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Original Article

Assessing parenting capacity to identify RSV symptoms and the impact on their children's health: A brief report

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Abstract. Respiratory syncytial virus (RSV) is a viral infectious disease that has detrimentally affected the quality of life in children younger than 2 years of age since it was discovered in 1956. It is the major cause of lower respiratory tract illness in young children. So effectively does RSV spread that essentially all persons have experienced RSV infection within the first few years of life. RSV is estimated to cause up to 75% of all infant bronchiolitis and 40% of all pediatric pneumonia. RSV can manifest in different ways, causing a myriad of symptoms, which are as follows: (1) cough; (2) shortness of breath; (3) fever; (4) wheezing; (5) decrease in appetite; and (6) runny nose. Data collection methods for this study consisted of the utilization of primary methods such as interviewing. Interviews conducted in either Spanish or English were utilized for data collection, accommodating the local Hispanic population. Seemingly, a weak negative correlation exists between early identification of RSV and oxygen requirements upon inpatient admittance and a weak positive correlation exists between early identification of RSV and length of hospital stay. This study concludes the need for additional research among the Hispanic population due to lack of information in parenting capacity to identify RSV symptoms.

Keywords: Hispanic, RSV, Symptoms, Hospitalizations

Introduction

Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis and pneumonia in children younger than 1 year of age in the United States [6]. The virus can spread from person to person through the air by coughing or sneezing, by direct contact with an infected person, or by touching an infected object or surface. Patients with RSV are normally contagious for about a week; however, infants and the immunocompromised may continue to spread the virus for as long as 4 weeks. Symptom onset occurs 4 to 6 days after infection. A physical exam, medical history, and nasal swab culture serve as important diagnostic tools in determining RSV infection [7]. This study aims to understand the importance of early RSV identification by parents and how it impacts the child's health through calculating the length of hospitalization once diagnosis has been made and the amount of oxygen administered on the 1st day of hospitalization. The results of this study will attempt to confirm or deny if a correlation exists between the factors mentioned above.

Materials and Methods

Study design

The distribution and collection of information from the families were done at South Texas Health System Edinburg Children's Pediatric Hospital. The interviews were performed either in English or Spanish. The study eligibility period was predefined as from November 1st 2022 to December 1st 2022.

Patient population and data collection

Children included in the study were younger than 4 years of age with laboratory-confirmed community-acquired RSV disease; 51 children participated in the study.

Statistical Analysis

Descriptive analyses were stratified to characterize children with RSV based on:
1. Age group (0-3 months, 3-6 months, 6-12 months, >1 year); 2. Gender (male / female).

A correlation analysis was used to assess if early recognition of symptoms by parents have an impact on the oxygen requirements for the child upon first day of arrival, and also its influence on the length of hospitalization among the eligible children cohort. A statistical analysis was also conducted in order to identify the difference in oxygen requirements based on age, gender, and the difference in length of stay based on the same variables mentioned above.

Study Site Characteristics

Assessing parenting capacity was done based on which

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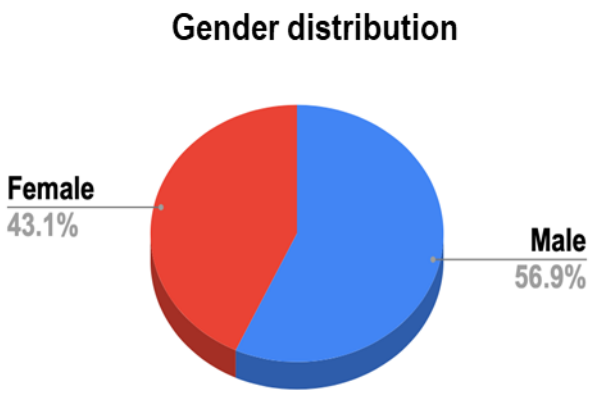

Figure 1 Patients percentage admitted based on gender distribution.

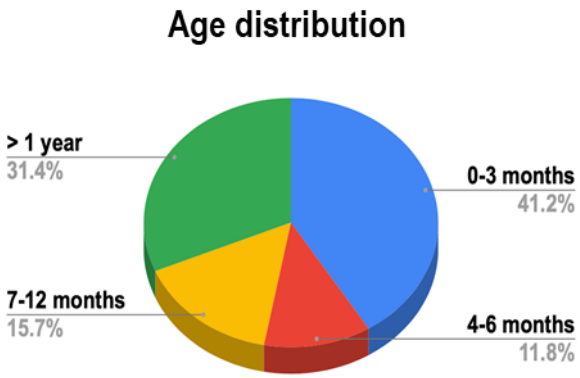

Figure 2 Patients percentage admitted based on age distribution.

