



## RESEARCH ARTICLE

## OPEN ACCESS

### PREVALENCE BY AGE GROUP, SEASONALITY AND CLINICAL MANIFESTATIONS IN HOSPITALIZED CHILDREN WITH RESPIRATORY INFECTION IN A HOSPITAL IN RECIFE

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#### ABSTRACT

**Introduction:** Respiratory conditions may be upper or lower, and in many cases, it is associated with an infection. The most affected age group is between 0 and 9 years old, with the highest rates among those younger than 1 year, due to the immaturity of their immune system. Studies have shown correlation of these conditions with rainy periods, such as winter, which represents the season with the highest incidence. Among the symptoms, fever, cough and dyspnea are seen in most cases. Therefore, the importance of the profile of the children hospitalized with these cadres in the Children's Hospital of the city of Recife is understood. **Objectives:** To describe the prevalence by age group of major involvement with hospitalization of children due to airway infections, to analyze the climatic periods of affection and its correspondence with the seasonality of airway infections among the children of the age group and to describe the initial clinical manifestations, according to URTI and LRTI. **Methods:** A cross-sectional, retrospective, documentary observational study through medical records of children between 0 and 10 years of age hospitalized with respiratory infections at Hospital do Recife in 2016. **Results:** The most affected age group was Infants, with 60.9% of the cases, followed by Pre-school (24.6%), School (7.8%) and Neonates (6.7%). As for the clinical manifestations, the most common was Dyspnea (86.8%), then Cough (74.7%), with Productive in 28.2% of cases; (65.9%), Wheezing (48.3%) and Adventitious Sounds (40.6%), with the most common being Rales (77%). Regarding seasonality, 33% occurred in Winter, leaving Summer in second place with 32.4% of cases. **Conclusion:** The data obtained are in line with the literature, showing the high prevalence of respiratory diseases in children between 0 and 10 years of age, mainly during the winter, with the development of specific strategies to treat and direct the diagnoses during these periods.

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#### INTRODUCTION

These syndromes can be subdivided into upper respiratory tract infection (URTI) and lower respiratory tract infection (LRTI) (Ranganatha, 2003), and they are caused mainly by viruses and bacteria (Pitrez, 2003). A study by Berezin *et al.* in 2012 noticed that the age group most affected by Pneumonias is 0 to 9 years.

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That can be explained because the pediatric population still has immune system immaturity, and has not yet acquired specific defenses against certain viruses (Durigon, 2014). This factor is present, for example, in neonates and children up to one year old, who presented the highest incidence rates (Nair, 2010). The age ranges can be divided into: Neonates (0 to 30 days), Infants (30 days to 2 years), Preschoolers (3 to 6 years) and School children (7 to 10 years). The main forms of URTI manifestations are: rhinopharyngitis, sinusitis, pharyngitis, laryngitis; while the main manifestations of LRTI are bronchitis, bronchiolitis and pneumonia, the latter being one of

the most prevalent among children with respiratory tract infections (RTI) and responsible for high mortality (Oliveira, 2014). According to Chou *et al.*, 2016, a study carried out in Taiwan showed that 70.8% of the children hospitalized with LRTI had a viral etiology, and 40.6% were *Streptococcus pneumoniae*. Other studies have shown a correlation between RTI and seasonality, with increased incidence in certain periods of time, as well as increased hospitalizations (Façanha, 2004 and Hueb, 2011). One factor that contributes directly to this picture is the change in air humidity, because reductions of more than 30% can cause risks to the integrity of the airways, while places with high humidity can facilitate the proliferation of fungi that can contribute to the emergence of RTI (MOLD, 2018). This same study pointed out that, although in greater quantity, the RTI present a lower chance of aggravation when they occurred in rainy periods. The explanation would be the fact that in dry periods the pollutants would facilitate a greater irritation of the airways, promoting more complicated pictures (Rosa, 2008). Seasonality and climatic conditions, therefore, are fundamental factors in the study of RTI and the most likely etiological agent of the disease. Another study showed that the main etiological agents responsible for these conditions were: rhinovirus, influenza, adenovirus, respiratory syncytial virus (RSV) (Herendeen, 2000), *Haemophilus influenzae*, *Streptococcus pyogenes* and *S. pneumoniae* in the case of URTI; among LRTI, *Bordetella pertussis*, *Bordetella bronchiseptica*, *Bordetella parapertussis*, *Chlamydia trachomatis*, *Chlamydia pneumoniae*, enterovirus, *H. influenzae*, *Klebsiella pneumoniae*, *Legionella pneumophila*, *Moraxella catarrhalis*, *Mycoplasma pneumoniae*, parainfluenza, *Staphylococcus aureus*, *S. pneumoniae*, cytomegalovirus, influenza, Epstein-Barr virus, rhinovirus, measles and respiratory syncytial virus are the most common (Goldman, 2005). In a study by Chou *et al.*, 2016, non-pneumococcal infections, when compared to pneumococcal ones, tend to reach younger children, attending less hospitalization time, longer fever, coughing, dyspnea and rales. However, its clinical presentation may be extremely varied, with nasal congestion, respiratory distress and stridor (Dasaraju, 1996), prostration, myalgia, chills, sore throat, coryza, nasal obstruction, sneezing, dry cough, among several other signs and symptoms (Heikkinen, 1999). Thus, it can be noted the importance of studying these several variables that are related to the sickness of the pediatric population and which are often not taken into account by health professionals. Once this research is outlined, prevention strategies can be created and the quality and specificity of care for the children affected by such a situation can be improved. These data will be taken into account in the search for a more accurate diagnosis and an effective and specific treatment.

