Economic analysis of promotion of hepatitis B vaccinations among Vietnamese-American children and adolescents in Houston and Dallas

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 study compared the use of 2 public health campaigns: a media-led information and education campaign and community mobilisation in the promotion of hepatitis B vaccination coverage among Vietnamese-American children and adolescents. The media education relied only on a professionally developed advertising campaign with billboards, prime-time radio spots, newspaper articles and advertisements, brochures and calendars, and a telephone hotline. The community mobilisation strategy was similar to local public health interventions without a professionally developed media campaign. A coalition of local leaders conducted an educational outreach.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population consisted of 1,200 families of Vietnamese-American children who were born between 1984 and 1993 residing in the Houston area in 1998 and in the Dallas area. There were 8,692 children in the media group and 5,657 in the community mobilisation group. The control site, Washington DC, was similar in demographics and size.

Setting
The setting was community. The economic analysis was carried out in Atlanta, GA, USA.

Dates to which data relate
The effectiveness data were collected between 1998 and 2001 and, although not explicitly stated, it would appear that the resource use data were collected at the same time. The date of the prices used was 2000.

Source of effectiveness data
The source of effectiveness data was a single study.

Link between effectiveness and cost data
Retrospective costing was carried out on the same sample of patients as that used in the effectiveness study.

Study sample
No mention was made of the use of power calculations in the determination of sample size. Random samples were taken of Vietnamese households in each of the three study sites in the spring of 1998 and between April 2000 and
March 2001. These samples were used to estimate the distribution of doses received in the aggregate population at the specified dates. No further details were given. If the randomisation was adequately performed and the sample sizes large enough, the samples should have been representative of the study population.

**Study design**

This was an observational study carried out in 3 sites. Dallas and Houston each conducted one of the study publicity campaigns. Washington DC conducted neither of them, although it was not stated whether or not there was a campaign of any kind. Random samples were taken pre- and post-publicity campaigns to estimate the number of hepatitis B doses received by the study population. Pre- and post-intervention hepatitis B coverage was ascertained by conducting computer assisted telephone interviews.

**Analysis of effectiveness**

The primary health outcomes used in the analysis were the uptake of doses of the hepatitis B vaccination, the uptake of the hepatitis B third dose and the number of children rendered seroprotected. The demographics of the cities were not compared in this paper. See details of the original clinical paper in "Other Publications of Related Interest".

**Effectiveness results**

The effectiveness results were as follows:

At the end of the intervention the number of children receiving any dose increased by 865 (from 1,953 (22.5%) to 2,818 (32.4%)) in the media group and by 437 (from 1,181 (20.9%) to 1,618 (28.6%)) in the community mobilisation group.

At the end of the intervention the number of children who had completed the series of 3 doses increased by 1,176 (13.5%) (from 1,238 to 2,414) in the media group and by 390 (6.9%) (from 801 to 1,191) in the community mobilisation group. The increase in the control site, Washington DC, was 0.

During the intervention it is estimated that 3,116 doses of HepB were administered to children in the media group and 1,243 doses to the community mobilisation group.

With the assumption that seroprotection was 95%, 85% and 50% for doses 3, 2 and 1, the estimated number of additional immune children was 926 (10.7%) by media intervention and 403 (7.1%) by community mobilisation.

**Clinical conclusions**

Although the increases in the number of children who completed three doses were modest for both Houston and Dallas areas, both media and community mobilisation proved to be effective methods of increasing the uptake. When the two methods were compared, the children in the media intervention group took more doses.

**Methods used to derive estimates of effectiveness**

Years of life saved were estimated by making the assumptions specified below.

**Estimates of effectiveness and key assumptions**

The following assumptions were made: 60% of infections are asymptomatic, 15% of persons infected in late childhood or as adolescents are at risk of chronic liver disease, and there is a 60% whole-life infection rate among Vietnamese-Americans.

Years of life saved were 131 by media intervention, and 60 by community mobilisation.
Measure of benefits used in the economic analysis
The outcomes used in the economic analysis were the increase in number of doses taken, the increase in the number of series of 3 doses completed, the increase in the number of seroprotected children and the years of life saved.

Direct costs
The cost/resource boundary was that of society. For the analysis focussing on the number of doses completed, costs included the direct publicity costs and vaccination costs. For the analysis including life years saved, costs also included those related to hepatitis B virus (HBV) infection.

Direct intervention costs included media, personnel and other costs. Direct vaccination costs included vaccine and administration costs. See below for indirect costs. The direct intervention resources came directly from the study, as did the direct vaccination resources. Some unit costs were reported, but unit costs sometimes varied if they were private or federal and, in some cases, the unit cost used was not specified. Other cost data came from the Bureau of the Census, the Medstat Marketscan database, refereed publications, interviews of experts in the field, and Centers for Disease Control and Prevention (CDC) data. Discounting was carried out using a 3% discount rate. The quantities of resources used were measured between 1998 and 2000, and the price year used was 2000.

