The cost-effectiveness of long-acting reversible contraceptive methods in the UK: analysis based on a decision-analytic model developed for a National Institute for Health and Clinical Excellence (NICE) clinical practice guideline

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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
The objective was to examine the cost-effectiveness of several long-acting reversible contraceptive (LARC) methods compared with either the combined oral contraceptive pill (COC) or female sterilisation, for the prevention of pregnancy. The authors concluded that LARC methods were cost-effective, for preventing pregnancy, from the British NHS perspective. The study appears to have been based on valid methodology, which enhances the validity of the authors' conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to examine the cost-effectiveness of several long-acting reversible contraceptive (LARC) methods in comparison with conventional procedures for the prevention of pregnancy. This study provided a guideline that was commissioned by the National Institute for Health and Clinical Excellence (NICE).

Interventions
The four LARC methods were copper intra-uterine device (IUD), the levonorgestrel intra-uterine system (LIUS), the etonogestrel subdermal implant (ESI), and the depot medroxyprogesterone acetate injection (DMPA). These were compared with the combined oral contraceptive pill (COC) and female sterilisation.

Location/setting
UK/secondary care.

Methods
Analytical approach:
This economic evaluation was based on a decision analytic Markov model with a 15-year time horizon. The authors stated that the perspective was that of the National Health Service (NHS).

Effectiveness data:
The clinical data were derived from a review of the literature and the design of each source was reported. Expert opinions were used to derive the long-term clinical data that were not available from the literature. The key clinical endpoint was the contraceptive failure rate, which was based on data from randomised controlled trials (RCTs) for the LARC methods and other published studies for the comparison strategies. The discontinuation rate was another important clinical outcome and was obtained from observational studies (from UK sources, when available).

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The summary benefit measure was the rate of pregnancy resulting from contraceptive failure. Other outputs were also reported. The outcomes were discounted at an annual rate of 3.5%.
Cost data:
The health service costs were those of contraceptive provision (drugs, health professionals' time and equipment for insertion and removal of IUD, LIUS, and ESI) and those associated with the outcomes of unintended pregnancy. The patterns of resource consumption were based on experts' opinions, supplemented with UK national reports. The unit costs were derived from British national sources. All costs were in UK pounds sterling (£) and the price year was 2005. A 3.5% annual discount rate was applied to those costs incurred after the first year.

Analysis of uncertainty:
A series of one- and two-way sensitivity analyses were carried out using published confidence intervals (for failure rates and discontinuation rates) or ranges set by the authors (for the costs of all methods). Alternative scenarios were considered with different assumptions on the use of COC, the LARC method discontinuation, the replacement of the IUD device, and other model inputs.

Results
For between 2 and 15 years of use, all LARC methods dominated the COC, which means they were more effective and less costly. The incremental cost per pregnancy averted with female sterilisation compared with LARC reached a maximum of £38,197 over the first four years of treatment, but for six years of contraceptive protection and above, female sterilisation became dominant over all LARC methods.

In the comparison among LARC methods, for between 2 and 15 years of use, the DMPA was dominated by the other LARC methods. The LIUS was dominated across all time frames. The incremental cost-effectiveness ratio of the ESI over the IUD was £13,206 per pregnancy averted, at one year of use, but gradually decreased as the years of intended use increased (except for slight increases at 4, 7, 10 and 13 years). At 15 years of contraceptive use, the ESI dominated the IUD.

The sensitivity analysis showed that these findings were sensitive to the assumptions on the perfect use of the COC and the rate of discontinuation with LARC. However, LARC methods dominated the COC, under most scenarios, and they were dominant over female sterilisation, when the LARC discontinuation rate was zero.

Authors' conclusions
The authors concluded that LARC methods were cost-effective for preventing pregnancy from the British NHS perspective. They pointed out that future studies should identify ways to increase the acceptability and reduce the discontinuation rate for LARC methods.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clearly explained and discussed. Only strategies that depended exclusively on the women’s choice and compliance were considered.

Effectiveness/benefits:
The use of a systematic literature review to identify the relevant sources of data was the optimal strategy for a decision analytic framework. However, the methods and conduct of the review were not reported. The authors provided some information on the design of their sources and these appear to have been valid. RCTs were appropriately selected to derive the treatment efficacy, while cohort studies were used to obtain real-world data on the treatment patterns and discontinuation rates. Pregnancies avoided are a commonly used benefit measure for contraceptive strategies, but a measure such as this is difficult to compare with the benefits of other health care interventions and it is also difficult to put a monetary value on an unintended pregnancy. The lack of data, on the quality of life associated with this outcome, rules out the possibility of using a more comprehensive and comparable benefit measure.

Costs:
The categories of costs were consistent with the perspective. However, they were only presented as macro-categories and no details on the relative impact of each of these cost items were given. The sources of costs were reported and were consistent with the perspective. Other details such as the use of discounting, price year, and use of sensitivity analyses on the economic estimates were reported.
Analysis and results:
The use of an incremental approach to combine the costs and benefits was appropriate and allowed the identification of dominated strategies. The issue of uncertainty was addressed, but the findings were selectively presented, and the expected costs and benefits were not reported. The data on the sources and the estimation of clinical and economic inputs were presented in an online appendix. The authors justified their selection of the time horizon, which was likely to reflect the full duration of the contraceptive effect of female sterilisation. The fact that the study followed NICE submission criteria should ensure that the methodology was sound, even though the details were not extensively reported. The authors pointed out that the side effects associated with the LARC methods and other strategies were not modelled, which was a limitation of their analysis. They also stated that caution would be required if extrapolating the findings to other health care systems due to the peculiarities of the British NHS.

Concluding remarks:
The study appears to have been based on valid methodology, which should enhance the validity of the authors’ conclusions.

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