

Burden of Respiratory Syncytial Virus in children ≤ 2 years of age in Germany: Retrospective analysis of health claims data from 2014-2019



Supplementary Material

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INTRODUCTION

Respiratory syncytial virus (RSV) is a leading cause of hospitalization for acute respiratory illness in children.¹

In severe cases, ICU admission and ventilator support may be required, particularly in high-risk groups, including premature infants and those with underlying chronic or congenital risk conditions.²

In Germany, the clinical and economic burden of RSV is likely to be underestimated or outdated, as mandatory national reporting was only introduced in July 2023.

OBJECTIVE

To understand and address the burden and costs associated with RSV in children ≤ 2 years in Germany by determining:

- RSV incidence rate stratified by population characteristics (month of life, prematurity, and high-risk group) and
- the cost of inpatient and outpatient care

METHODS

Data source:

- A representative sample of the German statutory health insurance database 'German Analysis Database (DADB) for Evaluation and Health Services Research'³

Time period:

- Pre COVID-19 years 2014-2019

Patient selection:

- Two age groups were formed: Infants aged 0-12 months and toddlers aged 13-24 months
- Determination of RSV lower respiratory tract illness (LRTI) episodes from patients with either a specific RSV diagnosis (ICD-10 codes: B97.4, J12.1, J20.5, J21.0) year-round and/or an unspecified bronchitis / bronchiolitis / pneumonia (UBP) diagnosis⁴ within the RSV season⁵

Stratification:

- Prematurity selected by ICD-10 codes: i) full term, ii) preterm (P07.3) and iii) extremely preterm (P07.2)
- High-risk group defined by ICD-10 codes for prematurity, perinatal conditions, chronic cardiac and respiratory diseases, immunosuppression, neurological diseases, prophylactic immunotherapy anamnesis and diabetes mellitus

Analysis:

- Hospitalization incidence rate of RSV per 1,000 person-years stratified by month of life
- Ratios of preterm/extremely preterm to full-term and high-risk to non-risk group based on overall incidence rates
- Hospitalization costs per patient incurred between the beginning and end of a RSV episode
- All-cause costs compared to a matched control group without RSV based on age, sex and prematurity in the inpatient (over 365 days) and outpatient (in the index calendar year) sectors
- Excess costs were defined as RSV-attributable costs by determining the difference between the mean all-cause costs in the RSV group and the control group

RESULTS

In infants, 43% of RSV hospitalizations occurred in the first three months and 74 % in the first six months of life. The highest incidence rate was observed in the second month of life with a mean of 46/1,000 per year (peak in 2017 with 54/1,000), with a gradual decrease thereafter (Fig. 1). An extrapolated average of about 15,270 and 3,900 hospitalized infants and toddlers respectively were recorded each year. Of these infants, 4,640 (toddlers: 1,520) were in the high-risk group and 10,630 (toddlers: 2,380) in the non-risk group. Thus, 70% of hospitalized infants were born at term and had no underlying comorbidities.

