Cost-Effectiveness Analysis of Expanding Intranasal Influenza Vaccination in Paediatric High-Risk Populations in Germany

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Background

Children with chronic conditions face a higher risk of influenza complications, yet vaccine coverage among high-risk children in Germany remains low (7.95%).[1,2] Increasing the uptake of intranasal LAIV may provide an opportunity to increase vaccination coverage in this population.

Objective

To assess the clinical impact and cost-effectiveness of increasing influenza vaccination coverage through expanded use of intranasal LAIV among German paediatric high-risk populations, we evaluated two uptake scenarios.

Scenarios

Base Case
VCR: 7.95%
Current VCR among high-risk children in Germany[2]

Intervention Scenario 1
VCR doubled: 15.89%
Similar development of LAIV uptake observed in Finland following reimbursement[3,4]

Intervention Scenario 2
Max VCR: 38.45%
VCR of adults aged ≥60 years in Germany[2]; approach as in Scholz et al.[5], in line with the PEARL study[6]

Increasing influenza vaccination coverage through expanded LAIV use among high-risk children is cost-effective from the payer perspective and cost-saving from the societal perspective, with most prevented influenza burden occurring through indirect population effects.

Results

Higher influenza vaccination coverage reduces influenza burden directly and indirectly

- **Increasing LAIV uptake** among high-risk children reduced influenza infections, medically attended cases and hospitalizations in both scenarios
- **Direct population:** 10,857 (Scenario 1) and 37,040 (Scenario 2) infections, 2,722 and 9,288 medically attended cases, and 23 and 79 hospitalizations were avoided
- **Indirect population:** 150,121 and 504,013 infections, 31,850 and 106,887 medically attended cases, 570 and 1,911 hospitalizations, and 43 and 144 deaths were avoided
- The majority of prevented events occurred outside the vaccinated high-risk population, demonstrating the substantial **indirect population-level benefit**

Higher vaccination costs are offset by substantial societal savings

- **Increasing LAIV uptake** resulted in higher direct costs of €1.5 million in Scenario 1 and €4.1 million in Scenario 2 compared to the Base Case reflecting changes in vaccination and healthcare costs
- At the same time, **reductions** in influenza-related morbidity substantially decreased indirect costs
- These **savings** more than offset the additional vaccination costs from a societal perspective, resulting in net societal savings of **€23.3 million** in Scenario 1 **and €79.0 million** in Scenario 2
- Within the **economic analysis**, (child-)sick-pay costs **decreased** by **€2.2 million** in Scenario 1 and **€7.5 million** in Scenario 2

Both increased-uptake scenarios are cost-effective from the payer perspective

- From the payer perspective, **increasing LAIV uptake** resulted in additional health gains at comparatively low incremental costs
- The ICER was **€1,977 per QALY** gained in Scenario 1 and **€1,670 per QALY** gained in Scenario 2
- Incremental payer costs per hospitalization avoided were **€2,462** (Scenario 1) and **€2,081** (Scenario 2), and per medically attended symptomatic case avoided **€42** and **€36**
- Compared with Scenario 1, the lower ICER in Scenario 2 indicates that the additional investment in higher vaccination coverage translates into proportionally greater health gains

Extending LAIV uptake to all children aged 2–17 years (full-population analysis)

- Hypothetical scenario with a STIKO recommendation for all children: Base Case VCR 7.95% (994,095 vaccinated children) vs. **doubled VCR of 15.89%** with LAIV reimbursement (+997,172 vaccinated children, +100%)

