Economic analysis of long term reversible contraceptives: focus on Implanon  
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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.

**Health technology**
Contraception using the long-term reversible contraceptive, Implanon.

**Type of intervention**
Primary prevention.

**Economic study type**
Cost-effectiveness analysis.

**Study population**
A hypothetical cohort of women using long-term reversible contraceptives.

**Setting**
Community and hospital. The economic study was conducted in the UK, using data from studies conducted both in the UK, and in other European countries.

**Dates to which data relate**
Effectiveness data and costs data were extracted from data published between 1992 and 1999. 1998 prices were used.

**Source of effectiveness data**
Effectiveness data were derived from a review of previously conducted studies.

**Modelling**
A conceptual model was used, comparing a cohort of 100 women for each treatment arm: Implanon, Norplant and Mirena. The model assumed that the use of each contraceptive method resulted in 3 possible outcomes:

- the occurrence of unacceptable adverse events leading to discontinuation;
- protection for the duration of effect of the contraceptive; and
- an unintended pregnancy.

In the case of unintended pregnancy, 3 possible consequences were foreseen: term birth, abortion or miscarriage.

**Outcomes assessed in the review**
Failure rates and risk of pregnancy for each contraceptive method, and duration of protection were considered.
Study designs and other criteria for inclusion in the review
Effectiveness data come from either controlled clinical trials (Implanon) or reports in the literature (other contraceptives).

Sources searched to identify primary studies
Family Planning Association reports, American Journal of Public Health, HMSO publications, British Journal of Family Planning, Contraception journals, and Department of Health publications were listed as sources for the studies referenced.

Criteria used to ensure the validity of primary studies
Controlled clinical trials of Implanon were used and other studies relating to the same topic for other contraceptives. No further details were provided.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
At least 8 studies were included.

Methods of combining primary studies
Narrative method.

Investigation of differences between primary studies
Not stated.

Results of the review
The risk of pregnancy was: 85% for no contraception, 0% for Implanon, 0.2% for Norplant and 0.2% for Mirena.

The duration of effect was 3 years for Implanon, and 5 years for Norplant and Mirena.

Discounting rates varied between 2.2% for Norplant (year 4 & 5) and 31.8% for Mirena in year 1.

Methods used to derive estimates of effectiveness
Estimates of effectiveness were also based on the authors= assumptions.

Estimates of effectiveness and key assumptions
The model assumed that the use of each contraceptive method results in 3 possible outcomes: the occurrence of unacceptable adverse events leading to discontinuation, protection for the duration of effect of the contraceptive, and an unintended pregnancy. In the case of unintended pregnancy, 3 possible consequences were foreseen: term birth, abortion or miscarriage.

Measure of benefits used in the economic analysis
Pregnancies avoided, miscarriages avoided, abortions avoided and births avoided were calculated per cohort of 100 women for each contraceptive considered. These were obtained using modelling techniques. Benefits were reported as undiscounted and as discounted at 5%.
**Direct costs**
Direct health service costs were considered, namely costs of normal contraceptive management: patient consultations, cost of contraceptives, cost of insertion and removal and costs of managing premature removal and discontinuation. The costs of the consequences of unintended pregnancy were also considered, namely the cost for a miscarriage, abortion or birth. 1998 prices were used and costs were not discounted, although discounting would have been appropriate given the time frame of the study (over 2 years). The authors provided an explanation for their choice.

**Indirect Costs**
Indirect costs were not considered.

**Currency**
UK pounds sterling (). 

**Sensitivity analysis**
One-way sensitivity analyses were conducted to test the robustness of the model.

**Estimated benefits used in the economic analysis**
Pregnancies avoided were (discounted figure is parentheses): Implanon, 205 (196); Norplant, 281 (259); Mirena, 251 (232); Depo-Provera, 108 (104).

Miscarriages avoided were: Implanon, 20; Norplant, 28; Mirena, 25; 

Abortions avoided were (discounted figure is parentheses): Implanon, 78 (75); Norplant, 107 (98); Mirena, 96 (88); and Depo-Provera, 41 (40).

Births avoided were: Implanon, 107; Norplant, 146; Mirena, 131; all calculated per cohort of 100 women.

**Cost results**
The total costs to the health service per patient were 154.68 for Implanon, 296.40 for Norplant, 222.65 for Mirena, and 289.49 for Depo-Provera.

**Synthesis of costs and benefits**
The cost per pregnancy avoided was: Implanon, 112.62; Norplant, 177.55; Mirena, 208.20.

The cost per abortion avoided was: Implanon, 296; Norplant, 467.24; Mirena, 547.90.

The cost per year protected was: Implanon, 94.62; Norplant, 145.02; and Mirena, 168.48.

For Depo-Provera, the cost per pregnancy avoided was 267.40, the cost per abortion avoided was 703.70, and the cost per year protected was 131.32.

The average annual rate of return (%), calculated by dividing the net benefits from preventing unintended pregnancies and their consequences by the total cost of contraception, was 190 for Implanon, 65 for Norplant and 52 for Mirena.

The internal rate of return (%) (discount rate which equates the benefits resulting from prevention of unintended pregnancies, discounted for the effects of time and uncertainty, with the total cost of providing the service) was 233 for Implanon, 91 for Norplant and 79 for Mirena.

The payback period (an indication of the period required to prevent sufficient unintended pregnancies in order to offset...
the costs incurred in providing the contraception) was 146 days for Implanon, 338 for Norplant and 368 for Mirena.

The sensitivity analyses demonstrated that Implanon was the most cost-effective method.

Authors’ conclusions
Reversible long-term approaches to contraception provide an effective and efficient use of healthcare resources and generate an excellent return of public investment. Implanon produces better rates of return than both Norplant and Mirena and is also more cost-effective in terms of cost per pregnancy avoided and costs per protected year than Norplant, Mirena, Depo-Provera and oral contraceptives.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparators is clear, as all technologies compared are commonly used methods of contraception. You, as a database user should consider if this applies to your own setting and country.

Validity of estimate of measure of benefit
The benefits of using Implanon and the comparator contraceptives were estimated by modelling. Probabilities used to populate the model were derived from the literature. However, the author did not report the methods and the conduct of the review, which appears not to have been systematic. As a result, there may be potential biases, limiting the validity of the study findings. The author stated that the study results were specifically relevant to the UK setting, although it is not clear how this was related to the methodology of the literature review. Benefits were reported as undiscounted (relevant to the UK) and discounted at 5%.

Validity of estimate of costs
Costs components were detailed and no important cost items were omitted. Costs were not discounted, although this appeared relevant. The authors provided their justification for not applying discounting on costs and this was not further investigated in the sensitivity analyses.

Other issues
The main weakness of the study rests in the sources of effectiveness data for the contraceptives. The author discussed the merits of using Implanon making reference to other similar studies. The research has been supported by an educational grant from the pharmaceutical company that produces Implanon.

Implications of the study
Clinical controlled trials for other long-term contraceptives (Mirena, Norplant) need to be conducted in order to draw a final conclusion regarding the effectiveness of long-term contraceptives.

Source of funding
Supported by an educational grant from NV Organon, Oss, The Netherlands.

Bibliographic details

PubMedID
10947343

Indexing Status
Subject indexing assigned by NLM

**MeSH**
Adult; Contraceptive Agents, Female /administration & dosage /adverse effects /economics; Cost-Benefit Analysis; Desogestrel; Drug Implants; Female; Great Britain; Humans; Vinyl Compounds /administration & dosage /economics

**AccessionNumber**
22000008111

**Date bibliographic record published**
31/05/2001

**Date abstract record published**
31/05/2001