

Objective Low birth weight infants (LBW) are at increased risk of cognitive and behavioral problems and at risk of iron deficiency (ID) which is associated with impaired neurodevelopment. We hypothesized that iron supplementation of LBW infants would improve cognitive scores and reduce behavioral problems.

Patients and methods: In a randomized controlled trial, 285 marginally LBW (2000–2500g) infants received 0, 1, or 2 mg/kg/day of iron supplements from six weeks to six months of age. At 3.5 years of age these infants and 95 normal birth weight controls were assessed with a psychometric test (WIIPSI-III) and a questionnaire of behavioral problems (CBCL).

Results There were no significant differences in IQ between the LBW-groups, nor compared to controls. Mean (SD) full-scale IQ was 105.2 (14.5), 104.2 (14.7), and 104.5 (12.7) in the placebo, 1 mg, and 2 mg-group respectively ($p=0.924$). The prevalence of children with CBCL-scores above the US subclinical cut-off was 12.7%, 2.9%, 2.7%, and 3.2% in the placebo, 1mg, 2 mg, and control-group respectively. Relative risks (95% CI) for behavioral problems vs. controls were 4.01 (1.13–14.29) in the placebo-group. In a logistic regression model, adjusted for confounders, the odds ratio (95% CI) for CBCL score above US subclinical cut-off in placebo-treated children was 4.5 (1.3–15.8) compared to iron supplemented children ($p=0.019$).

Conclusions Early iron supplementation of marginally LBW infants does not affect cognitive functions at 3.5 years of age but significantly reduces the prevalence of behavioral problems. The study suggests a causal relation between infant ID and later behavioral problems.

989 A RETROSPECTIVE COHORT STUDY TO ASSESS THE ASSOCIATION BETWEEN OUTDOOR AIR QUALITY AND LOW BIRTH WEIGHT

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Introduction Low birth weight (LBW) is defined by the World Health Organization as weight at birth of less than 2500 g. Epidemiological observations suggest that LBW contributes to a range of poor infant's health outcomes. Other studies suggest that an increase of outdoor air pollution levels may increase the incidence of LBW. This article presents results from a semi-ecological analysis of association between outdoor air quality and LBW in a cohort of mothers participating in Gestão Integrada Saúde e Ambiente (GISA) project, in Alentejo Litoral region (Portugal).

Materials Individual data on birth weight, residence, demographic, social and clinical covariates were collected by questionnaire from mothers ($n=1393$) participating on GISA project. Air quality data was collected with a lichen diversity biomonitoring program measured at spatially distributed sampling sites ($n=84$).

Methods Lichen biomonitoring was used to derive a continuous metric of outdoor air quality exposure. Geostatistical simulation was applied to lichen diversity data to derive equally probable maps of air quality with different exposure scenarios for each pregnant, to gain insight into exposure distribution and exposure uncertainty. Generalized linear models were used to predict the odds of LBW.

Results Factors found significantly ($p<0.05$) associated to LBW: smoking habits, prenatal surveillance, body mass index, intrauterine growth, weight gain during pregnancy, previous LBW. Air quality was not associated to LBW (odds, 1.001; confidence interval 95%, 0.998–1.006).

Conclusions Air quality was not associated to LBW. Factors found to be significantly associated with LBW are in line with scientific knowledge.

990 ETHNIC DIFFERENCES IN NEONATAL BODY COMPOSITION AND THE IMPACT OF PARENTAL SIZE. A POPULATION-BASED COHORT STUDY

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Background and Aim Neonatal size, and especially a relative "thinness", is associated with future risk of obesity and type 2 diabetes. The aim was to explore ethnic differences in neonatal body composition in a multi-ethnic population, and associations with parental anthropometrics and parity.

Methods A population-based cohort study of healthy pregnant women living in Oslo, Norway. Maternal data were collected in early pregnancy and neonatal weight, length, circumferences and skin folds after birth. Individual z-scores were calculated (stratified by gender and gestational age) with Western Europeans (WE) as reference. A general linear model was used to assess associations with parental anthropometry and parity. Crude and adjusted mean z-scores for neonates with origin from low- and middle income countries (LAMIC), with WE as reference, is presented.

