

Cost-Effectiveness of Strategies Protecting Infants from Respiratory Syncytial Virus in the Netherlands

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INTRODUCTION

- Respiratory syncytial virus (RSV) is the most common cold-causing virus in young children in the Netherlands, with almost all children becoming infected by the age of two years¹; 1 in every 56 healthy, term-born infants with RSV-associated acute respiratory infection is hospitalized²
- The Health Council of the Netherlands recommends all infants be protected against RSV before age 1 year³
- Both maternal bivalent stabilized prefusion F subunit vaccine, RSVpreF (MV), and monoclonal antibody, nirsevimab (mAb), are considered efficacious and safe, however, nirsevimab is currently preferentially recommended by the Health Council of the Netherlands

OBJECTIVE

- To evaluate the cost-effectiveness of mAb alone and, alternatively, year-round MV with complementary use of mAb for unprotected infants (MV+mAb), compared to no intervention, to protect infants against RSV due to lower respiratory tract disease (LRTD; RSV-LRTD)

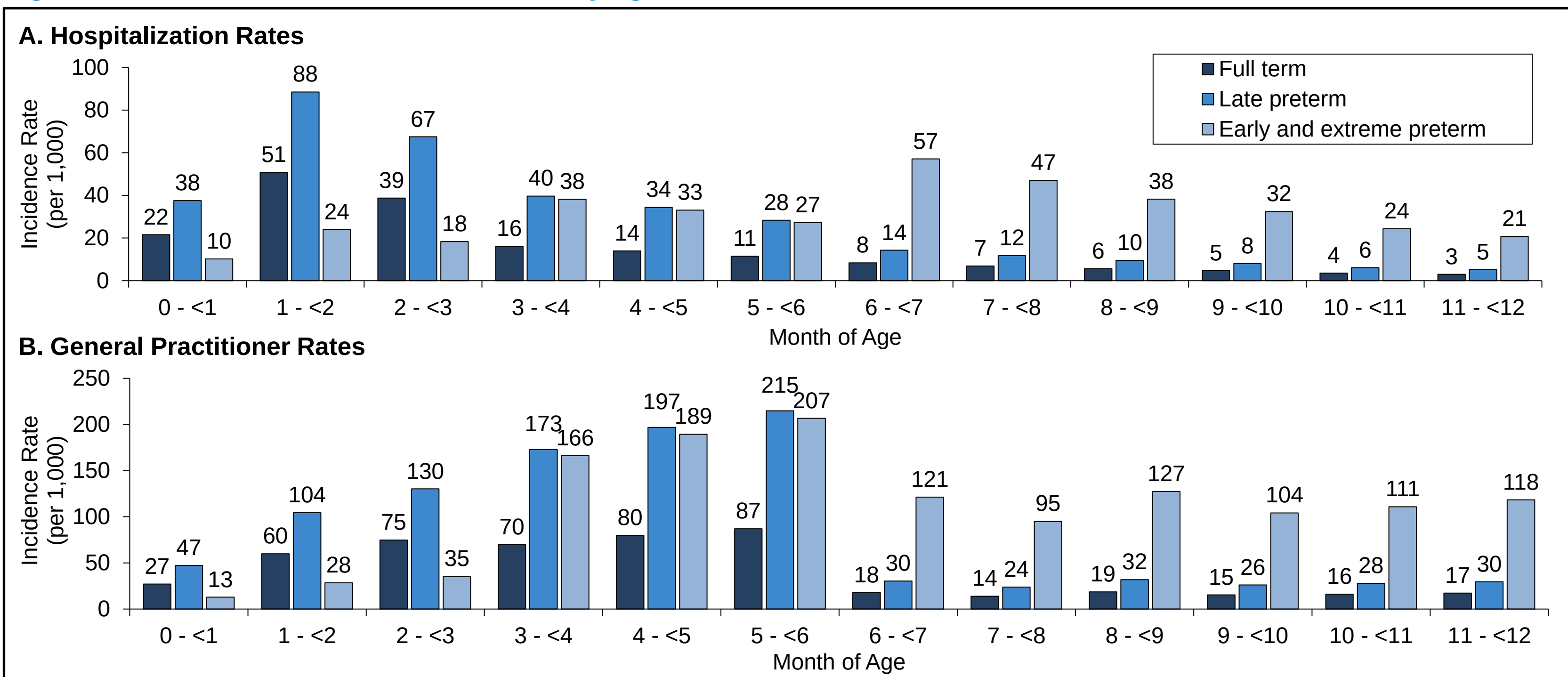
METHODS

Model Overview

- Population-based cohort model evaluated clinical outcomes and economic costs associated with RSV-LRTD during the first year of life, and expected impact of mAb or MV+mAb compared to No Intervention:
