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Can we reduce costs and prevent more unintended pregnancies? A cost of illness and cost-effectiveness study comparing two methods of EHC

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ABSTRACT

Objectives: To calculate the cost of an unintended pregnancy in 2011 and use this cost in a cost-effectiveness model comparing ulipristal acetate (UPA) with levonorgestrel (LNG) for emergency hormonal contraception (EHC).

Design: Retrospective analysis of published data sources and published cost-effectiveness model.

Setting: Women presenting in primary care in England for EHC within 24 or 72 h of unprotected sexual intercourse (UPSI).

Interventions: EHC of either LNG (1.5 mg) or UPA (30 mg).

Primary and secondary outcome measures: The primary outcome measure is the number and direct and indirect costs of an unintended pregnancy. The secondary outcome measure is the consequence of unintended pregnancy: miscarriage, abortion, ectopic pregnancy, stillbirth or live birth.

Results: From the comparative clinical studies of EHC we observe that if 125 women receive either LNG or UPA within 72 h of UPSI, there will be one less pregnancy due to method failure in the UPA group than in the LNG group. We calculate the cost of an unintended pregnancy to be £1663 in direct healthcare costs rising to £2922 with the inclusion of social costs. Using these costs in the comparative cost-effectiveness model shows that it costs £194 less in direct health costs alone to prevent one more pregnancy with UPA than with LNG. The inclusion of social costs of pregnancy increases this cost-saving potential to £1453 for each extra pregnancy avoided with UPA compared with LNG.

Conclusions: Clinical trials have demonstrated the superior efficacy of UPA compared with LNG as a method of EHC. Given that it costs less overall in health and social costs of pregnancy while preventing more pregnancies, UPA is said to be the dominant treatment, and primary care services should shift to offering UPA as the preferred oral option to women presenting within 24 and 72 h of UPSI.

Strengths and limitations of this study

- We analysed published data sources from the National Health Service (NHS) and the government agencies to calculate the actual health and social costs incurred by pregnant women in 2011.
- Women who experience an unintended pregnancy may in fact incur higher health costs than those who plan a pregnancy, so our estimates may be an underestimate of the cost of unintended pregnancies.
- We predict savings that could occur in women presenting for emergency hormonal contraception although many women do not present to the healthcare system until the pregnancy is confirmed.

INTRODUCTION

According to the government's Sexual Health Framework, around 50% of all pregnancies are unplanned. The government's ambition is to reduce unintended pregnancies among all women of fertile age through increased knowledge and awareness of all methods of contraception and improved access to these methods, including emergency hormonal contraception (EHC), for women of all ages and their partners. The Sexual Health Framework concludes that "emergency contraception is a safe and effective way of preventing unwanted pregnancy when regular methods have failed or have not been used."[1]

Reduction in teenage pregnancy is one of the indicators of the government's Public Health Outcomes Framework[2] and this age-group has the highest rate of abortions.[3] Despite this focus, the rate of abortions has not reduced dramatically even with the free availability of contraception in the UK and a greater access to EHC in the recent years. However, 46% of the consultations for EHC at family planning clinics in 2011/2012 were in teenagers and 37% of EHC consultations were in those aged 16–19 years.[4]

A study of unintended pregnancy and contraceptive use in Scotland found that less

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than 12% of those attending for abortion had used EHC.[5] From the end of 2008, EHC has been available free of charge from pharmacies in Scotland, and a small decrease in abortions has been observed there.[6] Women presenting for EHC are clearly indicating that they do not wish to become pregnant, despite being at risk of pregnancy following unprotected sexual intercourse (UPSI). As such they are a population that presents into the healthcare system at a risk of having an unintended pregnancy which could be avoided. Although the copper intrauterine device (IUD) is recognised by healthcare professionals as the most effective method of emergency contraception (EC),[7] over 95% of women who present after UPSI do not opt for an IUD as a method of EC.[4] In this article, we specifically examine the population who present at risk of an unintended pregnancy and for whom there is a choice of EHC.

There are two methods of EHC available: levonorgestrel (LNG) 1.5 mg which is indicated for EC if taken within 72 h of UPSI and ulipristal acetate (UPA) 30 mg which is indicated for EC within 120 h of UPSI.[8] The two drugs were directly compared in two randomised controlled trials (RCTs) among women presenting at family planning clinics including 10 in the UK, and UPA was observed to have a lower pregnancy rate than LNG whether it was taken within 24, 72 or 120 h of UPSI. These two RCTs were combined in a meta-analysis which showed that the differences in pregnancy rates observed were significant.[9] We previously used this meta-analysis to examine the relative cost-effectiveness of the two methods, and we demonstrated that there was an additional cost incurred to prevent every additional unintended pregnancy that occurred as a result of the higher failure rate of LNG.[10] In this article, we extend our previous study to calculate the likely cost of an unintended pregnancy. We do this by using more recent and accurate costs of abortion, miscarriage or the delivery of a baby and by including the wider health and social care costs of pregnancy that were actually incurred in 2011 as published by national data sources.