## Objetives

### General

- To describe the clinical-epidemiological profile of children aged 0 to 10 years hospitalized in a reference hospital in the city of Recife in the period of 2016.

### Specific

- To describe the prevalence by age group of major involvement with hospitalization of children due to airway infections.

- To analyze the climatic periods of affection and its correspondence with the seasonality of airway infections among the children of the age group.
- To describe the initial clinical manifestations, according to URTI and LRTI.

## MATERIALS AND METHODS

**Study Design:** This is a primary cross-sectional, observational, documentary study, carried out through the analysis of medical records of patients admitted to the infirmary and ICU with respiratory infection between 0 and 10 years old, at the Hospital Infantil Maria Lucinda, Recife, Pernambuco, Brazil.

**Population:** The study population is composed of children from 0 to 10 years of age hospitalized at the Hospital Infantil Maria Lucinda, through research in medical records using the recommended protocol.

**Inclusion Criteria:** Patients hospitalized in the infirmary and ICU of the Hospital Infantil Maria Lucinda for at least 2 days, aged between 0 and 10 years, diagnosed or who evolved to a respiratory infection.

**Exclusion Criteria:** Patients who died with less than 02 days of hospitalization and patients older than 10 years. Also, the lost records were not examined.

**Characterization of Infections:** At the time of admission, the RTI were defined as: acute infection (reported fever, documented temperature > 38°C, increased leukocyte count for age or abnormal differential) and signs or symptoms of respiratory disease (coryza, otalgia, otorrhea, abnormal breathing sounds, cough, sputum, hemoptysis, chest pain or dyspnea). These are different according to the affections, being grouped between URTI: rhinitis, sinusitis and pharyngitis and their respective clinical pictures. Already in the LRTI are laryngitis, bronchitis, bronchiolitis and pneumonia. As hospital respiratory infections, it is by definition: infection occurred more than 48 hours after hospitalization.

**Procedure:** The data were transcribed using a questionnaire previously prepared exclusively for this study, with the necessary data for the research. The operation followed a complete cycle of intercomplementary actions:

- Data collection;
- Database;
- Processing of collected data;
- Analysis and interpretation of processed data;
- Dissemination of results.

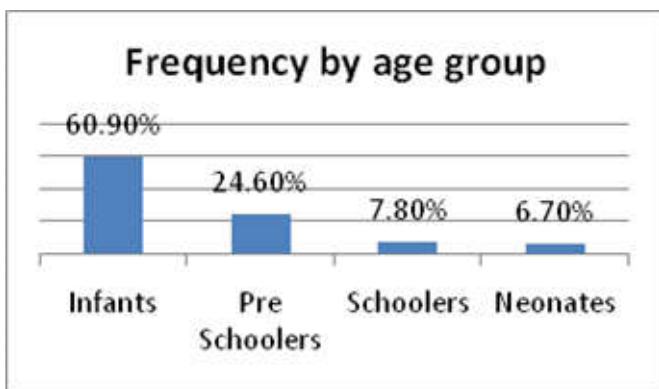
The data collected were transcribed to a spreadsheet in Excel and analyzed later. Statistical analysis was performed during data processing using the Statistical Package for Social Sciences (SPSS) software version 22.0. Descriptive statistics were used to characterize the subjects regarding the variables collected. The analysis and interpretation of the processed data and the dissemination of the results were then performed.

**Ethical Aspects:** All the ethical aspects of the research have been respected by guaranteeing the privacy of the medical

records and their obtained data, where their information is only used for scientific purposes.