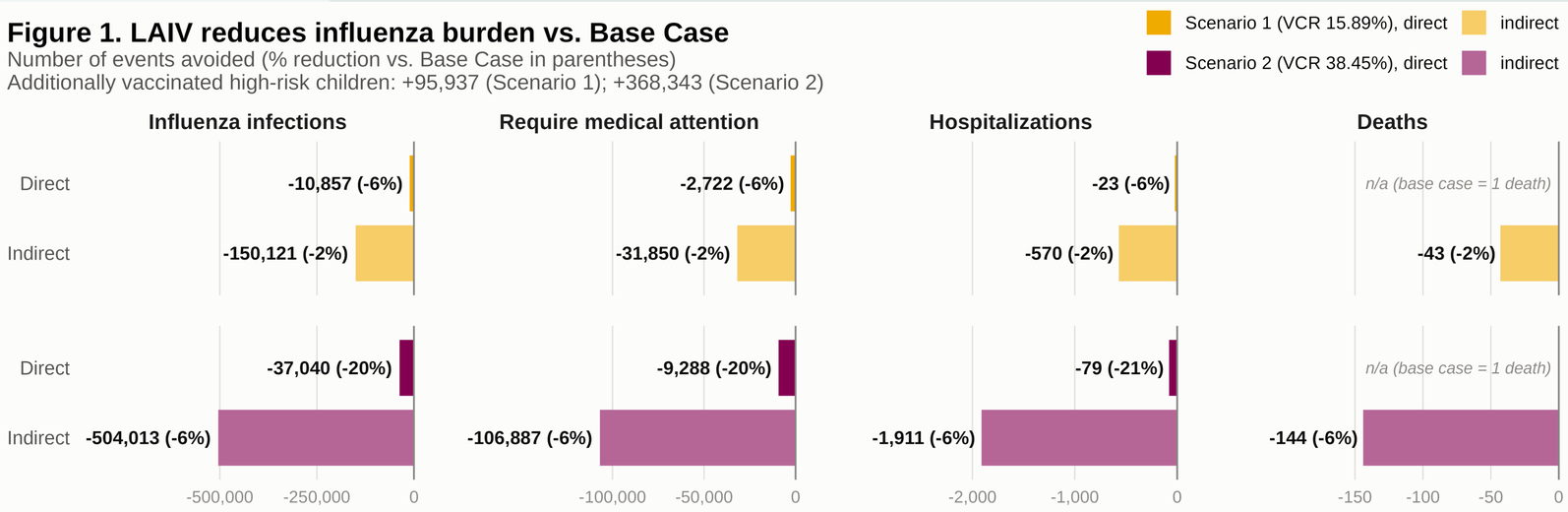
Change vs. Base Case	Direct (2–17 y)	Indirect	Total
Influenza infections	-324,853 (-20%)	-927,512 (-16%)	**-1,252,365 (-17%)**
Symptomatic cases (medically attended)	-61,141 (-20%)	-204,847 (-16%)	**-265,988 (-17%)**
Hospitalizations	-530 (-20%)	-4,052 (-16%)	**-4,582 (-16%)**
Deaths	-1 (-20%)	-333 (-16%)	**-334 (-16%)**
QALYs lost	-852 (-20%)	-4,882 (-16%)	**-5,735 (-16%)**

Full-population analysis (WIG2, 08/2026): direct population = all children aged 2–17 years; LAIV share 86.6% after reimbursement[3].

- **Payer perspective:** additional direct costs of €26.7 million (+5.2%) ; ICER **€4,651 per QALY** gained, €5,821 per hospitalization and €100 per medically attended case avoided
- **Societal perspective: cost-saving** with net savings of €165.1 million (–9.8%); (child-)sick-pay costs reduced by €16.6 million

