Screening methods for colorectal cancer in Chinese populations

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Large-scale screening for colorectal cancer (CRC) has been found to lower incidence and mortality of the malignancy,[1] and provided as a public health service in many countries or areas.[2] The much higher incidence but lower mortality of CRC in the United States and the United Kingdom than in China has been attributed to the full coverage and higher compliance of screening in target populations.[3] In this commentary, we provide an overview of the screening tests used in China, summarise the achievements and challenges, and propose potential solutions.

Screening tests for colorectal cancer in China

It was not until 2006 that the Chinese government implemented population-based CRC screening in high-risk areas. The national guideline of China recommended parallel use of risk assessment (RA) and two-sample qualitative faecal immunochemical test (FIT) as preliminary tests.[4] The recommended RA is a risk stratification system derived from epidemiological studies conducted in China between the 1970s and the 1990s. When using the system, all participants were asked to answer whether they had the following events: (1) history of any cancer; (2) colorectal polyps; (3) CRC in first-degree relatives; (4) chronic constipation; (5) chronic diarrhoea; (6) mucus or bloody stool; (7) serious unhappy life-events; (8) chronic appendicitis or appendectomy; and (9) chronic cholecystitis or cholecystectomy. Events (1) to (3) were considered to be major and (4) to (9) to be minor, and participants with at least one major event or at least two minor events were regarded as high risk.[5] In a rural population in China, the RA was found complementary to FIT in identifying bleeding and non-bleeding lesions, achieving high adherence to initial tests and subsequent colonoscopy.[6] Particularly, the parallel use of RA and FIT showed a specificity of 81.37% in detecting CRC, was proved cost-effective,[7] and thus widely used for triage screening in Chinese populations.

Triage screening is being carried out as a major public health service in Shanghai,[8] Guangzhou,[9] and Hangzhou.[10] The CanSPUC programme initiated in 2012 in urban China used a revised Harvard Risk Index as an initial test and recruited 1 381 561 participants from 2012 to 2015.[11] In Taiwan, one-sample quantitative FIT was used to identify high-risk individuals, leading to a 62% decrease in deaths from CRC.[12] In Hong Kong, a pilot screening programme was launched in 2016 using FIT as a preliminary test, resulting in 60% screen-detected CRC at early stage.[13] Triage screening reduced the number of unnecessary colonoscopies by 25%,[14] and lowered the disease burden of CRC in Chinese[6,8,11] and other populations.[15] It has been considered quite suitable for China, a country with a huge population, low CRC incidence and insufficient resources.

Challenges for colorectal cancer screening in China

Currently, CRC screening is mainly provided in urban China as a public health service. However, in these programmes, low adherence to colonoscopy among high-risk individuals was consistently observed. In Hangzhou, only 55.3% of high-risk individuals identified by parallel use of RA and FIT attended subsequent colonoscopy.[5] The similar parallel tests resulted in colonoscopy adherence as low as 39.8% in high-risk individuals living in Shanghai,[8] and only 24.9% among those living in Pudong New Area of the city.[16] In the CanSPUC programme, only 14.0% of high-risk individuals identified by the RA tool attended colonoscopy.[11]

Risk assessment tools have contributed to flattening upward trends of CRC incidence and mortality in China over the past decade. However, risk factors for RA may have changed and should be updated due to social development and nutritional transitions. For example, rapid urbanisation and industrialisation have led to a sedentary lifestyle and high intake of animal-source foods, and thus an epidemic of obesity, which should be included in RA tools.

Regarding qualitative FIT, a predominantly used method in China, the cut-off values for positive tests are pre-set by manufacturers, which may not be the optimal one for target populations. In addition,

two-sample qualitative FIT was recommended in China to improve sensitivity but was observed to lower specificity and colonoscopy adherence. The low specificity of the test,[16] which further decreased by parallel use with RA, has been consistently observed in large-scale screening practices in China. This may have led to distrust of positive results and thus low colonoscopy adherence.[5,7,16]

Potential solutions to the challenges

Our previous studies suggest the potential and feasibility of improving colonoscopy adherence by optimising initial screening tests.[16,17] Several approaches can be followed to achieve the goal.

First, optimising RA system to improve the specificity of initial tests. The currently used RA system in China did not include age, sex, smoking, drinking, body mass index, diet, physical activity, diagnosis of diabetes, use of non-steroidal anti-inflammatory drugs or aspirin,[5,8,11] the important risk factors of CRC contained in other scoring systems.[18] In the updated national guideline for CRC screening, these factors have been recommended as RA components for Chinese adults.[18] It is also urgent to identify population- and period-specific risk factors for RA to suit the altered aetiologic spectrum of CRC. Once an optimal quantified RA tool is established, it can be used by general practitioners to identify high-risk individuals for colonoscopy or by individuals for self-assessment of CRC risk and thereby adopting healthy lifestyles.

Second, incorporating qualitative FIT results as a predictor in risk scoring systems. In a study in Shanghai, a scoring system incorporating FIT result as a predictor showed better performance than parallel use of FIT and RA, as a result of its higher specificity, less demand for colonoscopy, and a higher detection rate of CRC, albeit a compromised sensitivity.[19] Those findings suggest great potential for using FIT and RA jointly in CRC screening.

Moreover, a one-sample qualitative FIT can be used instead of a two-sample test to simplify the screening procedure, and thus improve participation rate and reduce colonoscopy demand.[20] Adopting quantitative FIT may be a better choice to improve the specificity of preliminary tests, because quantitative FIT is superior to qualitative FIT in accuracy and flexibility in choosing cut-off values. However, the much higher financial cost of quantitative FIT greatly restricts its large-scale application in China.

Finally, novel screening tests, such as colon capsule endoscopy, magnetic resonance colonography, or tests for biomarkers in faeces or blood, may further improve colonoscopy adherence or even replace colonoscopy. However, the performance of these novel tests in mass screening of CRC needs further evaluation; meanwhile, the expensive costs of the tests also limit their widespread usage.[18]

Conclusion

In summary, triage screening strategy, if optimised, remains the best choice for mass screening of CRC in both urban and rural China. A great potential is suggestive to triage high-risk individuals more accurately for colonoscopy by optimising currently used tests and incorporating FIT results in risk scoring systems. Further studies are warranted to develop population-specific scoring systems and provide effective screening methods for diverse populations in China.

Author contributions

Concept or design: W Xu, MCS Wong.
Acquisition of data: W Wu, J Huang, S Tan.
Analysis or interpretation of data: All authors.
Drafting of the manuscript: W Wu.
Critical revision for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

As editors of the journal, J Huang and MCS Wong were not involved in the peer review process. As adviser of the journal, W Xu was not involved in the peer review process. Other authors have disclosed no conflicts of interest.

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