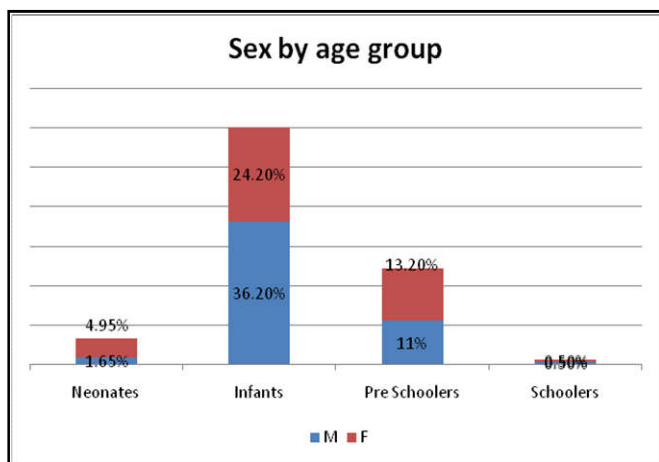
## RESULTS AND DISCUSSION

During the period from January 1, 2016 until December 31, 2016, 489 children aged 0 to 10 years were attended at the Hospital Infantil Maria Lucinda. Of these, 37.2% (182) were Airway Disorders, both Upper (URTI) and Lower (LRTI). The majority, 96.2%, corresponded to LRTI, while the other 3.8% was from URTI. The mean age was 1.96, with a median of 1 year. Regarding sex, 53.8% (98) were males, while 46.2% (84) were female. As for ethnicity, 122 were Brown (67%), 16 were White (8.8%), 4 were Yellow (2.2%), 1 was Black (0.5%) and 39 did not report (21.6%). As for origin, 166 lived in Recife and Metropolitan Region (91.2%), 6 lived in Agreste (3.3%), 3 lived in Zona da Mata (1.6%) and 7 did not report (3.8%).



Graph 1. Frequency of cases by age group

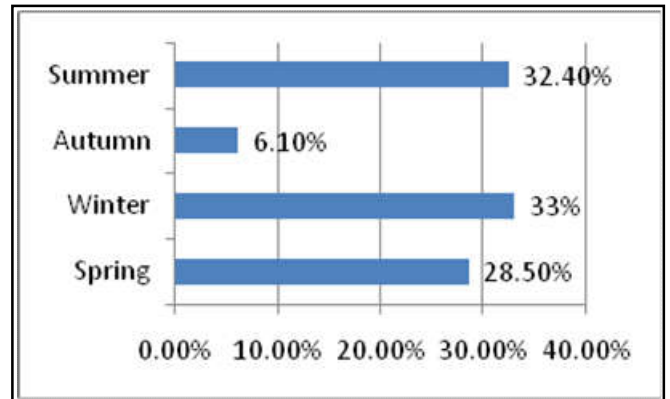
Regarding the age groups, it was observed that 60.9% of the cases were Infants (between 30 days and 2 years of age), 24.6% were Pre-school children (2 to 6 years), 7.8% were Schoolchildren (7 to 10 years old) and 6.7% were Neonates (0 to 30 days). This high value of Infants can be explained by the fact that the volume of air passing through their lungs is twice as large as that of an adult, per unit of body weight, causing agents and variations in atmospheric conditions to reach twice as many routes respiratory infections in children between 1 week and 1 year of life (Durigon, 2014 and Azevedo, 2015).



Graph 2. Sex division by age group

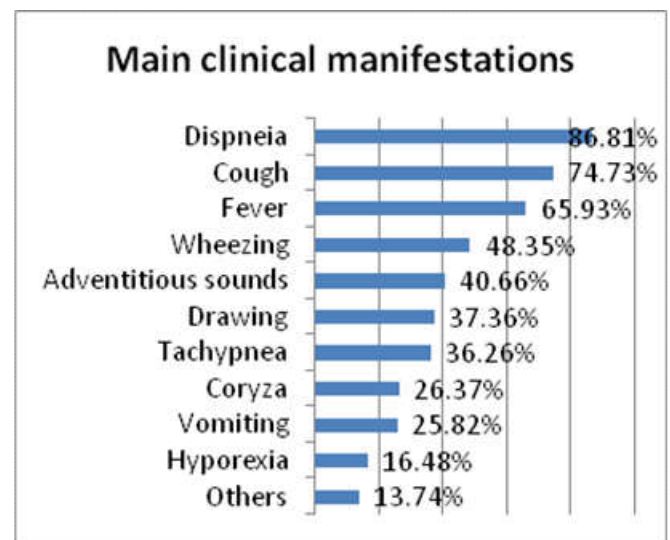
Among the Neonates, 4.95% were female and 1.65% male; among the infants, 24.2% were female and 36.2% male; among the preschoolers, 13.2% were female and 11% were

male; among the students, the proportion was the same, with 0.5% of males and females. This means that in the Neonate group, the M: F ratio was 1: 3; in the infants group, the M: F ratio was 1.5: 1; in the preschool group, the M: F ratio was 1: 1.2; in the group of schoolchildren, the M: F ratio was 1: 1. Therefore, in general, the male sex is the most affected, with 53.8% of the cases. This corroborates the literature that the prevalence is higher in this group (Chou, 2016).



