Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study examined the cost-effectiveness of adjuvanted versus nonadjuvanted influenza vaccination for patients who were receiving long-term haemodialysis for end-stage renal disease. The authors concluded that adjuvanted influenza vaccination was cost-effective, depending on the efficacy of the adjuvant, at an adjuvant cost of two US dollars or less. The cost-effectiveness approach was valid and various areas of uncertainty were considered. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of adjuvanted versus nonadjuvanted influenza vaccination for patients who were receiving long-term haemodialysis for end-stage renal disease.

Interventions
The two interventions were adjuvanted versus nonadjuvanted influenza vaccination.

Location/setting
USA/primary and secondary care.

Methods
Analytical approach:
The analysis was based on a decision-tree model that simulated the clinical and economic outcomes for adjuvanted versus nonadjuvanted vaccination. The time horizon was one year (one influenza season). The authors stated that the analysis was carried out from a societal perspective.

Effectiveness data:
The clinical data were from a selection of relevant studies. The authors stated that meta-analyses were used wherever possible. The key input for the analysis was the adjuvant efficacy, defined as the extent to which the adjuvant increased the influenza vaccine efficacy from the observed levels for haemodialysis patients to those of healthy adults. Several alternative efficacy rates were assumed.

Monetary benefit and utility valuations:
The utility values were from published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure.

Cost data:
The economic analysis included the costs of vaccination, vaccination side-effects, and the treatment of influenza (over-the-counter medications, out-patient visits, productivity lost during out-patient visits, hospitalisations, and deaths in hospital). The costs were average wholesale prices, and data from the US Department of Labor, and the Centers for Medicare and Medicaid Services. All costs were in US dollars ($) and were inflated to 2010 prices, using a 3% discount.
rate.

Analysis of uncertainty:
A probabilistic sensitivity analysis was undertaken by assigning probability distributions to the model inputs. One-way sensitivity analyses were carried out on selected inputs, such as the cost of the adjuvant, the probability of a clinic visit by patients with influenza, the probability of hospitalisation, the rate of death from influenza, and the need for a second dose of adjuvanted vaccine. Alternative assumptions were based on authors’ opinions.

Results
In the base case, at an adjuvant cost of $1, the incremental cost-utility ratio (ICUR) for the adjuvanted vaccine was $32,433, compared with nonadjuvanted vaccination, assuming an adjuvant efficacy of 60%. Below this efficacy rate, the adjuvanted vaccine was not cost-effective, at a threshold of $50,000 per QALY.

At an adjuvant cost of $2, the ICUR for adjuvanted vaccination was $38,357, compared with nonadjuvanted vaccination, assuming adjuvant efficacy of 100%. In general, above an influenza attack rate of 15%, adjuvanted vaccination was cost-effective or cost-saving, regardless of the adjuvant efficacy.

Adjuvanted vaccination was generally not cost-effective when the adjuvant cost was over $2.

The sensitivity analysis showed that the adjuvant potency, its additional cost, and the attack rate were the most influential inputs. Other variables had less impact.

Authors’ conclusions
The authors concluded that adjuvanted influenza vaccination was cost-effective depending on the efficacy of the adjuvant, at an adjuvant cost of $2 or less.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the two available types of influenza vaccine for haemodialysis patients were considered.

Effectiveness/benefits:
The clinical data were not extensively described. No systematic review was reported to identify the relevant sources of evidence. The authors stated that priority was given to published meta-analyses, but these sources were not described, and it is not possible to judge the validity of the clinical inputs. The method used to produce an estimate from among those available was not reported. The homogeneity and comparability of the data sources were not discussed. The derivation of the utility values was not clear. QALYs were a valid benefit measure, and they capture the impact of vaccination on survival and quality of life.

Costs:
All the cost categories relevant to the societal perspective appear to have been included. Standard US sources were used. The costs were presented as category totals, without separate resource use and unit cost data. The cost of the adjuvant vaccine was extensively varied, as this was a key input for the analysis. The price year and methods used to inflate earlier costs to 2010 values were clearly reported.

Analysis and results:
The cost and benefit results were not reported. Only the ICURs were reported, but these were presented for a wide range of scenarios, which enhances the external validity of the analysis. The uncertainty was investigated, in both deterministic and probabilistic analyses, and the findings were clearly illustrated and discussed. The authors stated that the haemodialysis population was extremely diverse and these results focused on an average patient aged 64 years.

Concluding remarks:
The cost-effectiveness approach was valid and various areas of uncertainty were considered. The authors’ conclusions appear to be robust.
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