Figure 1. LAIV reduces influenza burden vs. Base Case

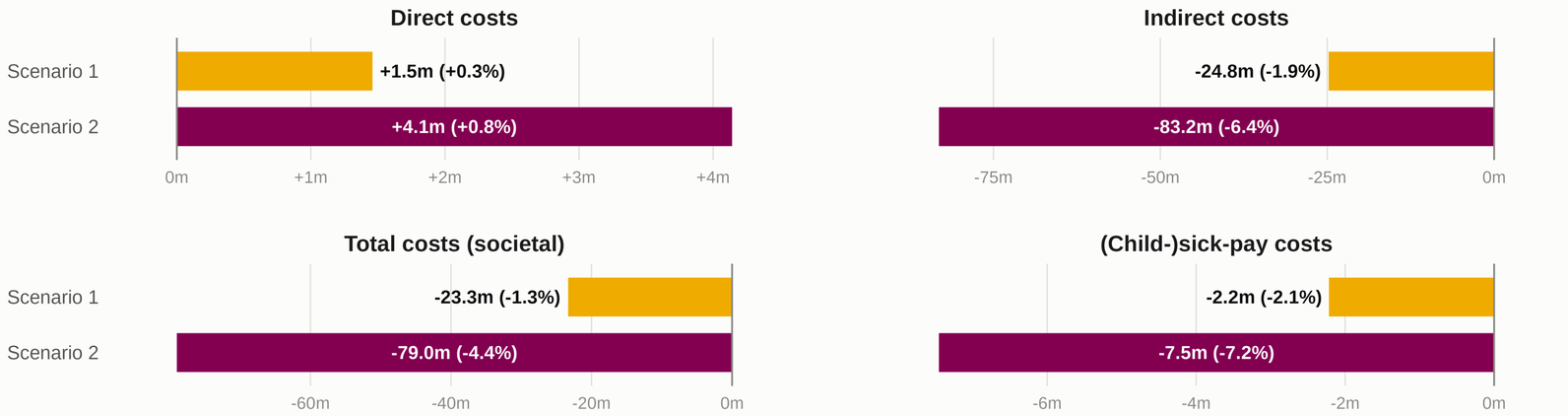
Number of events avoided (% reduction vs. Base Case in parentheses)
Additionally vaccinated high-risk children: +95,937 (Scenario 1); +368,343 (Scenario 2)



Direct population = high-risk children eligible to receive LAIV (2-17 years); all others are indirect. Base Case: 95,937 vaccinated high-risk children; the vaccinated indirect population is unchanged across scenarios.
Direct-population Deaths not shown: base case is 1 death (0 avoided). VCR, vaccine coverage rate.

Figure 2. Vaccination cost trade-off vs. Base Case

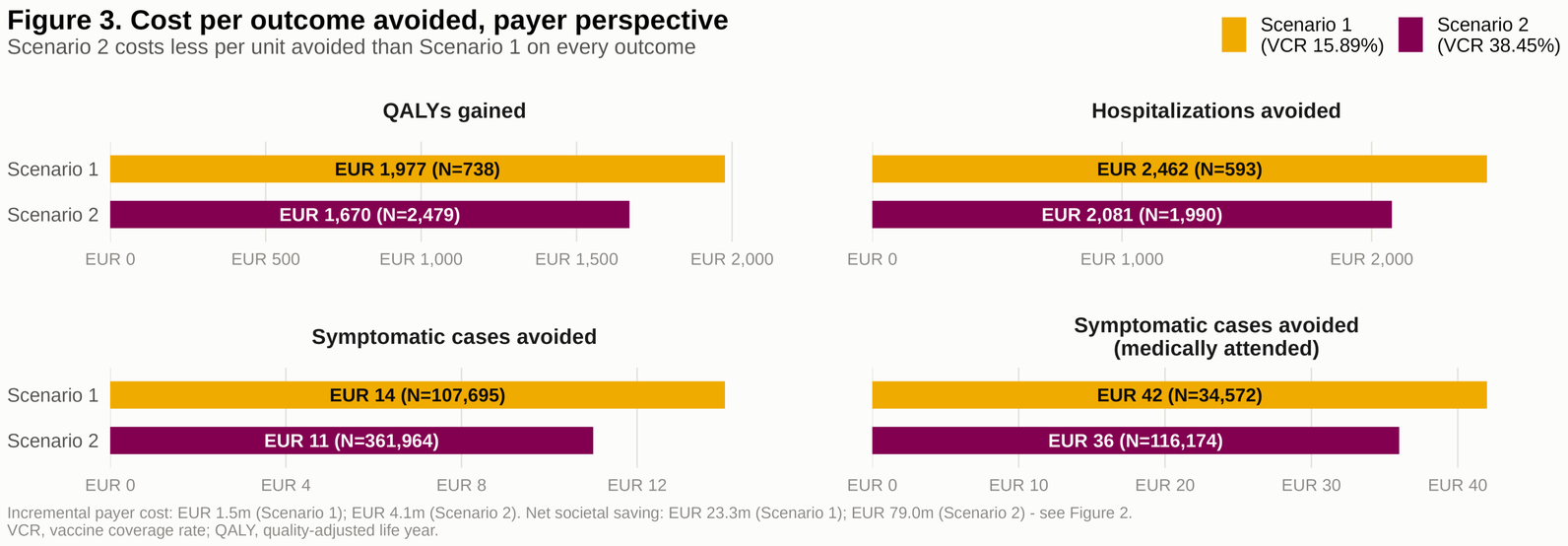
Change in costs vs. Base Case, EUR million (% change in parentheses)



Direct costs include vaccination/administration, adverse-event management, and outpatient/inpatient care. Total costs (societal) = direct + indirect costs.
Indirect costs are productivity loss (discounted 3%); (child-)sick-pay costs are a subset of indirect costs, broken out here. VCR, vaccine coverage rate.

