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Background

- Respiratory Syncytial Virus (RSV) infection is the leading cause of hospitalization in infants below age 12 months.
- Despite considerable evidence on the clinical predictors of RSV hospitalizations, little is known about their cost, its drivers and their relation to age and season.
- Specifically, the share of costs from infants at normal risk is unknown.
- Mechanical ventilation (MV) provides a well-documented marker of disease severity in hospitalizations.

Methods

Data source:

- The National Inpatient Sample was used to examine RSV inpatient admissions and their average charge from 2009 to 2011.¹
- This 3-year data set includes a large, nationally representative all-payer sample of 37,376 RSV admissions of infants in the US under age 12 months recorded by month.

Parameters calculated:

- Rate per 1000 infants of RSV hospitalizations (ICD-9-CM diagnosis codes 079.6, 466.11, 480.1)
- Share receiving MV (ICD-9-CM procedure codes 93.90, 96.01, 96.02, 96.03, 96.04, 96.05, 96.70, 96.71, 96.72)
- Mean charge per admission (separated by use of MV) with 95% confidence intervals (CI) by age and season, excluding incomplete data.

Analysis:

- All rates were converted to relative measures by dividing by the annual average (1.00 = annual average)
- All charges were adjusted to Jan 2020 based on the medical care component of the Consumer Price Index.
- Incomplete data were considered missing at random

Results

Hospitalization rates:

- Rates of hospitalization by age were highest for infants 1 month of chronological age (2.42 times the annual average) and declined steadily thereafter (Fig 1).
- The percentage of hospitalizations with MV averaged 4.5% (95% CI: 3.8%-5.2%).
- MV hospitalizations declined from months <1 to 5, with subsequent fluctuations through 11 months (Fig 1).

Hospitalization charges per episode:

- Charges varied relatively little by age.
- All-RSV charges exceeded the annual average only for infants aged <1 and 1 month (1.30 and 1.05 times the annual average, respectively, Fig 2).
- Average charges for all RSV differed little from RSV excluding MV because MV was relatively rare (4.87%).
- In 2020 prices, hospitalization charges per episode averaged \$175,211 with MV vs. \$17,313 without MV, totaling \$1.51 billion annually for the birth cohort of 4.04 million infants (\$374 per infant) (Fig 2).
- Average charges by month for all hospitalizations were similar to those excluding MV (Fig 3).

Use of MV:

- Hospitalizations without MV constituted 95.5% (95% CI 94.8%-96.2%) of all RSV hospitalizations and comprised 67.5% of aggregate yearly charges.
- RSV hospitalizations are highly seasonal, peaking Jan-March (Fig 4).
- In every season, rates of RSV hospitalization and shares of hospitalization with MV are highest in infants aged 0-2 months and lowest in infants aged 9-11 months (Fig 5).

Fig. 1 Share of RSV hospitalizations with MV [bars] vs. rate of RSV hospitalizations [line] by age

