

Economic evaluation studies in reproductive medicine: a systematic review of methodologic quality

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Objective: To evaluate the methodologic quality of economic analyses published in the field of reproductive medicine.

Design: Systematic review.

Setting: Centers for reproductive care.

Patient(s): Infertility patients.

Intervention(s): We performed a Medline search to identify economic evaluation studies in reproductive medicine. We included studies that concerned interventions, evaluated costs and effects, and were published in a journal on reproductive medicine, gynecology, or a major general journal from 1997 through May 2011.

Main Outcome Measure(s): Number of quality criteria adhered to.

Result(s): Our search revealed 5,519 articles, of which 85 met our inclusion criteria. Seventy-seven (91%) of the economic analyses were on treatment, six (7%) on diagnosis, and two (2%) on screening. The mean number of quality criteria adhered to was 20 out of 30 items, and only one article met all 30 criteria. The mean number of criteria adhered to was higher if at least one of the authors was from a methodologic or health economics department (mean 23 [n = 30] versus mean 20 [n = 55]). The most common limitations of published economic evaluation studies were in methodology or presentation of incremental analyses, sensitivity analyses, and discounting.

Conclusion(s): Economic analyses published in the past 15 years in the field of reproductive medicine seldom adhere to all recommended methodologic standards. A large majority of these publications evaluated treatments rather than diagnostic interventions. (*Fertil Steril*® 2013;99:1689–94. ©2013 by American Society for Reproductive Medicine.)

Key Words: Reproductive medicine, economic evaluation, methodologic quality, review

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Decision making on availability and reimbursement of interventions in reproductive medicine is becoming increasingly difficult owing to rising health care costs and waning resources. Economic analyses underpinning decision making are therefore gaining importance. Quality standards have been set on how to perform high-quality economic evaluations, with the aim to improve performance (1–3).

A review, evaluating the methodologic quality of cost-benefit and cost-effectiveness studies in journals on obstetrics and gynecology from 1990 to 1996 showed that of published economic analyses in this field, only five of the 89 articles reviewed adhered to all recommended standards (4).

In 2012, an update of this review showed that advances had been made in the past decade, but there was still room for further improvement (5).

Because the quality of economic analyses in reproductive medicine has not been assessed systematically, and because many guidelines on economic analysis in health care were initiated or improved in the middle and late 1990s, we aimed to evaluate the methodologic quality of recently published literature concerning economic evaluation studies in reproductive medicine in the past decade. Insight into the quality of economical analysis in reproductive medicine is important for valuing the performed studies and to assess whether these studies can be used for decision making.

MATERIALS AND METHODS

We performed a search of peer-reviewed journals to identify journals on reproductive medicine, medical

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decision making, and health economics. This resulted in a Medline search in 87 peer-reviewed reproductive and gynecologic journals, as well as five general journals: the Journal of the American Medical Association, The Lancet, the British Medical Journal, the New England Journal of Medicine, and the Canadian Medical Association Journal.

Our systematic search was limited to publications in the English language from January 1, 1997, to January 5, 2011, because standards on methodologic quality were first published in 1996 (1–3). We used the following search strategy: [A] using the Mesh term “cost-benefit analysis” and [1] “cost-benefit analysis (Mesh)” OR “cost-benefit” OR “cost-effectiveness” and [2] limit for humans and English-language publications and [3] limit for a specific obstetrics and gynecology journal, or [B] using the Mesh term “costs and cost analysis” and [1] “cost-benefit analysis (Mesh)” OR “cost-benefit” OR “cost-effectiveness” and [2] limit for humans and English-language publications and [3] limit for a specific obstetrics and gynecology journal and [4] [B1 to B3] NOT [A1 to A3].

