



Abstract 999 Figure 2 Ventilation simulation at 4.7 ATM

**Conclusion** The cardiorespiratory simulator, SimulResp, delivered blood gases values within normal range. The next step will be to implement clinical scenarios to facilitate medical student training.

**Reference** (1) Cherry AD, Predictors of hypercapnia in immersed exercise at depth, JAP2008,106:316–325.

## 1000 REPEATED THERMO-STERILIZATION INFLUENCES THE RELIABILITY OF PEEP-VALVES

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JC Hartung, G Schmalisch, CC Roehr. Dept. Neonatology, Charité Universitätsmedizin Berlin, Berlin, Germany

**Introduction** PEEP valves are used to provide a preset positive end-expiratory pressure (PEEP) together with self-inflating bags (SIB). It has recently been shown that such valves may deliver unreliable PEEP. We hypothesized that material fatigue due to repeated thermo-sterilization was responsible for decreasing reliability of PEEP valves.

**Methods** Laboratory study of 10 factory new PEEP valves. Valves were tested before (measurement 1) and after 10, 20 and 30 (measurements 2, 3, 4) cycles of routine thermo-sterilization for 7 min at 134°C by using a neonatal lung model (compliance 0.2ml\*kPa<sup>-1</sup>). Settings were: peak inspiratory pressure (PIP)=20 and 40cm H<sub>2</sub>O, PEEP=5 and 10cm H<sub>2</sub>O, respiratory rate=40 and 60/min, flow=8l/min. PEEP was recorded using a respiratory function monitor.

**Results** Before thermo-sterilization, a mean (SD) PEEP of 4.0 (0.9) and 7.7 (1.0)cm H<sub>2</sub>O was delivered by the 10 valves when set to 5 and 10cmH<sub>2</sub>O, respectively. One new valve only delivered 2.0 (0.0) and 5.0 (0.0)cm H<sub>2</sub>O. Four of the 10 investigated valves showed relevant variations in PEEP (CV>10%) throughout the thermo-sterilization process. Valve No. 8 completely lost its function after the second cycle of thermo-sterilization. 6/10 valves maintained the

ability to provide PEEP despite repeated autoclavation. Some valves showed tears or displacement of the rubber seal.

**Conclusion** The reliability of PEEP valves is affected by repeated thermo-sterilization. Valves should be tested before each use and substituted if necessary.

## 1001 CAN CLINICIANS PREDICT EARLY WHICH BABIES WOULD GO HOME ON OXYGEN: A CASE CONTROL STUDY

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<sup>1</sup>SSS Badrol, <sup>2</sup>K Quinn, <sup>3</sup>S Gupta. <sup>1</sup>Medical School, Newcastle University, Newcastle-upon-Tyne; <sup>2</sup>Neonatology & Paediatrics, University Hospital of North Tees, Stockton-on-Tees, UK

**Background** Babies born at extreme gestation are prone to develop complications of prematurity including bronchopulmonary dysplasia (BPD). It is however very difficult to predict babies at risk of being discharged on home oxygen.

**Aims** To identify the possible contributing factors for chronic oxygen dependency among infants born before 28 weeks gestation.

**Methods** Babies born before 28 weeks gestation between 2009 and 2011 and discharged home on oxygen (cases) from University Hospital of North Tees were identified. Matched control for gestation as close to the date of birth for each case was then identified from admission register. Demographic and clinical details pre & post discharge were collected for cases & controls and analysis for comparison done using SPSS® version 19.

### Results

- The mean gestation 26.5vs.25.6 weeks (p=0.170) and birth weight 915vs.828g (p=0.337) were similar between controls & cases respectively.
- Babies discharged on home oxygen were dependent on oxygen for significantly longer period (62vs.31 days; p=0.007); received prolonged CPAP (25vs.12 days; p=0.01) but difference in duration of mechanical ventilation was not significant (25vs.13 days; p=0.11).
- Peak inspiratory pressures for cases were significantly higher compared to controls (30vs.19mm Hg; p=0.031) but length of hospital stay was not different (87vs.80 days; p=0.477).
- BPD rates (p=0.001) and diuretic use (p=0.029) in home oxygen group was significantly higher.
- The duration of home oxygen therapy was not affected by postnatal complications or respiratory support.

