Review: Newer technologies improve sensitivity in detecting uterine cervical lesions but at a substantially increased cost

McCrory DC, Matchar DB, Bastian L, et al. **Evaluation of cervical cytology.** Rockville, MD: Agency for Health Care Policy and Research; February 1999. AHCPR publication no. 99-E010. http://www.ahcpr.gov/clinic/cervsum.htm.

QUESTION

In adult women at average risk for cervical cancer, what is the accuracy of the conventional Papanicolaou (Pap) test and of new technologies (thin-layer cytology, computer rescreening, and algorithm-based decision making) in detecting cervical cancer and cervical intraepithelial neoplasia?

DATA SOURCES

Studies were identified by searching MEDLINE, CancerLIT, HealthSTAR, CINAHL, EMBASE/Excerpta Medica, and EconLIT; scanning recent issues of selected journals; and contacting manufacturers of automated cytologic devices and relevant professional societies.

STUDY SELECTION

Studies were selected if cervical cytology was evaluated as a screening test, the reference standard was histology or colposcopy, and sensitivity and specificity (or relative true-positive and false-positive rates) could be calculated. Cytology was an acceptable reference standard if the studies also included an independent panel of cytology specialists to arrive at a consensus diagnosis and a 2-arm prospective study design was used. The cost analysis considered the cost of all medical services provided for screening, diagnosis, and treatment.

DATA EXTRACTION

2 reviewers independently extracted data, permitting calculation of sensitivity, specificity, and prevalence. Definitions of cytologic abnormality were extracted and defined by 1 of 3 thresholds: atypical squamous cells of uncertain significance (ASCUS), low-grade squamous intraepithelial lesions (LSIL), and high-grade squamous intraepithelial lesions (HSIL). Test characteristics were compared for cytologic and histologic results at 4 thresholds: ASCUS/cervical intraepithelial neoplasia (CIN) 1, LSIL/CIN1, LSIL/CIN2-3, and HSIL/CIN2-3.

MAIN RESULTS

86 studies met inclusion criteria. The evidence was insufficient to assess the accuracy of the newer technologies. 84 studies were included in a meta-analysis of conventional Pap test accuracy, but only 3 studies controlled for severe biases of disease prevalence and verification. These 3 studies showed conventional Pap test sensitivities of 56%, 53%, and 29% and specificities of 98%, 100%, and 97%. The cost-effectiveness of conventional Pap screening every 3 years compared with no Pap screening was U.S. $4079 per life-year saved. The addition of improved screening technology every 3 years had an incremental cost of U.S. $22 010 per life-year saved.

CONCLUSIONS

Implementation of newer technologies improves the sensitivity of primary cervical screening compared with the conventional Papanicolaou test but at a substantial increase in cost per life-year saved. Current evidence is not sufficient to justify routine implementation of newer technologies.

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COMMENTARY

The Pap test has been successful in reducing morbidity and mortality from cervical cancer in countries with organized screening programs. Worldwide, however, cervical cancer is the fourth leading cause of death from cancer among women (1). Concerns about the screening accuracy of the Pap test have led to the development of new technologies (liquid-based cytology, computer-assisted screening, and human papillomavirus testing).

In the United States, 60% of deaths caused by cervical cancer has been attributed to lack of screening or inadequate follow-up of abnormal results (2). In developing countries, the primary obstacles to successful screening are cost, availability of trained personnel, and acceptability of pelvic examinations. In this context, improving screening accuracy is less important than broadening screening coverage, lowering costs, reducing the need for highly trained personnel, and improving follow-up.

McCrory and colleagues did an exhaustive review on the accuracy of cervical cytology and new technologies. Unfortunately, because of the lack of high-quality research, they could not meet their objectives. Although 86 studies met their inclusion criteria, only 2 addressed new technologies. Only 3 of 84 studies on cervical cytology took sufficient precautions to avoid bias. The sensitivity for conventional cytology in these studies was relatively low, but it performed best in the detection of high-grade dysplasia, which is most likely to progress to cancer if left untreated (3).

Furthermore, the estimated cost-effectiveness of conventional cytology every 3 years compared with no screening was substantially better than the marginal cost-effectiveness of adding on new technologies. Rigorous research is needed to evaluate automated primary screening, which could reduce the need for cytotechnologists, and to evaluate the use of technologies that might replace cervical cytology or permit longer screening intervals. Conserved resources could then be allocated to broaden screening coverage and improve follow-up.

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