METHODS

We calculate the costs of pregnancy incurred in 2011 by analysing published data sources on costs and outcomes of pregnancy. We took a wider perspective than in our original analysis to include the direct healthcare costs and the indirect social costs of all maternities to calculate the average cost of pregnancy. Since the outcome of an unintended pregnancy is more likely to be an abortion, the average cost of an unintended pregnancy will differ from that of an intended one. We apply the outcome probabilities of unintended pregnancy that were observed in clinical trials of EHC and studies conducted on pregnancy intention in women in the UK to calculate the cost of an unintended pregnancy. This cost is then used, in the same cost-effectiveness model we developed previously,[10] to determine the incremental cost-effectiveness ratio (ICER) between the two alternative methods of EHC. We analyse the use and expenditure in 2011 on EHC to predict the possible cost savings that could be made by using a more effective method of EHC.

Direct healthcare costs

We examined published data sources to identify the number of pregnancy and healthcare events and their respective costs. We included the number of births recorded in National Health Service (NHS) hospitals,[11] the number of abortions[12] and the number of miscarriages and ectopic pregnancies.[13] The cost of each pregnancy event was taken from the NHS National Schedule of Reference Costs 2011[14] and includes the direct healthcare costs of managing each pregnancy whether it resulted in a miscarriage, abortion, ectopic pregnancy or delivery of a live or stillborn baby. These included community and hospital costs with the exception of additional general practitioner (GP) visits for pregnancy-related issues.

For the purposes of this analysis, we examined the routine healthcare costs that are incurred during the first year of a baby's life. These included the standard immunisation schedule for the baby,[15] hospital admissions recorded for children under 1 year,[13] health visitor costs,[14] community paediatric appointments[16] and visits to the GP.[17 18] We also calculated the cost of Healthy Start vouchers that are provided to some pregnant women and their babies.[17] In 2011, the government also funded Health in Pregnancy Grants, a payment of £180 which was given to all pregnant women at 20 weeks of gestation. Since this scheme is no longer in existence we have excluded this cost from our analysis.

Social costs

A pregnancy resulting in delivery gives rise to additional costs for society. The government subsidises employment costs to working women through Statutory Maternity Pay or Maternity Allowance and Sure Start maternity grants to unemployed pregnant women. Social welfare payments are given in the form of child benefit, working and child tax credit. We calculated the average cost of these maternity benefits per pregnant woman by dividing the total maternity costs spent in 2011 by the number of pregnant women in 2011. Other social benefits costs are incurred, such as social security payments, housing benefit and council tax rebates. We analysed the government expenditure on these benefits and calculated the proportion that was spent on pregnant women and children under 1 year in 2011.

Proportion and cost of unintended pregnancies

Women who become pregnant unintentionally may opt to continue with the pregnancy or terminate through planned abortion; spontaneous abortion may also occur. The studies conducted on pregnancy intention in British women conclude that around one-third of all

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pregnancies are unintended.[5 19] Since the proportions of the various outcomes of unintended pregnancy differ from those of intended pregnancy, we used the outcome proportions observed in the comparative clinical trial of the two methods of hormonal contraception in women who became pregnant following EHC.[10] These proportions were applied to the cost of each event to provide a cost of unintended pregnancy. We also examined the effect of using the outcomes observed in clinical practice from the published studies in the sensitivity analysis.

Cost-effectiveness of EHC

We used the updated cost of unintended pregnancy in our cost-effectiveness model comparing UPA with LNG.[10] In the original model, we used the cost of GP consultation for providing EHC. However, since EHC is now administered more often from pharmacy, we used the cost of a pharmacy consultation in our updated calculation. This model was based on the difference in pregnancy rates observed in the clinical trials comparing LNG with UPA.[9] In our original article, we took the time period of women presenting up to 120 h after UPSI. However, in this article, we conducted this analysis based on the timeframe of women presenting up to 72 h after UPSI since in the clinical trials 90% of women presented within 72 h of UPSI.[9] The cost-effectiveness analysis provides an ICER, which is the cost of preventing one additional pregnancy with one drug compared with another. If this figure is negative, it indicates that it costs less to avoid an additional pregnancy. An alternative interpretation of these figures using the number needed to treat (NNT) methodology is also presented.

Sensitivity analysis

Since the main components of the ICER are the cost of unintended pregnancy and the failure rate of EHC, we undertook some sensitivity analysis to see how altering the value of these components might change our findings. For the cost of unintended pregnancy we used the outcomes observed in the clinical practice of women's pregnancy intention to revise the cost of an unintended pregnancy.[5 19] For the failure rate of EHC we used the rate observed in the women presenting within 24 h of UPSI,[9] since in the clinical trials one-third of women presented for EHC in the first 24 h following UPSI. Increasingly, in clinical practice, women are presenting within 24 h of UPSI and often directly to a pharmacy with the advent of various pharmacy schemes.

