Contribution of respiratory syncytial virus (RSV) among patients <15 years hospitalized with severe acute respiratory infection (SARI) in Milan, 2014-2017.

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Background

Respiratory syncytial virus (RSV) infections can be asymptomatic or associated with symptoms ranging from mild cold to severe acute respiratory infection (SARI)[1] and are responsible for substantial global morbidity in young children and elderly individuals[2]. To implement preventive and control measures and to inform vaccination strategies, it is critical to characterize the epidemiological patterns of circulating RSV.

Objectives

This study aimed at describing the results of RSV molecular detection in respiratory samples collected from children <15 years hospitalized with SARI in Milan (Italy) during four consecutive years (2014-2017) and to estimate the prevalence of RSV, the risk of infection from RSV and the incidence of hospitalization of RSV-positive SARI stratified by age.

Methods

From January 1st, 2014, to December 31st, 2017, 3013 respiratory samples (2826 upper respiratory tract [URT] and 187 lower respiratory tract [LRT] specimens) collected from as many children <15 years hospitalized with SARI at a university hospital in Milan were analysed. After nucleic acids extraction, samples were tested by a multiplex real-time PCR to detect RSV[3].
SARI case definition: the standard SARI case definition is: acute respiratory infection with history of high fever or measured high fever (≥38° C) and cough with onset within the last 10 days and requiring hospitalization[4].
Incidence rate of hospitalization of RSV-positive SARI: incidence were calculated using the average number of population <15 years of age for each year of study as denominator.

Results

1 - Prevalence of RSV-positive SARI cases

During the study period, 571 out of 3013 (19%) respiratory samples tested positive to RSV (Table 1). In this SARI series, RSV positivity rate identified in LRT samples (27/187; 14.4%) and URT samples (544/2826; 19.2%) was similar (p=0.09). The median age of RSV-positive SARI cases was 6.6 months (inter quartile range; 17.2 months) with a male-to-female ratio of 1:1.12. Overall, 22% (355/1613) and 19% (125/658) of children aged less than 1 year and those aged 1-3 years, respectively, tested positive to RSV (Table 1). Cumulatively, 62.2% (355/571) of RSV were identified in children <1 year (Fig. 1) and 12.3% (70/571) in children <1 month.

2 - Risk of infection from RSV by age-groups

The risk of RSV infection in children aged 0-1 year was 1.5-fold (95% CI: 1.2-1.9) higher with respect to all the other age groups.

3 - Incidence of hospitalization of RSV-positive SARI

The overall incidence of hospitalization RSV-positive SARI was 40.5 per 100'000 children aged <15 years with the highest incidence rate observed in children less than 1 year of age (426/100'000) (Fig. 2).

4 - Temporal distribution of RSV

RSV circulated along the entire study period with the highest positivity rate (59.2%; 338/571) identified during seasonal peaks occurring from December to February each year.

Table 1. Prevalence of RSV detection in children with SARI by age.

Age group (year)	No. of patients	No. of RSV-positive patients	% of RSV-positive patients
0-1	1613	355	22.0%
2-3	658	125	19.0%
4-6	386	55	14.2%
7-11	210	22	10.5%
12-15	146	14	9.6%
Total	**3013**	**571**	**19.0%**

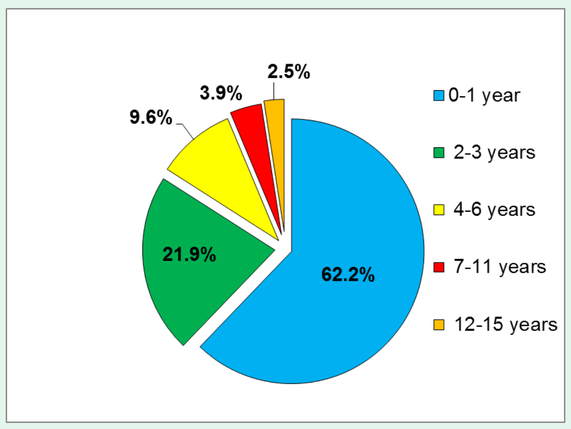

Figure 1. Distribution of RSV-positive SARI by age.

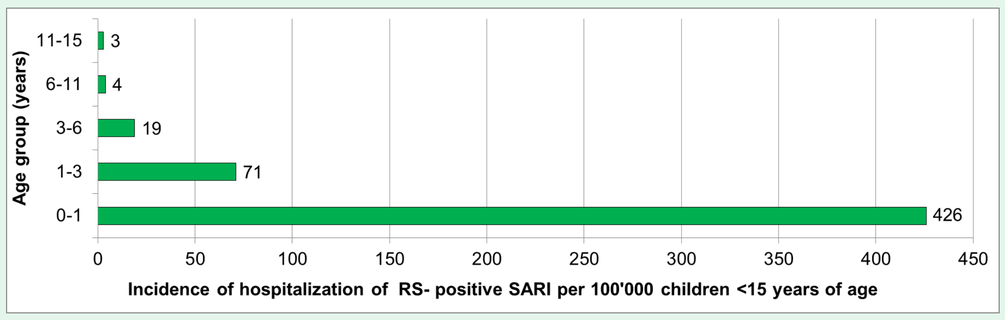

Figure 2. Incidence of hospitalization of RSV-positive SARI per 100'000 children <15 years of age.

Discussion and Conclusions

Accordingly to other studies[1-2], RSV was detected in 19% of hospitalized SARI cases <15 years, mainly in children <1 year in which the risk of RSV infection was 1.5-fold higher with respect to all the other age groups. As expected[1-2], circulation of RSV peaked from December to February each year. In this series, sampling of upper or lower respiratory tract resulted in similar RSV-positivity rate. RSV is recognized as a major cause of hospital admissions in young children; in this study, the highest incidence of hospitalization of children less than 15 year with RSV-positive SARI was 426 per 100'000 children aged <1 years. Routine molecular testing to detect RSV and epidemiological study are warranted to implement preventive and control measures and to drive further vaccination strategies.

References

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