Computer-generated recall letters for underimmunized children: how cost-effective?


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 computer-generated recall letters to improve vaccination coverage.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
A hypothetical cohort of children of 20 months of age who had not yet received the MMR immunisation and who had no gaps in their health plan between the age of 12 and 19 months were eligible for the study. All patients were members of Kaiser Permanente facilities in North Carolina.

Setting
The practice setting was the community/primary care. The economic study was conducted in the research division of Kaiser Permanente (an HMO), Oakland, California, USA.

Dates to which data relate
Effectiveness and resource use data related to 1994. The price year was 1996.

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

Study sample
Parents of eligible children who reached 20 months of age during the study period (January and November 1994) and who had not received the MMR vaccination were randomised, by means of a random number generator, to receive recall letters or no letters. After further exclusions following randomisation, the intervention group included 153 children and the control group, 136 children. Power calculations were not used to determine the sample size. The authors chose the age of 20 months on the basis of their experience that 'a substantial proportion' of 19 month old children become immunised before the age of 20 months, without intervention.

Study design
The study was a randomised controlled trial from two centres. The children were followed up until 24 months of age. Loss to follow-up overall was 17.3%. Loss to follow-up was 17.0% in the intervention group and 17.6% in the control group.
Analysis of effectiveness
The analysis was based on intention to treat. The primary health outcome used in the analysis was the number of children, not vaccinated by the age of 20 months, who had been vaccinated by 24 months, and whose vaccination was recorded on the HMO’s tracking system. The control and intervention groups were not shown to be comparable at the time of analysis.

Effectiveness results
Among families who were sent letters, 54% (82) received the MMR by the age of 24 months. Of the control group, 35% (47) had, by then, received the MMR (P = 0.001). The relative risk of receiving an immunisation after being sent a letter vs. not was 1.55. A follow-up survey was then taken of those families who had not received the MMR. Of these families, 14% reported that their child had received a vaccination during the previous 4 months, 71% of these at a non-Kaiser source. These families were then reclassified and a secondary analysis revealed that 58% of the intervention group and 41% of the control group had been immunised (P < 0.001). Confidence intervals were not given.

Clinical conclusions
The use of computer-generated letters to privately insured families, whose children had not received the MMR vaccination by the age of 20 months, resulted in a significantly higher proportion of immunised children at the age of 24 months compared with families who were not sent recall letters.

Modelling
A decision tree was used to generate estimates of outcomes and costs that would result if the intervention were extended to include all patients in the regional HMO population. The model incorporated the primary outcome estimates derived from the study, an estimate of baseline coverage taken from an unreferenced Kaiser report and cost estimates, the sources of which were not stated.

Measure of benefits used in the economic analysis
The effectiveness data were used in a decision tree to extrapolate the findings to the whole HMO population. The outcome measure used in the economic analysis was the number of additional children appropriately immunised each year. This was not translated into health benefit.

Direct costs
Costs were expressed in 1996 prices. Costs and quantities were reported separately, but their sources were not specified. The cost boundary adopted was that of the HMO’s research division. The costing analysis included the computing costs of identifying non-immunised children and administrative, stationery and postage costs. Treatment, patient and overhead costs were not included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was carried out. The estimate of the relative effectiveness of the intervention, and the baseline coverage rate were varied in a two-way analysis. The cost of computer time was also varied in a one-way analysis. The area of uncertainty investigated was the generalisability of the results.

Estimated benefits used in the economic analysis
The authors calculated that the intervention would result in an additional 4% of the population receiving immunisation.
For the HMO's Northern Californian population, in which 30,000 children would become 20 months of age within one year, this would mean that an additional 1,244 children would be appropriately immunised each year.

**Cost results**
The total intervention cost was $5031 annually. The cost of control was implicitly set at zero.

**Synthesis of costs and benefits**
The cost-effectiveness ratio for the intervention was $4.04 per child appropriately immunised, in 1996 prices. This figure assumed a baseline coverage rate among 24-month olds of 86% and a relative effectiveness of the intervention of 1.55. When a baseline coverage rate among 24-month olds of 90% was taken, this ratio varied from $13.46 (relative effectiveness of the intervention = 1.2) to $1.35 (relative effectiveness of the intervention = 3). When a baseline coverage rate among 24-month olds of 50% was taken, the ratio varied from $6.92 (relative effectiveness of the intervention = 1.2) to $0.69 (relative effectiveness of the intervention = 3). When the computing costs of the intervention were increased from $100/run to $200/run, the cost-effectiveness ratio of $4.04 per child appropriately immunised increased to $5.01; at $400/run, the ratio was $6.94.

**Authors' conclusions**
The use of recall letters to privately insured families with underimmunised children of 20 months of age improved immunisation delivery. Although the study population had a relatively high baseline coverage rate, this intervention could help achieve the Healthy People 2000 goal of 90% coverage. However, it was unclear whether this was the most cost-effective strategy.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of comparator is clear, namely that it described current practice (the do-nothing option).

**Validity of estimate of measure of benefit**
The measure of benefit used in the analysis was not expressed in terms of morbidity averted. For this reason, it was difficult to know the health benefit resulting from the intervention. The validity of the study estimates used in the model is uncertain: the demographic and socio-economic characteristics of the groups were not given, but study findings were generalised for the whole regional population. Furthermore, the authors substituted an estimate taken from a Kaiser report for a study estimate, which suggests that the authors had doubts about how representative the study sample may have been of the region as a whole. However, a sensitivity analysis was performed in which these estimates were varied and the results fully presented.

**Validity of estimate of costs**
Although quantities of resource use were reported separately from costs, only the cost of sending the recall letters was included in the analysis. Treatment, patient, overhead and indirect costs were not included.

**Other issues**
The authors' conclusions were justified based on the results of the sensitivity analysis. The issue of generalisability to other settings was addressed and reference was made to other relevant studies. Results were not presented selectively.

**Implications of the study**
A fuller analysis of the costs and effects of the intervention with respect to relevant comparator(s) would give a better estimate of the cost-effectiveness of using a recall letter system for improving vaccination coverage. It is unclear why the authors chose as their study population one in which the 'Healthy People 2000' goal, concerning the baseline coverage rate, had been reached without any intervention. The authors estimated a cost-effectiveness ratio for an
'autodial' method, but acknowledge that a randomised study is needed to determine the response rate for, and cost-effectiveness of, this alternative.

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