RESULTS

Direct health cost of a pregnancy

There were over one million pregnancies recorded in 2011 at a cost of over £3.9 billion in England. This cost is calculated from the number of recorded events of pregnancies resulting in miscarriage, abortion, ectopic pregnancy or delivery of a live or stillborn baby, as shown in table 1, multiplied by the cost per event taken from the National Schedule of Reference of Costs 2011.[14] A further breakdown of these calculations and the source documents are provided in online supplementary appendix A.

Table 1 The cost of pregnancy in England by outcome in 2011

	Number of events	Cost per event	Total cost
Miscarriages	114 091	£554	£63 206 414
Abortions	183 052	£714	£130 699 128
Ectopic pregnancies	10 796	£1228	£13 257 488
Stillbirths	3612	£3765	£13 599 180
Live births	694 048	£5337	£3 704 226 375
Total	1 005 599	£3903	£3 924 988 585

This means that the cost of a pregnancy, whether planned or not, was, on an average, £3903 in 2011 in direct healthcare management expenditures alone. However, these costs are only part of the total health expense of a pregnancy. In pregnancies that result in a delivery, further health and social costs are incurred for the mother and the baby. We estimate that an average of £821/child is spent on routine healthcare during the first year of life. This average cost is shown broken down by the various elements of healthcare costs for children in the first year (see online supplementary appendix B). This equates to a further £551 million in the most conservative estimate.

Wider social costs of pregnancy

The government expenditure on specific maternity benefits amounted to £2.3 billion in 2011. A further £34 billion was spent on tax credits and child benefit, although this was across all eligible children and not just for children under 1 year. Some pregnant women and their infants were also eligible for social security benefit, housing allowance and council tax rebates. On an average, the social cost for each woman delivering a baby was £7095 in 2011, as outlined in table 2.

Further details of the cost calculations and source documents are provided in online supplementary appendix C.

Number of unintended pregnancies

Two studies in Scotland examining contraceptive use in unintended pregnancy showed that 90% of terminations, 8% of deliveries and 11% of miscarriages were the result of unintended pregnancy.[5 19] These studies also estimated that overall one-third of all pregnancies are unintended. A recent study conducted among women presenting for abortion found that the pregnancy was unintended in 86% of cases and only 6.8% of women continued the pregnancy.[27] Applying the latter proportions to the number of pregnancy events in England in 2011 would suggest that almost a quarter of all pregnancies that occurred in 2011 were unintended.

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Table 2 Social costs of a pregnancy

	Expenditure 2011 (£millions)	Average cost per eligible recipient	Average cost per woman delivering
Working Tax & Child Tax Credit[20]	£22 309	£5638	£1847
Child benefit[21]	£12 283	£1065	£1065
Statutory Maternity Pay (SMP)[22]	£1934	£4972	£2911
Housing benefit costs[23]	£20 130	£4760	£523
Maternity allowance[24]	£301	£1592	£453
Social security[25]	£82	£590	£124
Sure start maternity grants[26]	£66	£500	£99
Council tax rebates[23]	£4291	£730	£73
Total			£7095

Cost of unintended pregnancies

The results from the clinical trials between the two methods of EHC show that in women who became pregnant after EHC failure, 66% had abortions, 18% continued to delivery and 16% experienced a miscarriage.[10] Applying these percentages to the average cost of each of these outcomes and allowing for the rate of ectopic pregnancy and stillbirth seen in the general population gives a cost of an unintended pregnancy. Using these most conservative outcomes of unintended pregnancies, the average cost of an unintended pregnancy is £1519 in pregnancy healthcare costs alone and £1663 with the inclusion of the child healthcare costs in the first year. Incorporating the wider social costs brings the average cost of an unintended pregnancy to £2922 in 2011. The breakdown of this calculation is provided in online supplementary appendix D.

Cost-effectiveness of EHC

Our 2010 analysis showed that, on an average, it costs £311 to prevent one extra pregnancy if UPA was used instead of LNG in women presenting for EHC. Using the lower estimate of our updated costs of unintended pregnancy shows that in fact at least £194 could actually be saved for each additional pregnancy avoided. Inclusion of the social costs of unintended pregnancy could lead to a saving of £1453 for each additional pregnancy avoided by providing UPA rather than LNG to women presenting for EHC. We also looked at the impact on the results for women presenting within 24 h of UPSI. These results are presented in table 3.

Further sensitivity analyses were undertaken using the cost of unintended pregnancy based on the outcomes observed in the clinical practice and by disaggregating the cost components, and all produced a negative ICER. This indicates the robustness of the cost-saving claim of using UPA rather than LNG. Full details of the cost-effectiveness calculations and sensitivity analyses are provided in online supplementary appendix E.