**Conclusion** Prolonged period of respiratory support, high peak inspiratory pressures and use of diuretics in extreme premature babies is correlated with discharge on home oxygen.

## 1002 MONITORING AND PREVENTION OF UNPLANNED EXTUBATIONS

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DK White, ME Harvey. Paediatric Intensive Care, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

**Background and Aims** Unplanned Extubations (UE's) are potentially life threatening events<sup>1</sup>. They can result in traumatic reintubations which in turn can lead to tracheal damage. The monitoring and prevention of these incidents is of paramount importance to the safety of children in the paediatric intensive care unit (PICU).

**Methods** A previous audit of UE's had been conducted between August 2010 and April 2011 as we had noticed a sharp increase in incidence. Although the rate of 0.56/100 ventilator days was within

the expected range of 0.11–2.27/100 ventilator days<sup>1</sup>, we identified staffing levels and sedation as key areas which appeared to have some causal effect on these numbers. Following the audit, staff were made aware of the increase in UE's and the importance of prevention was highlighted.

**Results** Between May 2011 and March 2012, all incident forms were examined and those relating to 'accidental extubations' or 'tube displacement' were examined in more detail. During this time period it was noted that the UE rate was 0.65/100 ventilator days.

**Conclusion** Despite reviewing the sedation policy and staffing levels, the UE rate remains unchanged. It is possible that the heightened awareness of staff has increased the reporting rate but there is no evidence of this. Although our UE rate remains low we will continue to examine each case individually and review practice as necessary.

1. da Silva et al 2010. *Pediatr Crit Care Med*. Unplanned extubation in pediatric critically ill patients.

**1003** **RANDOMIZED CONTROLLED TRIAL ON EARLY L-CARNITINE SUPPLEMENTATION TO PRETERM NEWBORNS WITH RESPIRATORY DISTRESS SYNDROME. DOES IT INFLUENCE NEONATAL WELLBEING?**

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R Said, M Abd El Meguid, D Mosallam, M Mahmoud, Neonatology. *Pediatrics & Neonatology, Faculty of Medicine Cairo University, Cairo, Egypt*

**Background and Aim** Respiratory distress syndrome (RDS) is the most common cause of respiratory failure and requirement for mechanical ventilation (MV) of newborns. L-carnitine is essential for the processes underlying fetal maturation such as surfactant synthesis. This study aims to study the effect of early carnitine supplementation on respiratory, nutritional, hematological parameters in preterm neonates with respiratory distress syndrome.

**Methods** This study was conducted on 60 preterm infants 30–33 weeks of gestation presenting with RDS divided randomly into 2 groups: group A comprised 30 preterm infants who received I.V. L-carnitine at a dose of 30mg/Kg/day until oral intake was established; then it was given orally at the same dose, group B comprised 30 preterm infants who did not receive L-carnitine. Laboratory and radiological investigations were done to confirm RDS, to evaluate and to follow up growth pattern, hematological, and respiratory outcome in those neonates.

**Results** L-Carnitine supplementation resulted in significant increase in weight gain, decreased period of stay on mechanical ventilator and duration of hospital stay as well as improved discharge status in group A.

**Conclusion** L-carnitine could be routinely used for preterm neonates suffering from RDS to reduce the need of mechanical ventilation and oxygen requirements in addition to its role in growth. However its effects on hematological parameters should be traced in further research work.