Graph 3. Incidence of cases by season

With regard to seasonality, it can be seen that the season with the greatest number of events is Winter, with 33% of cases, followed by Summer, with 32.4%. These data were partially compromised since most of the medical records from May to July had already been sent to the general archive, making it impossible to analyze them completely. Even though, the prevalence in Winter was still the highest. The few records that could be analyzed were those that had been stored in wrong folders that had not yet been forwarded to the archive. However, with all the analysis we can see that winter continued to be the season of the year with more frequent occurrences, as well as referring to the literature that deals with the subject (Façanha, 2004 and Hueb, 2011).



Graph 4. Main clinical manifestations of URTI and LRTI

Among the main symptoms were: Dyspnea (86.8%), Cough (74.7%), Fever (65.9%), Wheezing (48.3%) and Adventitious Sounds (40.7%). Of those who presented cough, 28.2% of the cases were Productive, against 8.7% that was Dry; there was one case (0.5%) that was described as cough with yellowish secretion. As for fever, the average temperature was 38.6°C.

Regarding the Drawing, of those who presented it, 75.7% had Subcostal, 56.1% had Intercostal, 24.2% had Furcula and only 4.5% had Subclavicular. In 48.5% of the cases, the draw was only one of the types, whereas in 51.5% of the cases, they had at least two types. Of the children who presented adventitious noise, 77% were classified as Rales, while 32.4% had snoring. 3.8% of the children presented these two signs in association. When the signs and symptoms were separated according to the intensity of the respiratory picture, the most common signs and symptoms of LRTI were: Dyspnea (88%), Cough (74.8%), Fever (%), Wheezing (49.1%) and adventitious noise (41.1%). In relation to the URTI, was found: Cough (71.4%), Dyspnea (57.1%), Fever (57.1%), Hyporexia (57.1%) and Tightening (42.8%). Although URTI are frequent, it is the LRTI that are responsible for leading to life-threatening conditions and are therefore responsible for the greatest number of hospitalizations<sup>14</sup>. Thus, we can confirm the highest absolute number of hospitalizations for LRTI (96.2%) in children in the present study, as well as the main symptoms that affect children when they contract one of these diseases (Heikkinen, 1999). The statistical tests done was the Kruskal-Wallis Test, a non-parametric evaluation of the data here collected. In that scenario, we have to accept the null hypothesis, once the p-value was higher than 0,005. That shows that there isn't a significant difference between the media of the analyzed treatments, as it's shown down below.

Clinical Manifestations	N	Median	Middle post	Z-Valor
Dyspnea	1	21	31,0	0,78
Cough	1	136	41,0	1,61
Fever	1	120	40,0	1,53
Wheezing	1	88	39,0	1,44
Adventitious sounds	1	74	38,0	1,36

Método	GL	H-Valor	p-Valor
Not adjusted for draws	41	40,77	0,481
Adjusted for draws	41	41	0,471

Pneumonia is responsible for 21% of all deaths in children under five years old<sup>14</sup>, and was responsible for 48.9% of the in-hospital diagnoses, followed by Asthma (20,3%) and Bronchiolitis (12,1%). These diseases are very prevalent within the population between 0 and 10 years old<sup>3</sup>. It is proved by this research that this pattern can also be seen in the city of Recife.

## Conclusion

Airway diseases were one of the main causes of hospitalization in children between 0 and 10 years old, mostly due to impairment of the Lower Airways (LRTI). Among the main diagnoses we have had: Pneumonia, Asthma and Bronchiolitis, in decreasing order of number of cases. The most affected were Infants (children between 30 days and 2 years) who presented about 60% of the cases, which can be correlated with the fact that the volume of air passing in their lungs is twice as large as the adult, in unit per kilo. In addition, climatic variations were related to hospitalizations, with higher hospitalization rates in the Winter and Summer months. In addition, the most common symptoms were: Dyspnea, Cough, Fever, Wheezing and Adventitious Sounds, being in agreement with the literature data. This was due to the fact that most of the cases were LRTI, these being their main presentations. It was noted that most of the medical records were not filled out, with much of the information being left out. This may in the future lead to a problem of inadequate conducts and diagnoses,

with subsequent damage to the health of those being treated. In addition, it can be inferred the underestimation of information that maintains direct correlation with the cases, as well as the non-detailing of others, such as Clinical Manifestations. For example, many of the patients who had fever did not have their temperature mentioned. Another problem was the fact that medical records are not electronic, which makes it difficult to find the information, as well as the illegibility of the professionals' letters. This shows the importance of investing in electronic materials in hospitals that would make service more efficient and reduce the margin of error.

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