Number needed to treat

A different way of interpreting the ICER is provided by NNT, which is defined by

$$\frac{1}{\text{Difference in efficacy}}$$

In the case of the difference between UPA and LNG in women presenting within 72 h of UPSI $\frac{1}{0.8\%}$=125 women would need to be treated with UPA rather than LNG in order to prevent one extra pregnancy. Table 4 outlines the additional costs incurred of treating these

Table 3 Estimates of ICER of UPA versus LNG in EHC

	UPA		LNG		
	Pregnancy rate (%)	All costs†	Pregnancy rate (%)	All costs†	ICER*
1. All healthcare costs of unintended pregnancy=£1663	1.4	£50.23	2.2	£51.79	–£194
2. Health and social cost of unintended pregnancy=£2922	1.4	£67.86	2.2	£79.48	–£1453
3. Pregnancy rate within 24 h of UPSI (with healthcare cost of unintended pregnancy=£1663)	0.9	£41.92	2.5	£56.78	–£929
4. Pregnancy rate within 24 h of UPSI (health and social care costs=£2922)	0.9	£53.25	2.5	£88.25	–£2188

*ICER is the difference in total costs divided by the difference in pregnancy rate.
†All costs are the drug cost (£16.95 for UPA and £5.20 for LNG)[8]+£10 pharmacy consultation+cost of pregnancy in EHC failures (pregnancy rate×cost of unintended pregnancy).
EHC, emergency hormonal contraception; ICER, incremental cost-effectiveness ratio; LNG, levonorgestrel; UPA, ulipristal acetate.

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Table 4 Interpretation of ICER using NNT

	Healthcare costs only	Health and social care costs
Additional spend	£1469	£1469
• Difference in cost of treating 125 women with UPA instead of LNG (125 x £11.75)		
Avoided cost	£1663	£2922
• Cost avoided by preventing an unintended pregnancy		
Net benefit	-£194	-£1453
• Additional drug cost minus the avoided health and social care costs		

ICER, incremental cost-effectiveness ratio; LNG, levonorgestrel; NNT, number needed to treat; UPA, ulipristal acetate.

125 women along with the costs saved by avoiding the additional unintended pregnancy. These net benefit figures are the same as the ICER and represent the budget impact of treating a population of 125 women with UPA rather than LNG and avoiding one additional unintended pregnancy.

Net savings offered by a more effective EC

Almost 245 000 prescriptions were issued for EHC in the community in England in 2011, costing £1.3 million.[28] A further 128 100 women obtained EHC directly from community contraception clinics.[4] Owing to method failure, a small proportion of these 373 094 women will still have become pregnant. Had these women been given UPA rather than LNG, almost 3000 additional pregnancies could have been averted, saving more than £355 000 in healthcare costs and over £4 million in health and social costs, as shown in figure 1. This is a conservative estimate of the potential savings since it does not include the women who obtain EHC directly from a pharmacy through *patient group directions*. Looking at the one-third of women who present within the first 24 h after UPSI, we found that an additional 2000 unintended pregnancies could have been avoided, saving over £4.3 million, as illustrated in figure 2.

Details of the calculations of the budget impact of EHC provision in 2011 are given in online supplementary appendix F.

DISCUSSION

We report the actual costs that were incurred by the NHS and government agencies to determine the average cost of pregnancy and subsequently the average cost of unintended pregnancy, rather than modelling the likely costs along a treatment pathway as we did in our 2010 study. We have also included all the costs of pregnancy, adding those related to management of pregnancy-related conditions and the neonatal period as well as health costs that are incurred by children during the first year of life. We did not include healthcare costs beyond the postnatal period for the mother.

Using the data from studies on women about pregnancy intention after contraceptive failure, we estimate that almost a quarter of all pregnancies in 2011 are unintended. Some authors have debated whether such pregnancies are truly unwanted as opposed to mistimed and preventing such a pregnancy defers, rather than prevents, the costs.[29] However, women presenting for abortion are indicating that they do not wish to continue with the pregnancy and studies have shown that in almost 90% of women presenting for abortion, the pregnancy was unintended.[27] In 2011, 36% of women presenting for an abortion had terminated a previous pregnancy, the highest percentage over the last decade.[12]

There is increasing evidence that unintended pregnancies have poorer outcomes, and a recent review by the Academy of Medical Royal Colleges and the National Collaborating Centre for Mental Health concluded that unwanted pregnancy is associated with an increased risk of mental health problems.[30] In addition, women who give birth following an unintended pregnancy may have a higher risk of postpartum depression,[29] giving rise to higher health costs of an unintended pregnancy than those calculated in this article. Some women having an abortion experience complications, for example, pelvic infection or

