

Cost-effectiveness Analysis of Penpulimab Plus Paclitaxel and Carboplatin Combination Therapy as First-line Therapy for Advanced or Metastatic Squamous Non-small-cell Lung Cancer

Meng Han^{1†}, Hye-In Jung^{2†}, Yong-Fa Chen^{1*} & Eui-Kyung Lee^{2*}

¹ School of International Pharmaceutical Business, China Pharmaceutical University, Nanjing, P. R. China

² School of Pharmacy, Sungkyunkwan university, Suwon, Republic of Korea

† Co-first author, * Corresponding author



EE243

OBJECTIVES

- This study aimed to assess the cost-effectiveness of penpulimab plus paclitaxel and carboplatin (penpulimab strategy) versus paclitaxel plus carboplatin (chemotherapy strategy) for first-line treatment in patients with locally advanced or metastatic squamous non-small-cell lung cancer in China.

METHODS

- A three-state partitioned survival model was constructed, and the health status was consisted of Progression-free (PF), Progressed disease (PD) and Death.
- The efficacy outcomes obtained by digitizing the AK105-302 clinical trial and was extrapolated to estimate the long-term efficacy.
- Various distributions such as Exponential, Weibull, gamma, Gompertz, log-logistic, log-normal, generalized gamma, and restricted cubic spline were extrapolated to find bet fit.
- The time horizon was 8 years (lifetime), the cycle length was 21 days and applied discount rate was 5%.
- Data on direct medical costs and utilities was gathered from the literature and commercial databases from the Chinese payer perspective.
- Outcomes included quality-adjusted life years (QALYs), life years (LYs), and the incremental cost-effectiveness ratio (ICER).
- One-way sensitivity analysis was performed to test the model robustness.
- The ICER was assessed using the Willingness-to-pay threshold of \$38,071/QALY, which is three times China's per capita GDP in 2023.

RESULTS

- The PFS curves of the penpulimab strategy employed a 2-knot spline distribution, and a 2-knot spline PO distribution was used for the PFS curve of the chemotherapy strategy. (Figure 1a)
- The OS curve for the penpulimab strategy was simulated using log-logistic, and gamma distributions for the OS of the chemotherapy strategy. (Figure 1b)

