Cost effectiveness of contraceptives in the United States
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study examined the cost-effectiveness of various contraceptive strategies in the US general population. The authors concluded that the copper-T intrauterine device, vasectomy, and the levonorgestrel-20 intrauterine system were the most cost-effective contraceptive methods, although their value for money depended on their costs, the cost of unintended pregnancy, and the length of the analysis. The study was based on sound methodology and, although the sources of clinical data were not fully reported, the authors' conclusions are likely to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of various female and male contraceptive strategies compared with no contraception (chance) in the general population.

Interventions
The following 16 contraceptive methods were compared: vasectomy, tubal ligation, oral contraceptive, transdermal contraceptive patch, vaginal ring, copper-T intrauterine device (IUD), levonorgestrel-20 intrauterine system (IUS), male condom, female condom, injectable contraceptive, implant, diaphragm, spermicides, sponge, withdrawal, and fertility-awareness-based (FAB) methods. No method (chance alone) was the comparator.

Location/setting
USA/primary and secondary care.

Methods
Analytical approach:
This economic evaluation was based on a Markov model with a five-year time horizon. The authors stated that the perspective of the payer was adopted.

Effectiveness data:
The clinical inputs to the model came from a comprehensive review of the literature, the details of which were not reported, supplemented with information from package inserts and expert opinion. Some assumptions were also made. The key clinical endpoint was the probability of failure for the contraceptive strategies.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
The summary benefit measure was the success of contraception or avoidance of pregnancy.

Cost data:
The economic analysis included the costs of: drugs or device, physician services (device fitting, insertion, and removal), method failure (pregnancy, ectopic pregnancy, abortion), and side effects. The costs of drugs and devices were based on average wholesale prices and discounts were considered. The costs of physician services were based on average fees associated with the Current Procedural Terminology (CPT) codes. The costs of tubal ligation, vasectomy, and induced abortion came from national average payments for relevant diagnosis-related groups. The cost of a birth (prenatal,
delivery-related, and postpartum health care) and ectopic pregnancy were based on published studies. Details of the patterns of resource consumption were not reported. All costs were in US dollars ($) and were discounted at an annual rate of 3%. The price year was 2007.

Analysis of uncertainty:
One- and two-way sensitivity analyses were carried out to investigate the uncertainty surrounding most of the model inputs. The sources of the ranges used were not reported, but they were likely to have been based on published studies.

Results
Over five years, the total costs were $647 with copper-T IUD; $713 with vasectomy; $930 with levonorgestrel IUS; $1,575 with male condom; $1,597 with implant; $1,892 with FAB methods; $2,017 with withdrawals; $2,171 with diaphragm; $2,647 with spermicides; $2,676 with female condom; $2,681 with injectable contraceptives; $2,798 with sponge; $2,978 with tubal ligation; $3,158 with vaginal ring; $3,381 with oral contraceptive; $3,458 with transdermal patch; and $4,739 with no method.

The average annual percentage who did not become pregnant was 99.6% with copper-T IUD; 100% with vasectomy; 99.8% with levonorgestrel IUS; 86.6% with male condom; 99.2% with implant; 100% with FAB methods; 79.2% with withdrawals; 85.8% with diaphragm; 76.6% with spermicides; 76.8% with female condom; 97% with injectable contraceptives; 79.8% with sponge; 99.8% with tubal ligation; 92.4% with vaginal ring; 92.4% with oral contraceptive; 92.4% with transdermal patch; and 48% with no method.

Thus, all the contraceptive strategies were more effective and less costly than no method, which was always dominated.

After excluding dominated strategies, Copper-T IUD was the reference strategy and the incremental cost-effectiveness ratio was $164 with vasectomy, $1,415 with levonorgestrel IUS (over vasectomy), and $2,375 with implant (over levonorgestrel IUS).

These results were sensitive to several model inputs including the method costs, the cost of unintended pregnancy, and the time horizon. This was mainly due to the very similar effectiveness results for some contraceptive strategies. In all scenarios, the long-term contraceptives (e.g. Copper-T IUD, vasectomy, levonorgestrel IUS, and implant) were the most cost-effective and only their ranking varied.

Authors' conclusions
The authors concluded that copper-T IUD, vasectomy, and levonorgestrel IUS were the most cost-effective contraceptive methods, but their value for money depended on their costs, the cost of unintended pregnancy, and the length of the analysis.

CRD commentary
Interventions:
This study considered a wide range of contraceptive methods, which are likely to be available in many settings.

Effectiveness/benefits:
Little information was provided on the method used to identify the relevant sources of data or on their characteristics. The authors mentioned a comprehensive literature review, but did not report any details. This limits the possibility of making an objective assessment of the validity of the clinical estimates. Also, experts' opinions and assumptions are generally considered to be less valid than data from rigorous published studies. The benefit measure was the natural outcome of the interventions, but is a specific measure, which will not allow comparisons with the benefits of other health care interventions.

Costs:
The categories of costs were appropriately selected for the perspective. Extensive information on the unit costs and their sources was reported. Details on the patterns of resource consumption were not given, partly due to the use of CPT costs, which are usually presented as macro-categories. The price year and the use of discounting were reported. The cost estimates were treated deterministically, but were varied in the sensitivity analysis.
Analysis and results:
The costs and benefits were appropriately synthesised using an incremental approach, which allowed the identification of dominated strategies. The issue of uncertainty was investigated in a deterministic analysis, which focused on the individual inputs to the model. The study results were clearly presented and discussed. Extensive information was clearly presented on the model structure and the basic assumptions of the analysis. The authors stated that their findings were similar to those from other published economic evaluations. The main limitation of this analysis was that the model did not consider the possibility of switching between methods over the five-year period, which might not reflect real-world patterns of care. A longer time horizon would have been more appropriate for considering the cost-effectiveness of long-term strategies. The model did not consider sexually transmitted diseases, which would have underestimated the benefits of some contraceptive strategies such as male condoms.

Concluding remarks:
This study was based on sound methodology and, although the sources of clinical data were not fully reported, the authors’ conclusions are likely to be valid.

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