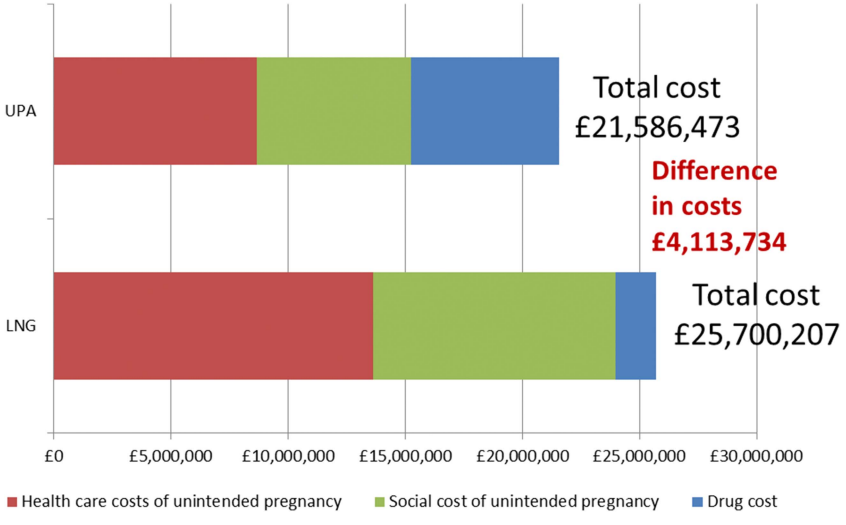

Figure 1 Cost of giving all women who presented within 72 h after unprotected sexual intercourse (UPSI) alternative emergency hormonal contraception (EHC) in 2011.

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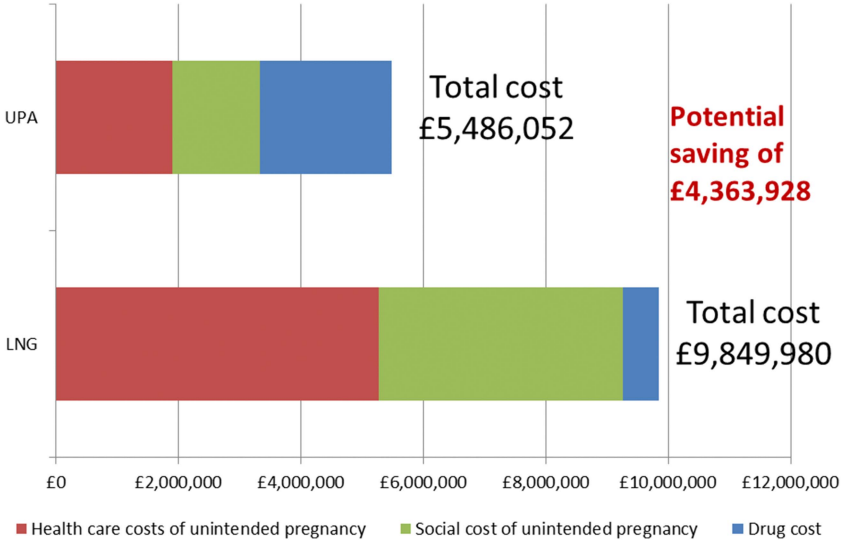

Figure 2 Cost of giving women who presented within the first 24 h after unprotected sexual intercourse (UPSI) alternative emergency hormonal contraception (EHC) in 2011.

a complication related to surgical termination that could in theory affect future fertility and further increase the cost of an unintended pregnancy. This would make the estimates of the cost-effectiveness of EHC conservative and could lead to higher savings than those predicted.

There has been a small reduction in the number and rate of abortions over the past 5 years in Great Britain but teenagers still have the highest rate of abortion. In 2011, in England and Wales, 43% of pregnant women under 20 years old had an abortion, which is twice as many as the rate seen overall.[12] The correlation between teenage pregnancy and deprivation was quantified in the Conceptions-Deprivation Analysis Toolkit, which also showed that under-18 conception rates in England were highly correlated with the percentage of children living in poverty.[31] The *Public Health Outcomes Framework* states that reducing under-18 conceptions has important benefits for short-term and long-term health outcomes. Teenage parents are at increased risk of postnatal depression and poor mental health in the 3 years following birth. The infants of teenage mothers also experience higher rates of infant mortality and low birthweight, accident and emergency admissions for accidents, and have a much higher risk of being born into poverty.[2] Given this, it is likely that the cost of unintended pregnancy in the teenage population is even higher than our estimates of unintended pregnancy across all age groups.

In this study, we consider women who are already presenting for EHC only. In clinical practice, the IUD is offered as EC and is widely recognised as the most effective method.[7] However, uptake of IUD has remained low and was given to only 4% of all women presenting for EC in 2011.[4] We specifically look at the population who have opted for EHC because they did not wish to use the IUD, it was not offered or was not available. We recognise that while this population is 'at risk' of pregnancy due to UPSI, the intervention of EHC will confer benefits for this presenting episode only and not the subsequent risk of unintended pregnancy if there are future episodes of UPSI.

The cost savings predicted in this study are based on a high proportion of women (almost 7 of 10) undergoing an induced abortion, with fewer continuing to delivery. However, in Northern Ireland and other parts of Europe such as Eire, abortion is only legally available under severely restrictive circumstances and women may have to continue the unintended pregnancy to delivery or travel for an abortion at a later and more costly stage. In such circumstances, even greater cost savings could be realised from the use of UPA for EHC.