**1004** **THREE DIFFERENT MASK HOLDS FOR POSITIVE PRESSURE VENTILATION IN A NEONATAL MANNEQUIN**

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<sup>1</sup>EV Wilson, <sup>1</sup>JE O'Shea, <sup>1</sup>M Thio, <sup>1,2</sup>JA Dawson, <sup>2</sup>R Boland, <sup>1,2,3</sup>PG Davis. <sup>1</sup>*Newborn Research, The Royal Women's Hospital*; <sup>2</sup>*The Murdoch Childrens Research Institute, Parkville*; <sup>3</sup>*University of Melbourne, Melbourne, VIC, Australia*

**Background and Aim** Mask ventilation is commonly used for neonatal resuscitation. Variable leak and inconsistent tidal volumes are reported in mannequin and delivery room studies. We compared the spider hold (SH) against the two-point top hold (TPTH),

and two-handed hold (THH) for delivering positive pressure ventilation (PPV).

**Methods** 53 participants from 5 professional groups provided PPV with each hold for 1 minute to a mannequin, using a T-piece resuscitator (PIP/PEEP 30/5 cmH<sub>2</sub>O, 40–60 inflations/min). Mask leak and expired tidal volume (T<sub>VE</sub>) were measured with a flow sensor. ANOVA was used to compare the average median leak from each participant for each hold and by professional group.

**Results** 7324 inflations were analysed.

**Abstract 1004 Table 1** Leak (%) mean(SD)

Professional Group	TPTH n=2554 inflations	SH n=2384 inflations	THH n=2406 inflations
Consultant n=10	34(28)	39(40)	45(35)
Fellow n=10	33(27)	32(32)	33(35)
Registrar n=10	31(22)	38(23)	13(14)
Midwife n=12	40(30)	43(36)	48(36)
Neonatal nurse n=11	35(28)	38(34)	40(33)

The mean (SD) leak was 35(27)%, 38(34)% and 39(33)% for the TPTH, SH and THH respectively (p=0.003). The mean (SD) T<sub>VE</sub> was not significantly different between the three holds (p=0.09). The lowest mean (SD) leak was measured with the THH by registrars 13(14)% and highest by midwives with the THH 48(36)% (p=0.001).

**Conclusion** Each hold can be used to give PPV. The SH does not appear to reduce leak when compared to the other holds.

**1005** **CALCULATED INHALED ALBUTEROL DOSE AND DELIVERED ALBUTEROL DOSE DURING SIMULATED INFANT VENTILATION USING A NOVEL VENTILATOR CIRCUIT CONNECTOR**

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<sup>1</sup>J Mazela, <sup>1</sup>K Chmura, <sup>2</sup>M Kulza, <sup>2</sup>E Florek, <sup>3</sup>TJ Gregory, <sup>3</sup>C Henderson, <sup>4</sup>M Keszler. <sup>1</sup>*Neonatology*; <sup>2</sup>*Laboratory of Environmental Research, Poznan University of Medical Sciences, Poznan, Poland*; <sup>3</sup>*Research and Development, Discovery Laboratories, Inc.*; <sup>4</sup>*Brown University, Women and Infants Hospital, Warrington, PA, USA*

**Background** Dose determination of aerosolized medications administered to ventilated infants is based on nominal dose and not on the calculated target inhaled dose. A novel ventilator circuit connector (VCC) (AFECTAIR®, Discovery Laboratories, Inc. Warrington, PA), has been developed to facilitate inhaled therapies to ventilated patients.

**Objective** The aim of the study was to evaluate the difference between the calculated inhaled dose (ID) and the actual delivered dose (DD) in an *in vitro* simulated infant ventilation system using the VCC vs standard of care (SoC).

**Design/methods** Albuterol sulfate (AS) was aerosolized with a jet nebulizer and delivered using SoC and VCC. Aerosolized AS was collected on HME filters placed before a test lung under different ventilation conditions. DD was determined by rinsing the filters and using an HPLC assay for AS. The calculated ID was determined using the formula: ID=Ca\*Vm, (Ca=aerosol concentration, Vm=minute ventilation).

**Results** There was a 10–14 fold increase in the *in vitro* DD of AS at various ventilation conditions when using the VCC compared with SoC. The difference between the calculated ID and the measured DD *in vitro* ranged from –42% to 15% for the VCC and from –388% to –158% for SoC.

**Conclusions** The VCC delivered a higher AS dose *in vitro* that was more representative of the calculated ID compared with SoC. The