Reducing medical service utilization by encouraging vaccines: randomized controlled trial

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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.

Health technology
The use of a vaccination campaign to promote influenza vaccination. Each eligible participant received two mailings, one in October 2002 and another one in November 2002. The mailer contained a description of the influenza season and things that can be done for protection of self and family. This intervention was compared with a control group that received no marketing pieces beyond that received by the population in the health plan, which did not encourage influenza or pneumococcal vaccination.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all subscribers and their dependents enrolled in Blue Cross Blue Shield Association Government Wide Service Benefit Program in the states of Oklahoma, Rhode Island, Kentucky, California, Arizona, Utah and Colorado in October 2002.

Setting
The study setting was the community. The economic study was carried out in the USA.

Dates to which data relate
The study period from which the effectiveness and resource use data were derived was 15 October 2002 to 15 March 2003. The price year was not reported.

Source of effectiveness data
The effectiveness and resource use data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness study.

Study sample
The sample size was determined by a budget of $40,000. The total sample size was 339,220 individuals, of whom 82,364 were allocated to the intervention group and the remaining 256,856 allocated to the control group. The average age was 50.2 (+/- 25.0) years in the intervention group and 50.0 (+/- 25.0) years in the control group. The proportions of males in the two groups were 46% (intervention) and 46.1% (control), respectively.
Study design
The study was a randomised controlled trial (RCT) that was carried out in PPO centres across the USA. The participants were randomised using a randomisation code that was developed using a computer random generator between the values of zero and unity. If the number was less than 0.25, the subscriber and their associated dependents were assigned to the intervention group. All study personnel and participants were blinded to the treatment assignment for the duration of the study. Only the study statisticians saw unblended data, but none had any contact with the study participants. The patients were followed up for 5 months. The authors reported that there was no loss to follow-up during the 5-month study period.

Analysis of effectiveness
The clinical study was conducted on an intention to treat basis. The primary outcome measure was influenza or pneumonia inpatient admissions and emergency department visits. The secondary outcome measures were influenza and pneumonia vaccinations. Administrative medical claims for the study period provided information on inpatient admissions and emergency department visits for pneumonia and influenza, and also evidence of influenza and pneumococcal vaccinations. Pneumonia and influenza were determined by ICD-9 codes 480 to 487. The patient groups were shown to be comparable in terms of age, gender and prognostic features.

Effectiveness results
The intervention group had a higher rate of receiving an influenza vaccination than the control group, with a rate difference of 41.3 per 10,000 people, (p=0.010). This group also had a higher rate difference of receiving a pneumonia vaccination at a rate of 11.0, (p=0.080).

The intervention group experienced a lower rate of influenza or pneumonia inpatient admissions than the control group, with a rate difference of 3.41, (p=0.136). This group also had a lower rate difference of influenza or pneumonia emergency department visits at a rate of 5.72, (p=0.002).

Clinical conclusions
Those receiving the intervention programme had a statistically significant higher rate of receiving an influenza vaccination, and a lower rate of emergency department visits due to influenza or pneumonia, than those not receiving the vaccination marketing programme.

Measure of benefits used in the economic analysis
The measure of benefit used was the total increase in estimated vaccinations in the intervention group in comparison with the control group. The total increase in estimated vaccinations was calculated as the rate difference in influenza or pneumonia vaccinations, multiplied by the number of people in the intervention group.

Direct costs
The resource use and the costs were reported separately for a number of resource categories. The direct costs included were those to the PPO health plan. These costs were for the vaccination marketing campaign, inpatient and emergency department admissions due to influenza and/or pneumonia, and influenza and pneumonia vaccinations. It would appear that the unit costs were derived from the authors' setting. Incremental costs (savings) were calculated by multiplying the estimated absolute difference in utilisation and vaccination by the average cost of either the utilisation or vaccination. Discounting was irrelevant, as all the costs were incurred during 5 months, and was therefore not applied. The price year was not reported. The study reported the total and incremental costs.

Statistical analysis of costs
The costs were treated as point estimates (i.e. the data were deterministic).
Indirect Costs
The indirect costs were not included.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analyses were performed.

Estimated benefits used in the economic analysis
The total increase in estimated vaccinations due to the intervention programme was 431.31 vaccinations.

Cost results
The cost of the intervention programme was $400,000.

The incremental savings totalled $86,055 for inpatient admissions and $7,981 for emergency department visits. However, the incremental cost totalled $1,627 for influenza vaccinations and $3,824 for pneumonia vaccinations. The total savings from reduced utilisation and increased vaccinations were $88,585.

Given the total savings and total cost of the intervention, the return on investment was $2.21 and the total savings were $48,585.

Synthesis of costs and benefits
The costs and benefits were combined using an incremental cost-effectiveness ratio. This was calculated by dividing the cost of the intervention (i.e. $40,000) by the total increase in estimated vaccinations. This resulted in a cost-effectiveness ratio of $92.74 per extra vaccination achieved due to the intervention programme.

Authors' conclusions
Members of the health plan responded to the mailings, as shown by the increase in influenza vaccination rates. The mailings had a positive and cost-saving impact on medical service utilisation and vaccination rates as a result of mailing information to members of a health plan.

CRD COMMENTARY - Selection of comparators
A justification was given for not encouraging people through a marketing campaign to receive vaccination. It represented current practice in the authors' settings. You should decide if this is current practice in your own setting.

Validity of estimate of measure of effectiveness
The study was an RCT. This was appropriate for the study question, as well-conducted RCTs are considered the 'gold' standard study design when comparing health interventions. Further, the randomisation method was computer generated and totally random, and all study personnel were randomised to treatment assignment. However, the authors reported that the study population was somewhat atypical to what might be expected in a health plan, as the average age was over 50 years and each subscriber was a federal employee. Thus, there was a tendency to include richer people than other plans. The sample size was not determined by any power calculations but through the criteria of budget available. Despite this, the study sample was very large (n=339,220) and it was clear that the study was sufficiently powered to detect any statistically significant differences. The patient groups were also shown to be comparable in terms of age, gender and prognostic features. Appropriately, all differences between the groups were tested for statistical significance.
Validity of estimate of measure of benefit
The measure of benefit (i.e. the number of additional vaccinations) was calculated using the rate difference in vaccinations between the two groups, multiplied by the number of people in the intervention group.

Validity of estimate of costs
All the cost categories relevant to the perspective adopted were included in the analysis, and all relevant costs appear to have been included. The costs and resource use were reported separately for several categories, except for the costs of the mailing programme. The authors did not explicitly report where the costs were derived from, but it would appear that they were derived from the unit costs from the PPO plan. The authors did not conduct any sensitivity or statistical analyses of the costs, which will hamper the generalisability of the results. Discounting was irrelevant, as all the costs were incurred during 5 months, and hence was not performed. The price year was not reported.

Other issues
The authors found that their cost-effectiveness ratio) was larger than those from other studies, $92.74 versus $3 to $46 per additional person vaccinated. The authors reported two possible explanations for this. One, the intervention did not target only high-risk people, but rather healthy people as well. Two, people could have received influenza vaccinations in places that did not generate claims. The issue of generalisability to other settings was not addressed. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of their analysis. The authors reported a number of further limitations to their study. First, influenza vaccinations could have been given in settings not generating claims, leading to an underestimation of the benefit of the intervention. Second, there might have been other unknown interventions that could account for the results. However, as the authors reported, plan members were randomised in one of two groups, so that any other community programme would have affected the study and control group participants similarly.

Implications of the study
The authors reported that additional studies to investigate the utility of this type of intervention in non-commercial health plan populations would be of interest.

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Other publications of related interest


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