Clinical and Economic Benefits of Cervical Cancer Screening in HIV-Infected Women

Goldie SJ, Weinstein MC, Kuntz KM, Freedberg KA. The costs, clinical benefits, and cost-effectiveness of screening for cervical cancer in HIV-infected women. Ann Intern Med 1999;130:97–107.

Study Overview

Objective. To determine the clinical benefits, financial costs, and cost-effectiveness of various strategies for cervical neoplasia and cancer screening in HIV-infected women.

Design. A Markov model cost-effectiveness analysis was used to assess and compare the benefits and costs of 6 screening strategies: no screening, annual Papanicolaou (Pap) smears, annual Pap smears after 2 negative smears obtained 6 months apart, semiannual Pap smears, annual colposcopy, and semiannual colposcopy. The model used data from the clinical literature, including values for incidence, progression, and regression of cervical neoplasia, efficacy of screening and treatment, progression of HIV disease, mortality from HIV infection and cancer, quality of life, and costs.

Setting and participants. Simulated clinical practice in the United States. Hypothetical women representative of the HIV-infected population in the United States.

Main outcome measures. Quality-adjusted life-years (QALYs), overall life-time costs, and incremental cost-effectiveness (determined by dividing the additional cost of a specific screening strategy by its additional clinical benefit, compared with the next least expensive strategy).

Main results. Compared with no screening, annual Pap smears increased quality-adjusted life expectancy by 2.51 months and lifetime costs by $2680, for an incremental cost of $12,800 per QALY added. Annual Pap smears after 2 normal smears obtained 6 months apart further increased QALYs by 0.04 months, at a cost of $14,800 per additional QALY. Semiannual Pap smears increased QALYs by 0.17 months, at a cost of $27,600 per additional QALY. Annual colposcopy increased costs but did not increase QALY, compared with semiannual Pap smears. For semiannual colposcopy, the cost of each additional QALY exceeded $375,000. Cost-effectiveness results were most sensitive to the variable rates at which neoplasia progressed to invasive cancer.

Conclusion

For women with HIV infection, cervical cancer screening with annual Pap smears after 2 negative smears obtained 6 months apart increases quality-adjusted life expectancy at a cost comparable to that of other clinical preventive interventions. However, the clinical benefits of screening are substantially decreased when quality-adjusted life expectancy decreases to less than 2 years.

Commentary

The authors used a state-transition Markov model to assess the clinical and economic benefits of various cervical cancer screening strategies in HIV-infected women. As with any model, the conclusions are only as good as the underlying data. Nevertheless, the authors addressed the problem of imperfect data by assessing the clinical and economic effectiveness of the various strategies across a broad range of input values, which strengthens their conclusions. As better data become available from larger longitudinal studies, the model can be updated to illustrate the impact of new findings [1].

Clinical and economic modeling is necessary due to the lack of large, definitive clinical trials evaluating health care interventions such as specific medications, therapeutic regimens, and diagnostic strategies. As this study illustrates, such models are valuable because they can identify the key drivers of clinical and economic effectiveness and their impact and expose the limitations of the data available to support clinical decision making. Furthermore, this study

illustrates a sound methodology for developing information to assist physicians in clinical decision making when the literature is lacking or ambiguous.

Applications for Clinical Practice

More than 100,000 women in the United States are HIV-infected and thus at increased risk for cervical neoplasia. This study shows that despite the high competing mortality of HIV disease, screening HIV-infected women for cervical cancer produces life-expectancy benefits equal to those commonly provided by accepted preventive measures used in general medicine. In addition, screening strategies in HIV-infected women are more cost-effective than in noninfected women; cervical cancer screening done every 2 years in the noninfected population has been estimated to cost $263,000 per year of life saved [2].

References

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2. Eddy D. Screening for cervical cancer. Ann Intern Med 1990;113:214–26.