 - Clinical outcomes included cases of RSV-LRTD requiring hospitalization (RSV-H), RSV-LRTD treated by a general practitioner (RSV-GP), RSV-H-attributable deaths, and quality-adjusted life-years (QALYs)
 - Economic costs included medical care costs, intervention costs, and indirect costs (caregiver work loss, future lost earnings from premature RSV-related death, travel costs)
 - Population characterized by age, calendar month of birth, and term status defined by gestational age in weeks (wGA) at birth (full-term, ≥37 wGA; late preterm, 32-36 wGA; early preterm, 28-31 wGA; extreme preterm, ≤27 wGA)
- ### Estimation of Model Inputs
- Infants born over a 12-month timeframe (N = 170,853) were characterized by wGA at birth⁴
 - Netherlands-specific RSV-H incidence rates⁵ were allocated by month of age using data from the United Kingdom (UK),⁶ adjusted to include RSV-LRTD only,⁵ and allocated across calendar months⁷ (Figure 1)
 - Incidence of RSV-GP was estimated by applying UK-specific ratio of hospitalizations to GP visits to RSV-H rates, and assuming 1.4 GP visits per episode^{8,9}; RSV-GP rates were then allocated by age based on United States (US) data,¹⁰ downwardly adjusted to include RSV-LRTD only,¹¹ and allocated across calendar months⁷
 - Case-fatality rate (CFR) associated with RSV-H was 0.064 per 100 cases,⁸ distributed by term status using US data¹²

METHODS (cont.)

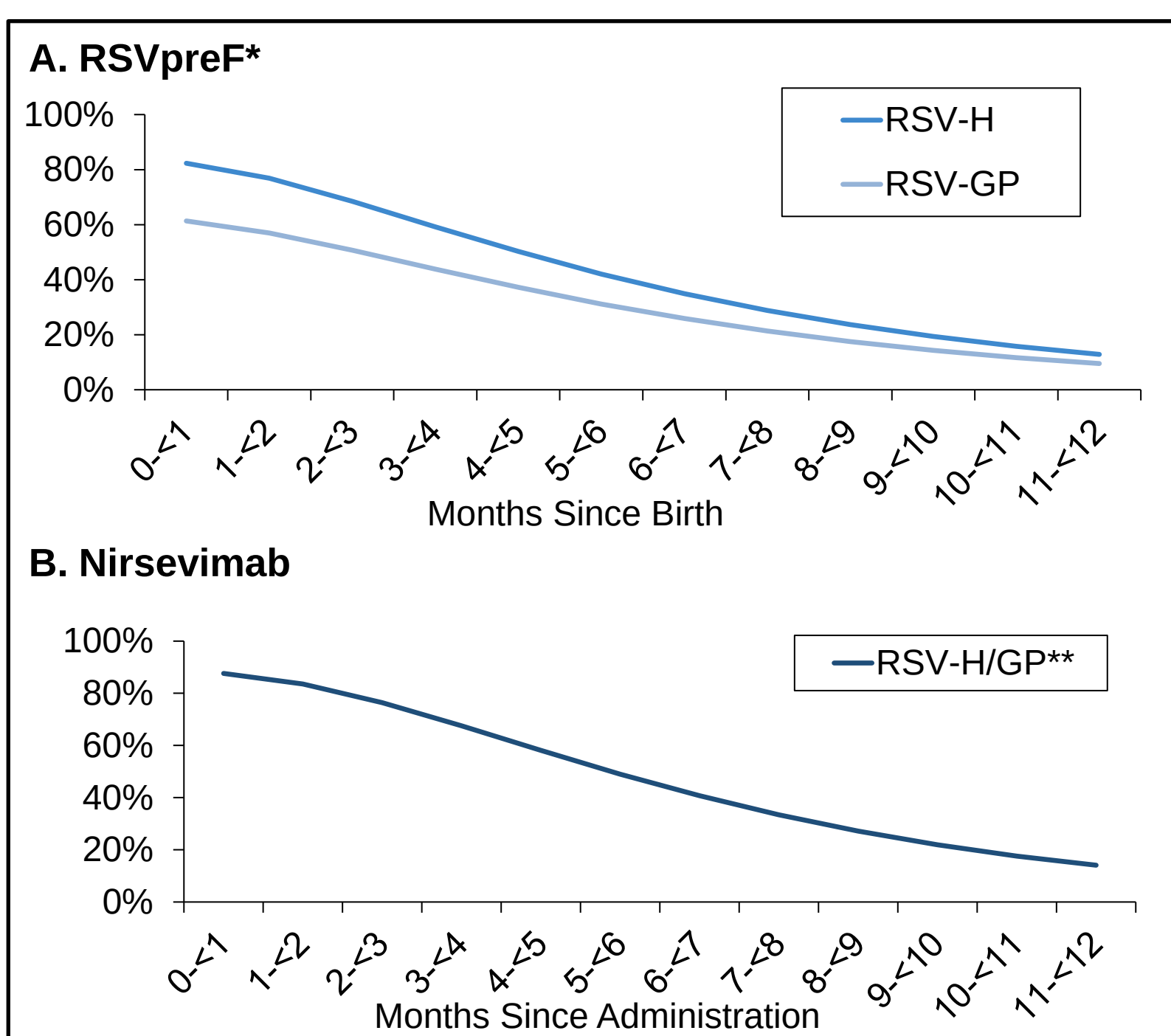
Figure 1. Estimates of RSV incidence rates by age and term status