Results 511 healthy, term neonates were included. LAMIC parents ($n=282$) were shorter than WE ($n=229$), had similar BMI but more maternal subcutaneous fat. Among the LAMIC neonates abdominal circumference differed the most from WE (mean z-score: -0.57 SD (95% CI: -0.69 to -0.44)). Neonatal skin folds were also smaller in the immigrant group (-0.29 (-0.40 to -0.17)). Length, however, was not significantly smaller (-0.21 (-0.35 to -0.07)). The observed ethnic differences were reduced when adjusting for parental body composition, but abdominal circumference remained significantly smaller (-0.37 (-0.53 to -0.21)).

Conclusions There were marked differences in neonatal body composition between neonates born by ethnic WE women and women with ethnic origin from LAMIC countries. Abdominal circumference was still smaller after adjustment for parental body composition.

991 NONINVASIVE VENTILATION IN CHILDREN, CAN WE PREDICT ITS FAILURE?

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Background and Aims Noninvasive ventilation (NIV) constitutes an alternative treatment for pediatric acute respiratory failure. However, tracheal intubation should not be delayed when considered necessary. Our main objective is to identify success/failure prognostic signs of NIV and determination of NIV characteristics.

Methods Noncontrolled, observational study in a PICU in a university hospital. All cases of NIV from June 2010 and March 2012 were included. Failure of NIV was defined as the requirement of endotracheal intubation at any time. The major characteristics of patients who were intubated were compared with the characteristics of those who were not after a trial of NIV. Predictive factors for failure of NIV were analysed by multivariate analysis.

Results 126 cases were included (60.3% males), mean age 25.3 ± 40.5 months and mean weight 11 ± 13 kg. There was 57.9% of type II

respiratory failure. Bronchiolitis was the most frequent condition (28%), followed by upper airway obstruction (15.2%), acute cardiogenic pulmonary edema (15.2%) and pneumonia (14.4%). CPAP was the respiratory mode more used. NIV success rate was 67.5%: 2.3% in the first hour, 32% between 1st–12th hour and 23.3% between 12th–24th hour. Failure rate was greater among patients with type I respiratory failure (34.9%) and acute respiratory distress syndrome (66.7%). A lower heart and respiratory rate at 6 hours were associated with NIV failure ($p < 0.05$).

Conclusions NIV is a useful and increasingly used ventilatory mode in PICU. Type I respiratory failure, decrease in heart rate and respiratory rate at 6 hours were risk factors for NIV failure. More studies involving predictive factors in children are still needed.

992 NEBULISED ILOPROST AND NONINVASIVE RESPIRATORY SUPPORT AS A FIRST TREATMENT FOR HYPOXAEMIC RESPIRATORY FAILURE IN EX-PRETERM INFANTS: PRELIMINARY EXPERIENCE

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Objective To describe a series of ex-preterm infants admitted to pediatric intensive care unit because of acute hypoxaemic respiratory failure complicated by pulmonary hypertension who were treated electively combining noninvasive ventilation (NIV) and nebulized iloprost (nebILO).

Methods Open uncontrolled observational study, Pediatric Intensive Care Unit, University Hospital.

Measurements and Main Results Ten formerly preterm infants with acute hypoxaemic respiratory failure and pulmonary hypertension, of whom 8 had moderate to severe bronchopulmonary dysplasia. Median age and body weight were 6.0 (2.75–9.50) months and 4.85 (3.32–7.07) kg, respectively. We observed a significant early oxygenation improvement in terms of $\text{PaO}_2/\text{FiO}_2$ increase ($p = 0.001$) and respiratory rate reduction ($p = 0.01$). Hemodynamic also improved, as shown by heart rate ($p = 0.002$) and pulmonary arterial pressure systolic/systolic systemic pressure (PAPs/SSP) ratio reduction ($p = 0.0137$). NebILO was successfully weaned in positive response cases: 4 infants were discharged on oral sildenafil. Three patients failed noninvasive modality and needed invasive mechanical ventilation; hypoxic-hypercarbic patients were most likely to fail noninvasive approach. Only one patient requiring invasive ventilation died and surviving babies had a satisfactory 1-month post-discharge follow-up.

