● **205** MONITORING PATIENTS IN A PICU: COST CONTAINMENT POTENTIAL. Murray M Pollack, Urs E Ruttimann, Timothy S Yeh, Nancy L Glass (Spon by Glenn Rosenquist). GWU Med Sch, Chil Hosp Nat Med Cntr, Depts of Peds, Anesthesia, Washington, DC

ICU's are expensive and account for ~1% of the GNP. Many patients (pts) without life threatening dysfunction and not utilizing unique PICU therapies who receive only monitoring could be cared for in other hospital areas at a significant cost savings. Methods: All admissions to a 16 bed PICU for 13.5 months were evaluated. Daily assessemnts of types of care were accomplished with the Therapeutic Intervention Scoring System (TISS). Each of the TISS components were categorized as PICU therapies (e.g. mech ventilation), montoring: personal intensive (e.g. hourly vital signs), monitoring: technology intensive (e.g. arterial catheter) and routine care. Daily assessments of severity of illness utilized the Physiologic Stability Index (PSI). Patients were divided into low (mortality risk<1%) and high risk groups by an average PSI cutoff of 9. Results: 822 admissions utilizing 3969 days of care were evaluated. 226 pts (27.5%) utilizing 297 days of care (7.5%) did not receive unique PICU therapies (monitoring pts). 94.2% (213/266) were at low risk. A single diagnosis or clinical service did not predominate. Most care modalities used by the monitoring pts were personnel intensive (e.g. hourly VS - 82.7%, accurate I/O - 56.6%, mult stat studies - 45.1%). 93.8% of monitoring pts stayed ≤ 2 days. Conclusions: 1) Significant numbers of PICU pts never recieve unique benefits from their PICU stay. 2) Most monitoring pts are at low risk. 3) Protocols for improving PICU efficiency should be directed at screening admissions rather than reducing stay and should concentrate on care needs, not diagnostic entities.

† **206** ALTERATION OF BRAIN VOLUME-PRESSURE RESPONSE DURING OCTANOATE INFUSION IN RABBITS. Yvonne Rutherford, Zehava L. Noah, Akram Tamer, David G. McLone, Peter Grain (Spon. by James A. Stockman, III). Northwestern University Medical School, Children's Memorial Hospital, Divisions of Pediatric Critical Care and Neurosurgery, Chicago, Illinois, and University of Miami, Jackson Memorial Hospital, Department of Pediatrics, Miami, Florida

Elevated serum concentrations of short chain fatty acids, including octanoate, are found in patients with Reye's Syndrome. Continuous intravenous infusion of octanoate in rabbits has been reported to result in similar clinical and chemical changes of Reye's Syndrome including hyperventilation, coma, seizures, increased intracranial pressure and hyperammonemia. To further evaluate the effect of octanoate on brain compliance we evaluated the brain volume-pressure response (VPR) during continuous octanoate infusion in rabbits.

Volumes of 0.1ml were infused into the cisternal space of control rabbits (C) infused with normal saline and rabbits with continuous octanoate infusions at 1.5mmoles/hr (O). VPR was 1mmHg (C) vs 4mmHg (O). Time to recovery of initial intracranial pressure was <5 seconds (C) vs >10 seconds (O). Both groups received pavulon 1mg/hr and were mechanically ventilated without changes in pH, pCO_2 or pO_2. Intracranial pressure (ICP) ranged 5-10mmHg and no differences were noted between (C) or (O) rabbits (p=ns).

We conclude that continuous intravenous infusions of octanoate in rabbits 1) alter the brain VPR, and 2) do not produce elevations in ICP at 1.5mmoles/hr.

207 A NEW TECHNIQUE FOR MEASUREMENT OF OXYGEN CONSUMPTION IN CHILDREN RECEIVING MECHANICAL VENTILATION AT HIGH INSPIRED OXYGEN CONCENTRATIONS James A. Schena, John E. Thompson, Marc B. Hershenson, Robert K. Crone, (Spon. by Allan W. Walker) Harvard Medical School, The Children's Hospital, Department of Anesthesia, Boston.

We describe a new apparatus for non-invasive measurement of VO2 in intubated children receiving high inspired oxygen concentrations. The apparatus is a modification of the closed circuit system originally described by Engstrom et al (Acta Anesth Scand, 1961). It consists of a standard Emerson 3PV Pediatric Ventilator enclosed in an airtight chamber in series with an Ohio 822 dry rolling seal spirometer, which is employed as a gas reservoir for the chamber. A circulating motor that supplies continuous flow of gas to the patient allows the system to measure VO2 during spontaneous ventilation. A CO2 adsorber is placed in the expiratory limb of the ventilator circuit to eliminate CO2 from the exhaled gas. Oxygen uptake by the patient results in a net volume loss within the chamber, which is then replenished by the reservoir gas contained in the spirometer, this gas volume equaling the patients VO2. We measured VO2 in 3 critically ill children who were receiving narcotics and muscle relaxants. After administration of morphine sulfate, VO2 (cc/kg/min) decreased from 5.0±0.1 to 2.9±0.5 ($\bar{x} \pm$ SEM). Our technique for measuring VO2 may be useful in the management of nutritional and circulatory problems in critically ill children.