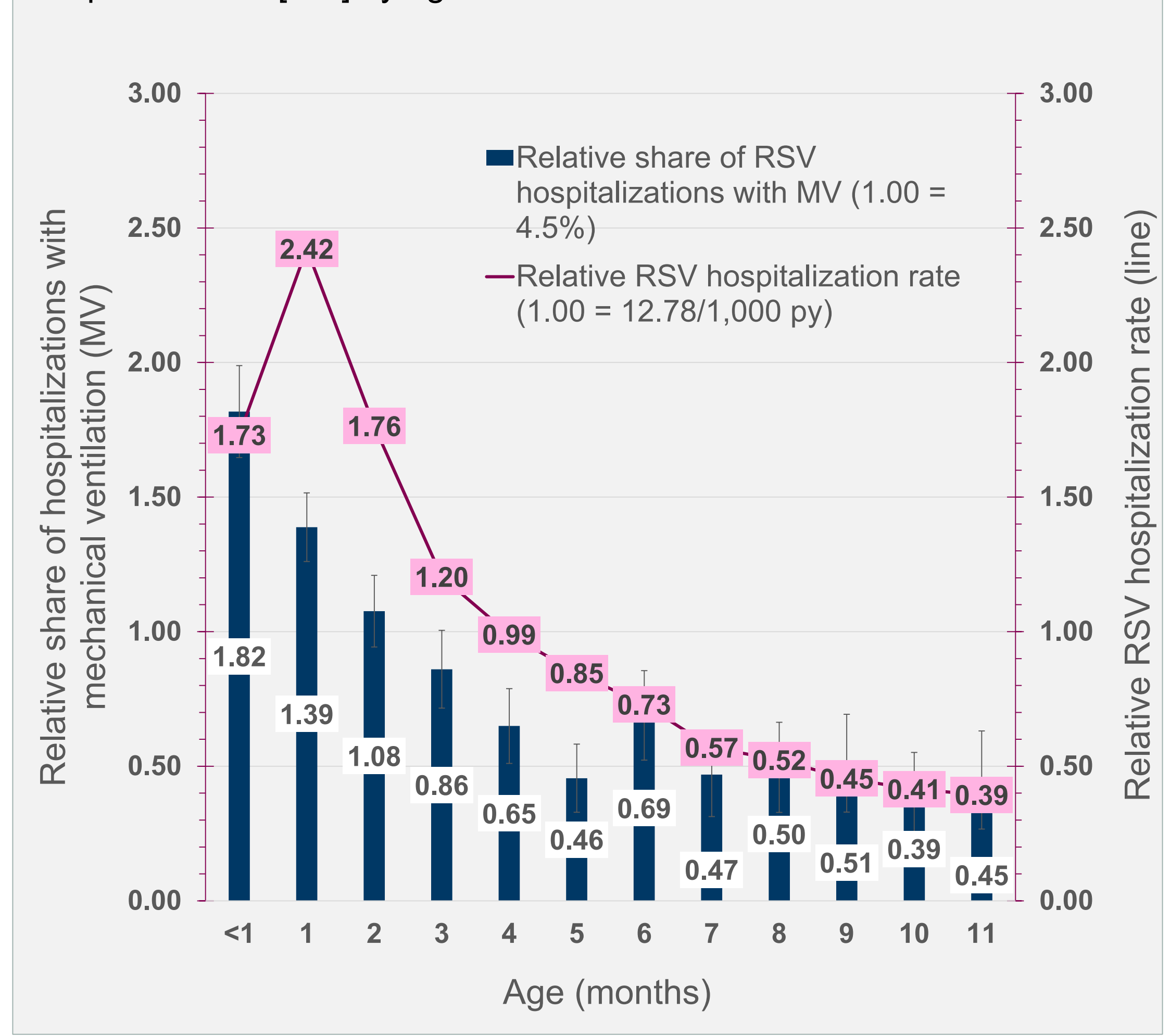


Fig. 2 Average charges [bars] vs. rate of RSV hospitalizations [line] by age