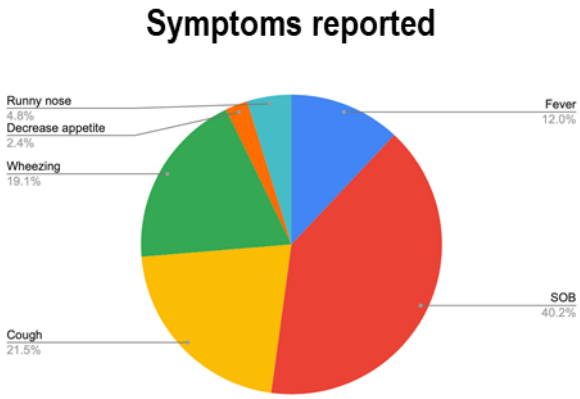

Figure 3 Symptoms reported by patients parents admitted to the hospital infected with RSV.

RSV symptoms were identified before hospital visit. Secondly, the study exemplified shortness of breath (SOB) serving as the predominant symptom most likely to be reported by parents, with 40.2% stating it to be the reason for their concern and visit to the hospital, ER, or pediatrician. Wheezing was reported to trigger a parenting alarm in 19.1% of cases and cough in 21.5%. Respiratory symptoms were of the most concern for parents with 80.8% reporting symptoms such as shortness of breath, cough, and wheezing. Additionally, the length of hospitalization due to RSV was an average of 4 days until their symptoms resolved or their parents felt comfortable going home. Female patients averaged 3.86 days while male patients averaged 4.27 days, a 10% increase in male patients.

Statistical analysis between age and length of hospitalization revealed that patients aged 4-6 months took longer to recover symptomatically, requiring 4.5 days compared to 3.8 days for children aged >1 year, exemplifying a 15% increase in hospitalization time in patients aged 4-6 months. The average amount of oxygen needed on the first day of hospitalization was 1.38 liters per patient. When comparing age groups among the patient population, the 4-6- month age bracket required the most oxygen with an average of 1.83 liters compared to the 1.22 liters of oxygen needed by the 0-3-month age bracket, suggesting a 33% higher oxygen consumption in patients aged 4-6 months.

The study exemplified the fact that 59% of parents brought their children to the hospital within 24 hours since of symptom onset and 79% in less than 48 hours. 43% of parents took their children directly to the pediatrician before the ER, while 57% of parents took their children directly to the ER.

The primary goal of this study was to analyze the possible existence of a correlation between:

- Early RSV identification & total length of hospital stay.
- Early RSV identification & amount of oxygen needed upon arrival.
- Amount of oxygen needed on arrival & total length of hospital stay.

We understand the correlation coefficient (r) value ranges from -1 to 1, showing either a positive or negative correlation. We define the strength of the correlation by the following range: strong correlation showing a value between 0.85 to 1, a medium correlation between 0.5 and 0.85, a weak correlation between 0.1 and 0.5 and no correlation if the value is below 0.1.

The study showed the following results:

- Early RSV identification and total length of stay at the hospital: $r = 0.11$
- Early RSV identification and amount of oxygen needed on arrival: $r = -0.145$
- Amount of oxygen needed on arrival and total length of stay at the hospital: $r = 0.09$

The study revealed a weak positive correlation between RSV identification and length of hospital stay, $r = 0.11$. As time passed between parents identifying RSV symptoms in their children and bringing them to the hospital ~~grew~~, the more time was spent in the hospital. A weak negative correlation exists between RSV identification and oxygen requirements upon arrival, $r = -0.145$. Though parents were able to bring their children to the hospital sooner, the need for oxygen grew. Finally, no correlation was established

TABLE 1
CORRELATION COEFFICIENT (R) RANGE

Correlation strength value	Range
Strong	0.85-1
Medium	0.5-0.85
Weak	0.1-0.5
No correlation	<0.1

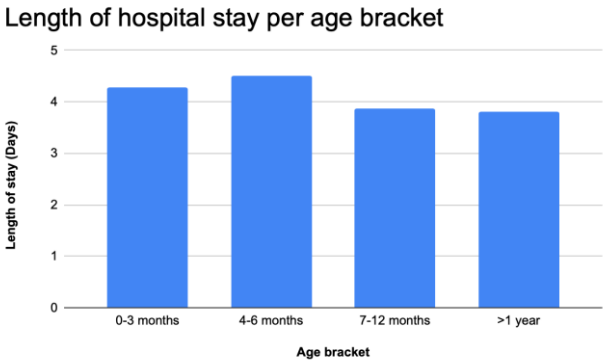

Figure 4 Length of stay at the hospital in days by each age bracket.