Full term: ≥37 wGA; late preterm: 32-36 wGA; early preterm: 28-31 wGA; extreme preterm ≤27 wGA

- Effectiveness of interventions was extracted from a published cost-effectiveness analysis, which employed clinical trial data from MATISSE (RSVpreF) and MELODY (nirsevimab)¹³ (Figure 2)

Figure 2. Estimates of intervention effectiveness



*RSVpreF effectiveness assumed to be 0% for infants born <2 weeks after vaccine was administered and for all early/extreme preterm infants

**Nirsevimab trial included a single primary endpoint, therefore nirsevimab effectiveness was assumed to be the same against RSV-H and RSV-GP

- Cost per RSV-H episode was based on weighted average of general ward and ICU hospitalizations (<2 mo: € 7,330; 2-<6 mo: € 4,844; 6-<12 mo: € 3,787)^{14,15}; cost per RSV-GP episode was € 55¹⁴
- Price of RSVpreF was €180 (public list price)¹⁶; nirsevimab price was based on average of the lowest publicly available

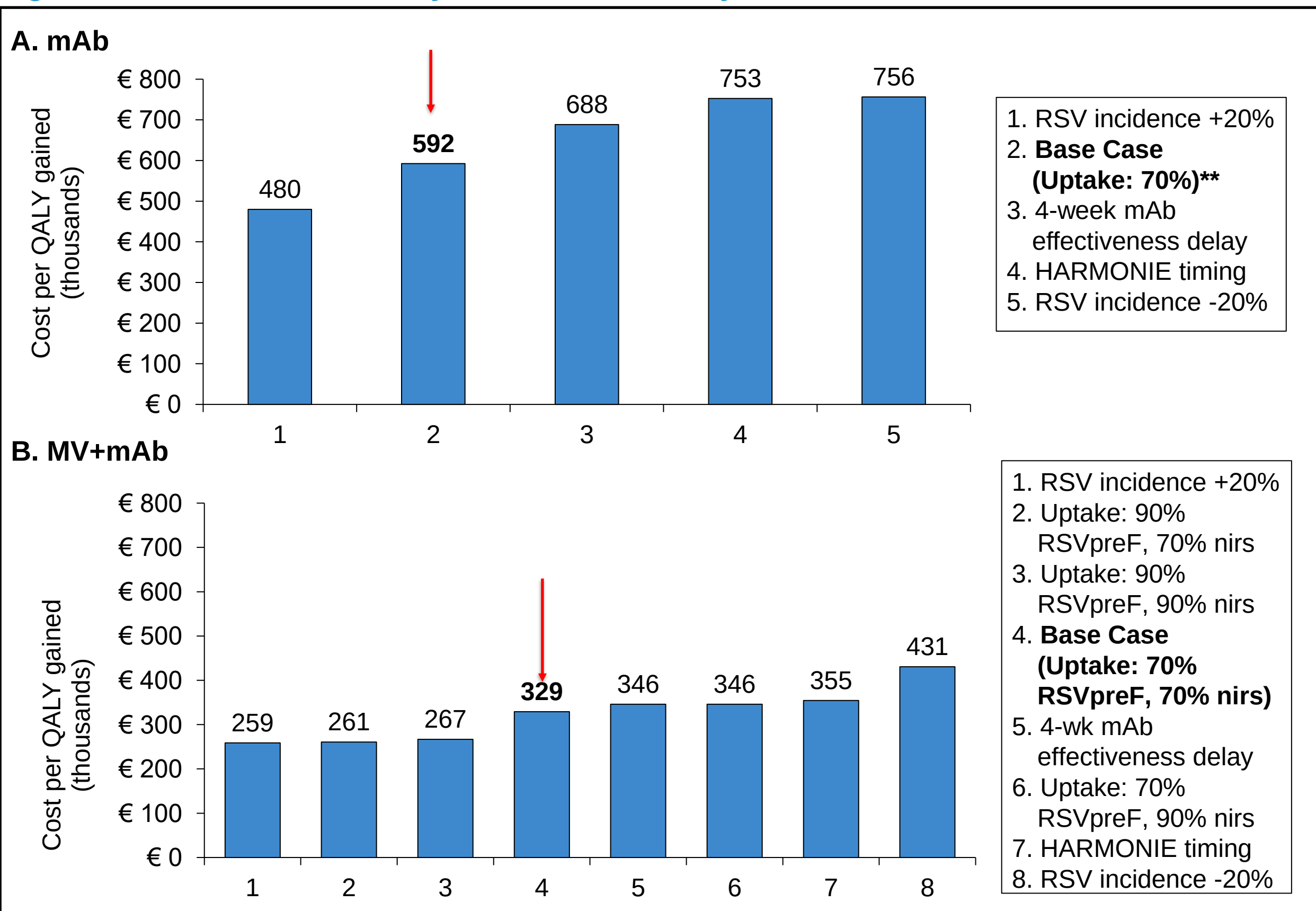
- prices in Norway, France and Belgium (€ 547.23)¹⁷⁻¹⁹; administration cost was € 30 for both interventions⁸
 - Costs of caregiver productivity loss (RSV-H: € 1,915; RSV-GP: € 743) was estimated only among infants aged ≥3 months due to parental leave^{20,23}
