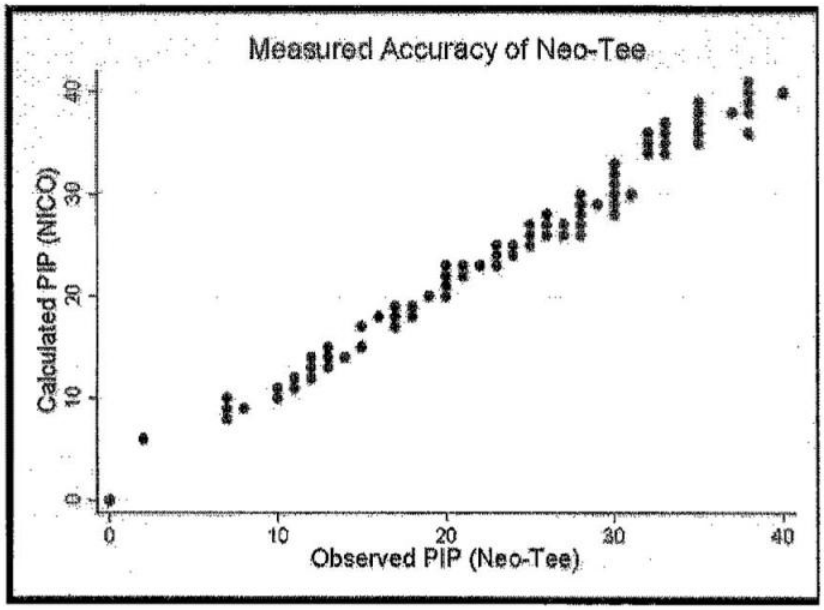
EVALUATION OF ACCURACY AND RELIABILITY OF THE NEO-TEE DISPOSABLE T-PIECE RESUSCITATOR.

John T. Gallagher, Kathleen M. Deakins, Timothy R. Myers; Rainbow Babies & Children's Hospital, Cleveland, OH

Background: T-piece resuscitators have gained popularity as devices used for both neonatal resuscitation and intermittent manual ventilation. Until recently, a substantial expense for the purchase of hardware was required to obtain reusable t-piece resuscitators. The Neo-Tee t-piece resuscitator (Mercury Medical, Clearwater, FL) incorporates the mechanical device into a disposable circuit. There is now a potential for more caregivers to adopt the practice of t-piece resuscitation courtesy of a technology that was formerly not available or affordable. The purpose of this bench study is to determine if a disposable resuscitator accurately and reliably delivers ventilating pressures at selected settings. Methods: Five Neo-Tee t-piece resuscitators were randomly chosen from a standard shipment supplied by the manufacturer. Resuscitators were adjusted to maintain the PEEP valve in a fully-closed position. Each circuit was independently attached to a flow sensor of the NICO 2 breath monitor (Respironics, Wellington, CT) and then to an infant test lung (Infrasonics, San Diego, CA) with known compliance of 1 mL/cmH2O. Manual ventilation was then simulated using this model. All five devices were evaluated at 12 prèdetermined levels of controlled pressure set within three color-coded zones on the Adjustable PIP Controller and at commonly-used flow rates of 5, 8, and 10 Lpm. Pressure readings on the built-in manometer were estimated by the investigator during simulated ventilation and were compared to calculated readings recorded simultaneously on the NICO 2 monitor using the Wilcoxon rank sum test. Reliability between circuits was evaluated using the ANOVA test. Results: There was no significant difference between the observed PIP ($p = 0.38$) or PEEP ($p = 0.22$) on the Neo-Tee when compared to the calculated pressures on the NICO 2. In addition, there was no significant difference in performance among disposable resuscitators when compared to one another ($p = 0.54$). Conclusions: In the laboratory setting, accuracy of delivered pressures and the reliability of circuit performance for the Neo-Tee resuscitators are consistent with the manufacturer's specifications.

Sponsored Research - None



1149785

CLINICAL ASSESSMENT OF CARBON DIOXIDE REBREATHING FUNCTIONAL RESIDUAL CAPACITY MEASUREMENT.

Lara Brewer, Joseph Orr; Anesthesiology, University of Utah Health Sciences, Salt Lake City, UT

Background: There is a need for an automated bedside functional residual capacity (FRC) monitoring system that can continually track the size of a patient's end-expiratory lung volume during mechanical ventilation without necessitating a step change in inspired oxygen (FIO_2). Such a system would be useful for measuring FRC in patients who cannot tolerate a change in FIO_2 because they require high levels of oxygen to maintain arterial oxygen saturation. We have developed a method for FRC monitoring that does not require step increases or decreases in FIO_2. The FRC measurement signals are provided by a volumetric capnometer (partial pressure of end-tidal carbon dioxide ($PetCO_2$) and volume of CO_2 eliminated (VCO_2) ($NICO_2$, Philips-Respironics, Wallingford, CT). The CO_2 washout observed during the single-breath transition from steady-state partial rebreathing to non-rebreathing is automatically actuated by the rebreathing loop of the $NICO_2$ monitor once every three minutes. This small observational study was designed to assess the accuracy, precision and repeatability of the proposed FRC measurement system. Methods: Accuracy and precision of FRC measurements were assessed by comparing the CO_2 rebreathing FRC values to the reference method, multiple breath nitrogen washout, in nine intensive care patients whose lungs were under mechanical ventilation. Repeatability was assessed by comparing subsequent individual measurements. Results: Compared to the reference method, the accuracy (bias) was -0.05 L and precision (1 SD of the differences) was 0.34 L (-2.6% ± 17.5%) (Figure 1). The difference between repeated measurements was 0.020 ± 0.42 L (mean ± SD) (1.1 ± 23.4 %), n=58. Conclusions: The CO_2 rebreathing method for FRC measurement provides acceptable accuracy and repeatability compared to the reference method during mechanical ventilation. These results indicate it should be possible to detect clinically important changes in FRC and automatically track the changes over a time course of hours or days. The precision of the measurement could likely be improved by averaging several measurements. Further study of the CO_2 rebreathing FRC method is needed to learn how accurate the method is for extremely injured lungs. Since both FRC and cardiac output can be monitored noninvasively by the $NICO_2$ monitor during mechanical ventilation, the measurements may be useful for guiding ventilator setting changes such as adjustments to positive end-expiratory pressure (PEEP).

