PNEUMERIC
CAPNOSPOT

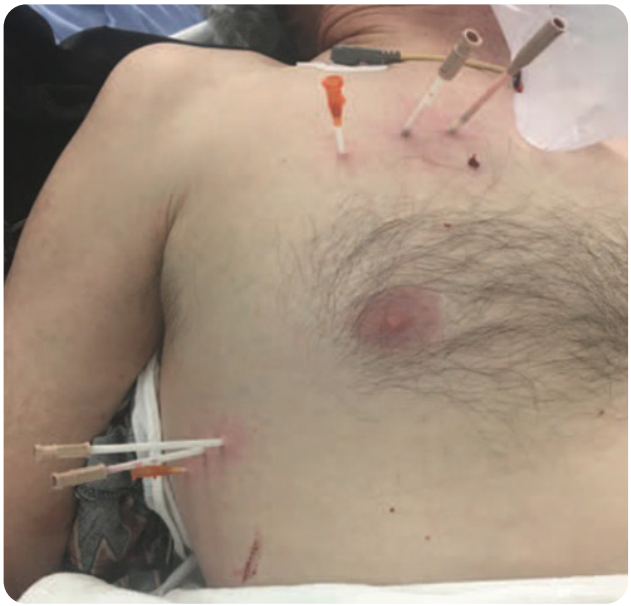
Know you're in with Capnospot™

Small. Lightweight. Lifesaving.

Decompression of tension pneumothorax via needle thoracostomy is lifesaving, with pre-hospital decompression reducing 24-hour mortality rates by 25%.[1] With the potential to improve decompression rates, reduce the number of procedures, and reduce wasted procedures and costs[4], Capnospot™ lets you know you're in.

The Problem

The current method of judging needle decompression success using a "gush of air" and clinical signs are subjective. Capnospot™ indicates if the decompression is non-therapeutic, or if the catheter loses patency, it will revert to its original color.[4]



Confidence

Even well-trained providers with correct equipment have needle thoracostomy failure rates of 10–50%.[2,3] More accurate than the current standard of care[4], Capnospot™ provides objective visual confirmation of decompression success or failure by using nearly instant (<5 seconds)[4] color change, ideal for noisy pre-hospital environments.

Versatility

Small, lightweight, and compact, Capnospot™ is compatible with all decompression devices and functions in low-light environments.

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2. J. M. Aho, C. A. Thiels, M. M. El Khatib, D. S. Ubl, D. V Laan, K. S. Berns, E. B. Habermann, S. P. Zietlow, M. D. Zielinski, Needle thoracostomy: Clinical effectiveness is improved using a longer angiocatheter., J. Trauma Acute Care Surg. 80, 272–7 (2016).
3. D. V Laan, T. D. N. Vu, C. A. Thiels, T. K. Pandian, H. J. Schiller, M. H. Murad, J. M. Aho, Chest wall thickness and decompression failure: A systematic review and meta-analysis comparing anatomic locations in needle thoracostomy., Injury 47, 797–804 (2016).
4. Naik ND, Hernandez MC, Anderson JR, Ross EK, Zielinski MD, Aho JM. Needle decompression of tension pneumothorax with colorimetric capnography. Chest. 2017;152:1015–20. - DOI

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Tension Pneumothorax Decompression with Needle Thoracostomy Colorimetric Capnography

Background

Trauma is a significant cause of reduced life years and mortality in both military and civilian populations. Tension pneumothoraces comprise a mixture of respired gases at pressures higher than atmospheric, and arise from air leaks within the respiratory system. Increasing volume of the pneumothorax increases intrathoracic pressure relative to cardiac filling pressures in the right atrium, leading to inflow failure, subsequent outflow failure, and eventual cardiopulmonary decompensation and death.

Rapid decompression of tension pneumothorax, via needle thoracostomy (NT), is a lifesaving maneuver allowing intrathoracic and atmospheric pressure equilibration and restoration of cardiac filling. While the technique appears simple, the data regarding the efficacy of needle decompression is controversial. Even if all the major variable factors such as chest wall thickness, anatomic location, optimal rigidity of the decompression catheter, and catheter length are accounted for, it remains difficult for field providers to rapidly confirm therapeutic decompression. *Current guidelines recommend operators utilize auditory cues for a "gush of air" and to assess for improvements in vital signs and cardiorespiratory function in an austere loud prehospital environment which is often impossible.*

Detection and *visual* recognition of respired gases during decompression is a simple method for improving needle thoracostomy. The gaseous composition of the tension pneumothorax is similar to that of endrespiratory gas, with an increased partial pressure of carbon dioxide when compared to the normal atmosphere, which makes colorimetric capnography an ideal confirmatory test.

Approach

We have developed a novel device based on colorimetric capnography to assist providers in rapid and accurate confirmation of needle thoracostomy placement. Immediate confirmation of success or failure of placement should result in immediate treatment; therefore, this device carries the potential to decrease the rate of mortality in prehospital situations. In previous work, our team generated and utilized a swine model of penetrating thoracic trauma to model tension pneumothorax physiology. We demonstrated that by incorporation of colorimetric capnography into the decompression device, needle thoracostomy led to improved success rates of decompression and earlier detection of success compared to currently used standard of care metrics. Additionally, we have conducted first in man pilot studies which demonstrate similar results in trauma patients.

Path forward

The Pneumeric, Inc. team has exclusively licensed the technology from Mayo Clinic and has received FDA clearance along with a superiority claim. Human clinical data has confirmed previous results from animal studies, providing a basis for broader fielding both in the military and civilian sector. In field care, this device should assist first responders in more accurate procedures allowing for more lives saved.

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