Pricey or priceless: cost-effectiveness of respiratory syncytial virus (RSV) prevention in infants

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The Lancet Regional Health - Americas 2024;29: 100657

Published Online xxx https://doi.org/10.1016/j.lana.2023.100657

Respiratory syncytial virus (RSV) is estimated to have resulted in 33 million episodes, 3.6 million hospital admissions and 101 thousand attributable deaths in young children worldwide in 2019.[1] Although the short-acting monoclonal antibody (mAb) palivizumab has been in use for RSV prevention in infants since 1998, its focus on high risk clinical indications (e.g. preterm ≤32 weeks of gestation, comorbidities), given the complexity of the required monthly injections and its high price, imply the vast majority of infants does not receive it.

A long-acting single-dose mAb (nirsevimab) and a maternal RSVpreF vaccine (MV) against RSV disease among healthy infants met their phase 3 trial endpoints,[2,3] while another long-acting mAb, MK-1654, is undergoing its phase 3 trial.[4] Decision makers need to understand the differences in effectiveness between these interventions given the options for their wide spread use in the context of their healthcare system (e.g. year-round or seasonal programmes), and their budget constraints. That is, their prioritisation task and price negotiations would benefit from having cost-effectiveness analysis. The National Immunization Technical Advisory Groups (NITAGs) of the United Kingdom and the United States (US) already made use of health economic analyses to help shape their recommendations for these two new licensed RSV products.[5,6] They highlighted the influence of their prices for their overall cost-effectiveness, and the price difference between them to prioritise one over the other. It is expected that the nirsevimab will be priced higher than MV.

Shoukat and colleagues conducted cost-effectiveness and budget impact analyses of nirsevimab and MV among Canadian infants and demonstrated that the more expansive the target population, the greater the reduction in overall disease burden, but also the lower the price of nirsevimab should be (Fig. 1).[7] The year-round MV has to be cheaper per dose to achieve similar cost-effectiveness, because of nirsevimab's higher efficacy values, and its potential catch-up component, through which infants born outside of the RSV season can receive nirsevimab at the start of RSV season. This is the first published study to consider a mixed programme of using both MV and nirsevimab. They find that a higher price of nirsevimab (CAD$615) in combination with a lower price of MV (CAD$140) would not only be cost-effective under a willingness-to-pay of CAD$50,000 per QALY gained, but also would have the lowest health care budget impact among the six strategies they considered.

Despite this being a generally well executed study, readers should be aware of some limitations, which apply also to many similar studies on this topic.

First, the authors recognised multiple relevant strategies were not evaluated. Based on cost-effectiveness, year-round nirsevimab is likely dominated by the seasonal plus catch-up strategy. However, administering nirsevimab in October in half of the birth cohort (born before the RSV season) is logistically challenging, and the costs to set this up are likely not fully captured. Furthermore, seasonal MV, shorter seasonal applications of nirsevimab, and other combination strategies might also be of interest.

Second, all six strategies were compared separately to no intervention rather than to each other in a full incremental analysis.[8] Hence the results cannot be used to inform which programme should be preferred when compared to any of the other programmes. For instance, the threshold price per dose of $160 at which MV becomes cost-effective applies to when MV is compared to no intervention, but not in comparison to one of the other programmes (i.e. L4).

Third, although sigmoidal and constant waning of efficacy over 10 months were explicitly evaluated, to-date the duration of protection and waning rates of both interventions are still unclear beyond 5–6 months.[2,3] The findings "relatively robust to the efficacy" should be approached with caution.

These new RSV interventions have long been anticipated, and are broadly considered a 'game changer'. However, they carry high price tags: nirsevimab $495 and MV $295 in the US,[9] whereas the mean price per fully vaccinated child is estimated at €339 in European countries.[10] In health economics, the scarcity of resources is intrinsically linked to the willingness-to-pay (WTP) per Quality-Adjusted Life-Year (QALY). Country-specific evaluations increasingly highlight threshold prices at which interventions become cost-effective for a given WTP per QALY and therefore can be used to facilitate tender procedures and price negotiations to protect infants against RSV at a cost that is

DOI of original article: https://doi.org/10.1016/j.lana.2023.100629
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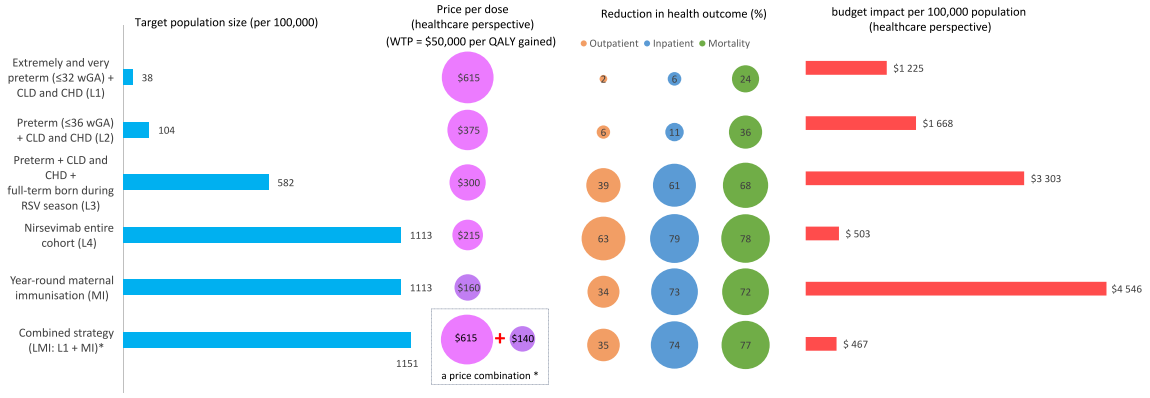

Fig. 1: Key findings: the cost-effectiveness analysis of RSV prevention strategies in Canada (Shoukat et al., 2023). The price-per-dose is estimated from the healthcare perspective under the willingness-to-pay threshold of CAD $50,000 per QALY gained. This Figure visually presents the data from the original publication Tables 3 and 5 and Figs. 2 and 3 with sigmoidal vaccine efficacy profiles (100% coverage). Abbreviation: wGA: weeks of gestational age; CLD: chronic lung disease, CHD: congenital heart disease, RSV: respiratory syncytial virus, MI: maternal immunisation, WTP: willingness-to-pay, QALY: quality-adjusted life-year, L: passive immunisation with nirsevimab, LMI: year-round maternal immunisation (MI) followed by nirsevimab to infants at high risk of severe RSV disease during RSV season (L1). *Various price combinations of combined strategy (LMI) were reported in the Shoukat et al., 2023, this figure only shows one combination with the lowest budget impact from the Canadian healthcare perspective.

consistent with other healthcare decisions. Shoukat and colleagues contribute to this process by providing threshold price estimates for these new products versus no intervention, and by showing that their mixed use can also be cost-effective, while having relatively less impact on the health care budget.[7]

Contributors

XL conducted the literature search and analysed the data. All authors wrote the initial manuscript draft. All authors critically reviewed the manuscript and provided final approval of the manuscript.

Declaration of interests

XL, JB and PB report grants to their institution from Respiratory Syncytial Virus Consortium in Europe (RESCEU) and Preparing for RSV immunisation and surveillance in Europe (PROMISE) outside the submitted work. PB reports unrestricted grants from Pfizer and Merck paid to University of Antwerp for unrelated projects.

Acknowledgements

Funding: There is no funding related to this comment.

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