



## RESEARCH PAPER

## OPEN ACCESS

## Prevalence and attributable risk factors of respiratory distress syndrome among neonates confined at Cagayan Valley Medical Center: A retrospective study

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### Abstract

Combination of maternal and neonatal health and demographic factors contributes to the increasing cases of Respiratory Distress Syndrome worldwide even though it is known to be a preventable disease. This study involved the study of all neonatal patients with Respiratory Distress Syndrome (RDS) confined at Cagayan Valley Medical Center, particularly in Neonatal Intensive Care Unit for the year 2014-2018. Since the study is retrospective, retrieval and review of charts were utilized to gather data. The research concludes that mothers and neonates demographic and clinical profile greatly contributes to the occurrence of Respiratory Distress Syndrome and there are increasing numbers of cases of the said disease in the hospital. Therefore, formulation of campaign and program by the Department of Health focused on the prevention, early detection, and management of RDS which will be cascaded to the hospitals, clinics, health care centers until barangay level of all the municipalities in the region.

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## Introduction

Neonatal Respiratory Distress Syndrome, also known as Hyaline Membrane Disease is a disease in newborns that affects the neonate's breathing caused by lack of surfactant. Respiratory distress syndrome, which occurs primarily in premature infants, affects about 1% of newborns, resulting in about 860 deaths per year. Across 184 countries, Philippines ranks second (2<sup>nd</sup>) in the number of premature births in Southeast Asia, eight (8<sup>th</sup>) worldwide and seventeenth (17<sup>th</sup>) in deaths arising from birth complications (Pressreader, 2015). According to the data from Philippine Statistics Authority (conducted in the year 2006 and 2007), Respiratory Distress Syndrome (RDS) is the leading cause of death to the premature babies, 21.5% in 2006 and 21.4% in 2007.

The health care system in the Philippines encounters great difficulty in protecting these neonates against RDS, resulting to the increasing cases of deaths in the country. The Department of Health, on the other hand, has no existing programs nor campaigns that focus on the prevention of RDS.

Cagayan Valley Medical Center, classified as a tertiary hospital located in Region 2 has three hundred fifty five (355) cases from year 2014-2018. With these, three hundred eleven (311) infants died due to insufficient number of neonatologist, absence of surfactant supply in the hospital, late diagnosis and shortage of supportive management like nasal CPAP device and Extracorporeal Membrane Oxygenation. Respiratory Distress Syndrome is a preventable disease which needs attention for it to be totally eradicated and lower neonatal deaths.

This study aimed to identify the 5-year prevalence point and the attributing risk factors of Neonatal Patients with Respiratory Distress Syndrome confined at Neonatal Intensive Care Unit of Cagayan Valley Medical Center.

## Materials and methods

The research made use of Cohort Retrospective Design. All the subjects are determined to be newborns having Respiratory Distress Syndrome.

Charts were retrieved and reviewed to analyze what were the predisposing factors.

### *Locale of the Study*

The study and collection of data was conducted at the Medical Records Section of Cagayan Valley Medical Center which is considered a tertiary hospital that caters to the health needs from neonatal to geriatric patients of Region 2

### *Data Collection Procedure*

Research was approved by the Cagayan Valley Medical Center- Research Ethics Review Committee (CVMC-RERC). The number and the list of patients diagnosed with Respiratory Distress Syndrome for the past 5 years was given by IT center.

This is to compute for the prevalence of the subject being studied. Charts of the neonate's and the neonate's mothers were retrieved to study the demographic, clinical and behavioral profile to identify the risk factors of having Respiratory Distress Syndrome.

## Results and discussion

**Table 1.** Prevalence of RDS among neonates spanning 2014-2018.

| Year  | Population | No. of newborn with RDS | Percentage (%) |
|-------|------------|-------------------------|----------------|
| 2014  | 5350       | 20                      | 0.37%          |
| 2015  | 5776       | 16                      | 0.28%          |
| 2016  | 6746       | 30                      | 0.44%          |
| 2017  | 7624       | 71                      | 0.93%          |
| 2018  | 8020       | 47                      | 0.59%          |
| Total | 33,516     | 184                     | 0.55%          |

### *Prevalence of Respiratory Distress Syndrome*

There are an increasing number of cases of RDS in the medical center from the year 2014- 2017. During these years, the medical center has a few number mechanical ventilators which play as supportive management for RDS patients. Another problem is the non-existence of other treatment modalities such as surfactant replacement therapy, Continuous Positive Airway Pressure Machine and Nitric Oxide Inhalation. The highest number of newborns with RDS was recorded in year 2017 since there were an increased number of deliveries in that year. As per observation, in the year 2018, there is a gradual

decrease of cases which is believed to be caused by procurement of other supportive management, especially mechanical ventilators. Surfactants were also available for purchase outside the hospital. Dexamethasone is also being prescribed to mothers

who are detected to be at risk of undergoing preterm labor. This is used to enhance the production of surfactant in the neonate's lungs, which prevents the occurrence of RDS or decreases the risk of mortality to RDS patients.

