Rubella, rubeola, and mumps in pregnant women: susceptibilities and strategies for testing and vaccinating.

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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 study evaluated the rubella only vaccine and the measles, mumps and rubella (MMR) vaccine for susceptible pregnant women after delivery. Susceptibility was tested with an enzyme-linked immunosorbent assay (Wampole Laboratories, Princeton) looking at viral immunoglobulin G titres for immunity to rubella, rubeola and mumps.

Type of intervention
Screening and primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised women receiving care in a prenatal clinic.

Setting
The setting was not specified, but it appears to have been secondary care. The economic analysis was conducted in the USA.

Dates to which data relate
The study data were collected between May 2004 and October 2004. It can be inferred that the costing was based on prices for the corresponding period.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was conducted retrospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were not conducted. Data were collected from all women presenting for initial prenatal care between the set dates. It was reported that no women were excluded from the analysis. Data from 973 pregnant women were studied. The mean age of the women was 24.2 years (range: 17 to 43).

Study design
This was a single-centre, cross-sectional, observational study of women receiving care in the prenatal clinic during a 6-month period.

**Analysis of effectiveness**
The analysis of effectiveness was based on susceptibility to rubeola or mumps depending on rubella status.

**Effectiveness results**
Overall, 9.4% of women were susceptible to rubella, 16.5% to rubeola and 16.3% to mumps.

A total of 32.6% of women were susceptible to at least one virus. Only 1.7% of women were not immune to all three: 51.6% of women who were susceptible to rubella were also susceptible to either rubeola or mumps, whereas 25.6% of women who were immune to rubella were susceptible to either rubeola or mumps.

A logistic regression model was used to assess for predictors of immunity to all three viruses and also to predict booster status.

The analysis showed that in a cohort of 1,000 women:

- strategy A would not immunise 280 women who were susceptible to a virus;
- strategy B, would not immunise 232 women who were immune to rubella but susceptible to either rubeola or mumps; and
- strategies C and D would immunise all women who were susceptible to any of the three viruses.

**Clinical conclusions**
The authors concluded that many pregnant women are susceptible to rubella, rubeola and mumps when they present for prenatal care. A quarter of the women immune to rubella were susceptible to either rubeola or mumps. The current strategy (B) used in the authors’ setting was not sufficient to ensure that all women had full immunity.

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

**Direct costs**
The estimation of the quantities and costs was based on data from the study. The unit costs and the quantities were reported separately. The costs fell into two categories, the cost of vaccines and the cost of testing. Retail vaccine costs and costs of laboratory tests were used in the cost analyses. The retail vaccine prices were derived from the manufacturer and a web-based price list. Discounting was not carried out, but was not relevant as the expenses were incurred during a very short time period.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect costs were not included.

**Currency**
Sensitivity analysis
A sensitivity analysis was not carried out.

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

Cost results
The cost of implementing strategy A for 1,000 women was $5,353.17.

The cost of implementing strategy B was $7,462.55.

The cost of implementing strategy C was $27,404.30.

The cost of implementing strategy D was $26,338.02.

Synthesis of costs and benefits
There was no synthesis of the costs and benefits because of the cost-consequences approach adopted.

Authors' conclusions
The current screening and vaccine programme (strategy B) has left many reproductive-aged women susceptible to rubella, rubeola and mumps infections. The authors acknowledged that the more comprehensive strategy C was more expensive. However, they suggested that, if the goal is to ensure maximal vaccination of all susceptible women, then strategy C should be implemented.

CRD COMMENTARY - Selection of comparators
Although no explicit justification was given for the comparators used, they would appear to represent variations of current practice in the authors' setting. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness was based on a prospective observational study of women presenting for prenatal check-up where a laboratory assay is used to determine susceptibility. The study design may be associated with some limitations, such as selection bias and confounding. The specificity and sensitivity of the test and the cut-off value used to indicate immunity were not reported, which may limit the transferability of the results obtained. The study sample appears to have been representative of the study population. However, the single-centre nature of this study might have affected its external validity.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis. In effect, a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The perspective adopted in the analysis was unclear but, since laboratory costs for conducting the tests were used, the perspective might have been that of the health care provider. The lack of an explicit perspective means that it is
difficult to ascertain whether all the relevant costs have been included. Although the costs of vaccine to the hospital were reported, the average retail cost was used for the calculations. Again, since no perspective was stated, it is not clear whether some adjustments should have been made to the retail cost. The costs for administering the vaccine were not included, although these would be relevant to the health care providers' perspective. The indirect costs were also not included and these would be relevant to a societal perspective. Their omission represents a limitation to the validity of the estimate of the costs.

**Other issues**
The authors compared their findings with those from other studies. The problem of generalisability was addressed, with the authors acknowledging that their population made up of active duty and dependent pregnant women may not be generalisable to the reproductive aged population in the rest of the country. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis.

**Implications of the study**
The authors state that screening for viral illness susceptibility during antenatal care with subsequent vaccination of those found to be seronegative is a means by which providers can help promote population health.

**Source of funding**
None stated.

**Bibliographic details**

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**Other publications of related interest**
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**Indexing Status**
Subject indexing assigned by NLM

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