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A Cost Effectiveness Analysis of NGS-Based Panel for Breast Cancer Patients in Egypt

Mariam Mohammed El-Attar*[1], Gehan Ramadan[2], Walid Gadelhak[3], Amr Yehia Sakr[4], Khaled Abdel Aziz[5], Mohsen Mokhtar[4], Gihan Hamdy Elsisi[6]

[1]HEOR Director, HTA Office-Technology Appraisal, Cairo, Egypt, [2]Medical Director, Romex Healthcare, Cairo, Egypt, [3]Managing Director, Romex Healthcare, Cairo, Egypt, [4]Professor of Clinical Oncology, Cairo University, Cairo, Egypt, [5] Consultant of Clinical Oncology, Ain Shams University, Cairo, Egypt, [6]The American University in Cairo, Egypt

Background[1-3]:

34.9%
of female cancers in Egypt are breast cancer

26,845
new breast cancer cases in Egypt, 2022

47.5%
of Egyptian patients were diagnosed at a late stage

158,867
years of life lost

Next generation sequencing (NGS)-based targeted panels optimize precision oncology by identifying actionable mutations, guiding therapy, and reducing exposure to ineffective treatments.

Research Question:

Objective: To evaluate the cost-effectiveness of germline BRCA testing versus no testing in Egypt.

Intervention: NGS-based germline BRCA testing, with treatment assigned by result.

Comparator: No genetic testing; all patients receive chemotherapy regardless of variant status.

Methodology:

Population:
- Adults with treatment-naïve metastatic triple-negative breast cancer (TNBC) and PD-L1 negative status (CPS <1)

Strategies:
- Identified BRCA-positive patients received targeted therapy (olaparib), while all others received standard chemotherapy

Setting:
- The model adopted the Egyptian public payer perspective over a lifetime horizon

Costs:
- Direct medical costs (EGP, 2026) were included, with unit costs obtained from the Universal Health Insurance Authority (UHIA)

Discounting:
- 3.5% a year for both costs and QALYs

Sensitivity:
- One-way sensitivity analysis varied input parameters by ±10% or published SDs/CIs

Modeling Approach:
- A hybrid decision tree and partitioned survival model were used to simulate the patient journey

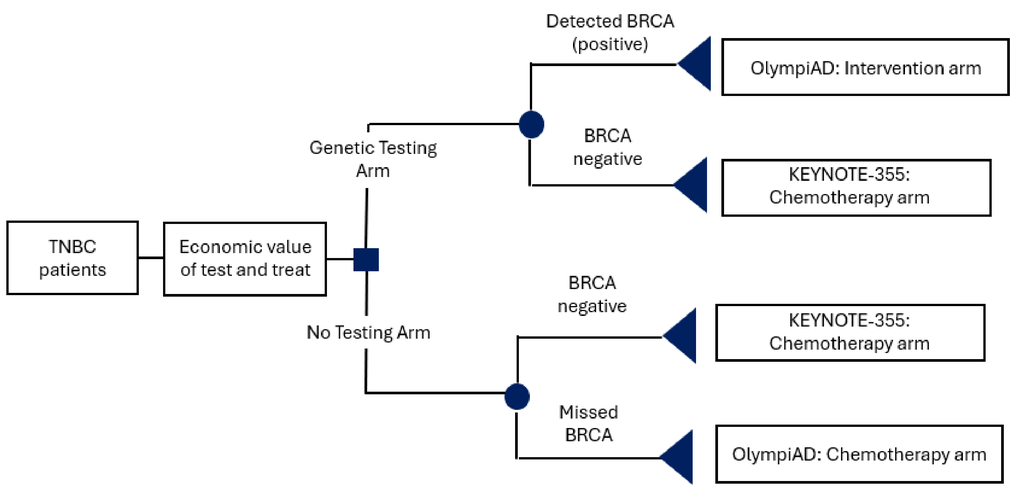


Figure 1. Decision tree at metastatic diagnosis: genetic testing versus no testing

