

Long-acting reversible contraceptives: not only effective, but also a cost-effective option for the National Health Service

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Background

The National Institute for Health and Clinical Excellence (NICE) clinical guideline on long-acting reversible contraception was published recently.¹ The key themes of the guideline are: choice, through better access and information; safety, through clinical guidance and training for health care professionals; and cost effectiveness. It is this last aspect that we address in this commentary. While NICE guidance is applicable to England and Wales, some aspects of it may be relevant to the provision of care and practice in Scotland and Northern Ireland.

Long-acting reversible contraceptives (LARC) are among the most effective contraceptive methods.² Unlike widely used methods, such as the combined oral contraceptive pill (COC) and barrier methods, the effectiveness of LARC is less dependent on users' compliance/correct use of a method. This property makes LARC suitable, in terms of contraceptive protection, for certain subgroups of the population, such as adolescents or women with no established regular routine, who have been shown to comply poorly with commonly used contraceptive methods.^{3,4}

Despite their demonstrated high effectiveness, currently the uptake of LARC in the UK is regarded as being low: only 8% of British women aged 16–49 years reported using LARC in 2003/2004.⁵ The perception among health providers that LARC are associated with high costs of provision is one of the main reasons for LARC not being offered on a regular basis to women seeking contraception.

Parameters of the economic analysis

In this context, the NICE clinical guideline on LARC incorporated an economic analysis aimed at determining the cost effectiveness of LARC in comparison to other contraceptive methods available in the National Health Service (NHS). A decision-analytic model was developed for this purpose, to assess both the costs and clinical outcomes associated with use of LARC, COC, male condom, female and male sterilisation. The LARC methods evaluated included the intrauterine device (IUD), the intrauterine system (IUS), progestogen-only injection and

the subdermal implant. The analysis considered multiple consecutive time frames, from 1 to 15 years of intended contraceptive use, so as to explore how the relative cost effectiveness of LARC varied over time.

The structure of the economic model was as follows. Hypothetical cohorts of sexually active women of reproductive age were assumed to adopt each one of the contraceptive methods assessed and were followed for a period equal to the time frames of the analysis. Every year a proportion of women in each cohort were assumed to discontinue the examined method and switch to another method or no method; the method adopted following discontinuation was in accordance with the contraceptive usage rates in the UK ('discontinuation' in the form of a reversal procedure was not considered for cohorts having undergone sterilisation). At any point of time during the simulation, women in each cohort either received the contraceptive benefits following use of contraception, or faced a contraceptive failure and the subsequent event of an unintended pregnancy. Four possible outcomes of unintended pregnancy were incorporated in the model: continuation of pregnancy leading to birth, miscarriage, abortion and ectopic pregnancy.

Outcomes were expressed as the number of unintended pregnancies experienced in each cohort due to contraceptive failure, *after* discontinuation had been taken into account. Discontinuation was considered as an important issue affecting the cost effectiveness of a method, since it led to initiation of another, possibly less effective, method (or no method) and, ultimately, to an increase in the number of unintended pregnancies experienced in each cohort. Moreover, in the case of LARC, early discontinuation may not allow future cost savings from prevention of unintended pregnancies to offset high initiation costs. Thus, the overall effectiveness of each method was determined not only by clinical efficacy (established by each method's failure rate) but also by the method's discontinuation rates.

NHS costs were estimated. They consisted of contraceptive provision costs and costs associated with possible outcomes of unintended pregnancy due to contraceptive failure (continuation of pregnancy and birth, miscarriage, abortion and ectopic pregnancy). Provision costs included ingredient costs and costs of health professional consultations (initial counselling and routine follow-up according to recommended practice) and equipment required to initiate the method (e.g. sterile packs). Moreover, in the estimation of consultation costs, health professional time for insertion and removal (in respect of the IUD, IUS and subdermal implant) or injection (in the case of the injectable) was taken into consideration. For male condom only ingredient costs were estimated. In the case of contraceptive failure following female or male sterilisation, repeat of the sterilisation procedure was considered, which incurred additional costs.

It was estimated that the costs of health professional consultations were similar regardless of the contraception provider, whether family planning clinics (FPCs) or general practitioners (GP). Since GP unit costs were available, while cost data for FPCs specific to contraceptive provision services were not, it was decided

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that estimation of consultation costs be based upon the GP unit cost. It was intended that costs should reflect actual resource use rather than financial flows to GPs, therefore no additional fees paid to GPs for provision of contraceptive services were considered. Costs incurred by clinical management of adverse events following contraceptive use were not included in the analysis, owing to lack of relevant data.

Failure and discontinuation rates utilised in the model were based on data reported in the guideline, derived from a systematic literature review. Resource use with respect to GP time was based on the Guideline Development Group (GDG) expert opinion. Unit costs related to health care resource utilisation were derived from national published sources. Values of other model variables (e.g. probabilities of outcomes following unintended pregnancy) were based on published literature or, where no data were available, on GDG consensus.

Conclusions of the economic analysis

The analysis demonstrated that LARC are more effective and, overall, less costly than COC and the male condom, even for short time frames. Injectables and IUDs were less costly than COC and male condom at all time frames examined (i.e. from 1 to 15 years of use). The implant and IUS incurred lower overall costs than COC and male condom starting at 2 years of use and above, but were deemed to be cost effective from Year 1, since the additional benefit (number of unintended pregnancies averted) compared to COC and male condom was considered to be worth the additional cost (approximately £350–£500 per additional unintended pregnancy averted). These findings result from the substantially higher effectiveness of LARC, which leads to much greater cost savings from unintended pregnancies averted relative to COC and the male condom, offsetting the high start-up costs entailed by LARC use. The higher cost effectiveness of LARC versus the male condom remains even when LARC are used in combination with the male condom. Consequently, for populations at high risk for sexually transmitted infections (STIs) who need, besides contraceptive protection, security against STIs, the combined use of LARC with the male condom is more cost effective than using the male condom alone.

