



Potential Public Health Impact of Bivalent Respiratory Syncytial Virus Prefusion F Maternal Vaccine for Prevention of Respiratory Syncytial Virus Lower Respiratory Tract Illness among Canadian Infants

EPH102

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INTRODUCTION

- Respiratory Syncytial Virus (RSV) is a major cause of lower respiratory tract illness (LRTI) among infants and is associated with substantial health and economic burden in Canada
- RSV prefusion F vaccine (RSVpreF)—a bivalent vaccine for prevention of RSV-LRTI among infants through immunization of pregnant individuals—is currently under review by Health Canada

OBJECTIVE

- The objective of this study was to assess the potential public health impact of year-round maternal vaccination with RSVpreF for prevention of RSV-LRTI among Canadian infants

METHODS

Economic Model

- Cohort model was developed to evaluate clinical and economic impact of maternal vaccination with RSVpreF among Canadian infants (N=369,092) from birth to age 1 year:
 - Clinical outcomes include cases of medically-attended RSV-LRTI and attributable deaths
 - Economic costs include direct costs related to medical care and indirect costs related to caregiver work loss and future lost earnings due to premature RSV-LRTI-related death:
 - All costs were reported in 2022 CAD and discounted at an annual rate of 1.5%

Estimation of Model Inputs

- Model population was estimated based on 2021 Statistics Canada data¹
- Infants were categorized by weeks of gestational age (wGA) at birth²: full term (≥ 37 wGA), late preterm (32-36 wGA), early preterm (28-31 wGA), extreme preterm (≤ 27 wGA)
- Incidence rates (assumed to vary by term status³ and calendar month)⁴ were stratified by care setting:
 - RSV hospitalization (“RSV-H”) rates were derived from Schanzer et al.⁵ and allocated by month of age^{1,6,7}
 - RSV emergency department (“RSV-ED”) and office/clinic visit (“RSV-OC”) rates were derived from US data⁸ (lacking Canadian data); only a proportion of cases were assumed to manifest as LRTI⁹
- Case fatality was assumed to occur among hospitalized cases only, and was estimated based on US data¹⁰ and a global meta-analysis¹¹
- Direct costs:
 - RSV-H: based on term status-specific RSV-attributable costs from Thampi et al.¹²
 - RSV-ED: based on average cost of ED treatment for influenza and respiratory illness in Alberta¹³
 - RSV-OC: based on Ontario Health Insurance Plan schedule of costing for influenza^{14,15}
- Indirect costs:
 - Caregiver work loss and associated lost earnings based on RSV episode length by care setting¹⁶ and national earnings data^{17,18}
 - Future lost earnings due to premature RSV-attributable death based on national earnings data, as well as life expectancy estimates¹⁷⁻¹⁹
- Vaccine uptake:
 - Uptake was assumed to be 64.8% based on 2021 maternal Tdap uptake¹⁶
 - Vaccination was assumed to occur between 24-36 weeks gestation, with 90% of vaccine administered between 24-32 wGA

METHODS (cont.)

Estimation of Model Inputs (cont.)

- Monthly estimates of vaccine effectiveness (VE) for full terms infants aged 0-<6 mo. were derived from interim Phase 3 MATISSE efficacy data (severe RSV+ medically-attended [MA] LRTI for RSV-H; RSV+ MA-LRTI for RSV-ED/OC)¹⁷; VE assumed to wane linearly to 0% by age 9-<10 mo.:
 - VE for late preterm infants assumed 83.3% of full term VE; for infants born <2 weeks after RSVpreF administration, VE assumed 0%

Analyses

- Base case analyses were conducted considering inputs as described
- Scenario analyses considering alternative inputs values for select model parameters were conducted as follows:
 - Vaccine uptake: assumed 80%
 - Duration of protection (DoP): assumed vaccine provides some protection through first year of life

RESULTS

Base Case Analyses

- RSVpreF was projected to prevent 33.4% of hospitalizations, 21.6% of ED visits, and 21.8% of OC encounters due to RSV-LRTI (Figure 1)
- Prevention of RSV-LRTI cases yields 31.4% reduction in direct costs and 25.6% reduction in indirect costs, largely attributable to reduction in RSV-H (Figure 2)