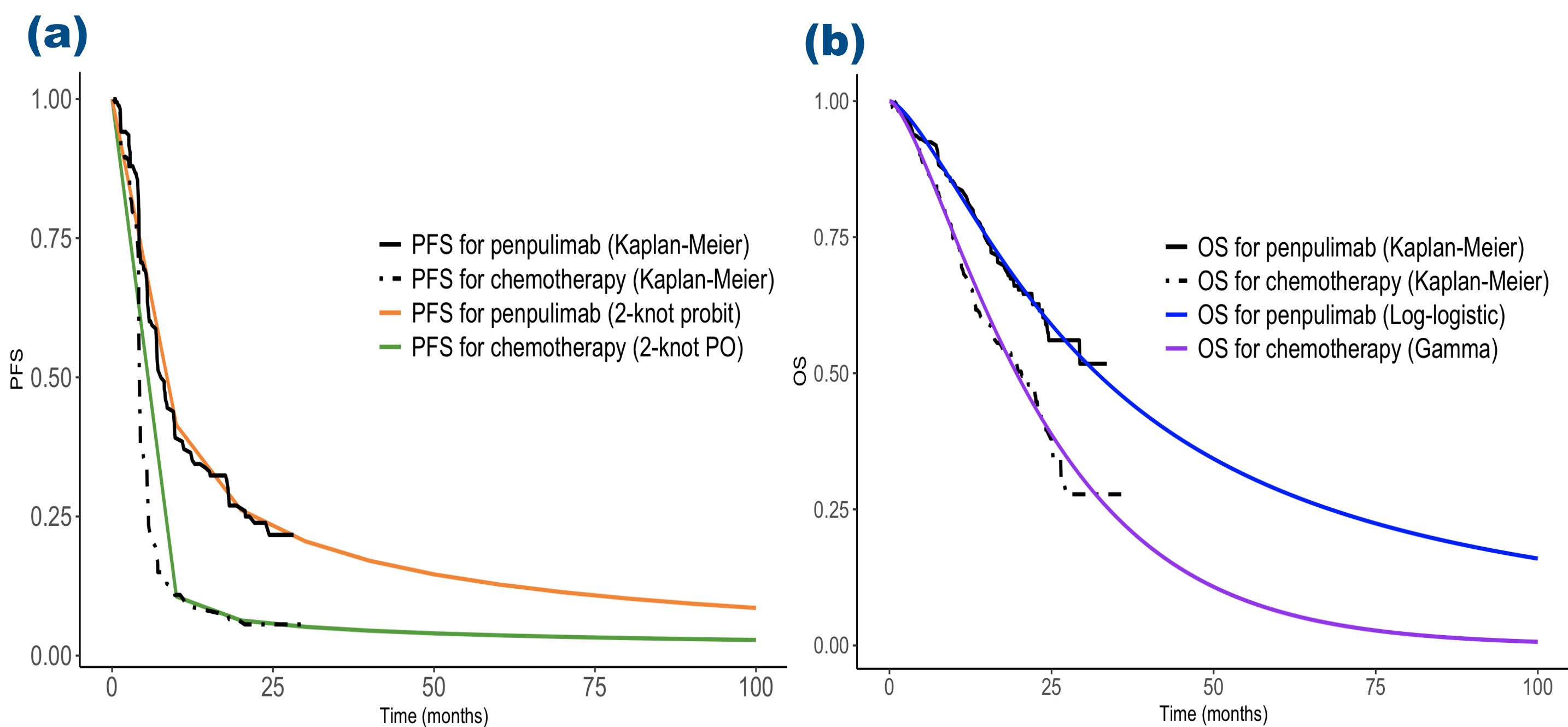


Figure 1. Extrapolations on KM curve of (a) PFS, (b) OS

Abbreviations: PFS, progression-free survival; OS, overall survival

❖ Base-Case Analysis

- During the time horizon, patients in the penpulimab strategy gained 0.821 QALYs (1.752 vs 0.932) and 1.176 LYs (3.089 vs 1.913) compared to the chemotherapy strategy. The incremental cost was \$20,335 (\$27,189 vs \$6,855), yielding an ICER value of \$24,778/QALY.
- The ICER value was below the WTP threshold. (Table 1)

Table 1. Results of Base-case Analysis

	Cost	QALYs	LYs	ICER
Penpulimab strategy	\$27,189	1.752	3.089	\$24,778/QALY
Chemotherapy strategy	\$6,855	0.932	1.913	

Abbreviations: QALYs, quality-adjusted life-years; LYs, life-years; ICER, incremental cost-effectiveness ratio

❖ Sensitivity Analysis

- According to one-way sensitivity analysis (Figure 2), the three most influential factors for the base-case analysis were the utility values of the progression-free state, the cost of penpulimab and time horizon.
- All the ICER values around the variable range were below the three times China's per capita GDP.