Statistical analysis of costs
No statistical analyses of the costs were undertaken.

Indirect Costs
Indirect costs included volunteers' time in the community mobilisation, parents' time lost in taking their children to be vaccinated, and also loss of earnings for HBV-related illness. Costs for premature mortality were also included, although this is not normally done since the cost of mortality is fully captured in the life years saved or quality-adjusted life-year (QALY) outcome. Discounting was carried out using 3% as a baseline. Earnings data came from the Bureau of Labor Statistics. The price year used was 2000.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analysis was undertaken to explore the effect of the assumptions for discount rate and infection rates. Prices were also varied using private sector prices. The type of analysis was not explicitly stated but it appears to have been one-way.

Estimated benefits used in the economic analysis
See the 'effectiveness results' and 'estimates of effectiveness and key assumptions' above. A discount rate of 3% was used.

Cost results
The cost results were as follows:

Only point estimates were reported.

Total intervention and vaccination costs were $313,904 for the media group and $169,561 for the community group.

The campaign costs were $153,323 for Houston and $106,276 for Dallas. The vaccination costs were $160,581 for Houston and $63,285 for Dallas.
The net savings, accounting for cost of illness averted, were $1,336,667 for the media intervention and $588,184 for the community mobilisation group.

**Synthesis of costs and benefits**

For the media group:

the intervention cost per child receiving any dose was $363;

the cost per completed series was $267; and

the cost per additional child rendered sero-protected was $339.

For the community group:

the intervention cost per child receiving any dose was $387;

the cost per completed series was $434; and

the cost per additional child rendered sero-protected was $420.

None of the results were sensitive to any of the parameters varied in the sensitivity analysis.

**Authors’ conclusions**

The authors concluded that both interventions were cost-effective. However, the community mobilisation was more labour intensive, and had lower impact on coverage. The media intervention was more expensive but appeared to be more cost-effective and cost-beneficial. In fact, had one publicity campaign been compared to another, then the media campaign would have dominated the community campaign in the long-run, i.e. it would have been more effective and less costly, since it would have saved costs of related illness.

**CRD COMMENTARY - Selection of comparators**

The 2 campaigns compared here were part of a government project. There are a variety of campaign designs that could feature any combination of the 2 approaches. You, as a user of this database, should decide if these approaches are relevant to your own setting.

**Validity of estimate of measure of effectiveness**

The study was observational. Different publicity campaigns were conducted in different cities and the changes in dose take-up rates were measured. This methodology was appropriate for the study question. A control site was used to indicate the underlying trend in take-up rates. No comparison was given, however, of demographic data between the cities. There could therefore be some bias. The sizes of the samples were not mentioned in this paper. However, they were random and, if large enough, they would have adequately represented the Vietnamese-American population.

**Validity of estimate of measure of benefit**

The measures of benefit were obtained directly from the effectiveness analysis and the choice of estimate was justified.

**Validity of estimate of costs**

All the categories of cost relevant to the societal perspective appear to have been included in the analysis. However, costing mortality was not appropriate as the cost of mortality would have already been incorporated into the years saved. Some unit costs were reported, but it was not clear which were used. Discounting was conducted for the long-term analysis, which was appropriate. Uncertainty in the use of resources was not addressed, as statistical and sensitivity analyses were not conducted on the quantities. A sensitivity analysis of the prices was conducted. The date to which the
prices related was reported, and this helps in the reproduction of the results to other settings.

Other issues
The authors made appropriate comparisons of their effectiveness findings with those from other studies. The issue of generalisability of their findings was addressed when the authors indicated that the results of this analysis should be treated with caution as it was based on the accurate measurement of all programme costs and reflected the epidemiological conditions prevailing in Houston and Dallas. The authors appear not to have presented their findings selectively and the conclusions reflect the scope of their analysis. They reported several limitations to their study, including the fact that they calculated ratios using life years saved rather than QALYs, as it is very difficult to obtain reliable health utilities data from chronic hepatitis B patients. They also indicated that they did not use estimates of wage and workforce participation rates specific to Houston and Dallas.

Implications of the study
The authors recommend media education specifically targeted at the Vietnamese community as an effective intervention to boost the very low hepatitis B vaccination coverage among Vietnamese-American children and adolescents. The authors indicate that their study could help policy makers compare programmes to maximise return on investment by selecting the most effective programmes.

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Other publications of related interest

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