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Assessment of a cancer screening program

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A B S T R A C T

Several Asian countries are implementing nationwide cancer screening programs. Assessment of the effectiveness of these programs is critical to their success as this is the only way to ensure that the benefits of screening outweigh the harms. In this paper we focus on colorectal cancer (CRC) screening to illustrate the principles of screening program assessment. The International Agency for Research on Cancer (IARC) has defined organized screening, distinguishing it from opportunistic screening. The key advantage of organized screening is that it provides greater protection against the possible harms of screening. Since screening is a process, not simply a test, the effectiveness of a program depends on the quality of each step in the cancer screening process. The evaluation of long-term screening program outcomes (CRC incidence and mortality) will not be observable for many years, given the time it takes to plan, pilot and implement a program. However, early performance indicators of the impact of screening should be monitored to give an early indication whether the program is on track. The European Union (EU) has recommended a minimum dataset to be collected and reported regularly by a screening program. Using information from these data tables, early performance indicators can be generated (e.g., participation rate, proportion of screen-detected cancers that are early-stage). Subsequently, modeling the natural history of the disease can be very helpful to estimate long-term outcomes, making use of these directly measured early performance indicators. Modeling can also be used to estimate the cost-effectiveness of a screening program

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and the potential impact of changes in policy, as illustrated by its recent use in the Netherlands to change the definition of a positive fecal immunochemical test (FIT) for the CRC screening program. Programs should consider modeling as an important component of screening program evaluation.

Introduction

Earlier chapters in this issue have described the epidemiology of gastrointestinal (GI) cancer in Asia (chapter 1), together with current approaches to screening for esophageal, gastric, pancreatic and colorectal cancer (CRC). Assessment of the effectiveness of these programs is critical to their success as this is the only way to ensure that the benefits of screening outweigh the harms. In this chapter we focus on CRC screening to illustrate the principles of screening program assessment, given that the topic is more fully developed for CRC screening than for the other GI cancers discussed in this issue.

When to start CRC screening?

Before any screening program can be considered, there should be evidence from randomized controlled trials (RCTs) that screening is associated with a reduction in cancer-specific mortality. The effectiveness of CRC screening has been established based on RCTs of gFOBT and flexible sigmoidoscopy (FS) [1,2]. Previous chapters have described CRC screening in Asia (chapters 9, 10). Evidence of effectiveness in itself is not sufficient before deciding to implement a screening program. There are several key aspects to consider in deciding whether and how to proceed with CRC screening, beginning with the burden of disease (CRC incidence and mortality). For example, the Asia Pacific Recommendations on CRC screening recommend population screening for CRC in those regions where the incidence is high, defined as CRC incidence rates of greater than 30 per 100,000 [3]. Because of the length of time it takes to plan, pilot and implement a screening program, projections of the future burden of CRC are needed as well. In addition, the availability of resources (or costs), not only those for screening but also for diagnosis and treatment are relevant in the consideration. Screening will initially increase detection of CRC, requiring surgery, chemotherapy and/or radiation. A recent publication from Disease Control Priorities (DCP3) initiative [http://dcp-3.org], funded by the Gates Foundation summarizes considerations on how screening, diagnosis and treatment for CRC might be implemented in different resource environments [4].

How to implement cancer screening: organized vs opportunistic

Screening is not simply a test; it is a process. The International Agency for Research on Cancer (IARC) defines an *organized* screening program as one with the following elements:

- An explicit policy with specified age categories, screening method, and screening interval
- A defined target population
- A management team responsible for implementation
- A health-care team for decisions and care and follow-up of patients with positive screening tests
- A quality assurance structure for every step in the process
- A process for monitoring, evaluating, and identifying cancer occurrence in the population, which generally means having a cancer registry [5].