Editorials, review articles, letters, technical notes, and articles that used the term cost-effectiveness or cost-benefit in a descriptive manner, i.e., the study was not supported with data, were excluded. The article was considered for inclusion with the use of three criteria: 1) The study population consists of sub-fertile couples; 2) the intervention evaluated concerns the field of reproductive medicine; and 3) the study concerns a full economic evaluation, defined as a comparative evaluation studying both costs and benefits. Each study eligible for our review was read and independently reviewed by two authors. Included articles were subsequently assessed for methodologic quality.

Methodologic Quality

We evaluated the methodologic quality with the use of an assessment form based on several international standards developed by Vijgen et al. (5) and resulting in 30-items concerning 8 topics (Table 1) (1–3, 6, 7). Our data extraction form consisted of two separate parts. Part 1 concerned items on clinical and methodologic characteristics of the economic evaluation study, including type of intervention, economic design (trial-based or model-based), and type of economic evaluation (cost-effectiveness or cost-utility analysis). In part 2 we assessed the methodologic quality of the study.

Each study was independently reviewed by L.M.M. and S.M.C.V., B.C.O. or B.W.J.M. Any discrepancies in scoring were resolved by discussion and consensus. All data were analyzed descriptively, and individual items were summarized as number and percentage of total with a positive score. The total number of items scoring positive was used as indicator of overall methodologic quality, and differences between types of journals, and between the affiliations of the authors, were analyzed with the use of one-way analysis of variance. Trends over time were tested with linear regression (SPSS 16.0). A *P* value of .05 was considered to be significant. No ethical approval was needed for this research.

RESULTS

The search strategy yielded 5,119 publications, of which 5,013 (including duplicates) were excluded because it was clear

TABLE 1

Data extraction and methodologic criteria used in the present study.

Data extraction

Country of investigation
 Category and type of intervention
 Type of patients
 Comparative intervention
 Type of effectiveness study used
 Outcome measure
 Economic design and perspective according to authors and reviewers
 Method of health benefits valuation
 Included costs, price-year
 Model used
 Discounting costs and effects
 Time horizon
 Sensitivity analysis

Methodologic criteria

Study design: study population, alternatives description, well-defined research question, appropriate economic study design, perspective description
 Effectiveness data: source of effectiveness data, details of effectiveness study, and/or an overview of studies
 Benefit measurement and valuation: statement of primary outcome measures, use of outcome measure describing the condition of the patient, details of method used for health benefits valuation
 Costing: completeness costs (looking at perspective and time horizon), description of resources and unit costs, currency and price data, details of inflation adjustment or currency conversion
 Modeling: description of modeling, details, and key parameters
 Adjustments for timing of costs and benefits: appropriate time horizon, discounting mentioned
 Allowance for uncertainty: description of statistical tests, description of sensitivity analysis and choice of variables
 Presentation of results: use of incremental analysis, presentation of major outcomes (separate and in a ratio), study question answered, logical conclusions

Moolenaar. Methodologic quality of economic studies. Fertil Steril 2013.

from the title and abstract that they did not fulfil the selection criteria. They included letters, comments, editorials, and reviews, but most of the time the articles were excluded because there were no full economic evaluations.

From the remaining 106 articles, three articles were excluded because they were not available in full text. During the review process, 18 articles were excluded because after close reading they also did not meet the inclusion criteria. Eighty-five articles were finally included and evaluated for methodologic quality. Two of a group of four reviewers independently reviewed each of the 85 articles and extracted data from each article with the use of the standardized form.

Of the included 85 articles, 73 (86%) were published in journals on reproductive medicine, 10 (12%) in journals on obstetrics and gynecology, and 2 (2%) in general journals. No studies on reproductive medicine were identified in health economic or medical decision making journals. Most economic evaluations were published in *Fertility and Sterility* (n = 31; 36%), *Human Reproduction* (n = 25; 29%), *Reproductive Biomedicine Online* (n = 8; 9%), and *Journal of Assisted Reproduction and Genetics* (n = 6; 7%). There was considerable variation in the annual number of publications

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