Analysis Of Respiratory Distress Syndrome

Respiratory Distress syndrome has been one of the most challenging diseases that clinicians have had troubled managing in pediatrics patients. One of the challenges that clinicians have encountered with is proving the proper treatment strategies since pediatrics have several differences than an adult does within. In order to have a better understanding we must first know the pathophysiology of respiratory distress syndrome to be able to evaluate the severity of the disease as well to update and educate our patients. In the next paragraph, I'm going to be discussing two different articles in how it summarizes their protocols in clinical management in in neonatal and pediatrics patients with ARDS. Today, every clinician has their own type of strategies and protocols in how they think best fits in treating their patients. The development of new modalities of treatments have significantly reduced its mortality rate which we will discuss the various forms of treatments in the next two articles.

Respiratory disease syndrome also known as the hyaline membrane is caused by the deficiency of surfactant production by the alveolar type 2 cells. Respiratory is the primary cause of respiratory disorders which there are so many factors that can contribute the deficiency such as prematurity, since surfactant isn't matured until 35 weeks of gestational. Other factors such as birth weight, gender, atelectasis, multiple gestations, prenatal maternal complications, maternal diabetes, abnormal placental conditions, and lastly umbilical cord disorders all contribute to the neonate's development and process. When I came across reading the book Comprehensive Perinatal and Pediatric of Respiratory Care, it mentioned the four phases that ARDS can be divided into:" the first phase the patient becomes dyspnea and tachypnea from latent pulmonary capillary leak into the interstitial space surrounding small numbers of alveoli. In Phase two, which usually occurs within the 12 -24 hours characterized by interstitial edema. As ARDS advances phase three begins, which the alveolar and capillary membranes become overwhelmed with fluid. During this stage, respiratory failure develops with worsening hypoxemia. Lastly, in the fourth phase, respiratory failure progresses which now the lungs have become fibrotic and resistant pneumonias begin to occur recurrently." (Eberle, P., Trujillo, L., & Whitaker, K. B. (2015) Clinical management of acute respiratory distress syndrome are much more limited for pediatrics that there is for adults since they are more sensitive internally and more delicate to treat without causing any kind of trauma. These articles explain the different types of trials they did in managing with tidal volumes, PEEP, high frequency oscillator ventilation, surfactant administration, nitric oxide. Pediatric acute lung injury and sepsis investigators did a study that described the incidence of acute lung injury and ARDS. They had a total of 6,403 admissions from those 1,096 required mechanical ventilation for more than 24 hours. They ended up enrolling 303 patients and 23 of them had ARDS. They had several doubts in their clinical management strategies if treating an infant would be the same as if treating an adult. I strongly disagree because an adult is going to have a much bigger chest wall, higher tolerance in their pulmonary system and lower functional residual capacity than an infant. The strategy approach they stated started with tidal volumes, they had a protocol for pediatrics which was based on a patient's gender, age, height and length. Peep has showed more effective when managing patient more aggressively with peep by improving arterial oxygenation and improved compliance. PEEP is strongly used in refractory hypoxemia, which is defined as partial pressure of arterial oxygen being less than 60mmHg on fraction of expired oxygen greater than 60%. Then they also did a study on HFOV which was reported that it might

improve survival and is unlikely to cause any harm. Due to the lack of trials mentioned in this article, it remains uncertain to which pediatrics demonstrates advantages over the HFOV over a lung protective conventional ventilation strategy. So many theories have been concluded, like surfactant administration which still remains uncertain if it's the right strategy for neonatal ARDS is successful. Questions also remain regarding the use of surfactant, the amount and the best delivery method. Inhaled nitric oxide is used to treat and manage pulmonary hypertension in newborns which is being used today for ARDS and even in adults as well. It is still not certain of the possible outcome improvements when contributing INO in the management of ARDS. Lastly, they mentioned how ARD's patient can benefit from ECMO, it can be a life saving with children with refractory hypoxemia due to the disease. It can be sometimes challenging to decide when children qualify to get treated for ECMO since it's shown to have a 18% surviving rate in newborns. Consider ECMO, when strategies result in inadequate gas exchange after evaluations demonstrate deteriorating trend. As per this article the proposed algorithm for ALI and ARDS is as follows, the initial management should include low tidal volume ventilation, optimization of peep, consider surfactant administration, keep peak inspiratory pressure less than 30 cm H20, oxygen index less than 15, if ventilation goals cannot be met consider HFOV or APRV. (pg.1596 Villar.Jesus.)

As technology advances to our advantages it increases more clinical trials to help improve the outcomes of neonatal, pediatrics and children with respiratory illness; it gives us their perspective for the future in our field. In this article, they start by explaining why is it so difficult to gather respiratory research since it's so limited when it comes to neonatal and pediatrics. They did a Cheifetz's presentation which focused on several of the large ARDS networks studies which they started with definitive data on low tidal volume ventilation (pg.1476). They did a comparison on the values of data on adults which the lowest tidal volume of 6 ml/kg benefits adults with ALI/ARDS. The question they couldn't seem to have answers for was if they could use 6ml/kg in pediatrics. There's still unresolved answers to where research remains unclear, yet studies and clinical trials are still being done. They also talked about other several topics regarding the management of ARDS such as PEEP, NPPV, Management of pulmonary hypertension, and Airway maintenance and Clearance which was about similar strategies to my other article mentioned above. When contributing the use high levels of PEEP, we need to also consider the possibility of causing barotrauma, which if it does occur we must consider high frequency ventilation. Regardless of the all the clinical strategies we must keep in mind, the sooner to treat early stages of ARDS the better the survival rate for the patient. We must aim to maintain a normal physiologic function which will give the patient time to heal and recover. Other treatments also being used in conjunction with ARDS are the use of diuretics, vasoactive, inotropic, terbutaline, administration of prostaglandin E, use of anti-inflammatory drugs such as corticosteroids and aerosolized bronchodilators which all have shown to increase survival in ARDS patients.

In Conclusion to these articles, there are so many strategies are yet to be proven as in having a successful rate in treating ARDS in neonatal. Although there is still no specific therapy for ARDS, treating the underlying conditions is essential along with supportive care, noninvasive ventilation and lastly mechanical ventilation. Since ARDS are more common in premature newborns, its important is to learn and understand the disease process and relate the knowledge to educate our patients. The outcomes of all these strategies is to provide adequate oxygenation and ventilation and protecting the lungs while minimizing injuries or trauma.