

Cost-effectiveness of microarray patches for hepatitis B virus birth-dose vaccination in low- and middle-income countries

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Background: Timely hepatitis B birth-dose coverage is essential for achieving elimination in low- and middle-income countries (LMICs). Expansion of vaccination coverage to births outside of health facilities (e.g., home births) is challenging in many LMICs due to storage and delivery protocols needed for current vial presentations. Microarray patches (MAPs) are a developing vaccine technology that could overcome these barriers; however, MAPs are likely to cost more to purchase per dose compared to vials. We investigated whether use of MAPs to expand hepatitis B birth-dose coverage would be cost-effective across a range of LMICs.

Methods: A deterministic, compartmental model was used to simulate mother-to-child hepatitis B transmission and subsequent disease progression. Compared to existing birth-dose vaccination coverage, MAP cost-effectiveness was evaluated for two potential use case scenarios: (1) MAPs used to expand coverage to previously unvaccinated births outside of health facilities and (2) MAPs also used to replace a proportion of existing coverage. Modelling was completed for 77 LMICs and the six World Health Organization world regions. Outcomes were discounted at 3% per annum, and analysis took the health providers' perspective.

Results: Expanding timely hepatitis B birth-dose coverage (scenario 1) was the most efficient use of MAPs, producing overall cost savings in 48 (62%), 40 (52%), and 38 (49%) modelled LMICs when priced at US\$1.65, US\$3.30, and US\$5.00 per MAP, respectively. Under a pessimistic scenario where MAPs expanded timely birth-dose coverage by 1% but replaced 10% of existing coverage (scenario 2), MAPs cost up to an average US\$117 (interquartile range: \$41, \$223) per disability-adjusted life year averted. However, evaluation against national willingness-to-pay estimates indicated this use would remain cost-effective in at least 71 (92%) modelled LMICs.

Conclusion: MAPs are likely to be a cost-saving or cost-effective mechanism to expand timely birth-dose coverage in LMICs and could be important for achieving hepatitis B elimination.

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