Figure 1. Cases of RSV-LRTI among Canadian infants aged <1 year with and without RSVpreF (base case)

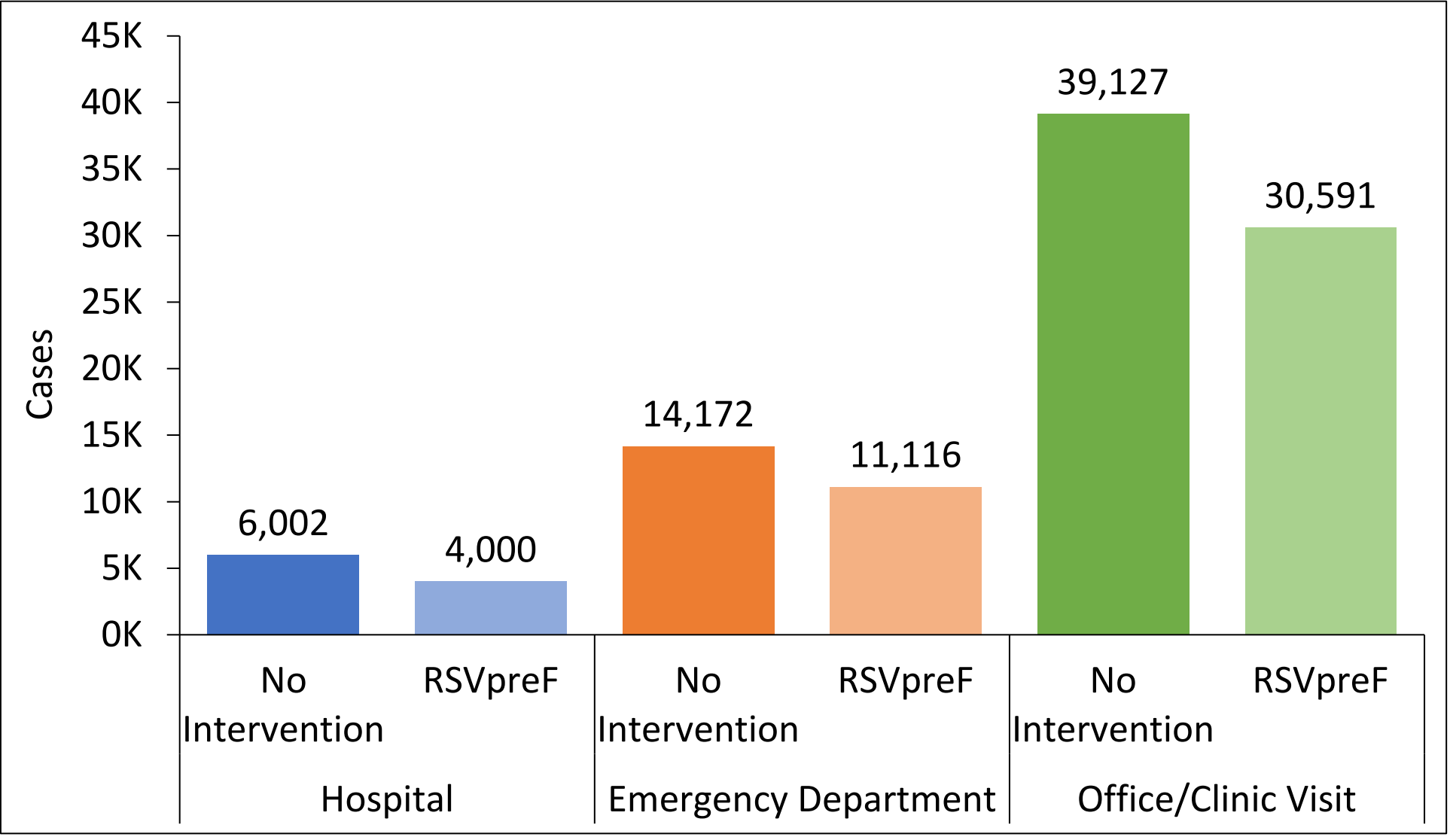
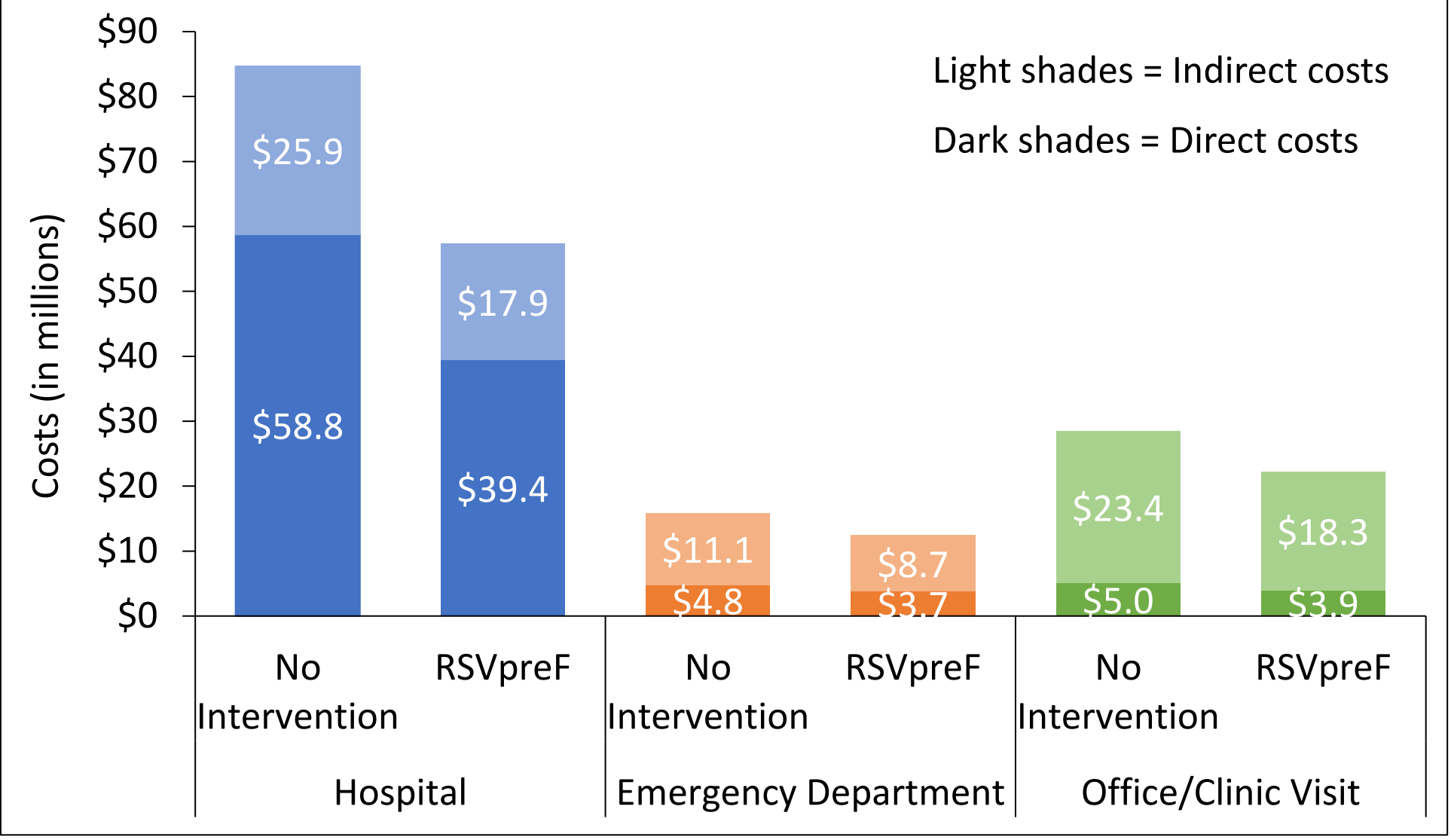


