Model Predicts Cost Efficacy of HPV Vaccination

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HPV vaccination should be targeted at preadolescent girls, with initial "catch-up" programs aimed at women and girls aged younger than 21 years, but should not be directed at older women, according to a report.

The impact of the HPV vaccination will not be "observable for decades," so decisions regarding vaccine policy must rely on estimates and mathematical simulation models, according to Jane J. Kim, Ph.D., and Dr. Sue J. Goldie of Harvard School of Public Health, Boston. They devised such a model to examine possible outcomes of current HPV vaccination programs.

In creating this simulation model, the investigators took into consideration the cost-effectiveness of vaccinating various age groups as well as "the dynamics of HPV transmission, the duration of vaccine efficacy, the potential benefits of preventing noncervical HPV-related conditions, the anticipated changes in screening practice, and potential disparities in access to care."

Assuming that the HPV vaccine confers lifelong immunity, the simulation model showed that routine vaccination of 12-year-old girls had a cost-effectiveness ratio of $43,600 per quality-adjusted life year gained. This is well within the commonly cited threshold of good value for resources spent, which is $50,000-$100,000 per quality-adjusted life year gained, the investigators said (N. Engl. J. Med. 2008;359:821-32).

Adding a "catch-up" program to vaccinate girls aged 13-21 years also was found to be reasonably cost-effective, especially when the benefits of averting genital warts and of cross-protection against other high-risk types of HPV were added into the model. However, extending such a catch-up program to women older than 21 was not found to be a good value.

Both the routine vaccination of 12-year-olds and the "catch-up" vaccination of adolescents remained cost-effective only at high levels of vaccine coverage, Dr. Kim and Dr. Goldie noted.

The model predicted less success for HPV vaccination programs if it turns out that immunity is not lifelong but lasts only 10 years. In that case, continued screening and boosters will be necessary and will add substantially to costs.

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In an editorial comment accompanying this report, Dr. Charlotte J. Haug, editor in chief of the Journal of the Norwegian Medical Association, Oslo, called the Harvard researchers' model "well done and ambitious."

"There has been pressure on policy makers worldwide to introduce the HPV vaccine in national or statewide vaccination programs. How can policy makers make rational choices about the introduction of medical interventions that might do good in the future, but for which evidence is insufficient, especially since we will not know for many years whether the intervention will work or—in the worst case—do harm?" she asked (N. Engl. J. Med. 2008;359:861-2).

One answer is to "develop mathematical models of the natural history of the disease in question, introduce various intervention strategies, and use cost-effectiveness analysis to estimate the costs and health benefits associated with each clinical intervention," as Dr. Kim and Dr. Goldie have done.

However, their model and its predictions are only as accurate as the assumptions on which the model is based, Dr. Haug noted. If any of these assumptions turn out to be overly optimistic, then HPV vaccination will not turn out to be as successful as the model predicts. The researchers cited other limitations in their analysis, saying that data on sexual behavior were primarily based on population averages from large surveys. Also, data are limited on several factors: incidence; mortality and quality of life associated with noncervical HPV-related cancers; the long-term efficacy of the vaccine; and the efficacy of the vaccine against noncervical cancers.

The researchers did not report any potential conflicts of interest. ■