If primary care services used UPA instead of LNG as the first choice for oral EHC to women presenting within the first 24 h of UPSI, over £1.7 million could have potentially been saved in direct healthcare costs while avoiding an additional 2000 unintended pregnancies. These potential savings present an opportunity to improve the access to sexual health services. The Department of Health published *Commissioning Sexual Health Services and Interventions: Best Practice Guidance for Local Authorities*[32] earlier this year and concluded that EC is more effective the earlier it is used after unprotected sex. It also concluded that EHC should be made easily available and from a wide range of outlets.

While a shift from LNG to UPA as first-line EHC would require sexual health services to spend more of their drug budget on EHC, it should lead to fewer unintended pregnancies and net savings for the NHS overall.

CONCLUSION

We found, through the analysis of published data, that the NHS spent almost £4 billion on pregnancy healthcare in 2011. Inclusion of child health costs during the first year of life brings the total NHS healthcare costs to £4.5 billion. We estimate that unintended pregnancies cost over £1 billion. We calculated that the average cost per unintended pregnancy was £1519 in direct

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pregnancy healthcare costs, rising to £1663 if child health costs in the first year are included and totalling £2922 for all healthcare and social costs of unintended pregnancy in 2011. Using these updated estimates in our previous cost-effectiveness model comparing UPA with LNG, we conclude that UPA is a cost-saving alternative to LNG. This holds true for whichever perspective (healthcare only or health plus social care) is taken. The earlier the UPA was given after UPSI, the greater the cost-saving potential. With the wider availability of EHC through various pharmacy schemes, more women present directly to the pharmacy within the first 24 h after UPSI.

There is no evidence to support the assertion that improved access to EHC will reduce abortion rates. However, the population who do present for EHC (1) are at risk of pregnancy following UPSI, (2) are indicating that such a pregnancy is unintended and (3) are more likely to terminate the pregnancy if they subsequently become pregnant. Therefore, this population should be offered the most effective method available, especially if it has the potential to reduce healthcare budgets and achieve a reduction in the number of unintended pregnancies. Women who present into the healthcare system at risk of unintended pregnancy should be offered the most effective EHC as this could confer savings that could be invested elsewhere in sexual health services.

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Contributors CMT conducted the cost analysis and drafted the manuscript methodology and results. SC was one of the original investigators in the clinical trials between ulipristal acetate (UPA) and levonorgestrel and provided input into the discussion section of the article about the management of women presenting for emergency hormonal contraception (EHC) in the clinical practice, the eligible population for EHC and she revised and approved the final draft.

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Competing interests CMT has been paid by HRA Pharma Ltd, the manufacturer of UPA, for consulting on health economics. SC was principal investigator for the clinical studies of UPA, which were sponsored by HRA Pharma Ltd and has received lecture fees from HRA Pharma Ltd.

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Appendix A: Calculation of the direct costs of pregnancy

Pregnancy outcome	National NHS cost 2011	Number of recorded episodes	Weighted average cost	Source and reference
Abortion	£85,585,954 recorded in NHS hospitals Total calculated cost £130,699,128	119,862 carried out in NHS hospitals 183,052 carried out in total (NHS funded)	£714	National Schedule of Reference Costs (NSRC) 2011 included HRGs MA17C, MA17D, MA18C, MA18D, MA19A, MA19B, MA20Z Abortion Statistics 2011, Table 2: Legal abortions: by purchaser
Miscarriage	£35,881,375 Total calculated cost £63,206,414	64,735 recorded in NSRC 114,091 admissions recorded in HES	£554	National Schedule of Reference Costs 2011 included HRG MB08Z Hospital Episode Statistics 2011-12 Primary diagnosis 3 character code and description included O01, O02, O03, O05, O06, O08, O20(including molar pregnancy and haemorrhage in early pregnancy)
Ectopic pregnancy	£24,339,956 recorded in NSRC Total calculated cost £13,257,488	19,826 for all HRG procedures 10,796 ectopic pregnancy admissions recorded in HES	£1228	National Schedule of Reference Costs 2011 included HRG MB04A, MB04B Hospital Episode Statistics 2011-12 Primary diagnosis 3 character code and description included O00.

