

# An economic evaluation to inform the use of enhanced influenza vaccines for those aged 65 years and older in the Seasonal Influenza Vaccination Programme in Ireland



**Health Information and Quality Authority**

An tÚdarás Um Fhaisnéis agus Cáilíocht Sláinte

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## Background

Enhanced inactivated influenza vaccines (IIVs) may offer benefits relative to a standard quadrivalent influenza vaccine (QIV). To inform a policy decision in relation to whether enhanced inactivated influenza vaccines (IIVs) should be provided for adults aged 65 years and older as part of Seasonal Influenza Vaccination Programme in Ireland, a health technology assessment (HTA) was conducted at the request of the Department of Health. The economic evaluation presented here was conducted as part of the HTA and aimed to estimate the cost utility of vaccination with enhanced IIVs for those aged ≥65 years.

## Methods

- An age-structured dynamic transmission model was developed analysing the transmission and incidence of notified cases of influenza. It incorporated both the Seasonal Influenza Vaccination Programme in Ireland at the time of writing and the impact of switching from a standard IIV to an enhanced IIV for everyone aged 65 years and older.
- The model specifically assessed the following two enhanced IIVs:
  - high-dose inactivated influenza vaccine (HD-IIV)
  - adjuvanted inactivated influenza vaccine (aIIV)
- A 6-month time horizon (one influenza season) and the publicly-funded healthcare system perspective were applied.
- The wholesale costs of the vaccines to the healthcare system were unknown. As such, the mean cost of a single pre-filled syringe of standard IIV was assumed to be €10.99 (ex-VAT) based on the current list price. Using published prices for enhanced influenza vaccines in Europe and prices used in similar economic evaluations, mean unit costs of €16.49 (ex-VAT) and €35.72 (ex-VAT) were assumed for a single pre-filled syringe of aIIV and HD-IIV, respectively.
- Given the high degree of uncertainty associated with the unit costs of all three vaccines, extensive sensitivity and scenario analyses were conducted.

## Results

From the payer perspective in the base-case scenario, of the three strategies considered, it was estimated that:

- A strategy based on aIIV dominated the existing strategy based on standard IIV, being less costly and more effective (more quality-adjusted life years (QALYs)) and would therefore be considered cost saving.
- A strategy based on HD-IIV was both more costly and more effective than an aIIV-based strategy. The incremental cost-effectiveness ratio (ICER) for this comparison was estimated at €76,731 per QALY and therefore would be considered not cost effective at a willingness-to-pay (WTP) threshold of €45,000 per QALY.
- At a WTP threshold of:
  - €20,000 per QALY, aIIV had the highest probability of being the cost-effective strategy (65.2%), followed by standard IIV (27.6%)
  - €45,000 per QALY, aIIV had the highest probability of being the cost-effective strategy (55.4%), followed by HD-IIV (22.9%).
- The sensitivity analysis highlighted that the estimates of cost effectiveness were highly sensitive to a number of parameters including the relative costs of the enhanced IIVs (compared with standard IIV).

## Conclusions

- This study highlighted the challenges of conducting a CUA of alternative vaccination strategies where only approximate vaccine prices are known.
- The HTA report provided to the Department of Health advised careful consideration of vaccine price in procurement negotiations with manufacturers and in associated decision-making regarding switching to an enhanced IIV.
- Subsequently, the Minister of Health advised that neither of the enhanced vaccines for older people met the criteria set out in the HTA for net monetary benefit when compared with the standard influenza vaccine.

## Scenario Analyses relating to the relative cost of the vaccines

- The relative costs of the vaccines were varied, both alone and in combination, to understand the impact on the ICERs (Figure 1)
- The unit costs of the three vaccines were varied simultaneously and the strategies with the largest net monetary benefit at WTP thresholds of €20,000 (Figure 2) and €45,000 per QALY were identified.

**Figure 1** Incremental cost-effectiveness ratios (€/QALY) for strategies involving high-dose (HD-QIV) compared with adjuvanted (aQIV) inactivated influenza vaccine by vaccine cost†

Unit cost of HD-QIV (€) ex VAT	Unit cost of aQIV (€) (ex VAT)						
	10.99	12.00	14.00	16.00	18.00	20.00	22.00
10.99	-31,465	-36,394	-46,154	-55,914	-65,674	-75,434	-85,194
15.00	-11,897	-16,825	-26,585	-36,345	-46,105	-55,865	-65,625
20.00	12,503	7,574	-2,186	-11,945	-21,705	-31,465	-41,225
25.00	36,903	31,974	22,214	12,454	2,694	-7,066	-16,825
30.00	61,303	56,374	46,614	36,854	27,094	17,334	7,574
35.00	85,702	80,774	71,014	61,254	51,494	41,734	31,974
40.00	110,102	105,173	95,414	85,654	75,894	66,134	56,374
45.00	134,502	129,573	119,813	110,053	100,294	90,534	80,774

†Assumes €10.99 (ex-VAT) for standard IIV

□ Closest approximation to ICER when the unit costs of HD-IIV and aIIV are at base-case values.

**Figure 2** Scenario analysis results for largest net monetary benefit of all three vaccination strategies at a willingness-to-pay threshold of €20,000 per QALY, by unit cost of vaccine

Vaccination strategy with largest net monetary benefit at a willingness-to-pay of €20,000 per QALY									
Standard IIV	Adjuvanted IIV	High-dose IIV							
		€10.99	€15.00	€20.00	€25.00	€30.00	€35.00	€36.27	€40.00
€5.00	€10.99	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€5.00	€12.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€5.00	€14.00	High-dose	High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€5.00	€16.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€5.00	€16.49		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€5.00	€18.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€5.00	€20.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€7.50	€10.99	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€7.50	€12.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€7.50	€14.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€7.50	€16.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€7.50	€16.49		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€7.50	€18.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€7.50	€20.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€10.00	€10.99	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.00	€12.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.00	€14.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.00	€16.00		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.00	€16.49		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.00	€18.00		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.00	€20.00		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€10.99	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€12.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€14.00	High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€16.00		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€16.49		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€18.00		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€10.99	€20.00		High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€12.50	€10.99		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€12.50	€12.00		High-dose	High-dose	Standard	Standard	Standard	Standard	Standard
€12.50	€14.00	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€12.50	€16.00	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€12.50	€16.49	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€12.50	€18.00	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€12.50	€20.00	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€10.99		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€12.00		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€14.00		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€16.00		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€16.49		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€18.00		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted
€15.00	€20.00		High-dose	High-dose	High-dose	Adjuvanted	Adjuvanted	Adjuvanted	Adjuvanted

□ Indicates results of base-cases scenario.