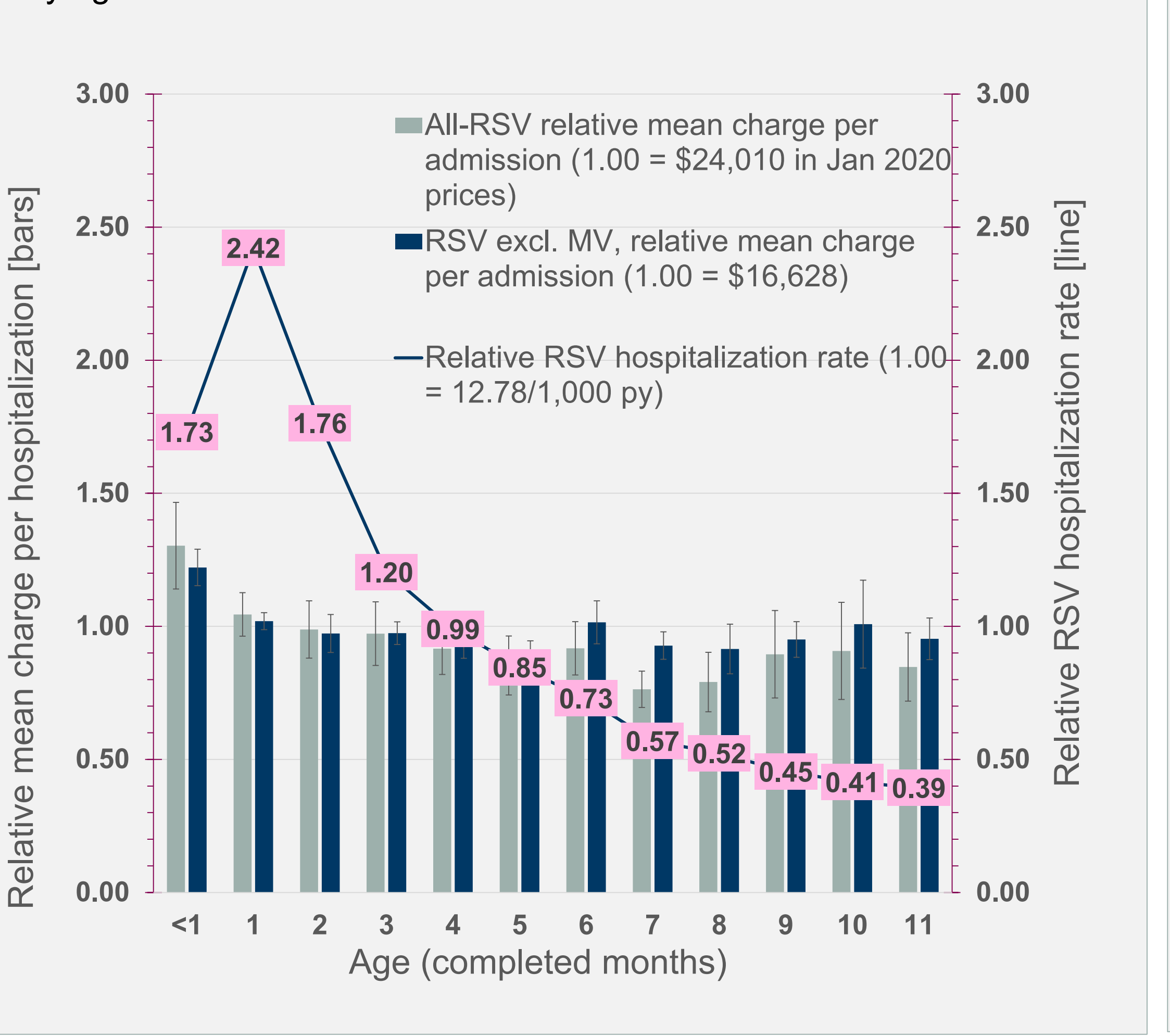


Fig 3. Average hospitalization charges [bars] vs RSV hospitalization rate [line] by season