Birth Components	**National Schedule of Reference Costs 2011**	**Recorded episodes**	**Average cost per delivery (694,048)**	**Source and reference**
Antenatal care	£138,039,448	2,591,030	£199	Community ante-natal visits CMANV
	£316,318,661	2,737,595	£456	Obstetrics outpatient appointments service code 501
	£162,126,588	2,670,998	£234	Hospital midwife appointments service code 560
	£549,816,884	1,656,507	£797	Ante-natal hospital care HRGs NZ10Z,NZ16Z, NZ17Z, NZ18Z, NZ19Z, NZ20Z, NZ21Z, NZ22Z, NZ23Z, NZ24Z
	£1,166,301,582		£1685	
Hospital Delivery	£1,443,424,955	694,048	£2080	Hospital Delivery HRGs included NZ11A, NZ11B, NZ11C, NZ11D, NZ11E, NZ11F, NZ11G, NZ12A, NZ12B, NZ12C, NZ12D, NZ12E, NZ12F, NZ12G, NZ13A, NZ13B, NZ14A, NZ14B, NZ15Z, NZ25Z
Postnatal care	£45,610,053	38,926	£66	Hospital post-natal care HRGs NZ26Z, NZ27Z
	£160,766,931	2,399,391	£232	Community post-natal midwife visits CMPNV
	£24,933,029	58,250	£36	Mother and Baby units (mental health) MHCOM08, MHOP08, MHIPMB
	£45,371,033	736,974	£65	Health visitor post-natal visits CN402
	£276,681,046		£399	
Maternal care	**£2,886,407,582**		**£4164**	*Sub-total of all above birth components*
Neonatal care	£134,108,060	117,343	£193	Neonatal Admissions HRGs PB01Z, PB02Z
	£659,734,354	1,035,850	£951	Neonatal Intensive care XA01Z, XA02Z, XA03Z, XA04Z, XA05Z, XA06Z
	£5,888,922	32,583	£8	Neonatal outpatients Service code 422
	£18,087,457	608,979	£26	Audiology screening ASNNS
	£817,818,793		£1178	

Live births total	**£3,704,226,375**	**694,048**	**£5337**	**Maternal care plus neonatal care**
Still birth	£13,599,180	3,612	£3,765	Maternal care costs excluding postnatal costs
All pregnancy events in 2011	**£3,924,988,585**	1,005,599	**£3,903**	Recorded (NHS) maternity events in 2011 (abortion, miscarriage, ectopic pregnancy, live birth and still birth)

Data sources

National Schedule of Reference Costs Year : 2011-12 - All NHS trusts and NHS foundation trusts - HRG Data and Outpatient Attendances Data https://www.gov.uk/government/publications/nhs-reference-costs-financial-year-2011-to-2012

The Health and Social Care Information Centre, Hospital Episode Statistics for England. Inpatient statistics, 2011-12. Activity in English NHS Hospitals and English NHS commissioned activity in the independent sector. Primary diagnosis: 3 & 4 character and NHS Maternity Statistics, 2011-12. http://www.hscic.gov.uk/hes

Births in England and Wales by Characteristics of Birth 2, 2011. Office of National Statistics Statistical Bulletin 7 February 2013. Table 4 Maternities in hospitals and communal establishments: live births and stillbirths, and area of occurrence, 2011 http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-279449

Department of Health, Abortion Statistics, England and Wales: 2011. May 2012. https://www.gov.uk/government/statistical-data-sets/abortion-statistics-england-and-wales-2011

Appendix B: Calculation of health care costs for children in the first year

Health care costs in first year	Includes	Cost	Population	Average cost per child<1	Calculation and Source
Standard child immunisations	Community Nursing Services: Health Visiting Services: Vaccination and Immunisation Community Midwife Vaccination and Immunisation Services	£10,770,555 £279,469 £11,050,024	444,344	£48	*NHS Immunisation Statistics* showed that 96% of children in 2011-12 completed the recommended course of 3 vaccinations by their first birthday so the population figure appears an underestimate. However, many children would have been immunised in the GP setting so this figure was calculated to be £48 (444,344/647,900*£25=£16 multiplied by course of 3 immunisations)
Hospital admissions	Total cost of specific conditions in children under 1 year Total cost for all other paediatric codes = £850,448,867 multiplied by proportion of children under 1 year	£55,822,846 £119,062,841 £174,885,687	694,048	£252	*National Schedule of Reference Costs (NSRC) 2011* Population figure of number of children under 1 year =14% *Mid-2011 Population Estimates*
Health visitor services	Health Visiting Services : Parentcraft Health Visiting Services : All Other Services £552,260,910 multiplied by 30%	£3,562,899 £165,678,273 £169,241,172	694,048	£244	*National Schedule of Reference Costs 2011* (estimation of 30% of Health Visitor time spent with children under 1 year) plus all Parentcraft costs
Community paediatrics services	All Community Paediatrician Services [excluding statutory work for education and social education] £123,348,050 multiplied by 35%	£43,171,817	694,048	£62	Recorded in NSRC apportioned to under children 1 year based on BACCH Prospectus calculator estimating 35% of appointments for conditions in children occur in those under 1 year old.
GP/primary care consultations	The cost of a GP consultation was taken from Unit Costs of Health and Social Care 2011=£36	£17,240,152	478,893	£25 x 5 =£125	*Diet and Nutrition Survey of Infants and Young Children (DSNIYC)2011* found that 69% of children <1 year consulted a health care professional and Trends in Consultation Rates in General Practice - 1995-2008 showed an average 5 consultations with GP per year for children aged 0-4 years.
Healthy start vouchers for pregnant women	£3.10 per week for 30 weeks = £93	£14,689,206	157,948	£22	Average for all 664,468 pregnant women Number of pregnant women in receipt of Healthy start vouchers
Healthy start vouchers 21% children under 1	£6.20 for 52 weeks =£322	£44,987,141	139,538	£68	DNSYI Table 3.3.8.1:Receipt of Healthy Start vouchers, by age
Total				**£821**	