Sponsored Research - Philips-Respironics

Measured Peak Inspiratory Pressures (cmH_2O)				
Circuits	*8 LPM Flow Rate*		*10 LPM Flow Rate*	
	Mean Error ± Std Dev	P-Value	Mean Error ± Std Dev	P-Value
Neo-Tee	2.7 ± 1.16	0.27	2.1 ± 1.10	0.12
NeoPEEP	2.3 ± 1.57	0.79	2.2 ± 1.23	0.44
NeoPuff	1.9 ± 1.20	0.37	2.0 ± 1.33	0.37
GE Resuscitator	2.0 ± 1.05	0.31	1.6 ± 1.17	0.21

1149846

When a CryoPen is held in contact with a wart, a freeze of the lesion is achieved. The CryoPen cryosurgery system does require daily maintenance that takes several minutes each day to assure that the metal probes are chilled and always available for use.

Additionally, since the pen applicators come into contact with the skin surface, these must be sterilized between uses.

Buzzy4Shots

Pediatricians and office staff are ever mindful that our young patients are fearful of the procedures we subject them to during well and sick visits. Some of our children are extremely anxious and upset when they arrive for a well-child exam because they are anticipating the inevitable sting of the needle.

Some parents of needlephobic children request prescriptions for lidocaine patches that they apply before office visits to anesthetize injections sites.

This year, Amy Baxter, MD, a pediatrician, researcher, parent, and pain specialist, developed the **Buzzy** device to reduce needlestick-associated pain in children. Appropriate for reducing the pain associated with venipuncture, intravenous catheter starts, vaccinations, and foreign body removal, the Buzzy is a vibrating device attached to frozen gel "wings" that is placed over a site for 30 seconds and then moved a few inches proximal (between the "brain and the pain") before the puncture or procedure. Based on the gate theory of nerve transmission, the vibratory and cold stimuli interfere with the ascending transmission of pain.

I've used the Buzzy for many weeks and have been impressed with the results. Before introducing Buzzy to my practice, I volunteered to get a needlestick and found that it was virtually painless.

Many of my young patients were impressed with the device, and their parents were pleased as well. For children, the Buzzy also provides a nifty distraction, which has a definite calming effect.

My nurses and I have observed that it is more effective on children older than 5 years than younger patients. I now use it routinely for wart treatments (see above) and for children aged 6 years and older who appear to be excessively anxious about an upcoming vaccination.

Very affordable at $40 each, every pediatrician should consider using Buzzy in his or her practice. To complement the device, Baxter also has created a variety of cards and posters featuring games with child-friendly characters and designs (as well as a Buzzy kazoo) to help with distracting children during painful procedures.

New resuscitator device

Those pediatricians who attend hospital deliveries are aware that there are new guidelines for neonatal resuscitation that were implemented this year. Traditionally, pediatricians use an anesthesia bag if a newborn requires positive pressure ventilations during resuscitation. With an anesthesia bag, even in the best of hands, it may be difficult to avoid overinflating the lungs even though we use an inline manometer.

Premature infants are particularly susceptible to the consequences of lung overinflation. Such barotrauma may be avoided with the use of the **Neo-Tee** from Mercury Medical—the first *disposable* T-piece resuscitator device. This $27 item includes an inline color-coded manometer as well as a pressure-relief valve that prevents overinflating of lungs. Bagging is not necessary because lung inflation is accomplished just by occluding an opening with a finger.

The unit requires setting the peak inspiratory as well as the peak end expiratory pressures before use, and each comes prepackaged with either a neonatal or infant anatomic face mask or a size 0 or 1 round silicone mask. The Neo-Tee is a welcome addition to our slowly growing repertoire of new devices to assist in resuscitation and newborn care.

Chemistry analyzer capability returns

Before CLIA '88 regulations went into effect in 1992, some high-volume pediatric practices found it worthwhile to perform serum chemistries in an office lab. For several decades, point-of-care chemistry analyzers were either not available or, as in the case of the iStat, just too expensive to consider using in a pediatric practice's office lab.

Recently Abaxis introduced its **Piccolo Xpress** chemistry analyzer for small office laboratories that perform numerous chemistry panels, both accurately and rapidly. Best of all, these tests are waived, cost a low $10 to $15 per panel, and use whole blood, so centrifugation is not necessary. Blood obtained by venipuncture