New Adjunct to Cervical Cancer Screening: Is It Cost-Effective?

Taylor LA, Sorensen SV, Ray NF, et al. Cost-effectiveness of the conventional papanicolaou test with a new adjunct to cytological screening for squamous cell carcinoma of the uterine cervix and its precursors. Arch Fam Med 2000;9:713–21.

Study Overview

Objective. To determine the marginal cost-effectiveness of adding speculoscopy, a procedure involving a magnified visual examination of the cervix and vaginal canal, to Papanicolaou (Pap) tests for cervical cancer screening.

Design. A Markov model was developed using data from previously published studies. The study used the health care payers' perspective (direct medical costs) and society's perspective (direct medical costs and indirect costs from lost productivity). An annual discount rate of 3% was applied in the base case analysis. Sensitivity analyses were performed by altering estimates of some clinical and utilization variables as well as the discount rate. The article does not make clear whether sensitivity analyses included multivariable manipulations.

Setting and participants. Three hypothetical cohorts were assessed: women offered screening from age 18 to 65 years, age 18 to 44 years, and age 45 to 65 years. These base cases were modeled with an average risk for developing cervical cancer. An analysis of targeted screening for a hypothetical high-risk population was also done.

Intervention. The hypothetical cohorts were run through models of traditional annual Pap tests and biennial Pap tests with speculoscopy. Data on speculoscopy were gathered from procedures using a chemiluminescent light and Speculite (Trylon Corporation, Torrance, California). The models provided 3 branches for follow-up for Pap results of atypical squamous cells of unknown significance and low-grade squamous intraepithelial lesions (SILs). This was done to reflect varying practice patterns.

Main outcome measures. The primary outcome was marginal cost per life-year gained. Secondary outcome measures included probabilities of detecting SILs, developing invasive cervical cancer, and dying from cervical cancer; total discounted direct costs; and direct plus indirect costs. Costs were estimated using average Medicare reimbursement in 1997.

Main results. The base case cohorts (screening at ages 18 to 44 years, 45 to 65 years, and 18 to 65 years) gained 8, 10.6, and 12.8 days of life expectancy, with a direct plus indirect cost savings per case of $590, $332, and $994, respectively. Up to age 31 years, annual Pap tests were less expensive than biennial Pap tests plus speculoscopy. Pap tests plus speculoscopy avoided 0.2%, 0.2%, and 0.47% more cases of cervical cancer and 0.08% (all cohorts) more cases of cervical cancer deaths. This trend was consistent through all sensitivity analyses with 1 exception: When the probability of an abnormal annual Pap test was 4% (base case, 6%), there was an incremental cost increase of $52 with an increased life expectancy of 4.7 days.

Conclusion

Biennial Pap tests with speculoscopy may have a small marginal cost and effectiveness advantage over the standard yearly Pap test for detecting cervical carcinoma.

Commentary

The model for this study was well designed. Taylor et al took into account reasonable variations in clinical practice and also included an analysis of a high-risk subgroup whose results were similar to the base cases. However, many other issues remain that must be considered. Probability estimates were derived from a variety of studies, some of which may not be accurate. For example, the citation for the probabilities of attending either annual or biennial screening programs did not address this issue directly [1]. This citation reported data from the Behavioral Risk Factor Surveillance Survey based on the question "Did you have a Pap test in the past 2 years?" It is not clear how the probability of attending annual screening was derived. Further, the probability of receiving biennial Pap tests plus speculoscopy has not been determined empirically. The estimated 0.8 probability for receiving these tests is likely an overestimate. Taylor and colleagues did not vary these probabilities in the sensitivity analysis. Likewise, differences in sensitivity and specificity between the 2 screening procedures may have been overestimated. An editorialist noted that the studies from which these estimates were derived had relatively few participants with positive findings. This author also pointed out that future studies should in-

clude analyses of the impact of increased false-positive results with speculoscopy on quality of life. Whether women would prefer trading less frequent testing and slightly better protection for a more invasive test with more false-positive results has not been explored.

Applications for Clinical Practice

While this study was not definitive, it suggests that a very successful primary prevention program can be made more effective at lower costs. Clinics and practices may want to perform their own analyses based on their cost and outcomes data. Hopefully, more studies will address this question in the future.

References

1. Centers for Disease Control and prevention. CDC surveillance summaries, August 27, 1993. MMWR Morb Mortal Wkly Rep 1993;42(SS-4):12.