Measles, rubella, mumps, and varicella seroprevalence among health care workers in Turkey: is prevaccination screening 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 study investigated the use of a programme for screening health care workers for their immunity to measles, rubella, mumps and varicella (MMRV), with those with no immunity receiving vaccinations against these diseases. This intervention was compared with a programme of vaccinating all health care workers.

Type of intervention
Screening and primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised health care workers in adult and children's hospitals.

Setting
The study setting was primary care. The economic study was carried out in Turkey.

Dates to which data relate
The effectiveness and resource use data were derived from health care workers enrolled into the study between March and May 2005.

Link between effectiveness and cost data
The costing study comprised the costs of screening and vaccination. For the cost of screening, the costing study was undertaken prospectively on the same patient sample as that used in the effectiveness study. For the cost of vaccination, the costing study was hypothetical since health care workers were not vaccinated.

Study sample
Between March and May 2005, a total of 2,500 health care workers from an adult hospital and another 560 from a children's hospital were invited to participate in this study. Of these, 363 agreed to participate and be screened for MMRV antibodies.

Study design
This was a prospective cohort study that was conducted on a single group of people. The study was undertaken at two Turkish hospitals (one for children and one for adults). The participants were not followed up as the intervention was drawing blood from health care workers to screen for MMRV antibodies.
Analysis of effectiveness
The primary health outcome was the proportion of health care workers who had antibodies against MMRV. In addition, health care workers were asked to report the history of any MMRV infections so that the sensitivity and specificity of MMRV history to MMRV immune status could be assessed. It would appear that all the patients included in the study were accounted for in the analysis.

Effectiveness results
The proportion of health care workers who had antibodies against measles was 98.6%, rubella 98.3%, mumps 92.2%, and varicella 98%.

The positive predictive value of MMR was 92% and that of varicella history was 100%.

Clinical conclusions
Over 90% of the health care workers were immune to MMRV.

Measure of benefits used in the economic analysis
The authors did not derive a summary measure of benefit. In effect, a cost-consequences analysis was performed.

Direct costs
The direct costs to the health care provider were included. These comprised the costs of the screening tests for MMRV and the costs of vaccination. Resource use for the screening programme was derived from the effectiveness study. As health care workers did not receive vaccination, the authors assumed that only those immune to MMRV would be vaccinated in the screening scenario, whereas all health care workers would be vaccinated in the other scenario. Vaccination costs included the costs of an MMR vaccine and a varicella vaccine. Although the authors reported the unit cost for each resource use category, the source from which the unit costs were derived was not reported. Discounting was not relevant since the costs were incurred immediately, and was therefore not performed. 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
Productivity costs were not included.

Currency
US dollars ($).

Sensitivity analysis
The authors undertook a sensitivity analysis by varying the proportion of health care workers immune to MMR and to varicella.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.
**Cost results**

The cost of screening for MMR and vaccinating susceptible health care workers was $3,211, compared with $3,630 for vaccinating all health care workers. Thus there was a total cost-saving of $419.

The cost of screening for varicella and vaccinating susceptible health care workers was $1,284, compared with $17,605 for vaccinating all health care workers. Thus there was a total cost-saving of $16,321.

**Synthesis of costs and benefits**

The costs and benefits were not combined as screening was found to be both less costly and more effective at establishing the immunity of health care workers than no screening.

The results of the sensitivity analysis showed that vaccination for MMR without screening would be cheaper if the proportion of immune health care workers was less than 78%. Against varicella, a policy of vaccinating only susceptible workers would be cheaper if the immunity rate was above 6%.

**Authors' conclusions**

A policy based on obtaining a history of varicella infection and screening those individuals with a negative history, then vaccinating only seronegative health care workers, was found to be appropriate.

**CRD COMMENTARY - Selection of comparators**

A justification was given for choosing the vaccination of all health care workers against MMRV as the comparator. It was recommended by the US Center for Disease Control and Prevention. You should decide if the comparator used represents current practice in your own setting.

**Validity of estimate of measure of effectiveness**

The analysis was based on a prospective cohort study, which was appropriate for the study question (to determine the immune status of health care workers to MMRV). It was unclear if the study sample was representative of the study population as only a small proportion of eligible health care workers took part in the analysis. The authors did not undertake any statistical analysis to show the uncertainty surrounding the proportion of patients immune to MMRV or the sensitivity and specificity of natural history used to calculate positive predictive values.

**Validity of estimate of measure of benefit**

The authors did not derive a summary measure of benefit. In effect, a cost-consequences analysis was performed.

**Validity of estimate of costs**

The authors undertook a very limited costing study that included only the costs of the vaccines and screening. Consequently, important cost categories and costs might have been omitted from the analysis. For example, the authors did not include the costs of any adverse reactions to the vaccines or the costs of treating MMRV infections. The authors did not report the sources used to derive the unit costs, although they did report the unit costs of each resource use category. Discounting was not relevant, as the costs were incurred immediately, and was therefore not performed. The price year was not reported, which will hamper any future inflation exercises.

**Other issues**

The authors reported that the seropositivity rates for MMRV in their study were comparable with those found in other studies in Japan, Italy and the UK, amongst other countries. 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 the analysis. The authors reported no further limitations to their study.
Implications of the study
The authors recommend vaccinating new health care workers for MMRV as it is the most cost-effective strategy.

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Other publications of related interest
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MeSH
Adolescent; Adult; Chickenpox /epidemiology /immunology; Chickenpox Vaccine /economics /immunology; Cost-Benefit Analysis; Cross-Sectional Studies; Female; Health Personnel; Hospitals, General; Hospitals, Pediatric; Humans; Immunization Programs /economics; Immunoglobulin G /analysis; Male; Mass Screening; Measles /epidemiology /immunology; Measles-Mumps-Rubella Vaccine /economics /immunology; Middle Aged; Mumps /epidemiology /immunology; Rubella /epidemiology /immunology; Seroepidemiologic Studies; Turkey /epidemiology

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