Figure 3. Cost per outcome avoided, payer perspective

Scenario 2 costs less per unit avoided than Scenario 1 on every outcome



Incremental payer cost: EUR 1.5m (Scenario 1); EUR 4.1m (Scenario 2). Net societal saving: EUR 23.3m (Scenario 1); EUR 79.0m (Scenario 2) - see Figure 2.
VCR, vaccine coverage rate; QALY, quality-adjusted life year.

How did we perform this research?

- **High-risk children:** aged 2–17 years with underlying medical conditions according to STIKO recommendations, representing approximately 9% of all children[1,2]
- **Model:** Dynamic transmission model (SEIR) linked to a health-economic model; Base Case VCR 7.95%, Scenario 1 15.89%, and Scenario 2 38.45%
- **Population:** Total German population N = 83,401,328[7], including 1,207,575 high-risk children (direct population) and 82,193,754 other individuals (indirect population)[2]
- **Calibration and time horizon:** Calibrated to an average influenza season based on 2014/15–2019/20 and 2022/23–2024/25[8]; 1-year time horizon
- **Costs:** Vaccination, treatment and medication costs; productivity losses included as indirect costs[2]
- **Limitations:** Cross-protection was assumed; vaccine effectiveness was modelled through effects on exposure and infection only; results depend on assumptions regarding VCR, vaccine effectiveness and influenza-season characteristics

Study design

	Key Inputs	Key Outputs
Clinical	• Infection rates • Vaccine effectiveness • Target vaccine coverage rates • Contact rates (age-stratified)	• Influenza infections, N • Symptomatic cases, N • Hospitalizations (general ward and ICU), N • Influenza-related deaths, N
Costs	• Vaccine costs • Administration costs • Healthcare resource-use costs • Productivity costs	• Vaccination and administration costs • Adverse-event management costs • Healthcare costs (outpatient and inpatient) • (Child-)sick-pay costs • Productivity loss (morbidity, childcare, mortality)

German population stratified by age and influenza risk group

What are the implications for payers?

- **Higher LAIV uptake** requires additional vaccination spending, but the incremental payer cost is low relative to the health gains achieved
- Evaluating strategies by **vaccine cost alone** may underestimate their value, as reductions in influenza-related healthcare use and (child-)sick-pay costs partly offset the added expenditure
- **Indirect protection** is a key driver of value, as most of the prevented influenza burden occurs outside the vaccinated high-risk group, extending benefits to the wider population
- **Dynamic transmission modelling** is therefore essential for payer decision-making, as it captures population-level effects that a vaccine-price-only comparison misses

Abbreviations: DTM, disease transmission model; G-BA, Gemeinsamer Bundesausschuss (Federal Joint Committee); ICER, incremental cost-effectiveness ratio; IIV, inactivated influenza vaccine; LAIV, live-attenuated influenza vaccine; QALY, quality-adjusted life year; RKI, Robert Koch Institute; SEIR model, susceptible-exposed-infected-recovered model; STIKO, German Standing Committee on Vaccination; VCR, vaccine coverage rate

Sources: 1. Robert Koch-Institut. Epid Bull 04/2026; **2.** WIG2 Forschungsdatenbank (WIG2 benchmark data), 2026; **3.** Finnish Institute for Health and Welfare (THL). Vaccination Coverage Atlas, 2026; **4.** Nohynek H, et al. Euro Surveill 2016;21(38); **5.** Scholz SM, et al. Value Health 2021;24(1):32–40; **6.** Robert-Du Ry van Beest Holle M, et al. PEARL study, ESCMID 2026; **7.** DESTATIS. Code 12411-0041, 2026; **8.** WHO FluNet, 2026