Evaluation of respiratory problems in premature neonates admitted to Elmonira hospital intensive care unit during the year 2007

Thesis

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تقييم مشاكل التنفس عند المبتسرين الذين تم حجزهم بوحدة العناية المركزة لحديثي الولادة في مستشفي المنيرة خلال عام ٢٠٠٧

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توطئة للحصول على درجة الماجستير فى أمراض الاطفال

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INTRODUCTION

Approximately 487,000 neonates were delivered before completing 37 weeks gestation in the United States in 2002, a population that represents 12.1% of all live births and a 14% increase since 1990 ***(Martin et al.,2002).*** The increase in the preterm birth rate in part to the steep rise in the number of multiple births over the past 2 decades (***Blondel et al., 2002).*** Many premature newborns require treatment in a neonatal intensive care unit at an annual national cost that exceeds $4 billion. Of the many complications of prematurity, including intracranial hemorrhage, necrotizing enterocolitis, sepsis and retinitis, lung disease remains the most common cause of neonatal morbidity.

During the past decade, dramatic changes in the medical management of premature infants have lowered the threshold of potential viability to 23-24 weeks of gestation. Below this age, developmental immaturity of multiple organ systems precludes survival. Death often results from pulmonary immaturity, which leads to severe tissue damage and dysfunctional gas exchange in an air-breathing environment (***Kendig et al., 1998).***The improved survival of very low birth weight neonates, the use of surfactant replacement therapy, and modern changes in mechanical ventilation have transformed the natural history of acute and chronic pulmonary insufficiency in premature newborns and have altered familiar radiologic patterns of disease. The main causes of respiratory problems in neonates include : respiratory distress syndrome, transient tachypnea of newborn, neonatal pneumonia, congenital anomalies as congenital diaphragmatic hernia, intracranial hemorrhage, severe anemia and metabolic disorders(***Cloherty et al., 2003).***

Evaluation starts with a thorough history and physical examination.History in the neonate focuses on maternal and prenatal history,particularly gestational age, maternal infection or bleeding, meconium staining of amniotic fluid, and oligohydramnios or polyhydramnios.Physical examination focuses on the heart and lungs. Chest wall asymmetry or sunken abdomen suggests diaphragmatic hernia. Asymmetric breath sounds suggest pneumothorax. In both neonates and infants, it is important to assess oxygenation and response to O2 administration by pulse oximetry(***Courtnery, 2007).*** Chest x-ray is also recommended.

There are several significant differences in the physiology of the respiratory system in infants compared with that of older children and adults. These differences include a more compliant collapsible chest wall, more reliance on diaphragmatic excursions over intercostal muscles, and collapsible extrathoracic airways; also infants' smaller airway caliber gives increased airway resistance and increased tendency towards atelectasis. Yet, other principles of respiration are similar in adults and children(***John, 2000).***

Infants born before 32 weeks gestation who received both antenatal steroids and postnatal surfactant were found on subgroup analysis to have significant reductions in mortality, severity of respiratory distress, and air leaks when compared with subgroups who received neither steroids nor surfactant, antenatal steroids only, or surfactant only(***Cole, 2006),(Stevens, 2007).***

Aim of the work

To evaluate the causes of respiratory problems in premature neonates admitted to Elmonira hospital NICU during the year 2007 as regards their incidence, management, complications and mortality.

Subjects and Method

This study is a retrospective study conducted on 106 preterm neonates admitted at neonatal intensive care unit (NICU) of Children Hospital, Cairo University over one year started from January to December 2007.

All records of premature neonates presented by respiratory distress are reviewed .

The presenting features included; tachypnea (respiratory rate > 60 breaths per minute), intercostal, subcostal, and sternal recession, expiratory grunting , cyanosis anddiminished respiratory sounds. Following data were collected; gestational age, birth weight, sex, mode of delivery , maternal illness, antenatal steroid intake, age at admission, duration on mechanical ventilation , complications and outcome.

Diagnosis of underlying respiratory problems was made using the following ;

(i)- clinical by using Downes Score

Downes Scoring system

	0	1	2
Cyanosis	None	In room air	In 40% FIO2
Retractions	None	Mild	Severe
Grunting	None	Audible with stethoscope	Audible without stethoscope
Air entry	Clear	Decreased or delayed	Barely audible
Respiratory rate	Under 60	60-80	Over 80 or apnea

Score:

> 4 = Clinical respiratory distress; monitor arterial blood gases

> 8 = Impending respiratory failure

(ii)-laboratory using arterial blood gases (ABG) and full sepsis screen.

(iii)- chest X-ray finings.

Mode of oxygen support used in this study to maintain oxygen saturation > 90% included ; head box, nasal oxygen , nasal continuous positive airway pressure (NCPAP) and synchronized intermittent mandatory ventilation (SIMV). Indication of mechanical ventilation were; PaO2 less than 50 mm Hg , PaCO2 more than 60 mm Hg, Arterial blood pH less than 7.2 and persistent apnea. Ventilator settings varied with individual cases. Adjustment were based on clinical, radiologicaland arterial blood gases. Neonates were weaned off the ventilator when there was clinical improvement supported by normal blood gases on minimal ventilator support.

All preterm neonates were monitored for any complications like pneumothorax , pneumonia , bronchopulmonary dysplasia, lung collapse and pulmonary hemorrhage.

- **Inclusion criteria :** all preterm neonates with respiratory distress**.**
- **Exclusion criteria:** lethal chromosomal or congenital anomalies and fullterm neonates.

Statistical analysis

Data were statistically described in terms of range, mean ± standard deviation (± SD), median, frequencies (number of cases) and percentages when appropriate. Comparison of quantitative variables between the study groups was done using Mann Whitney *U* test for independent samples when comparing 2 groups and Kruskal Wallis analysis of variance (ANOVA) test when more than 2groups. For comparing categorical data, Chi square (χ^2) test was performed. Exact test was used in stead when the expected frequency is less than 5. Univariate and multivariate analysis models were used to test for the preferential effect of the independent variable(s) on the dependent variable(s). A probability value (*p* value) less than 0.05 was considered statistically significant. All statistical calculations. were done using computer programs SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

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Abbreviation

ABG	Arterial blood gases
AOP	Apnea of prematurity
BPD	Bronchopulmonary dysplasia
BPD	Bronchopulmonary dysplasia
CDH	Congenital diaphragmatic hernia
CHD	Congenital heart defect
CLE	Congenital lobar emphysema
CPAP	Continous positive airway pressure
CS	Caesarian section
DIC	Disseminated intravascular coagulopathy
DM	Diabetes mellitus
ECMO	Extracorporeal membrane oxygenation
ET	Endotracheal tube
FDA	Food and drug adminstration
GA	Gestational age
GER	Gastroesophageal reflux
HFOV	High-frequency oscillatory ventilation
HFV	High-frequency ventilation
HIE	Hypoxic ischemic encephalopathy
HMD	Hyaline membrane disease
HTN	Hypertension