
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 cervical cancer vaccination added to screening in five countries and to consider potential changes in cervical cancer screening patterns with the new vaccination. The authors concluded that vaccination of 12-year-old girls combined with the current cervical screening was cost-effective in all locations. The study appears to have been based on recommended methodological guidelines, but there was limited reporting of the data sources. In general, the authors’ conclusions are likely to be valid.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of cervical cancer vaccination, for girls aged 12 years, when added to screening in five countries worldwide, considering the impact of potential changes in cervical cancer screening patterns due to the introduction of a vaccination policy.

Interventions
A strategy of cervical cancer vaccination against oncogenic human papillomavirus (HPV) types 16 and 18 as an addition to screening programmes was compared with no vaccination. Changes in screening parameters, such as compliance and screening accuracy, without changes in policy due to vaccination were considered.

Three possible changes in screening policy due to vaccination were also considered: reduction in the recommended frequency of screening; reduction in recommended age intervals for screening; and the introduction of HPV triage for atypical squamous cells of undetermined significance smears.

Location/setting
Canada, Netherlands, Taiwan, UK, and USA/primary care.

Methods
Analytical approach:
The analysis was based on a Markov model and the technical details of this were published elsewhere. The model had a hypothetical cohort of 100,000 12-year-old girls and a lifetime horizon. The authors stated that the perspective of the health care system was adopted for the UK, Taiwan, and Canada, while a societal perspective was considered for the USA and the Netherlands.

Effectiveness data:
The clinical estimates for each country were derived from global estimates in published studies, the details of which were not given. The vaccine efficacy was the key clinical input and was based on data derived from the previous modelling study and clinical trials. The screening accuracy was taken from the previous modelling study and assumptions were made for vaccine coverage and loss of efficacy over time.

Monetary benefit and utility valuations:
The utility values were based on published evidence, but the details were not reported.
Measure of benefit:
Quality-adjusted life-years (QALYs) and life-years (LYs) were the summary benefit measures and were discounted at country-specific annual rates (3% in Canada, Taiwan, and the USA, 1.5% in the Netherlands, and 3.5% in the UK).

Cost data:
The economic analysis included the costs of the vaccine, cytology test, colposcopy and biopsy, and treatment of cancer, which depended on disease stage. All the economic inputs were derived from published sources, the details of which were not given. The costs were expressed in local currencies; Canadian dollars (CAD) for Canada, Euros (EUR) for the Netherlands, UK pounds sterling (£) for the UK, US dollars ($) for the USA, and New Taiwan dollars (TWD) for Taiwan. Future costs were discounted according to country-specific rates (3% in Canada, Taiwan, and the USA, 4% in the Netherlands, and 3.5% in the UK). The price year was 2006.

Analysis of uncertainty:
Alternative estimates were considered in the sensitivity analysis; the costs were varied by ± 50% for all screening and diagnostic tests, screening compliance was varied by ± 20%, quality of life decrements by ± 20%, and screening accuracy (both sensitivity and specificity) was varied.

Results
With vaccination added to current screening compared with current screening alone, the additional costs were CAD 258 in Canada; EUR 280 in the Netherlands; TWD 10,879 in Taiwan; £193 in the UK; and $87 in the USA. The additional QALYs were 0.01143 in Canada; 0.01517 in the Netherlands; 0.01720 in Taiwan; 0.01067 in the UK; and 0.01112 in the USA. The incremental cost per QALY gained was CAD 22,532 in Canada; EUR 18,472 in the Netherlands; TWD 632,559 in Taiwan; £18,037 in the UK; and $7,828 in the USA.

According to country-specific decision thresholds, vaccination of 12-year-olds combined with the current cervical screening programme was cost-effective in all locations.

The sensitivity analysis showed that, although some increases in the cost-utility ratios were observed when inputs unfavourable to vaccination were used, in general, these figures remained below the decision thresholds for cost-effectiveness.

When changing the current screening policies with the introduction of vaccination, the most cost-effective strategies were: a five- or three-yearly screening programme in Canada and Taiwan (currently screen yearly); including HPV triage and then expanding the age range to include 25-year-olds in the Netherlands (currently screen five-yearly from 30 to 60 years); and narrowing the age range for screening to 25 to 60 years in both the UK and the USA (currently screen three-yearly from 20 to 68 years in the UK and yearly from 15 to 89 years in the USA).

Authors’ conclusions
The authors concluded that vaccination of 12-year-olds combined with the current cervical screening programme was cost-effective in all locations. Once vaccination was established, changes in the screening policy could make the vaccination plus screening strategy even more cost-effective.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear in that the background strategy was the current cervical screening alone and this was compared with the strategy of adding the immunisation programme.

Effectiveness/benefits:
The method used to derive the clinical data (a literature review or a selective approach) was not described and no details of the design and other characteristics of the primary studies were reported. These details were reported in a previous study. This limited reporting hinders an objective assessment of the validity of the clinical estimates. The vaccine efficacy was based on clinical trial data, which should ensure high internal validity. The benefit measures were both appropriate as they capture the impact of the interventions on the most relevant dimensions of health, namely survival and quality of life. LYs and QALYs also allow comparisons to be made with the benefits of other health care...
interventions.

Costs:
The economic analysis was not described in detail. The cost categories were reported, but no information on the data sources and resource quantities was provided. No statistical test was carried out on the economic inputs. The authors stated that the US and Dutch analyses were carried out from the perspective of society, but details of the indirect costs were not provided. The price year and the use of discounting were reported.

Analysis and results:
The analytic approach was appropriate. The costs and benefits were appropriately reported and the findings were extensively described and discussed for each location. The issue of uncertainty was only partially investigated using a deterministic approach, which focused on selected model inputs. A comprehensive methodology would have been more appropriate. Various scenarios were examined and several alternative screening policies were considered. The inclusion of five countries increases the transferability of results to other locations.

Concluding remarks:
The study appears to have been based on recommended methodological guidelines, but there was limited reporting of the data sources. In general, the authors' conclusions are likely to be valid.

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