions/min) and mechanically ventilated through an endotracheal tube at 10 breaths/min with a tidal volume of 10 ml/kg. After 6 minutes of untreated VF, all of the subjects were treated with 18 minutes of LUCAS^{TM} + ITD at different tilt angles followed sequentially by LUCAS^{TM} + ITD with whole body head-up tilt at +30° for 2 minutes and then LUCAS^{TM} alone for 2 minutes in the same +30° position. All animals therefore served as their own controls and the measured results were combined for aggregate analysis. A Student's t-test was used to compare the key hemodynamic variables during head-up CPR ± ITD and results were expressed as a mean ± SEM. The study was approved by the institutional animal care committee and conducted in compliance with applicable regulatory guidelines.

Results: Among the 8 subjects, calculated values (in mmHg) for both CorPP (decompression phase Ao minus RA pressure) and CerPP (Ao minus ICP) consistently showed a significant contribution from the ITD. When comparing the LUCAS^{TM} combined with the ITD (at +30°) versus use of the LUCAS^{TM} CPR device alone (at +30°), SBP fell significantly (78 ± 5 to 64 ± 5 mmHg; p <0.001) as did CorPP (25 ± 2 to 23 ± 2; p=0.012); CerPP (29 ± 3 to 25 ± 2; p=0.001) and $ETCO_2$ (33 ± 4 to 22 ± 3; (p <0.001).

Conclusions: Over a prolonged period of head-up CPR treatment in pigs, the combined application of LUCAS^{TM} and an ITD provided significantly higher SBP,