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EDITORIAL

# Cancer screening: Between appropriateness and effectiveness

Mostafa A Arafa

Mostafa A Arafa, Faculty of Medicine, King Saud University, PO Box 45632, Riyadh, Saudi Arabia

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Correspondence to: Mostafa A Arafa, Professor of Epidemiology, cancer research chair, Faculty of Medicine, King Saud University, PO Box 45632, Riyadh,
Saudi Arabia. mostafaarafa@hotmail.com
Telephone: +966-50-8129051
Fax: +966-50-4567324

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## Abstract

Two similar words, effectiveness and efficacy, have comparable insight and nearly describe analogous meaning for a screening test, yet clear understanding and perception of their diverse meanings will help clarify the basis of the differing conclusions about whether screening tests for different cancers reduce morbidity and mortality. Screening test may not be effective even when it sounds to be efficacious, on the other hand it should be efficacious when the test is effective.

**Key words:** Mortality; Screening test; Effectiveness; Efficacy; Cancer; Early detection



**Core tip:** Screening test should take account of heterogeneity among cancers. The effectiveness of any screening test should be evaluated on the basis of "whether it does more good than harm". Health professionals should be aware that such tests should outweigh the potential harm of investigating healthy people and consider the effect of intervening in apparently symptomless people.

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## INTRODUCTION

Screening is the probable identification of an unrecognized disease or defect by means of examinations, tests or any other procedures that can be practically and effectively applied. There are different aspects that should be considered upon the implementation of any screening procedure: specificity, sensitivity, positive and negative predictive values and acceptability. The likelihood that a positive screening test, predictive value positive, will give a correct result largely depends on the disease prevalence within the community. The lower the prevalence rate, the less the effectiveness of any screening health program even with the best screening tests[1].

The success of any screening program relies on a number of crucial factors, *i.e.*, the target disease or

cancer under screening should be highly prevalent and of public health importance, which is indicated by high morbidity or mortality, the treatment should be available and effective for decreasing morbidity and mortality, the screening test should be inexpensive and feasible, and the procedure itself must be convenient and virtually free of discomfort or risk[2].

When adopting an effective screening program, two major objectives should be considered: (1) a high level of case detection at an early stage when treatment can be more effective and before developing signs and symptoms, and a reasonably low level of false positive results; and (2) identification of risk factors which increase the probability of developing the disease and getting use of this knowledge to prevent or reduce the disease prevalence by changing these risk factors. Different criteria should be met for a screening test and the disease under screening to fulfill the previous objectives: The test should be competent of detecting a high percentage of disease in its preclinical state, hence the development of the disease from latent to affirmed condition should be amply understood, it has to be secure and cost-effective (the cost of case-detection including diagnosis and treatment should be economically balanced in relation to available expenditure), and it should lead to noticeably improved health outcomes on the basis of a continuing process and not once and for all projects[3].

Two similar words, Effectiveness and Efficacy, have comparable insight and nearly describe analogous meaning for a screening test, yet clear understanding and perception of their diverse meanings will help clarify the basis of the differing conclusions about whether screening tests for different cancers reduce morbidity and mortality. Screening test may not be effective even when it sounds to be efficacious, on the other hand it should be efficacious when the test is effective**.**

The most frequent method for appraising the effectiveness of a screening program is to compare the survival among cases detected as a result of screening with the survival of cases detected because of the occurrence of signs and symptoms.

Two contradicting results have emerged from the largest two longitudinal studies; The European Randomized Study of Screening for Prostate Cancer (ERSPC) reported that there was a 20% lower death rate from prostate cancer among men who were assigned to be screened in comparison to men not assigned to be screened, yet, screening itself carried a high risk for over-diagnosis[4]. On the other hand, the trial from the United States (Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial) declared that examination of the prostate and screening with a PSA cutoff of 4 ng/mL did not decrease the death rate from such cancer[5].

Screening programs themselves may have an effect on health and healthcare, which may in turn significantly impinge on the effectiveness of the programs. Whereas several screening methods have been shown to be effective in reducing the mortality of breast, cervical, colorectal and oral cancers, recommendations for liver, prostate and stomach cancer screening based on effectiveness, harm *vs* benefit and cost-effectiveness consideration are not clear or strong.

Many factors should be considered for determining the effectiveness of a cancer screening program, *i.e.*, quality adjusted life years (QALY), balance between costs and benefits, interval of screening and age at which screening should be conducted. The reported results from the ERSPC trial concluded that prostate cancer screening would be cost-effective when it is limited to few screens in subjects between 55 and 60 years of age, while it is less cost-effective when screening is conducted in subjects beyond 63 years of age because of loss of QALYs due to over-diagnosis[6].

In general, screening tests should take account of heterogeneity among cancers. The effectiveness of any screening test should be evaluated on the basis of "whether it does more good than harm". Health professionals should be aware that such screening tests should outweigh the potential harm of investigating healthy people and to consider the effect of intervening in apparently symptomless people.

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