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COST-EFFECTIVENESS OF POPULATION BASED BRCA TESTING WITH VARYING ASHKENAZI JEWISH ANCESTRY

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Background

Population-based BRCA1/2 testing in Ashkenazi Jewish (AJ) women aged ≥ 30 years with four AJ grandparents, has found to be cost-effective in comparison to family history (FH) based testing. However, 25% UK and 44% USA Jewish marriages are to non-Jews. Hence, many women may have differing AJ ancestry consisting of one, two, three or four AJ grandparents. This study aims to model the cost-effectiveness of population-based BRCA1/BRCA2 testing compared to family-history based testing in women with differing AJ ancestry.

Method

A decision-analytical model developed to calculate cost-effectiveness for screening women with four AJ grandparents was adapted to model cost-effectiveness outcomes for women of differing AJ ancestry. The following model estimates were recalculated: population prevalence of BRCA1/2, the probability of having a positive family history and the BRCA1/2 prevalence in FH negative individuals. These probability parameters were adjusted for relative BRCA mutation frequency in AJ and general populations. BRCA prevalence with 3AJ grandparents = $(0.75 * \text{AJprevalence}) + (0.25 * \text{General-populationprevalence})$; for 2 AJ grandparents = $(0.5 * \text{AJprevalence} + 0.5 * \text{General-populationprevalence})$ and for 1 AJ grandparent = $(0.25 * \text{AJprevalence} + 0.75 * \text{General-populationprevalence})$. One-way and probabilistic sensitivity analysis (PSA) were conducted on all four scenarios to account for any uncertainty.

Results

Population-testing in women with two, three and four AJ grandparent ancestry was found to be cost-saving and cost-effective at -£235, -£569, -£767 per QALY (quality adjusted life year) respectively. A cost-effective ICER of £423/QALY was observed for women with one AJ grandparent. The PSA showed $\geq 95\%$ of simulations for one, two, three and four AJ women were cost-effective at the £20,000/QALY threshold used by the National Institute for Health and Care Excellence.

Conclusion

This study demonstrates the cost-effectiveness of population-based BRCA1/2 testing in women with differing AJ ancestry. Our results support the move for changing the paradigm from FH to population-based testing across the entire AJ population. These results however cannot be extrapolated to the general non-Jewish population.