RESPIRATORY VIRAL INFECTIONS IN NEONATES SUSPECTED FOR BACTERIAL SEPSIS

Thesis

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Dedication

This work is dedicated to

Souls of

Mr/ Abdel Salam Osman Abdel Salam (1958-2014)

Dr/ Marwan Nazeh Emera (1992-2017)

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List of Abbreviations

Abb.	Full term
AAP	*American Academy of Pediatrics*
ALT	*Alanine aminotrasnferase*
AOM	*Acute otitis media*
ARDS	*Acute respiratory distress syndrome*
ASI	*Aspartate aminotransferase*
BAL	*Bronchoalveolar lavage*
BE/BD	*Base excess, base deficit*
BUN	*Blood urea nitrogen*
BW	*Birth weight*
C	*Celsius*
CBGs	*Capillary blood gases*
CD	*Cluster of differentiation*
CDC	*The centers for disease control*
CF	*Cystic fibrosis*
CHD	*Congenital heart disease*
CI	*Confidence interval*
CLD	*Chronic lung disease*
CNS	*Central nervous system*
CONS	*Coagulse-negative staphylococcus*
CPAP	*Continuous positive airway pressure*
CRP	*C-reactive protein*
CSF	*Cerebrospinal fluid*
CVCs	*Central venous catheters*
DFA	*Direct immunofluorescence or direct fluorescent antibody*
DM	*Diabetes mellitus*
DNA	*Deoxy-nucleic acid*
ECMO	*Extracorporeal membrane oxygenation*
EDTA	*Ethylene diamine tetra acetic acid*

List of Abbreviations (Cont...)

Abb.	Full term
EOS	*Early-onset sepsis.*
EV	*Enterovirus*
FDA	*Food and drug administration*
FIO2	*Fraction of inspired oxygen*
GBS	*Group B streptococci*
GI	*Gastrointestinal*
HA	*Hemagglutinin*
HAI	*Hospital-acquired infection*
HCO3	*Bicarbonate*
HCOV	*Human pathogenic coronavirus*
HFMD	*Hand, foot and mouth disease*
HFMV	*High frequency mechanical ventilation*
HMPV	*Human-metapneumovirus*
HRVS	*Human rhinoviruses*
HSV	*Herpes simplex virus*
I:T ratio	*Immature to total white blood cells ratio*
IFN	*Interferon*
IL	*Interleukin*
INF	*Tumor necrosis factor*
IQR	*Interquartile range*
IVIG	*Intravenous-immune globulins*
K	*Potassium*
LBW	*Low birth weight*
LOS	*Late Onset Sepsis*
M	*Matrix*
MAP	*Mean airway pressure*
MERS	*Middle eastern respiratory syndrome*
MPL	*Mannose binding lactin*

List of Abbreviations (Cont...)

Abb.	Full term

N ..... *Nadeoprotein*
NA..... *Neuroaminidase*
Na ..... *Sodium*
NICHD..... *National Institute of Child Health and Development*
NICU ..... *Neonatal Intensive Care Unit*
NMCU..... *Neonatal medium care unit*
NPA..... *Nasopharyngeal aspiration*
OI ..... *Oxygenation index*
P ..... *Phosphoprotein*
PaCo2..... *Partial pressure of carbon dioxide*
BG..... *Blood gases*
Pao2 ..... *Partial pressure of oxygen*
PCT..... *Procalcitonin*
PEEP ..... *Positive end expiratory pressure*
PH..... *Potential hydrogen*
PIP..... *Positive inspiratory pressure*
PROM..... *Premature rupture of membrane*
RBS..... *Random blood sugar*
RD, RF..... *Respiratory distress, respiratory failure*
RNA ..... *Ribonucleic acid*
rRT-PCR..... *Real time reverse-transcription polymerase chain reaction*
RSV..... *Respiratory syncytial virus*
SD ..... *Standard deviation*
SIMV ..... *Synchronized intermittent mechanical ventilation*
SNAP..... *Score for neonate acute physiology*
USA..... *United States of America*

List of Abbreviations (Cont...)

Abb.	Full term
UTIs	*Urinary tract infection*
UV light	*Ultraviolet light*
VLBW	*Very low birth weight*
WBC count	*White blood cell count*

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INTRODUCTION

Neonatal sepsis is defined as a clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first 4 weeks of life. When pathogenic bacteria gain access into the bloodstream, they may cause overwhelming infection without much localization (septicemia), or may be predominantly localized to the lung (pneumonia) or to the meninges (meningitis) ***(Paolucci et al., 2012).***

Neonatal early onset sepsis (EOS) is defined by ***the centers for disease control (CDC)*** as blood or cerebrospinal fluid (CSF) culture-proven infection occurring in a new born; that is younger than 7 days of age ***(Phares et al., 2008).*** Neonatal late onset sepsis (LOS) is defined as occurring from 8-90 days of life, occurring in otherwise healthy term infants in the community or affecting premature infants in the Neonatal Intensive Care Unit (NICU). For epidemiologic purposes, LOS infections occurring in very low birth weight (LBW) infants in the NICU are defined as those occurring at more than 72 hours of life ***(Puopolo, 2017).***

Because preterm infants in the NICU may not have classic symptoms that are observed in older infants and children, the possibility that a viral respiratory pathogen is the causative agent may not be considered ***(Colvin et al., 2012).***

The contribution of respiratory viruses to clinical signs of infection among infants in the NICU is largely unknown. These

infants are evaluated for sepsis, yet their bacterial cultures often are sterile. Because of diminished confidence in culture results, infants may receive prolonged antibiotic therapy ***(Cantey and Sanshez, 2011).***

Immunoflourescence of respiratory secretions, nasopharyngeal aspiration (NPA), tracheal aspirate and bronchoalveolar lavage (BAL) can be performed against a panel of respiratory viruses and is highly specific. The use of PCR can increase the rate of diagnosis of treatable causes of pneumonia from 13% to 31% ***(Clements et al., 2000).***

Comparative studies have shown that real-time reverse-transcription polymerase chain reaction (rRt-PCR) assays are substantially more sensitive than conventional methods, such as viral culture and immunofluorescence assays, for detecting respiratory viruses ***(Lassaumene et al., 2010).***

Furthermore, compared to conventional PCR and other real-time methods, multiplex rRT-PCR has a significant advantage as it permits simultaneous amplification of several viruses in a single reaction. This facilitates cost effective diagnosis, enabling the detection of multiple viruses in a single specimen, with high sensitivity (91%) and high specificity (100%) ***(Paranhos-Baccala et al., 2008).***