Conclusions The noninvasive approach combining NIV and nebILO for ex-preterm babies with respiratory failure and pulmonary hypertension resulted to be feasible and quickly achieved significant oxygenation and hemodynamic improvements.

993 IMPLEMENTATION OF VENTILATION POLICY IN A PICU

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Background and Aims Pediatric intensive care units (PICU) worldwide use different ventilators with a wide variety of ventilation modes. As an unambiguous international ventilation guideline, we developed one. After implementation we evaluated to what extent physicians adhered to the new guideline.

Method We developed a ventilation guideline accounting for two groups: 1) heterogeneous lung disease, in which pressure control is

the preferred mode; 2) homogeneous lung disease, in which pressure-regulated volume control is preferred. The guideline was implemented in October 2008. We performed an uncontrolled, retrospective before-after design with a pre-test from January to July 2008 (T0) and two post-tests: May–November 2009 (T1); May–November 2010 (T2). All patients on conventional invasive mechanical ventilation during these periods were included. Outcome measure was the percentage of physicians' adherence to the ventilation protocol. We measured this by describing the ventilation mode on the first hour on the day of admission and the cause of respiratory failure, to distinguish in which group this patient belonged.

Results In group 1, the T0 adherence percentage was 79% (67/85). Adherence percentages after implementation of the guideline were 71% (51/72) and 84% (46/55) for respectively T1 and T2. For group 1, adherence in period T2 was slightly better ($p = 0.092$) than that in period T1. In group 2, adherence percentages rose statistically significantly from 66% at T0 (62/93) to 78% (79/101) and 84% (85/101) ($p = 0.015$).

Conclusion Implementation of a new ventilation guideline increased guideline adherence over time. Selection of the appropriate ventilation mode seems now clearer for physicians.

994 NON-INVASIVE VENTILATION (NIV) IN CHILDREN - ESTABLISHMENT OF A PEDIATRIC NIV SCORING SYSTEM

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Objectives Non-invasive ventilation (NIV) is being increasingly used in children with respiratory failure in order to avoid intubation and associated problems. We analyzed the efficiency of NIV in children and the outcome of our patients.

Methods In a retrospective study children who received NIV over the last 7 years were analyzed. Included were all children that had at least more than one hour of NIV and a cardiological disease or an infection of the airway. Patients were divided in subgroups according to their underlying disease. The following parameters were analysed: age, gender, weight, mode of NIV, hemodynamic and ventilatory status, blood gas analysis, days of hospitalisation and mortality rate.

Results 70 patients between the age of 1 day to 28 years that received NIV were analyzed. The study population consisted of: 35 cardiological patients (50%) and 35 patient with an infection of the airway (50%). Children that had to be intubated because of a respiratory failure were classified as nonresponders. The overall rate of responders was at least 79%. Response correlated significantly with the Positive End-Expiratory Pressure (PEEP) values, pCO_2 and FiO_2 at 6 hours after initiation of NIV.

Conclusion NIV offers an effective and successful alternative to conventional mechanical ventilation of children with respiratory failure. Due to advances in the currently available equipment and NIV algorithms we could significantly improve the rate of responders. Based on our findings we established a pediatric NIV score helping to predict NIV success.

995 IMPACT OF VENTILATOR-ASSOCIATED PNEUMONIA ON TREATMENT AND LENGTH OF STAY IN CRITICALLY PEDIATRIC PATIENTS WITH LOWER RESPIRATORY SYSTEM INFECTION

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Background and Aims Ventilator-associated pneumonia (VAP) may complicate the hospital course in critically ill children with