 - Cost of infant mortality due to premature death from RSV-LRTD was € 1,069,684^{20,22,24}
 - Cost of travel for medical care was € 7.01 for RSV-H, € 3.81 for RSV-GP¹⁴
 - Baseline utility value for healthy infants was 1; QALY loss was 0.0157 for RSV-H and 0.0061 for RSV-GP²⁵; caregiver QALY loss was 0.0066 for RSV-H and 0.0041 for RSV-GP²⁵
- ### Analyses
- Cost-effectiveness of mAb and MV+mAb, respectively, versus No Intervention was estimated in terms of cost per QALY gained
 - RSVpreF was administered year-round to 70% of eligible pregnant women²⁷
 - Nirsevimab uptake was 70% among eligible infants (mAb: all infants; MV+mAb: infants unprotected by MV)²⁸; infants born from May-September received delayed nirsevimab in the following October or November:

- Infants considered unprotected by MV include those whose mothers were not vaccinated and those who were born <2 weeks after administration of MV
- Deterministic sensitivity analyses (DSA; +/-20% of base case incidence), scenario analyses (alternative uptake strategies, HARMONIE timing of nirsevimab, 4-week effectiveness delay for nirsevimab), and probabilistic sensitivity analyses (PSA; 1,000 replications) were also conducted
- Costs are reported in 2023 €; costs and QALYs were discounted annually at 3% and 1.5%, respectively²⁹

