

# Methodological Questions of Cost-Effectiveness Calculation of Health Technologies Aiming to Improve Fertility

Erika Országh<sup>1</sup>, Bertalan Németh<sup>1</sup>, Judit Józwiak-Hagymásy<sup>1</sup>, Tamás Takács<sup>2</sup>, Balázs Nagy<sup>1</sup>

<sup>1</sup>Syreon Research Institute, Budapest, Hungary, <sup>2</sup>Centre for Assisted Reproduction, Department of Obstetrics and Gynaecology, Semmelweis University, Budapest, Hungary

Contact email: erika.orszagh@syreon.eu

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## INTRODUCTION

- Even in jurisdictions with well-established health technology assessment (HTA) processes, guidance may be lacking on cost-effectiveness calculation of health technologies aiming to improve fertility.
- This is because these interventions are not aiming to directly improve the life expectancy or quality of life of patients, but to increase the likelihood of childbearing.
- There is a widening consensus that at wider social and environmental costs and benefits should be considered when analyzing complex nature of public health interventions [1].

## OBJECTIVES

- The aim of this study was to investigate the potential ways, through which a health technology aiming to improve fertility can be assessed, providing meaningful results for decision makers.

## METHODS

- A scoping review was performed to identify the relevant systematic literature reviews (SLRs) on the health economic evaluations and models related to assisted reproductive technologies (ARTs).
- Literature search was conducted via PubMed and Embase on 27th of June 2024.
- The search strategy was built up as a combination of search strings related to assisted reproductive technologies, health economic evaluations or models and systematic literature reviews, allowing the capture of all relevant keywords and synonyms that may have appeared in the papers.
- The following limitations were set:
  - Article, reviews, articles in press
  - Publication year of 2010 and beyond
  - English language
- No restrictions were applied regarding interventions, comparators or geographical location.
- In addition, multiple European pharmacoeconomic guidelines were reviewed, as well as European and American clinical guidelines [2-4].
- Moreover, experts were involved in multiple rounds of internal discussions to identify the most scientifically sound ways of assessing the cost-effectiveness of fertility interventions.

## CONCLUSION

- It is often unclear what is the most adequate methodology for calculating cost-effectiveness of health technologies aiming to improve fertility.
- We propose a comprehensive approach, by conducting multiple analyses, considering various aspects. These include a CEA, a CBA and two variations of a CUA to be conducted.

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## RESULTS

- As the result of the scoping review, 671 articles and 13 HTA agencies' websites were reviewed.
- The two most relevant articles found in the review were:
  - Olive et al. 2024, who conducted a systematic review of economic evaluations of assisted reproductive technologies in high-income countries [5]
  - Fenwick et al. 2023, who assessed willingness-to-pay thresholds and approaches for determining the cost-effectiveness of fertility therapies [6]
- Beyond a simple cost comparison, when considering the effectiveness and therefore cost-effectiveness of these interventions, the following pathways can be taken (Table 1):
  - If the local pharmacoeconomic guideline allows its use, the most straightforward way can be a cost-effectiveness analysis (CEA), where the outcomes are expressed in natural units, in this case the expected number of children being born after the application of health technology and its comparator.
  - Cost-utility analyses (CUA) may consider the sum of expected QALYs of the child during their lifetime.
  - Even if it is not the main goal of such interventions, the changes in the utility of parents can also be considered in the CUA.
  - Additionally, through a cost-benefit analysis (CBA), the predicted future earnings of the child during the child's lifetime can be assessed.

Table 1. Summary of the four main approaches

|             | Cost-Effectiveness Analysis (CEA) | Cost-Utility Analysis (CUA) - first version                 | Cost-Utility Analysis (CUA) - second version                                           | Cost-Benefit Analysis (CBA)                                 |
|-------------|-----------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Outcome     | Childbirth                        | Estimated QALYs gained throughout the lifetime of a newborn | Estimated QALYs gained throughout the lifetime of a newborn + QALY changes for parents | Estimated productivity throughout the lifetime of a newborn |
| Perspective | Payer                             | Societal                                                    | Societal                                                                               | Societal                                                    |
| Approach    | Extra-welfarist                   | Extra-welfarist                                             | Extra-welfarist                                                                        | Welfarist                                                   |

## DISCUSSION

- Though all four approaches have methodological limitations, based on discussions with experts, conducting all of them and presenting these together allows decision makers to get a full picture on multiple aspects relevant for fertility interventions.
- With the CEA approach the question of selecting a willingness-to-pay threshold for a particular outcome arises. Simply transferring a cost/QALY based threshold to other outcomes raises serious methodological questions