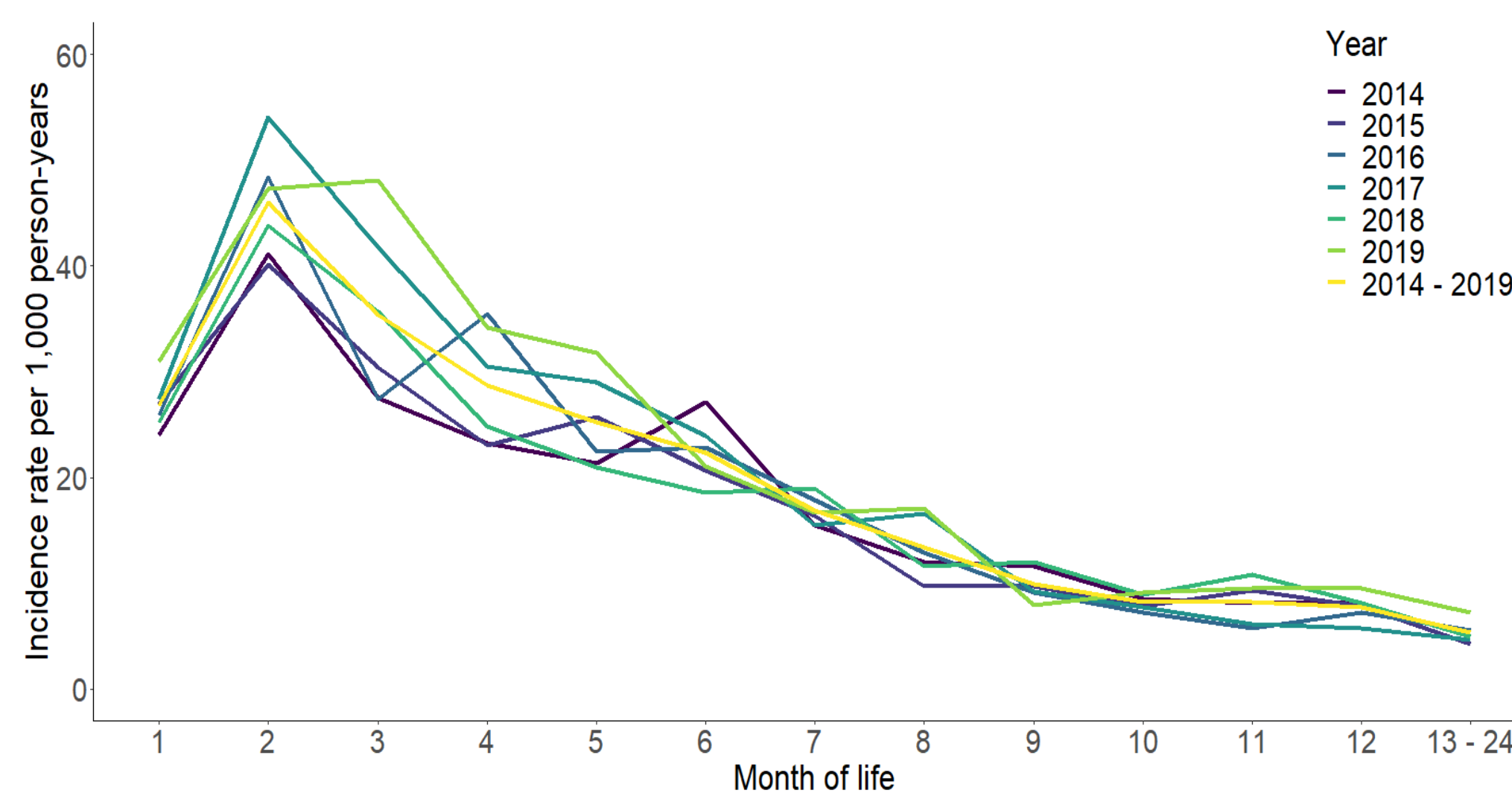


Fig. 1. Hospitalization incidence rates of RSV per month of life 2014 - 2019

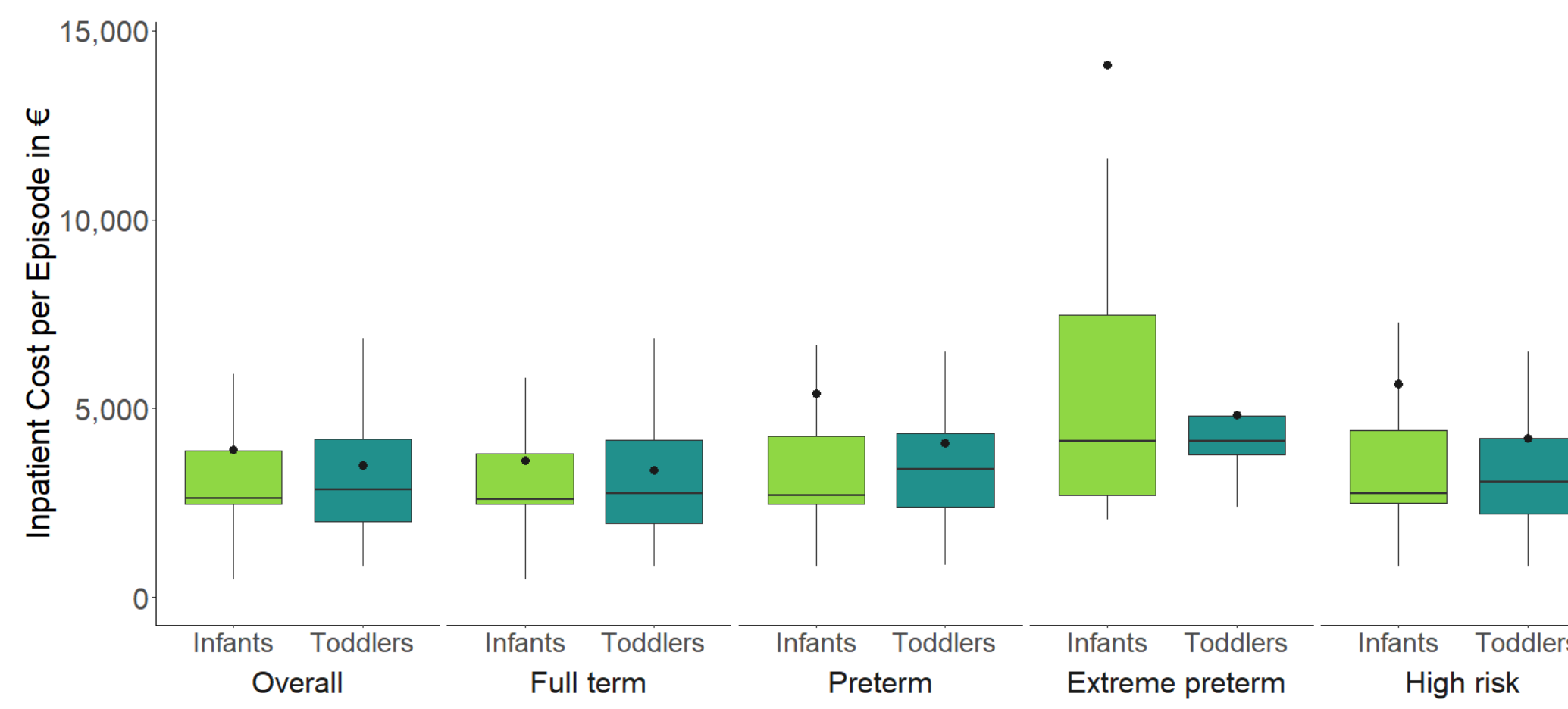


Fig. 2. Inpatient cost per RSV episode stratified by prematurity and high-risk group for infants (green) and toddlers (blue). Mean values are displayed as dots.