208 ACCURACY OF EXPIRATORY CO_2 MEASUREMENTS IN SMALL SUBJECTS USING THE COAXIAL AND CIRCLE BREATHING CIRCUITS. Richard A. Schieber, Alvin L. Saville, Richard A. Orr (Spon. by William H. Neches), Univ. of Pittsburgh School of Med. and Children's Hospital of Pittsburgh, Depts. of Anesthesia/CCM and Pediatrics, Pittsburgh, PA

Mass spectrometry is widely used to measure end-tidal concentrations of inhalation anesthetics and other gases during and after surgery in order to estimate their arterial concentrations. When certain breathing circuits are used in newborns, however, fresh gas flow may contaminate the expired sample, introducing a systematic error in the measurement of any end-tidal gas concentration. This error was estimated using CO_2 as an indicator substance of expired gas. The capnograms and the difference between $PaCO_2$ and peak-expired CO_2 ($PeCO_2$) were compared when either a coaxial or circle circuit was used to ventilate paralyzed newborn piglets. Gas was sampled from proximal and distal tracheal sites. No combination of standard circuit and sampling site produced a flat alveolar phase until the circle circuit was modified slightly to reduce gas mixing. Mean $PaCO_2$-$PeCO_2$ using the coaxial/proximal sampling, coaxial/distal sampling, and modified circle/proximal sampling circuits were 12.4, 9.2, 8.8 mm Hg, respectively. Mean $PeCO_2$ of each combination was significantly different from $PaCO_2$ ($p<.05$). Using the modified circle circuit with distal sampling, mean $PaCO_2$ in 17 piglets was 2.2 ± 0.2 mm Hg (SEM), range 0-6 mm Hg, with 95% confidence limits for each point ≤ 8 mm Hg. The modified circle system with distal tracheal sampling produces accurate results, although the standard coaxial and circle circuits do not.

† **209** CEREBRAL AND MYOCARDIAL BLOOD FLOW DURING CPR WITH AND WITHOUT EPINEPHRINE IN PIGLETS. Charles L. Schleien, J. Michael Dean, Raymond C. Koehler, John R. Michael, Teerachai Chantarojanasiri, Richard J. Traystman, and Mark C. Rogers. Johns Hopkins Hospital, Depts. of Anesthesiology/Critical Care Medicine and Medicine, Baltimore, MD

We assessed efficacy of conventional CPR in terms of cerebral (CBF) and myocardial (MBF) blood flows in an infant animal model and determined whether epinephrine (EPI) improves CBF and MBF as in adult animals. CPR was performed on pentobarbital-anesthetized piglets (2 weeks old, 4-5 kg) by a pneumatic compressor with 20% sternal displacement, 100 compressions/min, 60% duty cycle, and 1:5 breath to compression ratio. Chest recoil was incomplete, leading to 20% deformation of diameter. CBF ($ml \cdot min^{-1} \cdot 100g^{-1}$; microspheres) was 43 ± 4 (± SE; n=8) pre-arrest and 24 ± 7 at 5 min of CPR, but gradually fell further to 5 ± 4 at 50 min. MBF (188 ± 38 pre-arrest) fell from 27 ± 7 at 5 min to 1 ± 1 at 50 min. This was related to a gradual fall in aortic pressure with little change in right atrial or intracranial pressures. A second group of piglets (n=8) received EPI (4 μg/kg/ min). CBF at 5 min (46 ± 9) and 20 min (44 ± 10) were not different from pre-arrest (49 ± 5), although CBF still fell by 50 min (11 ± 4) as MABP fell. MBF (65 ± 16, 5 min), CBF, cerebral O_2 uptake and perfusion pressure were higher in the EPI group. We conclude that a) conventional CPR in infant piglets without EPI initially provides higher CBF and MBF than in adult animals, which is probably related to the greater chest deformity in young animals, and b) EPI further improves CBF and MBF by constricting other beds.

● **210** PRESENCE OF A PULMONARY VASCULAR "CRITICAL PRESSURE" IN INTACT CANINES: POSSIBLE EFFECT ON CAPILLARY WEDGE PRESSURE MEASUREMENTS. Sima M. Sconyers, Susanne R. Kest, Howard S. Goldberg. (Spon. by Alan H. Klein) UCLA School of Medicine, Cedars-Sinai Medical Center, Departments of Pediatrics and Medicine, Los Angeles, California.

In intact, open-chested canine preparations, cardiac output (Q), pulmonary artery pressure (P_{pa}), pulmonary capillary wedge pressure (P_{cw}), left atrial pressure (P_{la}), and airway pressure (P_A) were measured. In a Zone II condition, pulmonary vascular pressure-flow [($P_{pa} - P_A$) - Q] relationships were determined. The mean pressure axis intercept, the average critical pressure (P_c), was 15.9mmHg (range 9.4 - 18.1mmHg). These data confirm the presence of a P_c in the intact canine pulmonary vascular bed as has been previously described in isolated canine lung lobes. The presence of a $P_c > P_A$ should influence P_{cw} measurements. During small (2-3mmHg) step-wise changes in P_A over a range of P_A (3-26mmHg) we observed that P_{cw} accurately reflected P_{la} at low P_A and then diverged sharply. After diverging from P_{la}, P_{cw} increased as P_A increased with an average slope of 0.74 (range 0.61 - 0.86); P_{cw} always exceeded P_A. The breakpoint of P_{cw} from P_{la} did not occur at the boundary between Zone II and Zone III of West but rather, when P_A was still substantially less than P_{la} (mean 7mmHg less). These findings suggest that driving pressure in Zone II is the difference between P_{pa} and P_c, not $P_{pa} - P_A$. Since P_{cw} is either P_{la} or P_c, the P_{cw} can be taken as the pertinent back pressure to flow under all conditions.