The Health Technology Report Series has been developed by the Institute of Family Medicine and Public Health of the University of Tartu

The effectiveness and cost-effectiveness of preimplantation genetic testing for aneuploidy

Summary

Background: *In vitro* fertilisation (IVF) is an effective treatment method in infertile patients but may fail if aneuploid embryo is transferred, resulting in miscarriage or not achieving pregnancy. Preimplantation genetic testing for aneuploidy (PGT-A) can improve treatment outcomes by helping to select only euploid embryos for transfer. As PGT-A requires an invasive embryo biopsy, the intervention should be indicated only to selected IVF patients.

Objective: To estimate the effectiveness, cost-effectiveness, and budget impact of PGT-A compared to standard practice (i.e. embryo selection based on morphological criteria) in poor-prognosis IVF patients in Estonia.

Methods: A systematic literature search was performed in PubMed to identify relevant guidelines and studies on the effectiveness, safety, and cost-effectiveness of PGT-A. A meta-analysis on the effectiveness and safety and a systematic review on the cost-effectiveness of PGT-A was conducted. A Markov cohort model and a budget impact model were constructed to estimate the cost-effectiveness and budgetary effects of PGT-A in Estonia.

Results: According to clinical guidelines and worldwide clinical practice, most relevant indications for PGT-A are advanced maternal age (AMA), repeated implantation failures (RIF), and repeated pregnancy losses (RPL). Based on the meta-analysis of 27 mainly observational studies, PGT-A is effective in reducing miscarriage rates in poor-prognosis IVF patients compared to standard practice. Although PGT-A is also effective in increasing live birth rates per transfer, the cumulative live birth rates (i.e. considering all embryo transfers resulting from one oocyte retrieval) were not statistically different between study groups. Meta-analysis of 21 studies did not reveal significant health risks with blastocyst biopsy.

Only six cost-effectiveness studies were found on PGT-A. In all studies, health gain was measured in added life years or avoided miscarriages, and the focus was on AMA patients only. Four studies out of six concluded that PGT-A is a cost-effective embryo selection method compared to standard practice, although no agreed cost-effectiveness threshold exists for incremental cost per selected health gain measures.

The incremental cost-effectiveness ratios were 121,700, 12,200, and 64,200 euros per added live birth, per avoided miscarriage, and per added quality-adjusted life-year, respectively. Using a cost-effectiveness threshold of 40,000 euros per added quality-adjusted life-year, PGT-A is not cost-effective in Estonia. Providing PGT-A to the poor-prognosis IVF patients would cost an additional 1,5 million and 803,000 euros annually for Estonian Health Insurance Fund compared to standard practice when up to three or only one test is being reimbursed, respectively.

Conclusions: Although PGT-A is effective in reducing miscarriage rates and leading to live births more quickly, the intervention is not cost-effective in poor-prognosis IVF patients in Estonia compared to standard practice.

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