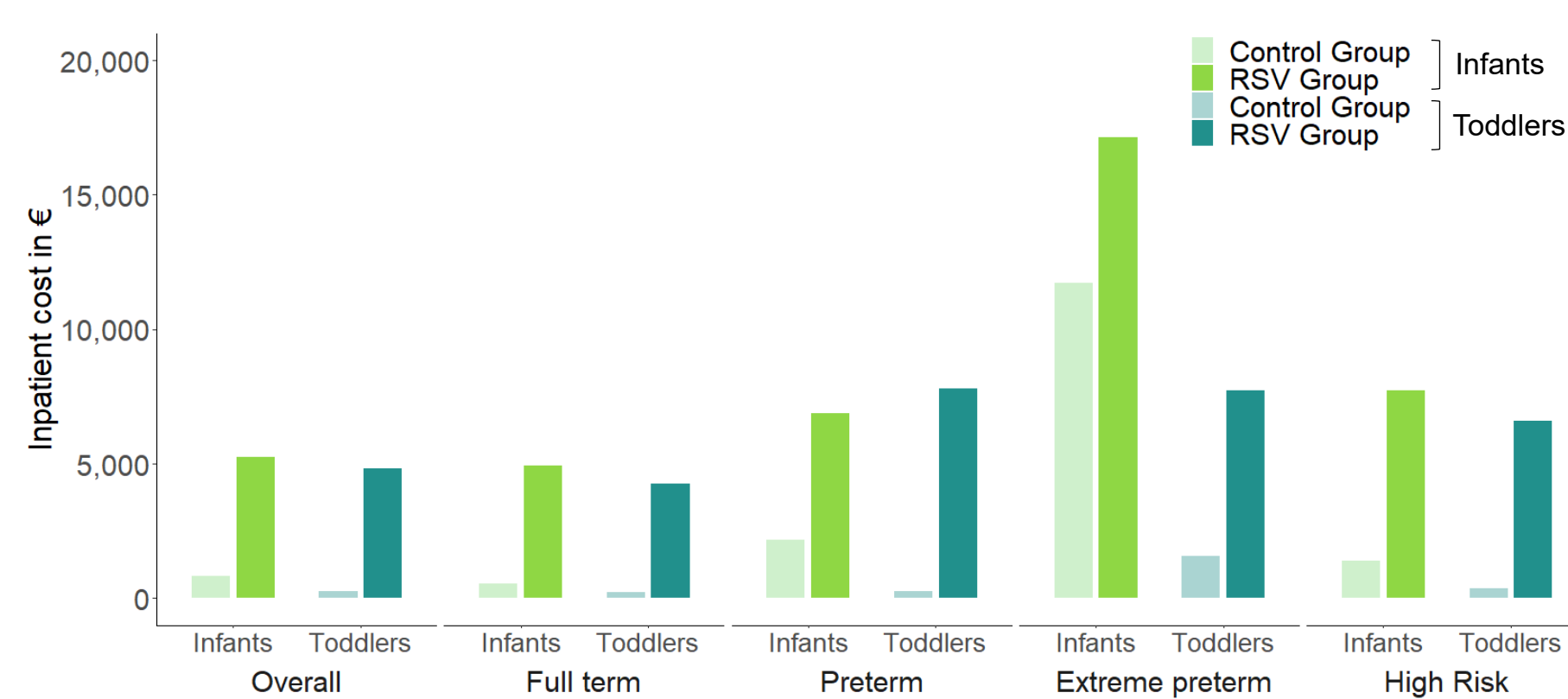


Fig. 3. Mean all-cause costs in the RSV group (dark shading) over one year compared with mean all-cause costs in the control group (light shading) in the inpatient sector stratified by prematurity and high-risk group for infants (green) and toddlers (blue). Costs in RSV-cohort were significantly higher than in the control cohort (p<0.001).

Tab. 1. Hospitalization Incidence rate (IR; %) and calculated ratios (IRR) for stratification groups

Stratification groups	Infants		Toddlers	
	IR	IRR	IR	IRR
Full term	1.9 %	-	0.5 %	-
Preterm	4.4 %	2.3	1.2 %	2.5
Extreme preterm	5.0 %	2.6	3.3 %	6.9
No risk	1.7 %	-	0.4 %	-
High risk	4.1 %	2.4	1.2 %	3.0

The incidence rate was at least twice as high in infants born preterm or in the high-risk group as in those born full-term or in the non-risk group (Tab. 1). Risk factors and prematurity affect incidence rates in both infants and toddlers.

The mean inpatient cost per RSV episode was high for patients born at extremely prematurity (Fig. 2; infants 14,090 €, toddlers: 4,828 €) and in high-risk the group (Fig. 2; infants: 5,660 €, toddlers: 4,207 €). Higher costs were also associated with first three months of life (4,650 €), around 1,340 € higher than in the following months.

