Cost-effectiveness of routine antenatal varicella screening

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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
Routine ante-natal varicella screening.

Type of intervention
Primary prevention and screening.

Economic study type
Cost-effectiveness analysis.

Study population
Hypothetical pregnant women with negative or indeterminate varicella histories and history-negative adults. The age of women presenting for care was assumed to be 25 years, with a subsequent life expectancy of 55 additional years.

Setting
Hospital. The study was carried out at the University of Rochester School of Medicine and Dentistry, Rochester, New York, USA.

Dates to which data relate
Effectiveness data were collected from studies previously published between 1962 and 1996. Resource use data were collected from a 1996 source. The price year was 1996.

Source of effectiveness data
Effectiveness data were derived from a review of previously published studies.

Modelling
A decision analytic model was used to compare costs and outcomes of the screening versus no screening strategies. A second tree was constructed by using a Markov model spanning 55 years to determine the costs and outcomes of a strategy consisting of varicella vaccination and ante-natal screening.

Outcomes assessed in the review
The review assessed the following outcomes: exposure, screening test performance, varicella cases, effectiveness of varicella-zoster immunoglobulin (VZIG), and death rate.

Study designs and other criteria for inclusion in the review
Not stated.
Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Summary statistics from each study.

Number of primary studies included
Approximately 17 studies were included.

Methods of combining primary studies
Narrative method.

Investigation of differences between primary studies
Not stated.

Results of the review
The rate of exposure to varicella was estimated to be 0.01. In the "no-screen" group, 0.2% of women report exposure by day 3, 0.3% between days 3-4, and 0.5% after day 4. The serologic test has a sensitivity of 0.95 and a specificity of 0.84. 80% of patients with negative or indeterminate varicella histories are immune. The administration of VZIG reduces the risk of infection, pneumonia and death by 50%. Varicella pneumonia-related mortality was estimated to be 10%. If screening is performed and a varicella seronegative sub-population is identified, a vaccination rate of 0.75 was postulated.

Measure of benefits used in the economic analysis
Varicella cases, life years and deaths due to varicella pneumonia were used as the measure of benefits. Recovery from varicella or varicella pneumonia was assumed to be complete. Therefore, there was no need for a quality adjustment of subsequent life years following recovery from varicella.

Direct costs
Given that the initial analysis only considered events occurring during the nine months course of pregnancy, costs were not discounted. In the case of the screening and vaccination strategy, costs were discounted at an annual rate of 3% given that the model extended over a period of 55 years. Quantities and costs were reported separately. Direct costs include all direct medical costs (costs of screening, hospitalisation, VZIG treatment). The quantity/cost boundary adopted was that of society. The estimation of quantities and costs was based on actual data. The costs of a varicella titer were estimated from the Microbiology Department at Strong Memorial Hospital. Varicella hospitalisation costs were estimated from diagnosis related group listings obtained through the Rochester Healthcare Information Group. The price year was 1996.

Statistical analysis of costs
Not reported.
Indirect Costs
Indirect costs included 2 weeks of lost wages per case of varicella. This cost was interpolated from the median yearly wage of a 25- to 34-year-old woman.

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was conducted on the following parameters: VZIG effectiveness, varicella communicability, rate and timing of contact reporting, costs (per case, pneumonia, and death), or serologic test performance.

Estimated benefits used in the economic analysis
The strategy consisting of screening during pregnancy was associated with 0.001422 varicella cases, 54.999061 life-years and 0.000017 deaths due to varicella pneumonia per individual. If VZIG was assumed to be the preferred treatment in the "no screen" option, "no screen" was associated with 0.00135 varicella cases, 54.999165 life-years and 0.000015 deaths due to varicella pneumonia per individual. If VZIG was used only if seronegative after exposure in the "no screen" option, "no screen" was associated with 0.0016488 varicella cases, 54.998733 life-years and 0.000023 deaths due to varicella pneumonia per individual. When postpartum vaccination is an option, screening is associated with 0.0485751 varicella cases, 54.99865 life years and 0.000031 deaths due to varicella pneumonia per individual. No screening is associated with 0.074529 varicella cases, 54.998502 life years and 0.000037 deaths due to varicella pneumonia per individual.

Cost results
Costs of screening during pregnancy amounted to $14.94 per individual. If VZIG was assumed to be the preferred treatment in the "no screen" option, costs amounted to $4.78 per individual. If VZIG was used only if seronegative after exposure in the "no screen" option, costs amounted to $3.10 per individual. When postpartum vaccination is an option, the costs of screening amounted to $42.56 per individual. The costs of "no screening" amounted to $56.44 per individual.

Synthesis of costs and benefits
The screening during pregnancy strategy was dominated by the "no-screen" option which used VZIG as the preferred treatment. The incremental cost-effectiveness ratio for preferential VZIG versus VZIG only if seronegative after exposure was $3,889 per life year. When postpartum vaccination is an option, the screening strategy was dominant. The cost-effectiveness results were insensitive to changes in VZIG effectiveness, varicella communicability, rate and timing of contact reporting, costs (per case, pneumonia, and death), or serologic test performance.

Authors' conclusions
Routine ante-natal varicella screening of all pregnant women with negative or indeterminate varicella histories is not cost-effective. It could be cost-effective in groups of women with increased exposure risk, or as part of a policy of screening and vaccination of all adults.

CRD COMMENTARY - Selection of comparators
Rationale for the choice of the comparator was clear. You, as a user of this database, should verify whether these health technologies are relevant to your setting.

Validity of estimate of measure of benefit
Relevant measures of benefit were considered. More details about the literature review could have been provided. The
results do not appear to have been presented selectively. A sensitivity analysis was conducted to allow for uncertainties in the effectiveness measures such as the incidence of pneumonia, the death rate following varicella in pregnant adults, and efficacy of varicella vaccination in adults.

**Validity of estimate of costs**

direct costs and costs related to lost productivity were considered. Costs were derived from local sources and are therefore unlikely to be generalisable to other settings.

**Other issues**

ell conducted study using a rigorous methodology. The generalisability of the results to other settings or countries was not discussed. The main issues to consider are the uncertainty surrounding the effectiveness measures, the imprecise cost estimates and the assumptions used in the two decision trees.

**Implications of the study**

Routine screening of pregnant women with negative or indeterminate varicella histories is not cost-effective. If varicella vaccination of seronegative adults becomes standard, then routine screening may capture part of the target adult population, and in that way, become cost-effective.

**Source of funding**

None stated

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**Other publications of related interest**


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