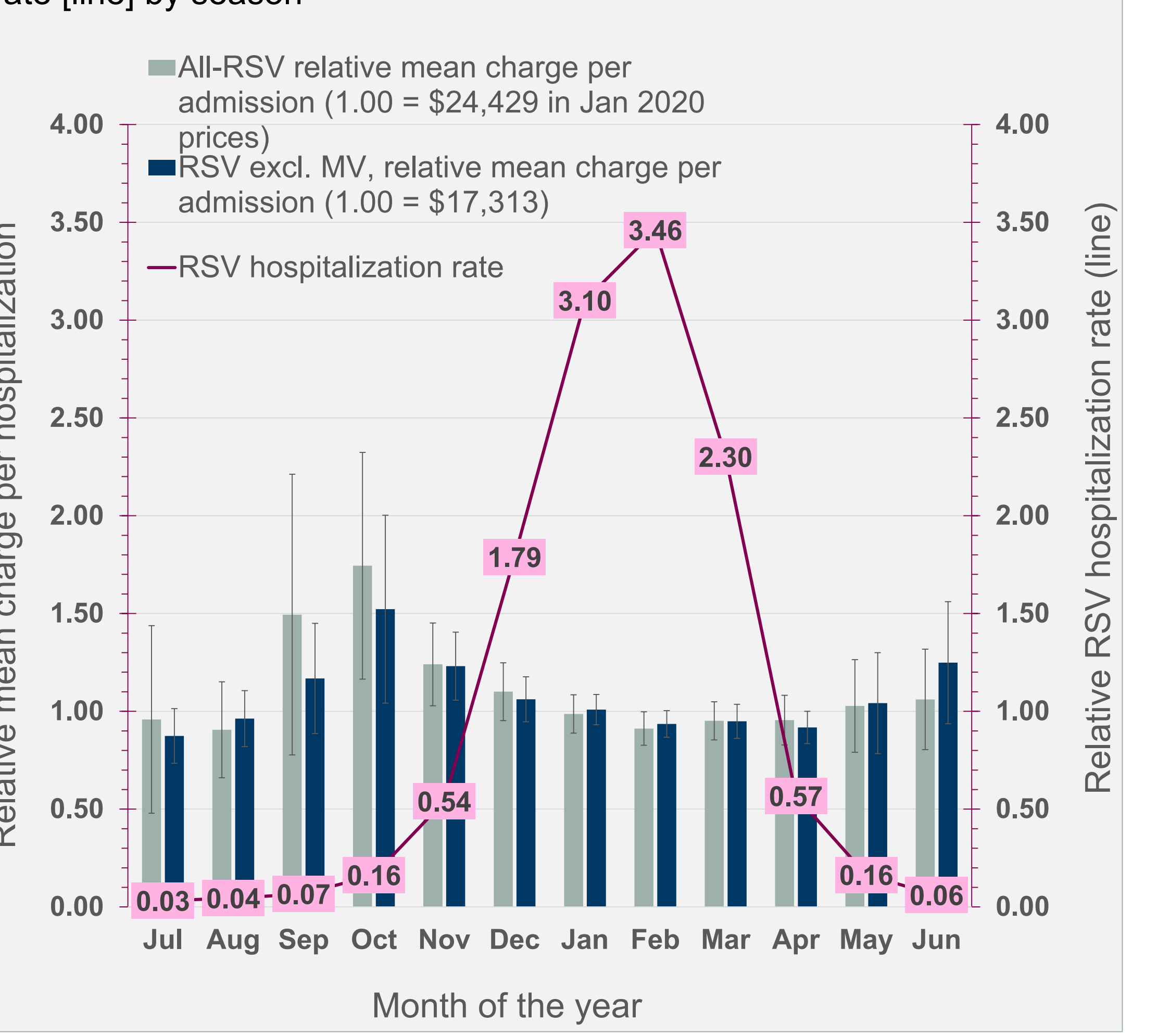


Fig. 4. Utilization of MV [bars] vs RSV hospitalization rate [line] by season

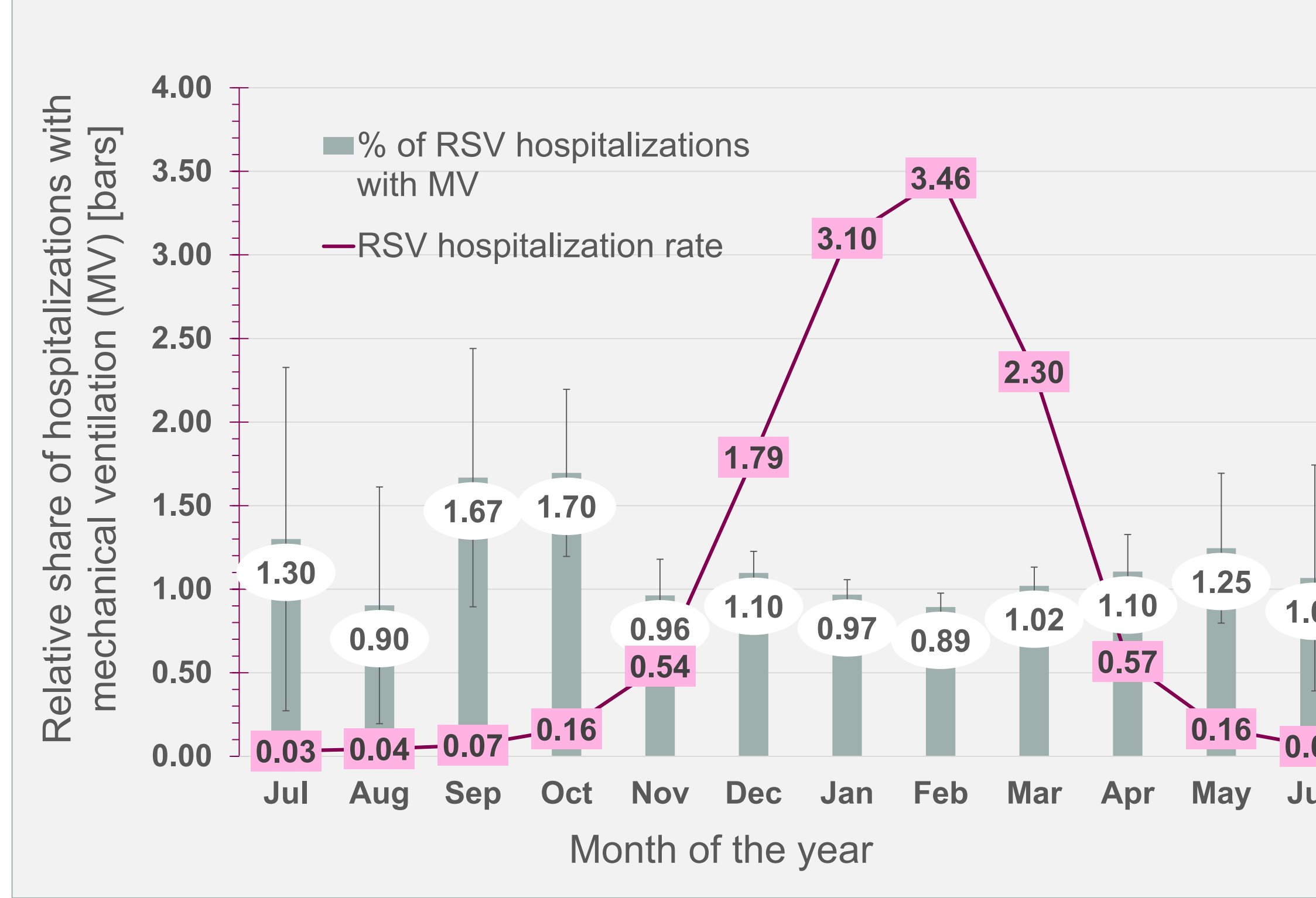
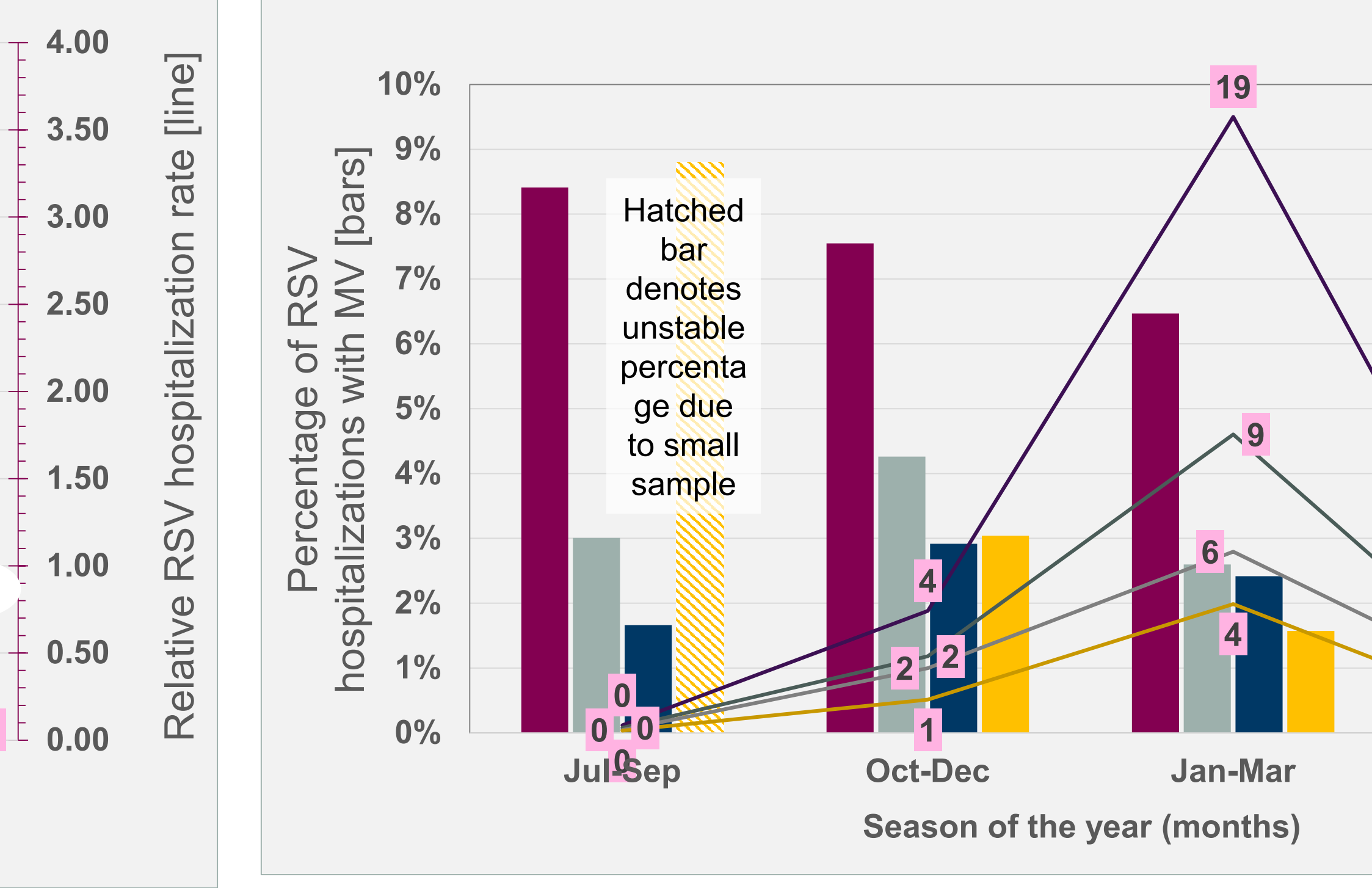


Fig. 5. Relation between use of mechanical ventilation (MV) [bars] and RSV hospitalization rate [lines] by season and age (in months)



Conclusion

- Although MV hospitalization charges average 10 times higher, non-MV hospitalizations are 20 times more prevalent.
- Thus, infants with MV are not the main driver of RSV hospitalization charges.
- Due to their large share (95.5%) of RSV hospitalizations, those without MV constitute two-thirds of aggregate RSV inpatient charges.

References

1. HCUP Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), 2009-2011. Agency for Healthcare Research and Quality, Rockville, MD. hcup-us.ahrq.gov/nisoverview.jsp