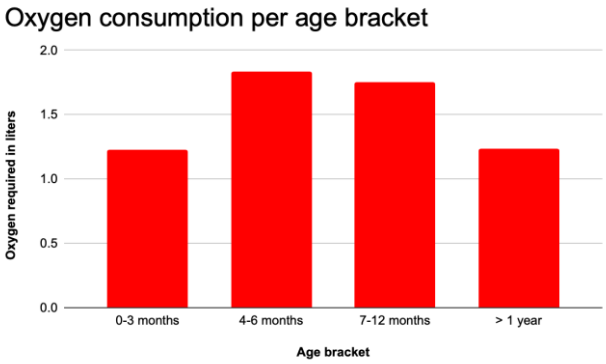

Figure 5 Oxygen amount required in liters upon arrival for each age bracket.

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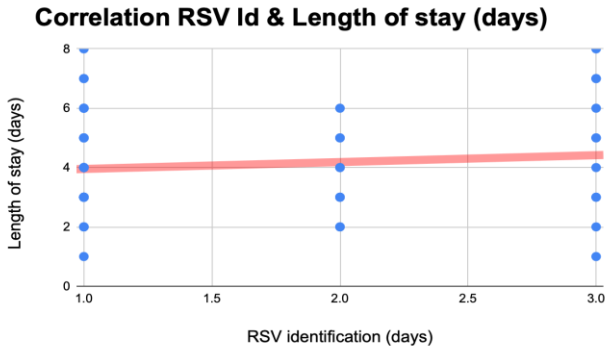

Figure 6 Weak positive correlation between RSV identification in days and length of stay in the hospital in days.

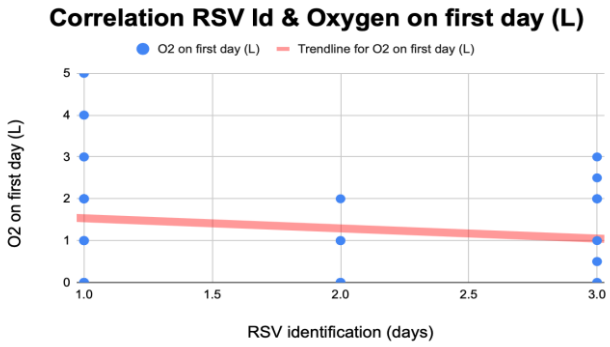

Figure 7 Weak negative correlation between RSV identification in days and oxygen amount required in liters.

between oxygen requirements upon hospitalization and total length of stay, r = < 0.1.

Discussion

The study concluded that early identification of RSV symptoms does have an impact on the child's health regarding length of hospitalization (r = 0.11), exemplifying that earlier hospitalization correlates with earlier discharge. Increasing parental awareness regarding RSV identification will result in an optimization of hospital resources, translating into less demand for RSV-associated hospital admission and an increase in bed availability for other conditions. The study also proved a weak negative correlation (- 0.145) between early identification of RSV and oxygen supply needed on the first day of arrival. When parents admit their children sooner to the hospital (sooner RSV identification), they do so in reaction to the child displaying a worse condition, of which may be due to the peaking of viral symptomatology compared to latter admitted patients. The latter population may not require as much oxygen due to diminished viral strength.

Furthermore, no correlation existed between oxygen requirements during hospitalization and total length of stay, r = < 0.1, possibly due to unique recovery requirements from person-to-person from the same viral attack.

It is worth mentioning that only 43% of parents took

their children to a pediatrician before taking them to the hospital, while 57% took them directly to the ER. Continued awareness and education for parents could lead to a better understanding of viral symptomatology as well as steps required for proper care. The potential benefit of this initiative is a better allocation of hospital resources, less demand for hospital admission, and therefore less demand for hospital oxygen supply.

We understand that early identification of RSV could be perceived as a lead time bias, patients would seem to recover faster from the disease when in reality their disease was just detected earlier. This would imply that hospital support for patients suffering from RSV has no effect on the development of the virus or its recovery time. We conclude that more studies would be beneficial, introducing a better understanding of the correlation between early symptom identification and the impact on the child's health. A larger population would increase the power of the analysis, providing a more sensitive correlation coefficient value.

Conclusion

This study describes the potential benefit of early RSV identification and pediatric hospitalizations in Hidalgo County. Between the 2021-2022 and 2022-2023 seasons, Southeast Texas had an increase in the number of RSV tests reported as well as the number of positive test results [8]. Such an increase in RSV positive cases creates a greater pressure in the South Texas Healthcare System every winter, this study may be complemented by an RSV cost estimate in the community setting or by an ecological approach to estimate hospitalization attributable to RSV.

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Conflict of interest

The authors declare no conflicts of interest.

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