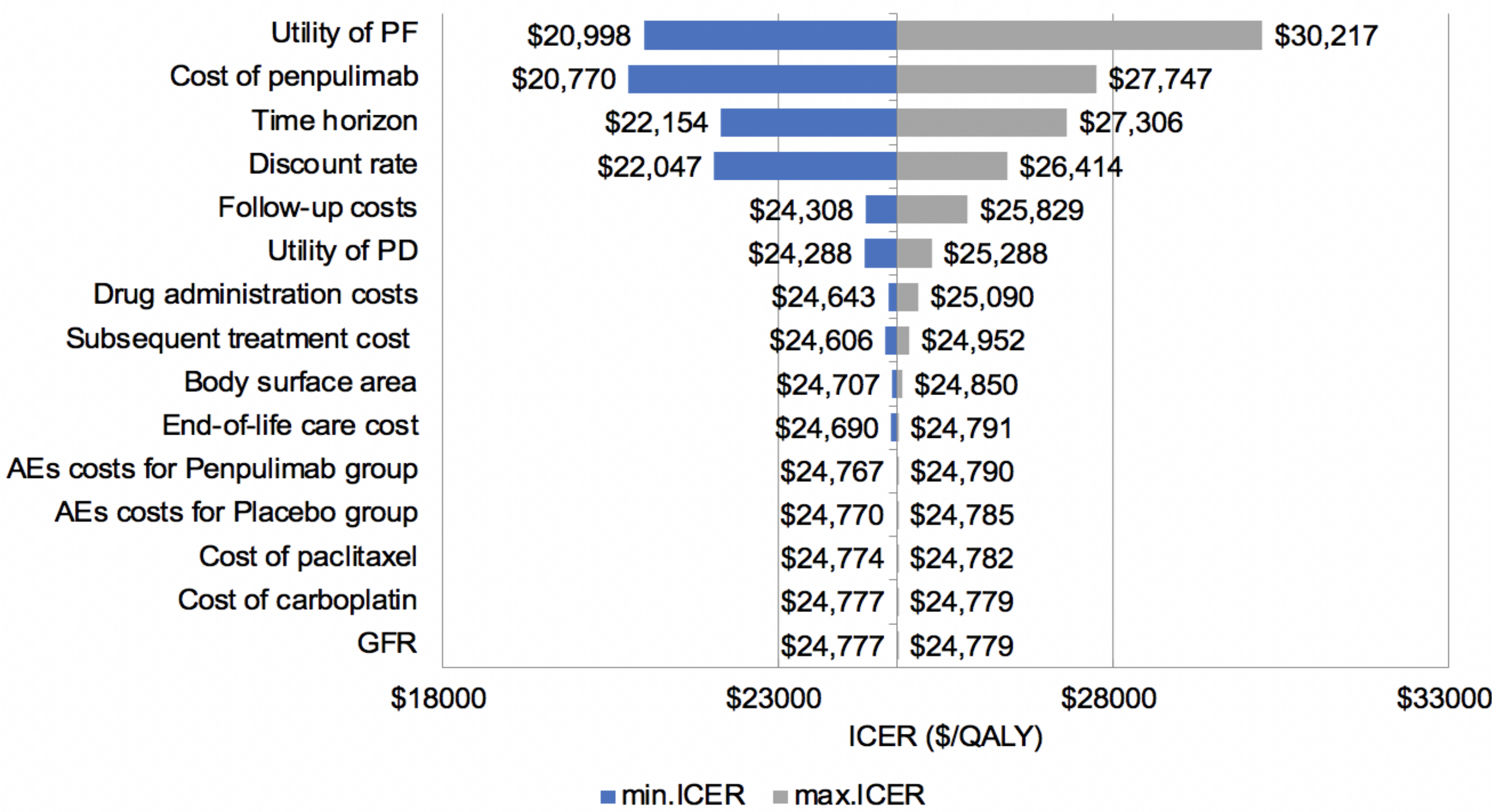


Figure 2. Result of One-way Sensitivity Analysis

Abbreviations: ICER, incremental cost-effectiveness ratio; AEs, adverse events; GFR, glomerular filtration rate

DISCUSSION & CONCLUSIONS

- From the Chinese payer perspective, penpulimab plus paclitaxel and carboplatin combination therapy is shown to be a cost-effective option compared to paclitaxel and carboplatin in locally advanced or metastatic sqNSCLC patients.
- This study is based on clinical trial data entirely derived from the Chinese population, thereby providing a high level of reference value for clinical and healthcare decision-makers for Chinese payers.
- We employed various parametric distributions to enhance the accuracy of capturing nuances in survival curve dynamics, thereby achieving better model fitting outcomes.
- The restricted cubic spline model explained the complexity of underlying hazards in a unique time-course of PFS related to the treatment better compared to the standard distributions.
- We fill a gap in squamous non-small-cell lung cancer treatment by providing new evidence in economic evaluation of penpulimab.

❖ REFERENCES

- Zhong H, Sun S, Chen J, et al. First-line penpulimab combined with paclitaxel and carboplatin for metastatic squamous non-small-cell lung cancer in China (AK105-302): a multicentre, randomised, double-blind, placebo-controlled phase 3 clinical trial. *Lancet Respir Med.* 2024;12(5):355-365.
- Liu G, Hu S, Wu J, Wu J, Yang L, Li H. China guidelines for pharmacoeconomic evaluations (Chinese-English version). Beijing: China Market Press2020.
- Wu Y, Jiang Y, Wang W, Zhang T, Li Y-X, Bi N. Estimating the long-term survival of unresectable stage III non-small cell lung cancer based on cure model analysis. *Radiotherapy and Oncology.* 2024;197:110341.