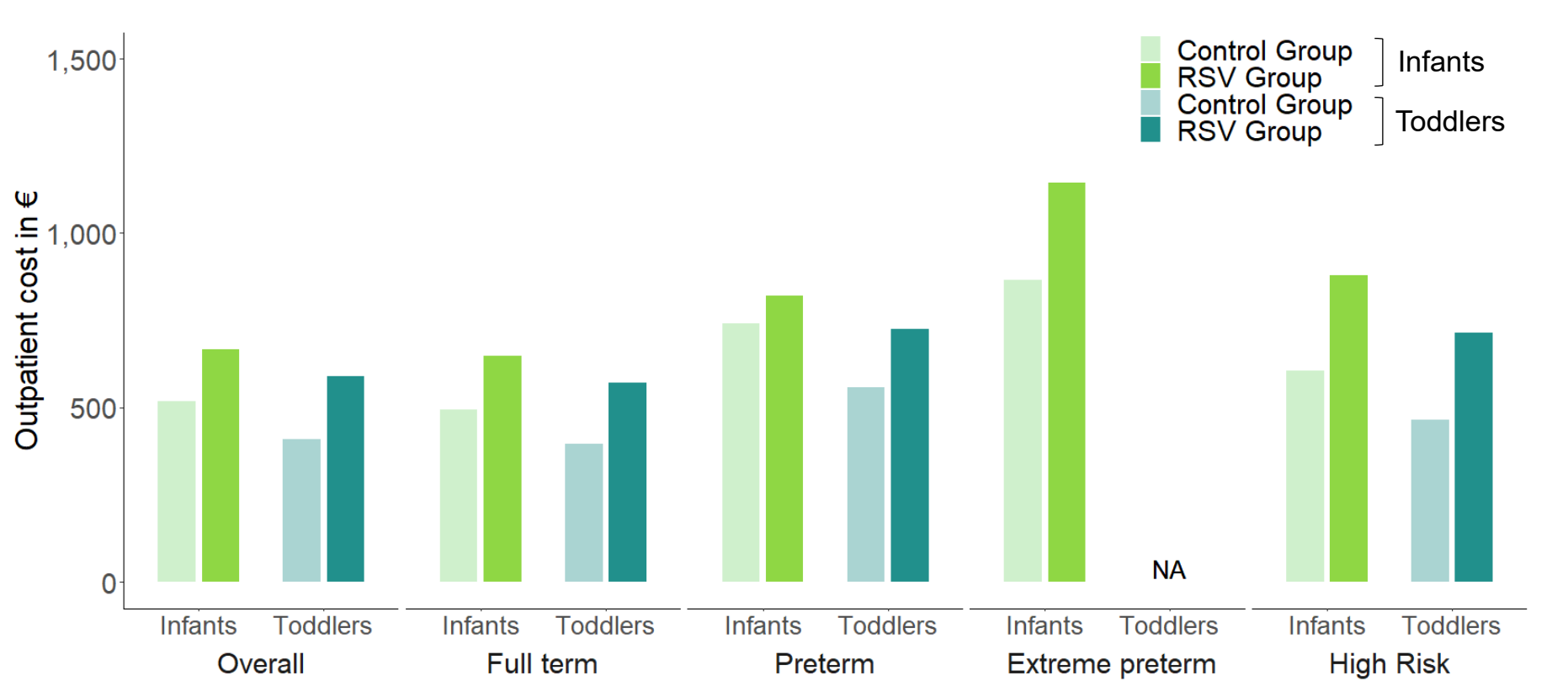


Fig. 4. Mean all-cause costs in the RSV group (dark shading) for the index calendar year compared with mean all-cause costs in the control group (light shading) in the outpatient sector stratified by prematurity and high-risk group for infants (green) and toddlers (blue). Costs in RSV-cohort were significantly higher than in the control cohort (p<0.001). NA (not available) due to small sample size.

The highest RSV-attributable excess costs were observed for those born preterm or extremely preterm (Fig. 3; infants: 5,400 €, toddlers: 7,552 €) and in the high-risk group (Fig.3; infants: 6,305 €, toddlers: 6,236 €) in hospital. Overall, 56 % of the annual economic burden for hospitalizations of infants was observed in infants born at term with no underlying comorbidities (34 million €).

CONCLUSIONS

RSV constitutes a major clinical and economic burden on the German healthcare system, particularly during infancy. Infants are particularly at risk in the earliest months of life.

Although infants and toddlers with preterm status are at highest risk, RSV-infections in healthy children without underlying risk factors cause the largest clinical burden and consequently the largest financial burden for the German health care system.

These findings highlight the importance of broader surveillance to identify the most vulnerable groups and consequently implement preventive measures such as immunization.

References

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Author Disclosures

CB, LJB, und BH are all employees of Pfizer in Germany, the sponsor of this study. SM and JR are employees of Gesundheitsforen Leipzig GmbH, paid by Pfizer to conduct the study. TT is an expert in the field of RSV and received an honorarium from Pfizer for input on the study design.



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