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What is the most cost-effective screening regimen for colon cancer?

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BACKGROUND: Expert panels recommend several different screening regimens for colorectal cancer (CRC), including annual fecal occult blood testing, sigmoidoscopy every 5 years, annual fecal occult blood testing plus flexible sigmoidoscopy every 5 years, double contrast barium enema every 5 years, and colonoscopy every 10 years. All of these tests vary considerably with respect to performance characteristics, complication rates, acceptability, and cost. Only fecal occult blood testing has been studied in a randomized controlled trial to establish effectiveness. This article compares the cost and effectiveness of CRC screening methods.

POPULATION STUDIED: The authors used a hypothetical population of men and women (white and black) aged 50 years and at average risk for colon cancer. They were placed in health categories defined by the presence or absence of a colon polyp or cancer. The categories were reassigned to simulate the natural progression of colon cancer on the basis of probabilities from studies and data from the Surveillance Epidemiology and End Results (SEER) program.

STUDY DESIGN AND VALIDITY: This study used a Markov model to simulate the evolution of normal epithelium in the colon to an adenomatous polyp and progression to malignancy. The screening mechanisms that allowed detection, removal of a polyp, and treatment of cancer were compared. Screening started at age 50 years and continued until age 85 years. Incremental analysis by rank ordering the strategies allowed methods of increasing effectiveness to dominate those methods that were more costly and less effective. Test and treatment costs were obtained from an health maintenance organization study population. Based on previous studies, an expected compliance rate of 60% was used to estimate the cost-effectiveness of screening tests. Sensitivity analysis was done to measure test performance when parameters such as test cost, sensitivity, specificity, and compliance rates were altered.

OUTCOMES MEASURED: The outcomes measured include cost-effectiveness of colorectal screening methods, life expectancy, and CRC incidence and mortality.

RESULTS: The reported results were for white men only. All CRC screening tests resulted in a reduced incidence of cancer and decreased mortality from CRC. Theoretically, the most effective test to screen for CRC is the annual rehydrated fecal occult blood test plus sigmoidoscopy every 5 years. This method has a cost-effectiveness ratio of $92,900 for each year of life saved. This compares similarly to the cost-effectiveness of screening Papanicolaou tests and mammograms. This method also resulted in a 60% reduction in the incidence of CRC and an 80% reduction in CRC mortality. Interestingly, the cost of this method became prohibitive if the model used a 100% compliance rate instead of 60%. Colonoscopy every 5

years is more effective than rehydrated fecal occult blood testing plus sigmoidoscopy every 5 years but is cost prohibitive. If the price of colonoscopy could be reduced by 25%, colonoscopy every 10 years would be a viable option. Annual rehydrated fecal occult blood testing alone shows a 65% reduction in CRC mortality, while dry cards only show a 55% reduction. The longer life expectancy of women and the higher cancer mortality in African Americans may make CRC screening even more cost-effective in these groups.

RECOMMENDATIONS FOR CLINICAL PRACTICE

According to this hypothetical analysis, the most effective test to screen for colorectal cancer is annual rehydrated fecal occult blood testing plus sigmoidoscopy every 5 years (60% reduction in CRC incidence and 80% in CRC mortality). The cost-effectiveness is comparable with screening tests for other types of cancer. Annual rehydrated fecal occult blood testing alone provides a 38% decrease in CRC incidence and a 65% decrease in mortality. Future changes in the cost and availability of colonoscopy may offer an additional screening regimen with acceptable cost-effectiveness.
