INTRODUCTION

- China had 410,000 new cases of hepatocellular carcinoma (HCC) in 2020, accounting for 45.3% of the world, most of which originated from chronic hepatitis B (CHB)
- When diagnosed as HCC in China, 70-80% of patients are in the advanced stage and have no opportunity for radical treatment. The 5-year survival rate in Chinese HCC patients was only 14.1%.
- Sensitivity and specificity of screening tests are important for early diagnosis of HCC as well as patients' prognosis.

OBJECTIVE

To evaluate the cost-effectiveness of serological tests or ultrasound (US) alone versus their joint use with or without multivariate index algorithm for HCC screening in CHB patients in China.

METHODS

- A discrete event simulation model combining a decision tree and Markov structure was developed to simulate the CHB cohort with the age of over 40 years on a lifetime horizon. Each model cycle consisted of 6 months and Chinese healthcare system perspective was adopted.
- Patients of the simulated cohort were assumed to be screened with seven different strategies, US, AFP, PIVKA-II, US+AFP, AFP+PIVKA-II, GAAD, or GAAD+US per 6 months.
- The decision tree model (Figure 1) was used to simulate the results of above screening strategies. Patients detected as positive would receive confirmatory imaging tests (computed tomography (CT) or magnetic resonance imaging (MRI)). Patients confirmed by CT/MRI would receive corresponding treatment, while patients diagnosed as negative (either true or false) would be followed up or continue previous treatment.
- The Markov model (Figure 2) was used to simulate the natural history of CHB with 8 health states, including CHB, compensated liver cirrhosis (CLC), decompensated liver cirrhosis (DCLC), early HCC undetected, advanced HCC undetected, early HCC detected, advanced HCC detected, and death. Based on the Barcelona Clinic Liver Cancer (BCLC) staging system, early HCC includes BCLC (0) and BCLC (A) patients, while late HCC includes BCLC (B), BCLC (C) and BCLC (D) patients. The screening strategies in decision tree works in each cycle of Markov model until HCC diagnosis.

RESULTS

- Screening with US was associated with lowest costs of ¥41,100 and yielded lowest number of QALYs (13.177), while GAAD+US had highest costs of ¥58,089 and generated greatest number of QALYs (13.518) (Table 2).
- With 3 times China 2021 GDP per capita (¥242,928) as the threshold, the 3 strategies of US, GAAD, and GAAD-US formed the cost-effectiveness frontier, in which GAAD-US brought the best health outcomes. The ICER of GAAD over the US and GAAD-US over GAAD were ¥33,586 per QALY and ¥179,529 per QALY respectively.
- Figure 4 & 5 showed one-way and probabilistic sensitivity analysis of GAAD versus US respectively. Both of them proved the stability of the results.

Table 1. Clinical performance of each screening strategy

Table 2. Base case results

CONCLUSION

With 3 times China GDP per capita as the threshold, the GAAD+US has demonstrated the most cost-effective screening strategy for HCC among CHB patients with the age of over 20 years in China.