RESULTS

- With No Intervention, RSV-LRTD would have an annual burden of 10,482 episodes and € 17.4 million in total costs (Figure 3):
- mAb would yield a 47% reduction in RSV-H and 47% reduction in RSV-GP, with an associated cost-effectiveness ratio of € 592K/QALY compared to No Intervention (due to high mAb costs)
- MV+mAb would yield a 56% reduction in RSV-H and 41% reduction in RSV-GP, resulting in a cost-effectiveness ratio of € 329K/QALY compared to No Intervention
- MV+mAb would prevent 4% fewer total cases than mAb, but prevent 19% more total hospitalizations and cost 31% less, thereby making MV+mAb dominant (i.e., more effective and less costly) if compared to mAb
- In DSA, scenario analyses, and PSA, the highest incremental cost-effectiveness ratio (ICER) for MV+mAb (vs. No Intervention) was still lower than the lowest ICER for mAb (vs. No Intervention) (Figure 4, Figure 5)

Figure 4. Results of sensitivity and scenario analyses



*Cost per QALY gained for all analyses are depicted from the societal perspective

**Alternative uptake analyses were not conducted for the nirsevimab strategy because uptake does not impact the incremental cost-effectiveness ratio in single intervention strategies

Figure 3. Total costs and cases with use of mAb and MV+mAb vs. No Intervention

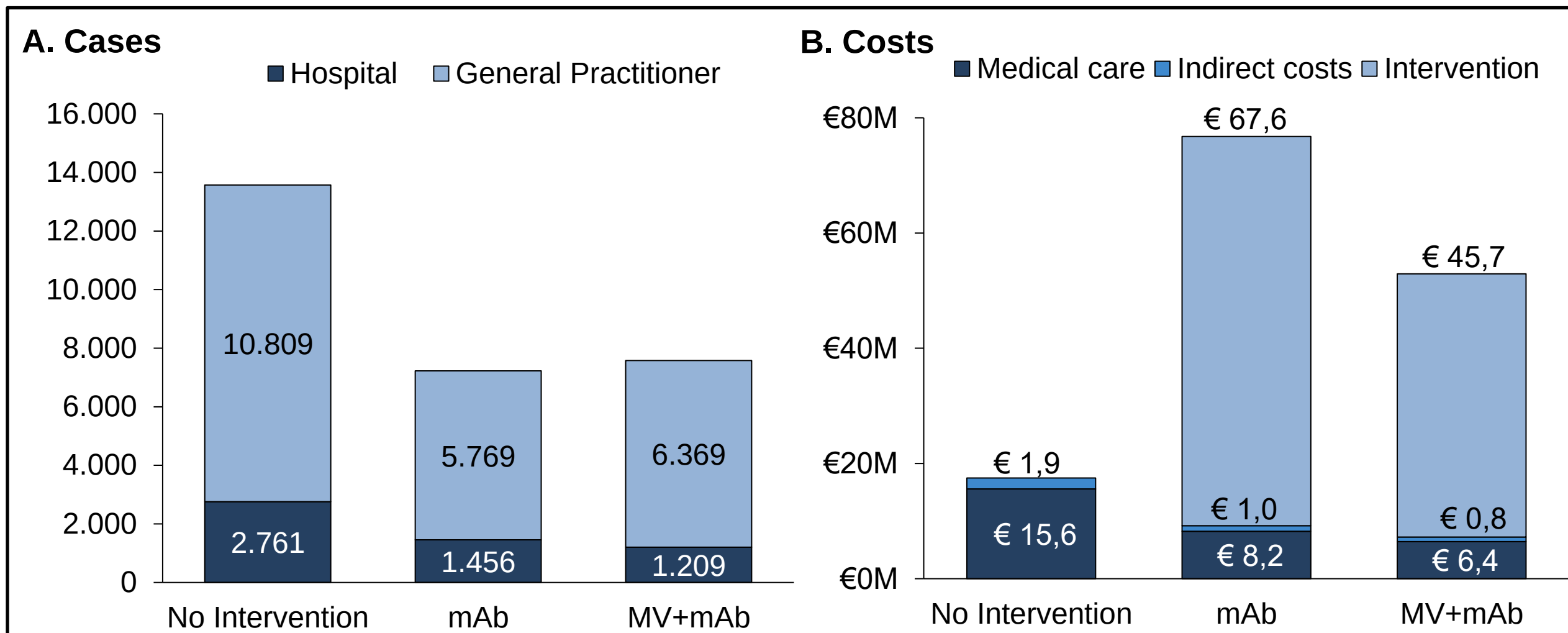
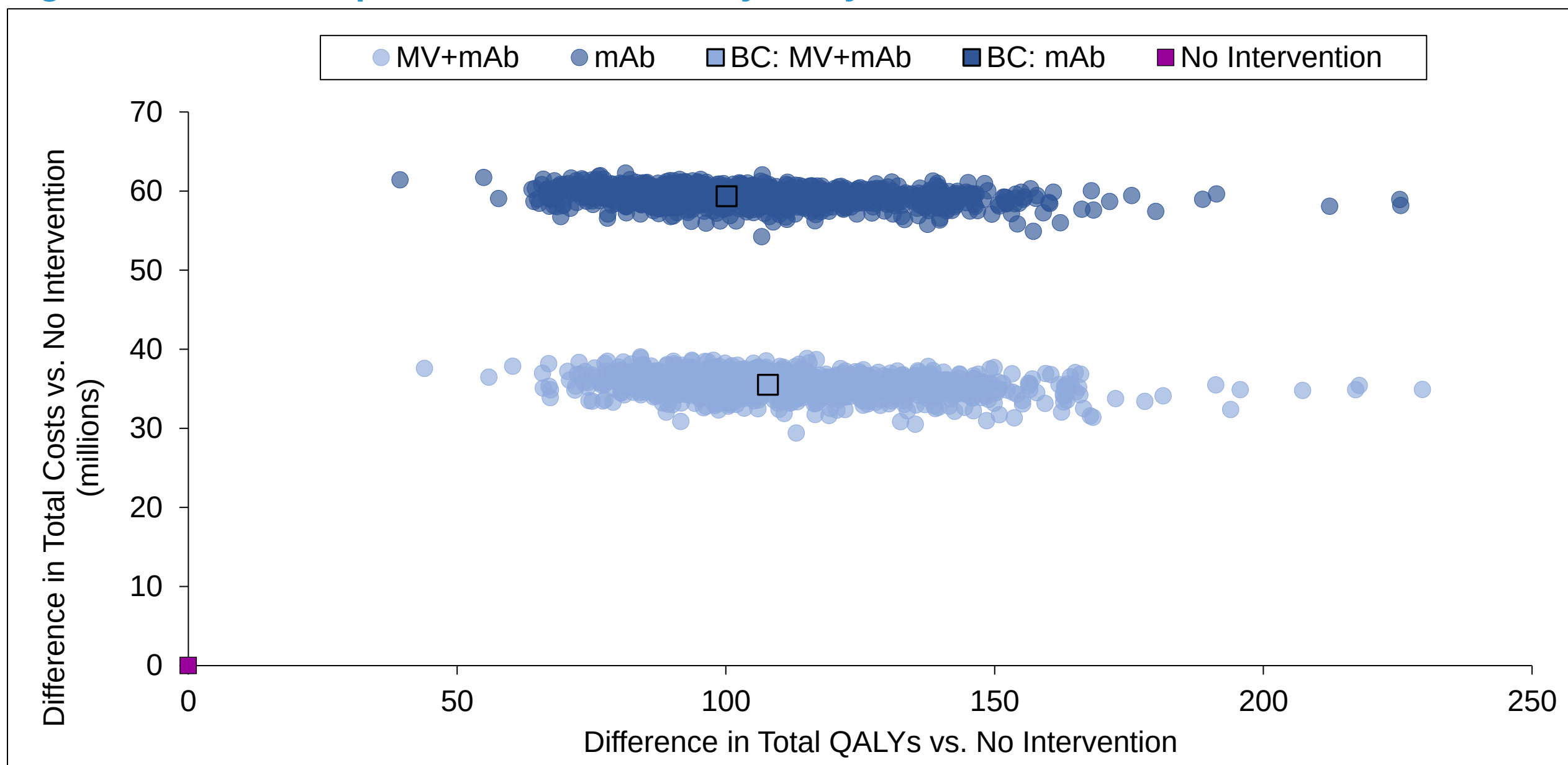


Figure 5. Results of probabilistic sensitivity analyses



BC: base case

CONCLUSIONS

- Prevention strategies employing RSVpreF and nirsevimab would yield substantial reductions in RSV-LRTD cases and medical care costs
- A strategy involving RSVpreF with complementary nirsevimab would be the most cost-effective of the strategies evaluated

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