

## The cost-effectiveness of colorectal cancer screening

### Summary

**Objectives:** To evaluate the effectiveness, costs and cost-effectiveness of different screening strategies for population based colorectal cancer (CRC) screening programme in Estonia.

**Methods:** Literature reviews for evidence on effectiveness and cost-effectiveness of FIT and gFOBT occult blood tests and sigmoidoscopy based CRC screening were carried out in relevant databases. Data on incidence, treatment and cost of CRC cases was obtained from Estonian Health Insurance Fund database and included all receipts and service bills (2011-2013) for cases with CRC as main diagnosis (ICD 10: C18–C21) in 2011. An independent Markov cohort model was constructed to simulate the cost-effectiveness of FIT, gFOBT (both every two years) and sigmoidoscopy (once) based CRC screening scenarios compared to no screening. The base-case analysis followed a hypothetical cohort of 17,000 60-year-old patients during 10 years. Data for effectiveness, disease transition probabilities and quality of life outcomes was obtained from published literature; costs were calculated based on Estonian data. The model evaluated different strategies for detected adenomas and CRC cases, and differences in costs and quality-adjusted life-years (QALYs) using incremental cost-effectiveness ratios (ICER). Costs and effects were discounted using an annual discount rate of 5%. Additional budget impact analysis covering different screening strategies was performed.

**Results:** CRC screening reduces CRC related mortality and allows for earlier detection of malignant carcinomas. Based on published literature, QALY gains for FIT and gFOBT occult blood tests range from 0.0076–0.0227 QALYs per patient, with slight advantage for FIT. ICERs in published literature ranged from 1,864 – 27,066 €/LYG for gFOBT, 2,819 – 27,384 €/LYG for FIT and 589 – 12,675 €/LYG for sigmoidoscopy. Our Markov analysis indicated that compared to no screening, implementation of CRC screening could prevent 33–74 deaths and save 71–136 QALYs in a 10 year perspective. In base-case scenario, ICER for screening with gFOBT was €13,456 per QALY, €9,919 for FIT and €3,759 for sigmoidoscopy, respectively. The results were most influenced by coverage rate, adenoma and CRC probabilities and change in the time perspective. The costs of fully implemented CRC screening programme were depending on the method €985,399 – 1,401,446. In addition, costs for follow-up endoscopic procedures were between €14,800 – 63,000; costs related to administration of the screening programme will increase the overall cost of the programme even further.

**Conclusions:** CRC screening, allowing the earlier detection of adenomas and CRC reduces disease specific mortality and is thus an important public health measure. The costs and QALYs of different screening options vary, but their cost-effectiveness ratios in Estonia are comparable to results from previously published data. The proposed outline of the programme and budget impact analysis contributes to the planned implementation of nationwide CRC screening in Estonia.

**Citation:** Männik A, Suuroja T, Juus E, Vörno T, Uusküla A, Reile R, Orav K, Kiivet R-A. Kolorektaalvähi sõeluuringu kulutõhusus. Tartu: Tartu Ülikooli tervishoiu instituut; 2014.