

Cost-effectiveness of colon cancer screening – preliminary results

by prof. Róbert Baberá, August 30, 2020

For the first time in the history of cancer screenings, National Oncology Institute proposes cost-effectiveness results of selected screening strategies in the area of colon cancer. Thanks to the cooperation with MISCAN_COLON/EUTOPIA project, local specialists, health insurance companies VŠZP and Dôvera and MoH SR, experts from NOI were able to prepare and model as precise conditions as possible for colon cancer screening strategies in Slovak circumstances and offer the first insight into their cost-effectiveness. The model has worked with available epidemiological indicators of the Slovak population, including epidemiological data of patient population with colon cancer. If necessary, missing data were modeled based on sources from Slovenia which is the point of departure for Central and Eastern Europe (CEE region). Complex methodology of the model allows to prepare various scenarios adapted to local conditions of a country, to a regulator or even to individual payers. As a priority, epidemiological outcomes were simulated for a model population (in our case people aged 50 – 75) for the next 30 years, i.e., until 2050. Economic parameters expressed by potential savings and basic HTA parameters are modelled per 1 million screened patients and their timeframe is life-long. Our report includes a summary of the most important results from the individual scenarios.

In the first scenario, the model analyzed an opportunistic screening which is currently carried out in the population aged 50 – 75, mainly within routine check-ups. It was based on 100% coverage of the population and 43% participation rate which was confirmed by experts. This current strategy would achieve a drop in mortality of colon cancer by 21.08% by the end of 2050, prevent 7,800 deaths and reduce total healthcare expenses by 230 million euros (per 1 million screened citizens, for life). Additional expenses per unit of improvement of health condition (QALY) amounted to 3,024 euros, which is 12 times less than the current limit of willingness to invest in new technologies defined in the legislation. At the moment, invitations to screening and tests are not actively sent out.

The second modelled strategy was an invitation screening with a letter and an FIT intended for the same target population once in 2 years. With a 60% coverage of the target population and 50% participation rate, this type of preventive strategy can reduce mortality of colon cancer by 14.4%, prevent 5,100 deaths and reduce healthcare expenses by 154 million euros (per 1 million screened citizens, for life). Additional expenses per QALY amounted to 4,427 euros, which is approximately 11 times less than the current limit of willingness to invest in new technologies defined in the legislation, and this technology is very cost-effective.

The third modelled strategy was an invitation screening with a letter and an FIT which was intended for the same target population of people aged 50 – 75 as in the previous scenario, but with an annual

periodicity. With a 60% coverage of the target population and 50% participation rate, this type of preventive strategy can prevent 7,000 deaths due to colon cancer, reduce mortality by 19.38% and reduce total healthcare expenses by 220 million euros (per 1 million screened citizens, for life) by 2050. Additional expenses per QALY were only a little higher than in the previous strategy, 5,044 euros, which is still approximately 10 times less than the current limit of willingness to invest in new technologies defined in the legislation. Again, this technology is very cost-effective.

The last entertained and modelled strategy was screening by colonoscopy in the same target population with a 10-year frequency. The coverage was modelled at 85% of the target population. Patients would be invited to the examination but no additional test would be included in the invitation. With an 85% coverage and 50% participation rate, this screening strategy could reduce mortality of colon cancer by 22.58%, prevent 8,300 deaths and reduce total healthcare expenses by 230 million euros (per 1 million screened citizens, for life) by 2050. With a 30% participation rate, it has the potential to reduce mortality of colon cancer in the target population by 14%, prevent 5,100 deaths and reduce total expenses on the treatment of colon cancer by 178 million euros (per 1 million screened citizens, for life). Like all the previous strategies, colonoscopy once in 10 years is very cost-effective because additional expenses per QALY amounted to 1,255 euros (50% participation) and 1,251 (30% participation).

No.	Model CRC screening strategy	Target population*	Model coverage per invitation	Ideal scope of screening program per year (post roll-out)	Percentual participation rate	Total participation
1.	Opportunistic screening	1,642,391	100%	821,195	43%	353,114
2.	Invitation screening (letter + FIT, once in 2 years)	1,642,391	60%	492,717	50%	246,359
3.	Invitation screening (letter + FIT, annually)	1,642,391	60%	985,435	50%	492,717
4.	Screening colonoscopy once in 10 years	1,642,391	85%	139,603	50%	69,802
5.	Screening colonoscopy once in 10 years	1,642,391	85%	139,603	30%	41,881

*based on demographic data for 2020, entire target population

Source: NOI, 2020 (unpublished data)

Overview of some important preliminary results

No.	Model CRC screening strategy	Target population*	Model coverage of the target population (%)	Expected reduction of mortality (%)	Expected reduction of the number of deaths (total, 2020 – 2050)	Expected reduction of expenses on cancer care (€)	Additional expenses per QALY (€)
1.	Opportunistic screening	1,642,391	43	21.08	7,800	230 million	3,024
2.	Invitation screening (letter + FIT, once in 2 years)	1,642,391	60	14.40	5,100	154 million	4,427
3.	Invitation screening (letter + FIT, annually)	1,642,391	60	19.38	7,000	220 million	5,044
4.	Screening colonoscopy once in 10 years (50% participation)	1,642,391	85	22.58	8,300	290 million	1,225
5.	Screening colonoscopy once in 10 years (30% participation)	1,642,391	85	14.00	5,100	178 million	1,251

Source: NOI, 2020 (unpublished data)

From the point of view of the current results, all modelled strategies are *highly cost-effective*. It is expected that subsequent pharmacoeconomic comparison of individual alternatives will show that the last scenario – colonoscopy every 10 years – is the most viable with the current parameters of the model. This fact is confirmed also by net monetary benefit analysis (NMB): with a willingness to pay 35,000 euros for a new technology, this type of screening has the greatest benefit.

It is also important to realize that the current analysis is mainly a cost analysis. Within the entire approach to screening strategies, other important aspects of the choice of screening method for organized population-wide screening must be taken into account. When choosing to implement a certain screening strategy, it is necessary to consider other factors besides economic ones, such as non-invasiveness of the method, acceptance by screening program participants as well as overall accessibility of the method, for example in terms of sufficient number of certified experts performing colonoscopy exams.

Participating experts:

Mária Rečková, M.D., Dr. Jana Trautenberger Ricová, Ľudmila Kutáková, M.D., Assoc. Prof.
Alexandra Bražinová, David Balla, MSc., Rudolf Hrčka, M.D., Prof. Tibor Hlavatý, Andrej Orságh,
M.D.