Abstract ID:EE200

Economic Evaluation of an Opportunistic Screening Program for Alzheimer's Disease in Luohu, China

Yinan Ren[1,2], Dachuang Zhou[1,2], Qian Xing[1,2], Fangfang Gong[3], Wenxi Tang[1,2]

1 School of International Pharmaceutical Business, China Pharmaceutical University, Nanjing, Jiangsu, PR China 2 Center for Pharmacoeconomics and Outcomes Research of China Pharmaceutical University, Nanjing, Jiangsu, PR China 3 Department of Hospital Group Office, Shenzhen Luohu Hospital Group Luohu People's Hospital (The Third Affiliated Hospital of Shenzhen University), Shenzhen, Guangdong, PR China

Background

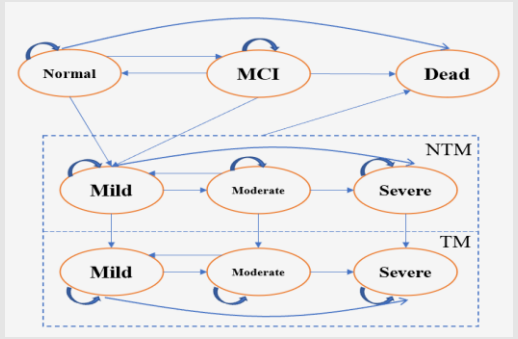
- There are **15.07 million cases of dementia** among the senior individuals (≥60 years) in China, with **9.83 million of those (65.23%) diagnosed as Alzheimer's disease (AD)** [1,2].
- China is the country with **the highest number of AD patients worldwide**[3,4]. In addition, 15.5% of the old adults suffer from mild cognitive impairment (MCI) [5].
- The annual costs of treating AD in China reached **167.74 billion USD in 2015** and are expected to **exceed 1,887.18 billion USD by 2050**[6].
- AD is a progressive neurodegenerative disorder that includes cognitive dysfunction, executive dysfunction, and personality and behavior changes. As AD worsens, patients gradually lose the ability to communicate, bowel and bladder control decreases, and the loss of the ability to swallow causes malnutrition and increases the risk of aspiration.
- Early diagnosis and intervention are effective ways to reduce the burden of AD. Potential promoters of AD, such as depression and vitamin resistance, can be detected and treated to improve the therapeutic outcome[7].
- Economic evaluations of the screening for AD implemented in South Korea and the UK both proved its cost-effectiveness. However, there is still **a gap in this field** in mainland China. This study aimed to evaluate the effectiveness and cost-effectiveness of the two-steps screening both in Luohu and extrapolated to mainland China for Alzheimer's disease (AD).

Methods

- Considering that patients with AD will gradually lose the capacity for self-care and therefore incur non-medical expenses, we conducted this study **from a societal perspective**.
- We set the age at which subjects **entered the model at 60 years**. The average life expectancy in China is 77.3 years, and therefore the simulation continued **until the target population was 80 years old or died**. The size of the cohort was 100,000.
- The strategy was **two-steps** screening, that is, using scale scores initially and providing diagnostic tests for individuals deemed positive for AD from the scale scores.

Methods

- **The initial screening tool** was the MMSE, the most widely used short cognitive test scale so far and the most commonly used assessment tool for dementia screening, cognitive grading, and outcome evaluation in clinical trials[8].
- **The diagnosis cut-off point** was ≤22 for individuals lacking literacy, ≤23 for individuals with a primary school education, ≤24 for individuals with a secondary school education, and ≤26 for individuals with a university education.
- **Diagnostic tests** included a physician's examination, laboratory tests of bodily fluids (blood biochemistry, folic acid, serum vitamin B12, serum amylopsin, syphilis antibodies, thyroid function, and cerebrospinal fluid), and brain examination (magnetic resonance imaging and electroencephalography)[9].
- A **9-state Markov Model** was established based on the natural history of AD. Both MCI and AD were included in the model. Subjects developed the disease following the sequence of **normal cognitive function, MCI, and AD**. **AD was classified as mild, moderate, or severe** according to the clinical dementia rating scale
- It was assumed that all patients diagnosed with AD by the screening would be treated. And this study assumed that false-positive subjects were treated for only 1 year and then considered to regain normal cognitive function. Given the low awareness and treatment rates of AD, we also assumed that patients diagnosed through the screening were treated 2 years earlier than those who did not participate in the screening.