Figure 2. Direct and indirect costs of RSV-LRTI among Canadian infants aged <1 year with and without RSVpreF (base case)



LIMITATIONS

- VE was based on data from MATISSE:
 - Rate of RSVpreF waning is uncertain
 - VE may be underestimated in preterm infants
 - Model outcomes are not necessarily aligned with predefined study endpoints in MATISSE
- Other benefits of RSVpreF (e.g., reduction in household transmission) were not considered

CONCLUSION

- The results of this analysis suggest that an immunization program with RSVpreF in pregnant individuals in Canada would substantially reduce the clinical and economic burden associated with RSV-LRTI among infants**

Scenario Analyses

- 80% uptake: 28.3% reduction in total cases (Figure 3), 38.7% reduction in direct costs, and 31.6% reduction in indirect costs compared with no intervention (Figure 4)
- DoP through first year of life: 25.0% reduction in total cases (Figure 5), 33.5% reduction in direct costs, and 27.7% reduction in indirect costs compared with no intervention (not shown)

Figure 3. Cases of RSV-LRTI among Canadian infants aged <1 year with and without RSVpreF (sensitivity analysis: 80% vaccine uptake)

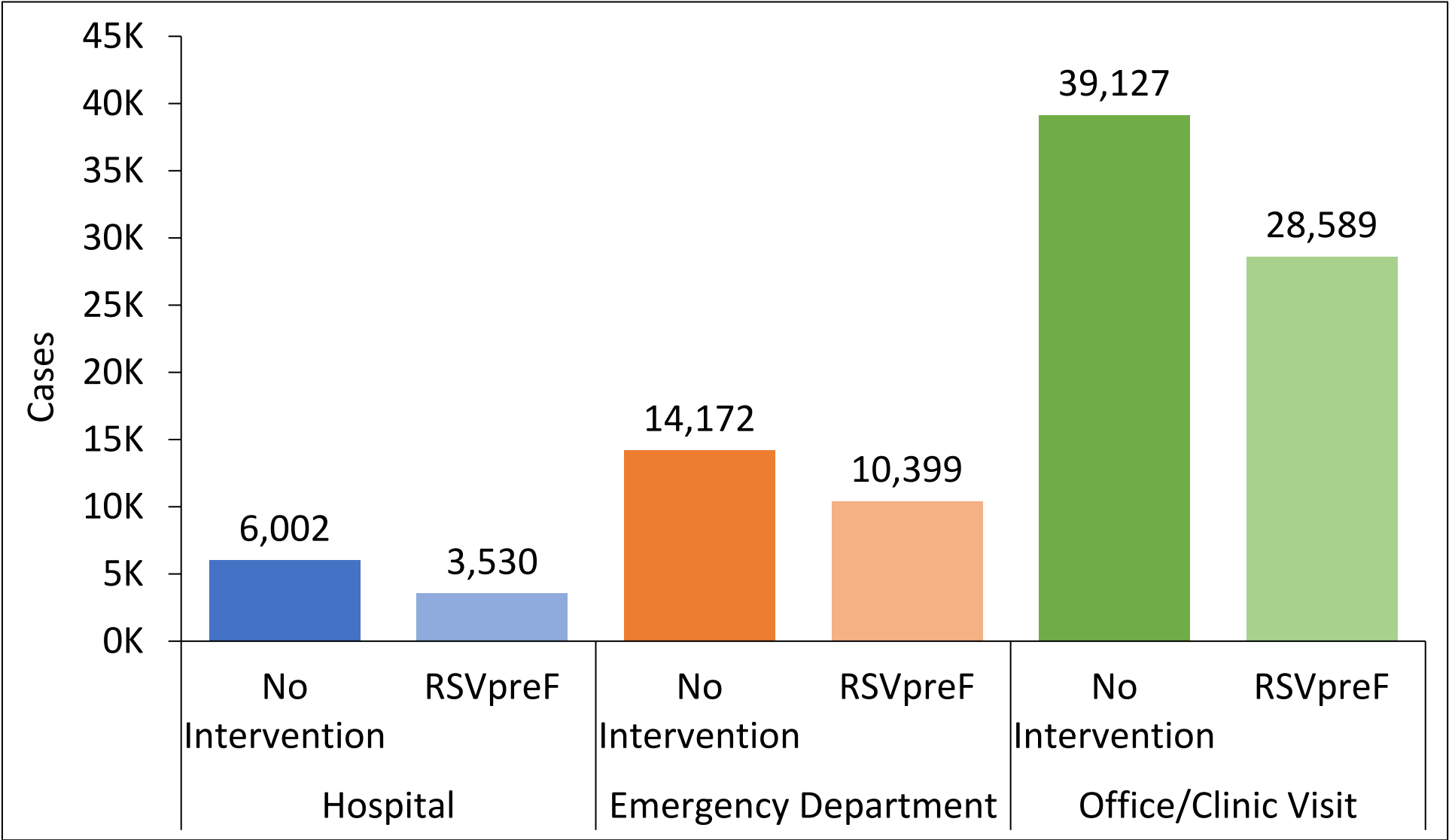


Figure 4. Direct and indirect costs of RSV-LRTI among Canadian infants aged <1 year with and without RSVpreF (sensitivity analysis: 80% vaccine uptake)

