Cost-effectiveness of hospital vaccination programs in North Carolina

Honeycutt A A, Coleman M S, Anderson W L, Wirth K E

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 aim of the study was to examine the costs and cost-effectiveness of three provider-based influenza and pneumococcal vaccination programmes (standing orders, physician reminders and pre-printed orders) for patients found to be eligible for at least one vaccination in the hospital setting. The authors concluded that the standing orders vaccination programme is a cost-effective option to increase adult vaccination coverage. The methodology used in the analysis has certain limitations and the authors’ conclusions should therefore be considered with caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The aim of the study was to examine the costs and cost-effectiveness of three provider-based influenza and pneumococcal vaccination programmes for patients found to be eligible for at least one vaccination in the hospital setting. The programmes were standing order programmes (SOPs), physician reminders (PRs) and pre-printed orders (PPOs).

Interventions
The programmes included in the analysis were SOPs, PPOs and PRs. SOPs authorise non-physician personnel to deliver vaccines without prescriptions or vaccine orders after patients are screened for high-risk conditions and contraindications. PPOs are unsigned vaccination orders that are placed in admission packages or patient charts, and require a physician signature for vaccination. PRs are notes placed in patient charts to remind physicians to determine patient eligibility and to order the vaccination.

Location/setting
USA/secondary care.

Methods
Analytical approach:
The effectiveness and cost data were collected from a single observational study. The time horizon of the study was 6 months. The authors reported the perspective of the study to have been that of the hospital.

Effectiveness data:
This was a multi-centre, retrospective cohort study that was conducted in 9 hospitals in North Carolina. It comprised 10 vaccination programmes. Participation of hospitals was based on self-selection. With the exception of one hospital, which provided data over 4 months for influenza and over a 7-month period, the effectiveness data were collected over a 6-month period. The primary outcomes of the study included the number of hospital admissions, the proportion of screened patients found to be at high risk, the proportion of high-risk patients eligible for one or both vaccines, and the proportion of eligible patients for whom at least one vaccine was ordered. Six programmes were based on actual data while four programmes provided best estimates.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Effectiveness was measured as the number and percentage of admitted patients vaccinated over a 6-month period.
Cost data:
Costs were reported as US dollars ($). They included the cost per patient of screening and determining eligibility and the cost of ordering, administering and recording the vaccine. Per patient costs were estimated by multiplying per patient staff time required for the activity by each staff member's hourly wages and benefits. Non-labour resources were also valued and included in per patient estimates. Community prevention programme costs were valued following published recommendations (Haddix et al. 2003, see 'Other Publications of Related Interest' below for bibliographic details). The resource use data on personnel time and other resources were based on retrospective estimates supplied by the hospitals. Physician labour costs were obtained from the Bureau of Labour Statistics. Mean patient costs per activity were multiplied by the number of patients and aggregated across all activities to derive the total costs of the vaccination programme. The price year was 2004.

Analysis of uncertainty:
One-way sensitivity analyses were performed. These considered the impact on the cost-effectiveness analysis results of assigning the same high-risk and eligible patient mix to each hospital and by evaluating incremental cost-effectiveness ratios (ICERs) using the minimum and maximum cost for each programme activity.

Results
The mean percentage of admitted patients who received vaccination was 8.9% for SOPs, 7.9% for PRs and 3.2% for PPOs.

Mean programme operations costs per patient were approximately $4 for SOPs (range: 2.40 to 7.20), $5.60 for PPOs (range: 2.30 to 10) and $5.50 for PRs (range: 3.60 to 7.80).

Compared with no vaccination, the ICER was $57.60 per additional admitted patient vaccinated for SOPs, $89.70 for PRs and $411.80 for PPOs.

The results varied little when the same patient mix was assumed and were sensitive to cost variations.

Authors' conclusions
The authors concluded that the standing order vaccination programme comprises a cost-effective option to improve adult vaccination rates in hospital settings.

CRD commentary

Interventions:
Whilst the interventions were reported clearly, it was not clear if other relevant interventions were available and could have been considered in the analysis. The analysis was restricted to hospitals in North Carolina, USA. You may wish to take this into account when determining the generalisability to your own setting.

Effectiveness/benefits:
The study referred to hospitals already implementing vaccination programmes. It was unclear whether these and the patients included were comparable at analysis. Appropriate statistical analysis to account for potential biases and confounding factors was not undertaken, thereby limiting the internal validity of the study. The primary outcomes were reported clearly.

Costs:
The costs included would appear to reflect the authors' perspective. However, the resource quantities were not reported separately and relevant data were based on retrospective estimates and not compiled from medical records, which may introduce uncertainty into the results. The costs of the comparator used in the analysis (no formal vaccination programme) were assumed to be zero, which is unlikely to occur. A one-way sensitivity analysis around the cost estimates demonstrated that the results were not robust to variations in the cost data.

Analysis and results:
The authors conducted an incremental analysis. However, they failed to identify the dominated strategies (more costly and less effective). In fact, PR and PPO were dominated by the SOP. Furthermore, the alternative interventions should
be ranked according to their costs and the ICERs should be calculated for each successive alternative, from the least
costly to the most, after the dominated strategies have been excluded from the analysis. The authors simply computed
cost-effectiveness ratios for each strategy having a no formal vaccination programme as a comparator. No costs were
assigned to the no formal vaccination programme, which seems unrealistic as any vaccination programme would clearly
have positive costs.

Concluding remarks:
The methodology of the costing analysis has certain limitations, therefore the authors' conclusions should be considered
with caution.

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Bibliographic details
Honeycutt A A, Coleman M S, Anderson W L, Wirth K E. Cost-effectiveness of hospital vaccination programs in

Other publications of related interest
Haddix AC, Teutsch SM, Corso PS. Prevention effectiveness: a guide to decision analysis and economic evaluation.

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