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Real-world cost- effectiveness analysis: Tumor Treating Fields for newly diagnosed glioblastoma in China

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Abstract

Background: Glioblastoma (GBM) stands as the most aggressive and prevalent primary brain malignancy. Tumor Treating Fields (TTFields), an innovative therapy complementing chemotherapy for GBM treatment, which can significantly enhance overall survival, disease progression-free survival, and patient's quality of life. However, there is a dearth of health economics evaluation on TTFields therapy both domestically and internationally.

Objective: The study aims to assess the cost-effectiveness of TTFields + temozolomide (TMZ) in comparison to TMZ alone for newly diagnosed GBM patients. The intent is to provide robust economic evidence to serve as a foundation for policymaking and decision-making processes in GBM treatment.

Methods: We estimated outcomes for newly diagnosed GBM patients over a lifetime horizon using a partitioned survival model with three states: Progression-Free Survival, Progression Disease, and Death. The survival model was derived from a real-world study in China, with long-term survival data drawn from GBM epidemiology literature. Adverse event rates were sourced from the EF-14 trial data. Cost data, validated by expert consultation, was obtained from public literature and databases. Utility values were extracted from published literature. Using Microsoft Excel, we calculated expected costs and quality-adjusted life years (QALYs) over 15 years from a health system perspective. The willingness-to-pay threshold was set at three times the Chinese per capita Gross Domestic Product (GDP) in 2022, amounting to CN¥242,928 (US\$37,655) /QALY. A 5% discount rate was applied to costs and utilities. Results underwent analysis through single factor and probability sensitivity analyses.

Results: TTFields + TMZ demonstrated a mean increase in cost by CN¥389,326 (US\$57,859) and an increase of 2.46 QALYs compared to TMZ alone. The incremental cost-effectiveness ratio (ICER) was CN¥157,979 (US\$23,474) per QALY gained. The model exhibited heightened sensitivity to changes in the discount rate. Probability sensitivity analysis indicates that, under the existing threshold, the probability of TTFields + TMZ being economical is 95.60%.

Conclusions: This cost-effectiveness analysis affirms that incorporating TTFields into TMZ treatment proves to be cost-effective, given a threshold three times the Chinese per capita GDP.

Keywords: Cost-effectiveness analysis; Glioblastoma; Real-world evidence; Tumor Treating Fields.

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