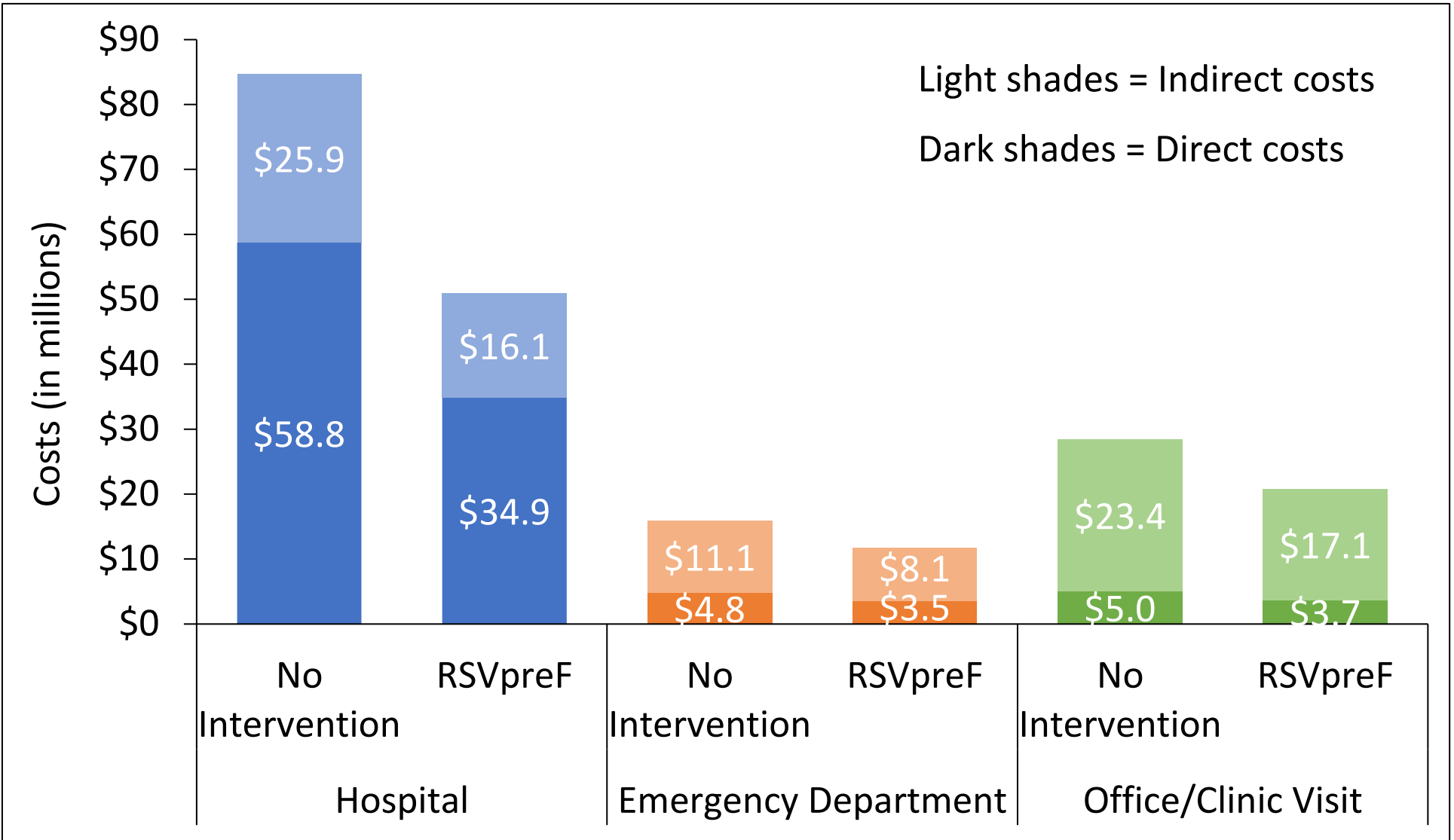
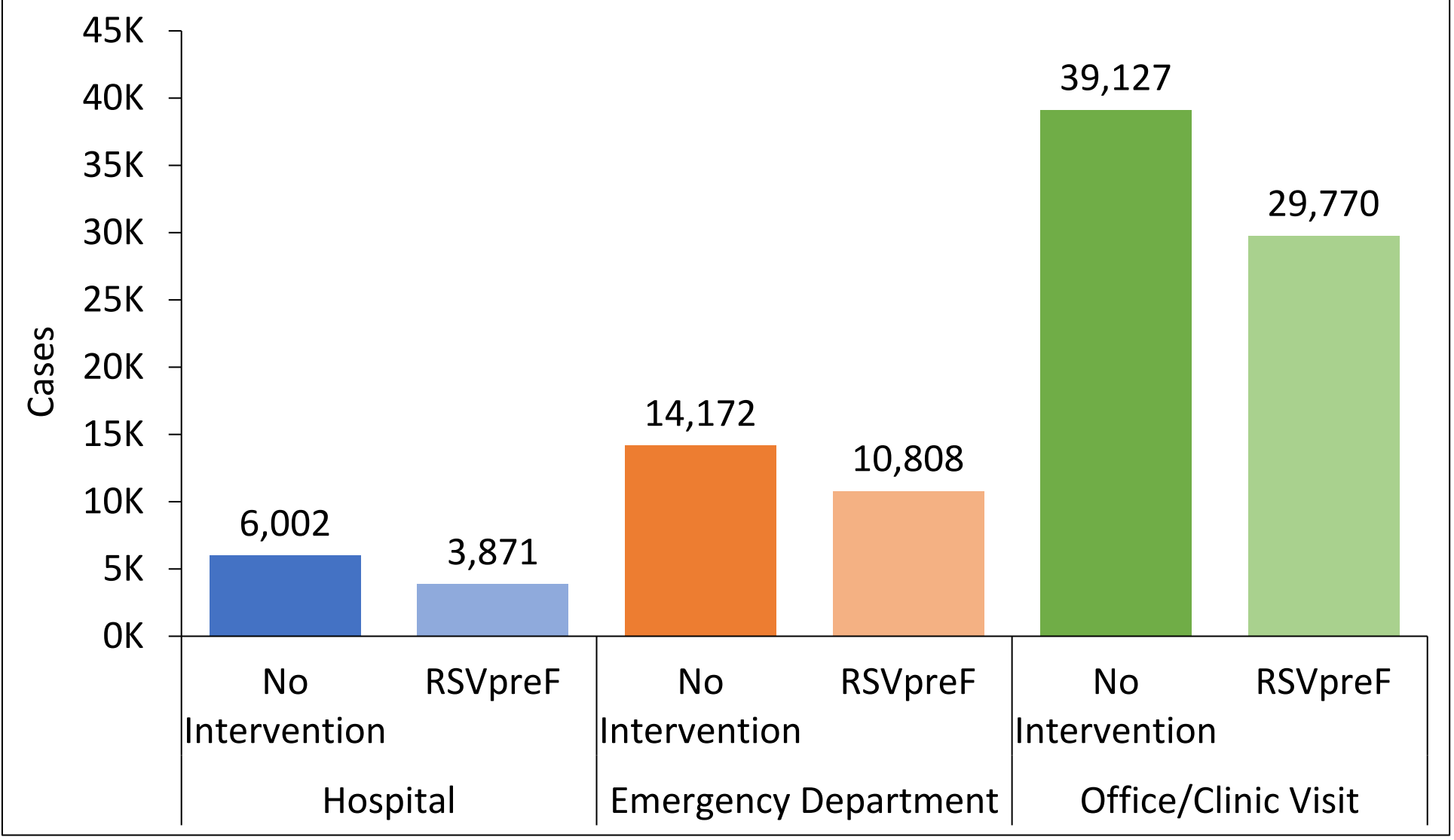


Figure 5. Cases of RSV-LRTI among Canadian infants aged <1 year with and without RSVpreF (sensitivity analysis: DoP through age 1 year)



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