Economic value of seasonal and pandemic influenza vaccination during pregnancy
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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
The objective was to examine the cost-effectiveness of vaccination against laboratory-confirmable influenza for all pregnant women compared with no vaccination, considering the subsequent health of both mothers and neonates. The authors concluded that vaccination was highly cost-effective from the perspectives of both society and the third-party payer. The data sources were not satisfactorily reported, but the analytic approach was appropriate and the findings were robust, which enhance the validity of the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of vaccination against laboratory-confirmable influenza, for all pregnant women, in comparison with no vaccination. The subsequent impact of the vaccine on both the mother and the neonate were considered.

Interventions
The influenza vaccination was either a single dose or two doses and it was given to pregnant women during seasonal and pandemic influenza outbreaks.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis used a stochastic computer simulation, which modelled the clinical and economic outcomes for both mothers and neonates, for a lifetime horizon. The authors stated that the perspectives of society and the third-party payer were adopted.

Effectiveness data:
The clinical data were from a selection of relevant studies and the criteria used to identify the most appropriate input from those available were not described. No information on the design or other characteristics of the selected sources was provided. The vaccine efficacy was the key clinical input to the model.

Monetary benefit and utility valuations:
The utility values were from published sources and their details were not reported.

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

Cost data:
The economic analysis considered costs, for both mothers and neonates, of: death, home treatment of influenza, home treatment of vaccine-related adverse effects, hospitalisations for influenza, vaccine acquisition and administration, pre-term birth, and productivity losses for out-patient visits due to illness. These costs and quantities were from published sources, but their details were not reported. All costs were in US dollars ($) and the price year was 2009. Future costs were discounted at an annual rate of 3%.
Analysis of uncertainty:
A probabilistic sensitivity analysis was undertaken on all the model inputs, which were assigned probability distributions based on published or arbitrary ranges of values. Alternative scenarios for the vaccine efficacy, prevalence of disease, and maternal mortality were also considered.

Results
From the societal perspective, the incremental cost per QALY gained with single-dose vaccination over no immunisation ranged from dominant, which meant that vaccination was cheaper and more effective, to cost-effective, which was below the threshold of $50,000 per QALY, in all scenarios, regardless of the severity of the influenza strain, as long as the prevalence of influenza was over 2.5%. From the perspective of the third-party payer, single-dose vaccination was the preferred strategy (below the established threshold) when the prevalence of influenza was 2.5% or more and the probability of influenza-attributable mortality was equal to or greater than the expected seasonal rate. From the societal perspective, the two-dose vaccination was cost-effective, but not dominant, over no vaccination when the influenza prevalence was 7.5% or more, for all scenarios. It was also cost-effective when the prevalence of influenza was 5% or more and the mortality due to influenza was three or four times the expected seasonal-influenza mortality.

Variations in the vaccine efficacy did not substantially change these findings. The most influential model inputs were the influenza prevalence and severity of illness. The probabilistic analysis showed that when influenza prevalence was set at 12.5% and the societal willingness to pay for a QALY was $50,000, the probability of vaccination being cost-effective was around 90%. At higher prevalence rates the probability of vaccination being cost-effective increased.

Authors' conclusions
The authors concluded that influenza vaccination for pregnant women was highly cost-effective from the perspectives of society and the third-party payer.

CRD commentary
Interventions:
The selection of the comparators, vaccination and no vaccination, was appropriate and applicable to other settings. Two strategies were considered, with one or two doses.

Effectiveness/benefits:
Limited information was given on the approach used to identify the relevant sources, the methods of these studies, their similarity, and the derivation of the utility values. This lack of information hinders the judgement of the validity of the clinical analysis. QALYs were an appropriate benefit measure. They capture the impact of the intervention on the most relevant dimensions of health (survival and quality of life) and they allow cross-disease comparisons. No discounting for QALYs was reported and it should have been conducted given the lifetime horizon.

Costs:
The economic analysis was only partially reported. The data sources were not described and most of the costs were presented as total categories without a breakdown of individual items, which reduces the transparency of the economic analysis. The price year and the use of discounting were reported and the cost estimates were varied in the sensitivity analysis.

Analysis and results:
The expected costs and benefits were not reported, but cost-utility ratios were given for scenarios based on the severity of disease and the influenza prevalence. The analytic approach was appropriate. The issue of uncertainty was satisfactorily investigated in a probabilistic analysis and in several alternative scenarios. The authors stated that a strength of their analysis was the use of laboratory-confirmed influenza cases rather than episodes of influenza-like illness, as used in other publications. The use of influenza-like illness could overestimate the benefits of a vaccine.

Concluding remarks:
The data sources were not satisfactorily reported, but the analytic approach was appropriate and the findings were
robust, which enhance the validity of the authors’ conclusions.

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