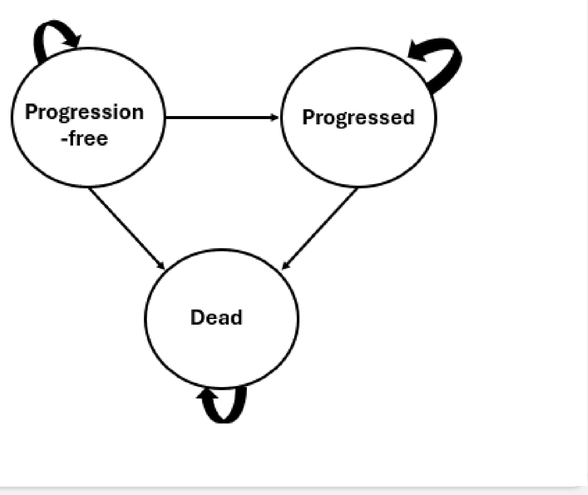
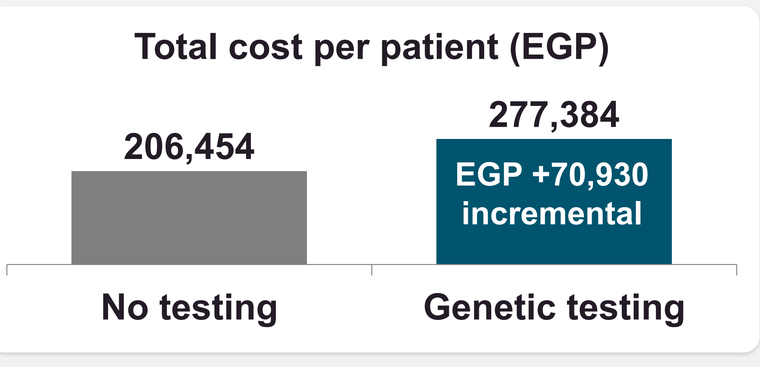
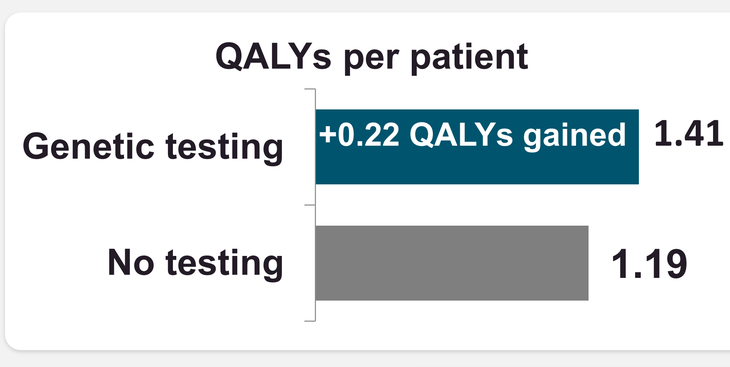


Figure 2. Three-state partitioned survival model

Key model inputs
- Transitions were derived from extrapolated PFS and OS curves from OlympiAD and KEYNOTE-355 (subgroup analysis of PD-L1 CPS <1).[4-6]
- Utilities were obtained from the published literature.
- Germline BRCA1/2 pathogenic variant prevalence was derived from a five-center Egyptian study of 1,349 patients with TNBC or epithelial ovarian cancer who underwent genetic testing.[7]
- Resource use reflected patient journeys in Egypt's healthcare system.

Results:





Incremental cost-effectiveness ratio

EGP 316,059 per QALY

0.16
Incremental relative QALY gain

EGP 351,344
Willingness-to-pay (WTP) = 2× GDP per capita

ICER < WTP

NGS-based germline BRCA testing is **a cost-effective strategy** within the Egyptian healthcare system

One-way sensitivity analysis:

Sensitivity analysis demonstrated model robustness, with the utility of progression following targeted therapy being the primary driver.

Conclusion:

BRCA-based genetic testing provides substantial clinical and economic value in Egypt. By enabling early identification of actionable mutations, it facilitates timely access to targeted therapy and prevents exposure to ineffective treatments. Integrating this panel into national guidelines supports personalized care and optimizes healthcare resource allocation.

References: 1. GLOBOCAN 2022, Egypt fact sheet. Accessed Feb 2026. 2. Ismail et al., J Public Health Res 2022 3.Wahab et al., J Med Econ. 2025;28(1):36-43. 4. Senkus et al., Int J Cancer 2023;153:803-814 5. Robson et al., Eur J Cancer 2023;184:39-47 6. Chen et al., J Immunother Cancer 2024;12:e007931 7. Shohdy et al., ESMO Open 2025;10:105510

*Corresponding author email; Mariam Mohammed El-Attar, Mariam.attar@htaoffice.com