**Table 2.** Significant difference on the prevalence of RDS when neonates are grouped according to their demographic and clinical profile.

| Category            | Profile of Neonates         | Pearson Chi-square | P-Value | Interpretation     |
|---------------------|-----------------------------|--------------------|---------|--------------------|
| Demographic Profile | Sex                         | 49.3928            | 0.688   | Not significant    |
|                     | Weight                      | 493.063            | 0.33*   | Significant        |
|                     | Birth order                 | 3.3927             | 0.907   | Not significant    |
|                     | Municipality of origin      | 43.1721            | 0.671   | Not significant    |
| Clinical Profile    | Classification of infant    | 19.9330            | 0.018*  | Significant        |
|                     | APGRAR score                | 5.6858             | 0.771   | Not significant    |
|                     | Estimated gestational age   | 211.7934           | 0.005*  | Significant        |
|                     | Associated co-morbidities   | 10.3732            | 0.321   | Not significant    |
|                     | Tool used to rule out RDS   | 9.2505             | 0.414   | Not significant    |
|                     | Supportive management given | 54.7068            | 0.152   | Not significant    |
|                     | Length of hospital stay     | 186.8859           | 0.002** | Highly significant |

\*at 0.05 level of significance

#### *Attributable Risk Factors in Neonates*

Among all the categories under demographic profile of neonates, only weight yielded a significant result. This means that when infants are classified according to their weight, it will show that there is a relationship of weight and the prevalence of having RDS. This is because all of the infants are classified as low birth weight. Since all of the neonates are also premature, the fetus has lesser time to grow and develop in the mother's womb. This result is supported by the study of South American in October 2010, regarding the impact of RDS in very low birth weight infants, where it has been found out that RDS had a high incidence among this group. Mortality is high and relevant morbidity is also increased. Clinically, length of hospital stays demonstrated high significance. The longer an infant stay in the hospital, the more the supportive management provided, the greater is the possibility of the infant response to the treatment. Mortality often occurs between one to three days when the disease is progressive and worse. This is further explained by Unipoint health in the year 2020 where it affirms that RDS usually gets worse about 3-4 days. If a baby has relatively mild disease and does not need a breathing machine, the infant may be off oxygen in 5-7 days. If a baby has more severe disease

there is also improvement after 3-5 days, but the improvement may be slower, and the baby may need extra oxygen and/or ventilator for days to weeks. Classification of infant and estimated gestational age is also found to be significant in the prevalence of RDS. The smaller and more premature the infant is, the greater the incidence of RDS. The greatest risk factor for RDS is low gestational age and the development of the disease begins with the impaired synthesis of surfactant associated with prematurity. (Pickered & Kotecha, 2008, p 155).

#### *Attributable Risk Factors in Mothers*

The number of children is significantly related in the occurrence of RDS. Relating this with the monthly income, which also showed significance, indicates a higher tendency of having RDS in infants whose mothers have low income. The study of C. Ruth *et al*, Socioeconomic Status (SES) is linked with birth outcomes; lower SES groups demonstrates higher neonatal morbidity and mortality, partially related to higher rates of preterm delivery, which in turn premature delivery causes RDS. Diseases experienced by mothers before and during pregnancy, such as Diabetes and Hypertension are factors that increase the incidence of RDS in babies.

That is because increased systemic glucose and serum insulin concentrations in the fetus are potential inhibitors of fetal lung maturation and may contribute to the pathogenesis of RDS in infants of mothers with Diabetes Mellitus. (NCBI, 2015). Moreover, the increased incidence of respiratory

distress syndrome in babies of hypertensive mothers may be due to the absence of labour before delivery because of the greater likelihood of caesarean section. (NCBI, 1991). Medications taken during pregnancy, as one of the clinical factors in this study, have also resulted significant in this study.

**Table 3.** Significant Difference on the prevalence of RDS when mothers are grouped in demographic, clinical and behavioral/lifestyle profile.

| Category              | Profile of mothers                                  | Pearson Chi-Square | P-Value | Interpretation     |
|-----------------------|---|--------------------|---------|--------------------|
| Demographic profile   | Age   | 66.8493            | 0.314   | Not significant    |
|                       | Occupation  | 149.6066           | 0.607   | Not significant    |
|                       | Monthly income                                      | 182.9633           | 0.0043* | Significant        |
|                       | No. of children                                     | 144.2751           | 0.001** | Highly significant |
| Clinical profile      | Disease(s) experienced during pregnancy             | 36.7295            | 0.001** | Highly significant |
|                       | Underlying disease/chronic disease before pregnancy | 224.4810           | 0.014*  | Significant        |
|                       | Medications/ vitamins taken during pregnancy        | 34.8290            | 0.018   | Significant        |
|                       | Type of delivery                                    | 29.6944            | 0.328   | Not significant    |
| Lifestyle/ Behavioral | Smoking   | 8.0468             | 0.529   | Not significant    |
|                       | Alcohol consumption                                 | 0.1696             | 0.681   | Not significant    |

\*at 0.05 level of significance

The study of M. Arigliani and Associates published in 2018, affirms that micronutrient deficiency is proven common worldwide and vitamins are extensively recognized as being important for the developing fetus and neonate. Pregnant women have higher metabolic demands and are at risk of micronutrient deficiency, especially those of low socio-economic status from developing countries. Micronutrients with the most relevant effects on lung development are Vitamins A, D, E, selenium and omega-3 docosahexaenoic acid. Majority of the mothers did not take any vitamins or medication, which may cause the incidence of RDS in their babies.

### Conclusions

Mothers and neonates demographic and clinical profile greatly contributes to the occurrence of Respiratory Distress Syndrome. The five point prevalence of RDS in Cagayan Valley Medical Center is 5.55% in every 1000 neonatal deliveries and it seems to be of high prevalence during 2014-2017 period because of limited resources in the medical center as well as unawareness of the mothers to the risk factors of RDS. However, it decreased in the year

2018, since, different management approach is being given, such as mechanical ventilator and surfactant replacement therapy.

The status of RDS even when there is observed decrease in prevalence during this recent years, and that the factors causing RDS are slowly addressed, it remains a threat to neonates and in the next coming years we will have to expect deaths because of RDS.

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