

Christian Stock
Dr. sc. hum.

Colorectal endoscopy use in the general population: international variation, trends and public health implications

Promotionsfach: Epidemiologie (Deutsches Krebsforschungszentrum, DKFZ)
Doktorvater: Prof. Dr. med. Hermann Brenner, MPH

Colorectal cancer (CRC) is the third most common cancer in men and the second in women worldwide. However, substantial proportions of CRC cases and deaths could theoretically be prevented through early detection and removal of precancerous adenomas by colorectal endoscopy (colonoscopy or sigmoidoscopy). In population-based CRC screening of average-risk adults, colorectal endoscopy is therefore increasingly employed as a primary or secondary screening tool. The main objectives of this dissertation were to provide international estimates of colorectal endoscopy use in the general population aged ≥ 50 years and to assess public health implications arising from these estimates with respect to CRC prevention and early detection. Focusing on Germany, other European countries and the United States (U.S.), health insurance claims data, health survey data and cancer registry data were analyzed.

An initial review of the medical literature showed that the available evidence on colorectal endoscopy use in the general population is essentially limited to studies conducted in the U.S.. Evaluation of German health insurance data indicated that after inception of the colonoscopy-based CRC screening program in 2002, colonoscopy screening failed to gain widespread acceptance and use of the alternative fecal occult blood test (FOBT) decreased. Nevertheless, at the end of 2008 approximately every fourth person aged ≥ 50 years had undergone (diagnostic) colonoscopy in the preceding 10 years. Men generally underwent CRC screening less frequently than women, possibly due to the different specialists involved in the screening process. Estimates obtained from a large cross-national European survey conducted in 2004/05 indicated that the use of colorectal endoscopy and FOBT varies widely across 11 European countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, and Switzerland). Among the included countries, colorectal endoscopy use appeared to be relatively high in Austria, Germany and France, whereas it was relatively low in Greece and Spain. Ample opportunities remained in all analyzed European countries to reduce the burden of CRC by screening programs that ensure both high quality and compliance with the screening tests offered. The estimated prevalence of colorectal endoscopy in the U.S., the only Western country with clearly decreasing CRC incidence rates for many years, was substantially higher than in the analyzed European countries. This might partly explain differences in recent CRC incidence trends. Reductions in CRC risk in the U.S. have been observed almost only at distal subsites and at a similar magnitude for both sexes, while they were not seen before the age of 50 years. This observation is generally consistent with the hypothesis of a major reduction of CRC risk due to increased use of colorectal endoscopy in the population aged ≥ 50 years, but decreasing alcohol intake, decreasing smoking prevalence, higher aspirin and nonsteroidal anti-inflammatory drug use, and higher post-menopausal hormone use (until 2002) are also likely contributors to the declining CRC risk.

A novel method based on prevented and attributable fractions was proposed to estimate the impact of colonoscopy use on CRC mortality at the population-level. It was exemplarily applied using U.S. data from 2005. The results showed that approximately twice as many

CRC deaths remained attributable to nonuse of colonoscopy than were actually prevented by using it. This highlighted the potential benefits of public health interventions to increase the use of CRC screening by colorectal endoscopy.

Due to the recent implementation of population-based CRC screening programs in many European countries and the ongoing trend in colorectal endoscopy use in the U.S., the prevalence levels of colorectal endoscopy in these regions is likely to (further) increase in the near future. The different prevalences of colorectal endoscopy use internationally need to be taken into account in the interpretation of cross-national differences and time trends in CRC incidence and mortality, and in the planning and evaluation of CRC screening programs.