Cost-effectiveness of Olaparib Compared to Rucaparib for the Treatment of Metastatic Castration-Resistant Prostate Cancer (mCRPC) in the United States

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Background

- Prostate cancer is the most common type of cancer in men, comprising an estimated 14.1% of all cancers among men worldwide.
- mCRPC is an advanced form of prostate cancer where cancer no longer responds to treatments that lower testosterone levels and has metastasized.
- Two poly-ADP ribose polymerase (PARP) inhibitors, olaparib, and rucaparib were approved for patients with mCRPC by US Food and Drug Administration (FDA) in May 2020.
- In the PROfound trial, olaparib increased overall survival by 18.5 months compared to abiraterone with prednisone or enzalutamide. In the TRITON2 trial, rucaparib improved median progression-free survival by 9 months compared with placebo.
- Despite these promising results, there is little data comparing the two new therapies, making it difficult for clinicians to determine the optimal treatment choices for their patients

Objective

- To perform a cost-effectiveness analysis of olaparib compared to rucaparib in the treatment of mCRPC state from a US payer perspective

Methods

- We developed a partitioned survival model in TreeAge Pro 2021 to conduct a cost-effectiveness analysis using published data from the PROfound and TRITON2 trial[1,2]
- The partitioned survival model had three mutually exclusive health states: Progression-free disease state (PFD), progressed disease (PD), and death
- The model cycle length was one month, and the time horizon was five years.
- Costs and quality-adjusted life years (QALYs) were calculated at a discounted rate of 3% annually from the US payer perspective.
- We considered a willingness-to to-pay threshold (WTP) of $50,000/ per QALY for cost-effectiveness
- Parametric modeling was used to extrapolate data beyond the time endpoint in the clinical trials using standard statistical analyses described by Hoyle et al.[3]
- Progression free survival (PFS) curves of olaparib and rucaparib were informed by the results of the PROfound and TRITON2 trials, respectively.
- However, the TRITON2 trial did not report overall survival (OS) curves as this data was not available at the time of publication. We, therefore, used the OS curve from the olaparib trial as the rucaparib OS curve in our model.

Methods (contd.)

- Web plot digitizer (version 4.5; https://OS curves. automeris.io/WebPlotDigitizer) was used to gather the survival data points from the PFS and OS curves.
- These survival data points were then used to fit the following parametric survival functions: Weibull, log-normal, log-logistic, exponential. The model selection was based on goodness of fit, Akaike information criterion value (AIC).
- We determined that the Weibull function was the most reasonable function with the lowest AIC value in each case.
- Direct medical cost for drug acquisition, management of adverse events (AEs), cost of end-of-life care, and follow-up visits were based on literature. (Table 1)
- Utility values for progression-free disease (PFD), progressed disease (PD) and disutility for AE were based on previously published studies. (Table 1)

Parameter	Base case values	Range	Distribution
Clinical Inputs			
Survival Model for Olaparib			
Weibull model for OS	Lambda:0.007 gamma:1.504		
Weibull model for PFS	Lambda:0.042 gamma:1.38		
Survival Model for Rucaparib			
Weibull model for OS	Lambda:0.007 gamma:1.504		
Weibull model for PFS	Lambda:0.032 gamma:1.29		
Cost Inputs ($)			
Olaprib 600mg per day	13,886	10,414-17,358	Gamma
Rucaparib 600mg twice per day	14,702	11,027-18,378	Gamma
Foundation One CDX	5800	4350-7250	Gamma
Supportive care	5700	4275-7125	Gamma
Terminal Care	36,403	-	-
Follow-up per month	584	438-730	Gamma
Managing Vomiting per event (grade≥3)	2683	660-3297	Gamma
Managing anemia per event (Grade ≥3)	145	109-181	Gamma
Managing fatigue per event (Grade ≥3)	858	643.5-1073	Gamma
Utility Values			
PFD	0.76	0.57-0.95	Beta
PD	0.37	0.28-0.46	Beta
Disutility due to grade ≥3 AEs	0.16	0.12-0.2	Beta

Table 1. Model input parameters

Results

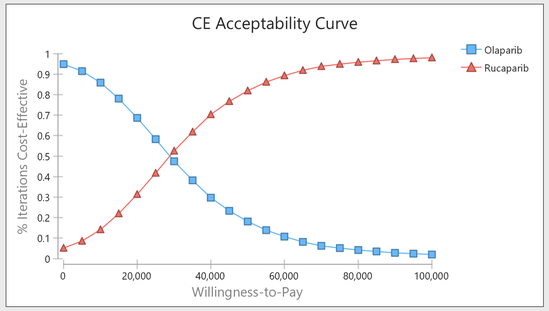

Figure 1:Cost-effectiveness acceptability curve

- At a WTP threshold of $50,000 and $80,000 per QALY, the probability of rucaparib being cost-effective was 81% and 95%, respectively (Figure 1).

	Olaparib	Rucaparib
Total Costs		
Progression Free State	$136,339	$204,828
Post-Progression	$106,649	$83,796
Total Costs	$242,988	$288,624
Incremental Costs	-	$45,636
Total Quality-Adjusted Life Years(QALY's)		
Progression Free State	6.61	9.65
Post-Progression	4.74	3.25
Total	11.34	12.90
Incremental QALY'S	-	1.56
ICER, $ per QALY		23,323
Net Monterey Benefits(NMB)		
Progression Free State	193999	277498
Post-Progression	130137	78817
Total	324137	356316

Table 2: Summary of costs and outcomes in Base-Case analysis

Results (contd.)

- Total discounted QALY's over the modeled time horizon were higher for rucaparib than olaparib (12.90 vs. 11.34 QALY's) (Table 2)
- Total discounted costs were also higher for rucaparib ($288,624) than olaparib ($242,988). (Table 2)
- These values translated to an ICER of $29,323 for rucaparib vs. Olaparib. (Table 2)
- The one-way sensitivity analysis revealed that incremental cost results were most sensitive to the cost of rucaparib, the utility of a progression-free state, and the cost of olaparib. (Figure 2)

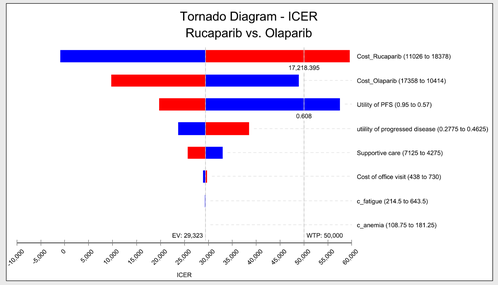

Figure 2: Sensitivity Analysis (Tornado Diagram)

Conclusions

- Rucaparib is potentially cost-effective compared to olaparib for men suffering from mCRPC who have specific germline mutations. However, this cost-effectiveness model needs to be updated when OS data is available for rucaparib.
- Our study addressed the unmet need for the economic assessment of PARP inhibitors for mCRPC. Based on our knowledge, this is the first study to evaluate the cost-effectiveness of olaparib compared to rucaparib.

References

References

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