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POSTER CODE: EE110

The Impact of Seasonality and Hospital Capacity on the Cost-Effectiveness of Maternal RSV Vaccination in Norway

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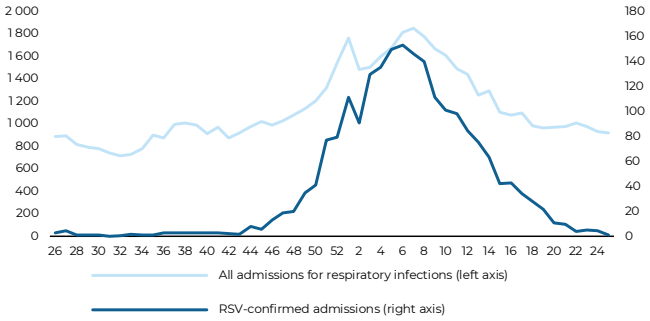
BACKGROUND

Respiratory syncytial virus (RSV) causes infections of the respiratory tract and is a primary cause of hospitalizations among children with lower respiratory tract infections (LRTI) in developed countries [1].

In temperate countries, RSV is seasonal and peaks in the winter, placing an additional burden on healthcare systems already dealing with other respiratory illnesses such as influenza (Figure 1) [2].

Cost-effectiveness analyses of preventive measures, such as vaccination against RSV, rely on reference unit costs of hospitalizations, which do not account for the value of reducing healthcare system pressure during the winter months.

Figure 1: Number of hospital admissions for respiratory infections by calendar week in Norway, 2018-2019 average



Source: FHI (2024) [2]

RATIONALE

There are at least three potential channels through which the avoidance of acute, vaccine-preventable hospital admissions during the season of highest capacity pressure may be more valuable than what is suggested by reference costing.

A) Reference costs may not provide an accurate estimate of the true marginal cost of these hospitalizations avoided during peak capacity pressured times at hospitals. Additional part-time staff, as well as an increased reliance in the use of extra shifts for existing staff during winter months are not accurately reflected, for example.

B) Vaccine-preventable hospitalizations may have knock-on effects on other patients who may see their admissions shortened or their procedures postponed to free up beds for patients with acute illness [6, 7]. A study from the UK suggest that in contexts of high capacity pressure this value can be up to two times the direct costs avoided [7].

C) An increasingly relevant argument since the COVID-19 pandemic, is that maintaining a portion of spare capacity year-round should be a goal as part of emergency preparedness.

OBJECTIVES

To assess the impact of explicitly incorporating the excess costs of hospitalizations during the winter months on the cost-effectiveness of a national, seasonal maternal RSV vaccination campaign in Norway.

KEY FINDINGS

The use of yearly reference costs for hospitalization likely underestimates the cost-effectiveness and societal value of preventive healthcare measures such as RSV maternal vaccination by not considering the increased costs of hospitalizations during high-pressure seasonal months.

METHODS

A Markov-model populated by efficacy inputs from the MATISSE trial of the RSVPreF vaccine and Norwegian RSV incidence was used to depict clinical outcomes and costs related to medically attended RSV-positive lower respiratory tract infections (LRTI) among a yearly cohort of infants in Norway [2-4]. The cost-effectiveness of a nationwide maternal vaccination campaign was estimated from a healthcare sector perspective.

Health outcomes of vaccinated and unvaccinated infants were measured over the course of a twelve months, and no effects were assumed beyond that time. Outcomes included RSV-associated hospitalizations, outpatient clinic encounters and primary care visits. No preventable RSV-mortality was assumed and any protection from vaccination provided to infant's mothers were ignored [5].

Base-case hospitalization costs were based on the corresponding diagnosis-related group (DRG) codes, by infant's term status and age at admission, (Table 1). Seasonal hospitalization costs were modelled by increasing costs by 10% increments during winter months (December through February) and decreasing them by the same amount during summer months (June through August).

Table 1: Base-case LRTI hospitalization costs (NOK, 2024)

Age (months)	Full term (≥ 37 wGA)	Preterm (≤36 wGA)
<1 months	61 358	79 788
1 to <2 months	58 218	60 468
2 to <6 months	57 472	59 268
6 to <12 months	57 196	58 823

RESULTS

Seasonal costs of hospitalizations have a more than proportional effect on the incremental cost-effectiveness ratio (ICER) of a maternal vaccination program against RSV. **Increasing LRTI hospitalization costs** by **10, 20 and 30 percent** during the winter months (December through February) and reducing them by the same percentage during the summer months (June through August) **reduces the ICER by 26, 52 and 78 percent**, respectively.

CONCLUSION

The cost-effectiveness of preventive healthcare measures such as vaccination programs is highly sensitive to the assumptions made regarding the cost of hospitalizations during peak hospital capacity periods. Further research is needed to document and quantify the variation in hospitalization costs across seasons.

References

1. Shi, T., et al., *Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in young children in 2015: a systematic review and modelling study.* Lancet, 2017. 390(10098): p. 946-958
2. FHI. *Ukerapporter om covid-19, influensa og andre luftveisinfeksjoner.* 2024; Available from: https://www.fhi.no/publ/statusrapporter/luftveisinfeksjoner/.
3. Kampmann, B., et al., Bivalent Prefusion F Vaccine in Pregnancy to Prevent RSV Illness in Infants. N Engl J Med, 2023. 388(16): p. 1451-1464.
4. Hutton, D., Economics of the Pfizer maternal RSVpreF vaccine. 2023: ACIP Meetings, June 2023.
5. Johannesen, C.K., et al., *Age-Specific Estimates of Respiratory Syncytial Virus-Associated Hospitalizations in 6 European Countries: A Time Series Analysis.* J Infect Dis, 2022. 226(Suppl 1): p. S29-S37.
6. Sandmann, F.G., et al., Estimating the opportunity costs of bed-days. Health Econ, 2018. 27(3): p. 592-605
7. Brassel, S., et al., The Value of Vaccines in Maintaining Health System Capacity in England. Value in Health, 2023. 26(7): p. 1067-1072

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