*MCI:mild cognitive impairment; (N)TM:(not) taking medicine

Figure 1 The structure of the model

Results

- The ICER was **31,479.85 USD per QALY** compared with no screening.
- The number of deaths and severe AD cases who did not receive treatment averted by screening accounted for 0.11% and 0.01% of the total population, respectively.
- **The NMB was 45.90 USD per capita.**
- Under the thresholds of three times the GDP per capita, the probability of screening being cost-effective was approximately **54%.**
- The ICER **decreased to 21,347.51 USD per QALY** when the drug effect was prolonged, and **increased** when the frequency of screening was increased, the starting age was postponed, and patients suffering from comorbidities were more.

Table 1 Base-case results

	Costs	QALYs	Incremental Costs	Incremental QALYs	ICER
Screening	29472.02	9.083	541.70	0.017	31479.85
No screening	28930.32	9.066			

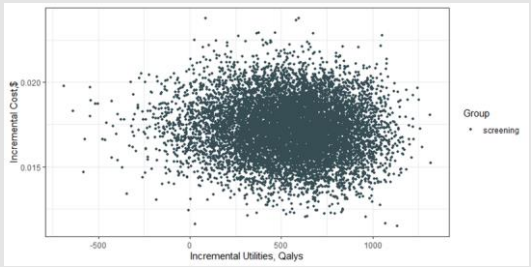


Figure 2 The scatter figure

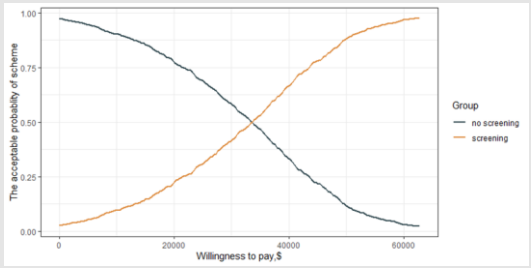


Figure 3 Cost-effectiveness acceptability curve

Conclusions

- Screening for AD in those over 60 can reduce the numbers of severe AD cases and deaths and may be cost-effective, depending on factors such as screening frequency, starting age, and duration of drug effects

References

1. The seventh national census (No.5) [EB/OL]. [12-01]. http://www.stats.gov.cn/tjsj/zxfb/202105/t20210510_1817181.html.
2. Zhou M, Wang H, Zeng X, et al. Mortality, morbidity, and risk factors in China and its provinces, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017[J]. Lancet, 2019,394(10204):1145-1158.
3. Zhang Y Q, Wang C F, Xu G, et al. Mortality of Alzheimer's Disease Patients: A 10-Year Follow-up Pilot Study in Shanghai[J]. Can J Neurol Sci, 2020,47(2):226-230.
4. Ballard C, Gauthier S, Corbett A, et al. Alzheimer's disease[J]. Lancet, 2011,377(9770):1019-1031.
5. Ferri C P, Prince M, Brayne C, et al. Global prevalence of dementia: a Delphi consensus study[J]. Lancet, 2005,366(9503):2112-2117.
6. Jia L, Du Y, Chu L, et al. Prevalence, risk factors, and management of dementia and mild cognitive impairment in adults aged 60 years or older in China: a cross-sectional study[J]. Lancet Public Health, 2020,5(12):e661-e671.
7. Jia J, Wei C, Chen S, et al. The cost of Alzheimer's disease in China and re-estimation of costs worldwide[J]. Alzheimers Dement, 2018,14(4):483-491.
8. Folstein M F, Folstein S E, McHugh P R. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician[J]. J Psychiatr Res, 1975,12(3):189-198.
9. Jinzhou T, Hengge X, Luning W. Chinese guideline for the diagnosis and treatment of Alzheimer's disease dementia(2020)[J]. Chin J Geriatr, 2021,40(03):269-283.

Conflicts of Interest

The authors declare no conflict of interest.

Funding

This study was funded by: General Program of National Natural Science Foundation of China (72174207), Key projects of National Natural Science Foundation of China (71734003), Youth Project of National Natural Science Foundation of China (71603278).