The economic impact of HPV vaccines: not just cervical cancer

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Cervical cancer is the leading cause of cancer death among women worldwide. Although regular screening dramatically reduces the incidence and death from cervical cancer, effective screening requires substantial investment of resources to ensure adequate population coverage, acceptable test performance, and appropriate management of abnormal results. The discovery that cervical cancer was caused by human papillomavirus (HPV) led rapidly to the development of vaccines targeted against HPV-16 and -18, which account for approximately 70% of cancer cases. These vaccines are 90%-100% effective in reducing the incidence of persistent infection and cervical lesions, which includes CIN 2/3, with these viral types. Based on these data, mathematic modeling studies consistently have estimated that vaccination will result in a substantial reduction in the burden of cervical disease. Based on current prices of the available vaccine, vaccination is unlikely to be cost-saving (i.e., the overall costs of a vaccine program are higher than the costs of not vaccinating), but the cost-effectiveness—the price paid for gains in life expectancy and quality of life—is generally within a range that is considered acceptable and is comparable to other preventive measures, such as mammography.

However, HPV-16 and -18 are associated with other cancers that include anal cancer, especially in men who have sex with men, and some head and neck cancers. The currently available HPV vaccine, Gardasil, is a quadrivalent vaccine that is targeted against HPV-6 and -11 as well as -16 and -18; HPV-6 and -11 account for 90% of genital warts, and vaccination with Gardasil was as effective in preventing lesions caused by HPV-6 and -11 as it was in preventing HPV-16– and -18–related disease. What is the additional economic impact of prevention of noncervical lesions that are caused by HPV-16, -18, -6, and -11 through vaccination?

In this issue of the Journal, Hu and Goldie provide some crucial data that will help to answer that question. Using a variety of data sources and methods for synthesizing the data, they provide estimates for the range of noncervical disease caused by HPV. Based on their estimates, noncervical lesions account for approximately 8% of the total HPV-related economic burden. Sixty percent of this extra burden is caused by conditions related to HPV-6 and -11, juvenile-onset recurrent respiratory papillomatosis, and anogenital condylomata.

Estimating the costs that are associated with diagnosis and management of a disease is not a trivial task. This is especially true in the United States, where there is variability in the prices that are charged by suppliers and providers, where there is the proprietary nature of data about the relationship between costs and charges, and where there are regulations that make it difficult to estimate the total costs of a chronic condition at the individual patient level. The closest thing to a “universal” source in the United States, Medicare data, is not applicable for many conditions of interest to obstetrician/gynecologists. The work of Hu and Goldie is likely to represent the best estimate available for quite some time; however, even with an exhaustive effort, their estimate of $418 million is not very precise: the lower and upper end of the reasonable range varies by 10-fold, from $160 million to $1.6 billion. However, even the low end of the range is a substantial amount of money, especially in an era when every possible reduction in healthcare costs is needed.

Although the cumulative costs that are associated with HPV-related disease are not immediately useful to patients or clinicians who are making decisions about HPV vaccination, they will prove to be invaluable to policy makers, including insurance companies. Although the obvious public health impact of HPV vaccines is primarily the reduction in morbidity and mortality rates that are related to cervical cancer, the economic impact of this reduction is relatively small for payers who are considering HPV vaccines. First, the incidence of cervical cancer is low, especially in a screened population. Even though the cost of treating an individual cancer is substantially higher than the cost of a vaccine series, the savings that result from preventing additional cases of a relatively rare cancer do not outweigh the costs of universal vaccination. Second, costs that are incurred in the future have a lower value than costs that are incurred in the present in standard financial and economic analysis, which is a concept known as discounting. This means that the disparity between the costs of universal vaccination now and the cost savings from fewer cancer cases in the future is even greater than it would be based on relative disease incidence alone. Finally, because most girls and women who are vaccinated by a given insurer are unlikely to be covered by that insurer 10–20 years from now, the insurer may never see the cost savings.

However, all of these considerations are also true of current screening practices. The overwhelming majority of the costs that are associated with cervical HPV are related to screening and management of low-grade abnormalities. Reducing the incidence of these low-grade abnormalities in vaccinated women will be much more likely to have direct economic benefits to payers. These benefits will be magnified if longer term
data on the duration of efficacy of vaccines allows delaying the age of first screening and extending screening intervals. By demonstrating that reductions in the incidence of 2 noncervical HPV-related diseases (juvenile-onset recurrent respiratory papillomatosis and anogenital warts) should result in substantial savings, Hu and Goldie have provided invaluable information to assist payers in estimating their “return-on-investment” in HPV vaccination, especially because both of these conditions are likely to occur at much younger ages than cervical cancer. Recognition of the value of HPV vaccines should help further reduce barriers to vaccine access.

REFERENCES