Based on the results of the economic analysis, it can be shown that in a population of 1000 women, initiation of LARC for an *intended* period of 5 years of contraceptive use prevents, on average, an additional 47 unintended pregnancies yearly, and provides annual net cost savings (including provision costs) of £51 641, in comparison to COC use. [NB. Intended period of 5 years of contraceptive use means that women start each method with the intention of using it for 5 years, but they may discontinue the method for any reason at any time point within this period, according to discontinuation rates reported in published literature.] Applying these findings to the population of COC users aged 16–49 years in England and Wales, it was estimated that if 5% of this population (approximately 155 000 women^{5,6}) switched from COC use to one of the LARC available in the NHS for an initially intended period of 5 years of contraceptive use, the average annual reduction in unintended pregnancies would be approximately 7500, while the net cost savings from the switch would reach £8 million. It must be noted that these figures apply specifically to a switch from COC to LARC use. Benefits in terms of number of unintended pregnancies averted and net cost savings would be far more substantial if women using a contraceptive method less effective than COC (or no method) switched to LARC use. Results per

Table 1 Annual average outcomes (number of unintended pregnancies due to contraceptive failure) and costs per 1000 women using the combined oral contraceptive pill (COC) or long-acting reversible contraceptives (LARC) for an initially intended 5-year contraceptive use

Contraceptive method	Unintended pregnancies (<i>n</i>)	Total costs (£)
Intrauterine device	46	106 911
Intrauterine system	46	120 707
Implant	43	133 455
Injectable	60	152 120
LARC (average)	49	128 298
COC	96	179 939
Difference: LARC vs COC	-47	-51 641

1000 women using LARC or COC for an intended period of 5 years of contraceptive use in terms of average annual costs and average annual number of unintended pregnancies resulting from contraceptive failure are presented in Table 1.

Female and male sterilisation are more cost-effective than LARC at 15 years of contraceptive protection as they prevent more unintended pregnancies and carry lower total costs. This is explained by the high discontinuation rates characterising LARC, resulting in the use of less effective contraceptive methods. However, sterilisation is not an option for all women seeking contraception. Male sterilisation presupposes the couple as the unit of protection and not the woman alone. Female sterilisation is not an option for women wishing to retain their fertility. Furthermore, 3–10% of women who have undergone sterilisation regret this decision at a later date, and a proportion request a reversal procedure.⁷ In all these cases, use of an effective, reversible method such as LARC might be more appropriate than permanent sterilisation.

Among LARC, the injectable is the least cost effective for time frames longer than 1 year, as it prevents a lower number of unintended pregnancies and incurs higher costs compared to the rest of LARC (however, for 1 year of use the injectable is the least costly among LARC). The implant is the most effective but, at the same time, the most costly of the remaining LARC. Nonetheless, the additional costs associated with the implant relative to IUD/IUS are greatly reduced as duration of contraceptive use increases. The IUD is the least costly but also the least effective option for most time frames examined. The IUS is ranked between the IUD and the implant regarding associated costs and outcomes. Discontinuation is a major driver of the relative cost effectiveness of the IUD, IUS and implant; in contrast, modest changes in discontinuation rates ($\pm 10\%$ of values used at baseline) have no significant impact on the cost effectiveness of the injectable compared to the rest of LARC.

A limitation of the economic model was that it did not consider side effects associated with LARC use. Besides causing distress to the user, some side effects may require additional health care resources for their management, and this factor was not taken into consideration in estimating the total costs incurred by LARC use. Conversely, non-contraceptive benefits of LARC and subsequent cost savings (e.g. the management of menstrual disorders achieved with IUS use⁸) were also not considered. The quality of life arising from contraceptive use and the distress caused by contraceptive failure were additional factors not accounted for in the economic analysis.

Concluding remarks

The key message is that LARC are a cost-effective contraceptive option. The relatively high initiation costs

should not restrain their use, as LARC result in greatest cost savings compared to other reversible methods. Nevertheless, the cost effectiveness of LARC is only one factor to consider when offering women contraception. Women's preferences, individual needs and lifestyle must always be taken into account when helping women seeking contraception to make an informed choice. Women should be given the opportunity to choose from a wide range of contraceptive methods including all available methods of LARC.

Statements on funding and competing interests

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Janie Foote graduated with a degree in Biochemistry from the University of Leeds, and followed this with a period of postgraduate research in the field of cancer research. Finding the somewhat rarefied atmosphere of scientific research not to her liking, Janie made the transition to scientific publishing, working on both book and journal projects for a number of major UK publishers. Janie has been employed on a freelance basis since 1999, supplying publishing consultancy and editorial services to a range of clients. Janie has worked on the *Journal of Family Planning and Reproductive Health Care* for the past 4 years in the capacity of Managing Editor, and she is now delighted to take up the position of Editorial Manager, a role which will increase her day-to-day involvement with the journal, its Editorial team, peer reviewers and contributing authors. In this new role Janie will take responsibility for overseeing the smooth progress of manuscripts from submission to publication via the new online submission and peer review system (AllenTrack). In addition, she will have ample opportunity to utilise her extensive publishing experience in advising the editorial team on plans for the future development of the journal.

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