Data sources

National Schedule of Reference Costs Year : 2011-12 - All NHS trusts and NHS foundation trusts - HRG Data and Outpatient Attendances Data

https://www.gov.uk/government/publications/nhs-reference-costs-financial-year-2011-to-2012

NHS Immunisations Statistics – England 2011-12 Table 1: Completed primary courses: percentage of children immunised by their first birthday, 2001-02 to 2011-12

http://www.hscic.gov.uk/catalogue/PUB09125/nhs-immu-stat-eng-2011-12-tab-exc.xls

Mid-2011 Population Estimates: Single year of age and sex for local authorities in England and Wales; estimated resident population; based on the results of the 2011 Census.

http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-england-and-wales/mid-2011--2011-census-based-/index.html

Service vision for health visiting in England

https://www.gov.uk/government/publications/service-vision-for-health-visiting-in-england-cphva-conference-20-22-october-2010

Calculator to estimate service demands in Community Child Health Services (updated 041012) www.bacch.org.uk/publications/documents/Propectus_calculator_041012.xls

Diet and Nutrition Survey of Infants and Young Children (DNSIYC) 2011

Table 3.3.8.1: Receipt of Healthy Start vouchers, by age

Table 3.3.14.1: Health problems that resulted in consulting a health professional, by age

https://www.gov.uk/government/publications/diet-and-nutrition-survey-of-infants-and-young-children-2011

Trends in Consultation Rates in General Practice - 1995-2009 Table 3:Consultation rates in England by sex, age band and year

http://www.hscic.gov.uk/catalogue/PUB01077/tren-cons-rate-gene-prac-95-09-95-08-tab.xls

Appendix C: Calculation of the social costs of pregnancy

Element	Amount spent in 2011 £ thousands	Population		Cost per eligible recipient	Cost per delivery	Source
		Eligible/in receipt	*Total*			
Child benefit	£12,283,000	647,900	11,537,505 (6.6m families)	£1,065	£1,065	HMRC Tax and NI receipts 23/4/13 http://hmrc.gov.uk/statistics/receipts.htm *Child benefit statistics Geographical analysis August 2011© ONS 2012* *Table 7: Number of children at 31st August 2011 for whom Child Benefit is received in each local authority by their single year of age*
Child tax credit only	£7,394,450	5,729,000	*12,077,665 (all ages)*	£1,291	£612	Table 1.1: Families receiving CTC or WTC, or with children and receiving out-of-work benefits, July 2003 to December 2011. http://www.hmrc.gov.uk/statistics/prov-main-stats.htm#3
Working tax & child tax credit	£14,914,720	3,431,400	*12,077,665 (all ages)*	£4,347	£1,235	
Maternity allowance	£301,045	189,100	664,468 (maternities in England 2011)	£1,592	£453	Maternity allowance quarterly 2011 https://www.gov.uk/government/organisations/department-for-work-pensions/series/maternity-allowance-quarterly-statistics
SMP	£1,934,000	*388,987**	664,468	£4,972	£2,911	Statutory Maternity Pay Benefit Expenditure by Country and Region https://www.gov.uk/government/publications/benefit-expenditure-by-local-authority
Sure start maternity grants	£65,738	86,381	664,468	£500	£99	Table 6: Breakdown of Social Fund expenditure, 1991/92 to 2015/16 Real Terms (2011/12 Prices) https://www.gov.uk/government/publications/data-about-people-that-were-receiving-benefits-in-2011-as-published-with-the-budget-and-the-autumn-statement
Social security	£82,355	139,538	664,468	£590	£124	chap5socialprotectio_tcm77-234130 www.ons.gov.uk
Housing	£20,129,981	73,091	4,229,386	£4,760	£523	Housing Benefit and Council Tax Benefit expenditure by local authority district, 2011/12

benefit						https://www.gov.uk/government/publications/housing-benefit-and-council-tax-benefit-caseload-statistics-published-from-november-2008-to-present
Council tax rebates	£4,290,881	66,447	5,877,400	£730	£73	
Total average per live birth					**£7,095**	

*Assumed number based on total number of pregnant women less those eligible for maternity allowance and Sure Start maternity grants

Appendix D: Cost of an unintended pregnancy

Calculation of direct health care costs of an unintended pregnancy

	Calculated cost in 2011[1]	Proportion in EHC clinical trials[2]	Proportion in studies about unintended pregnancy[3]
Abortion	£714	66%	72%
Miscarriage	£554	15%	5%
Ectopic pregnancy*	£1228	1%	1%
Stillbirth*	£3,765	0.5%	0.5%
Live birth	£5,337	17.5%	21.5%
Weighted average for unintended pregnancy		£1,519	£1,720

*These figures were adjusted using the standard rates as they were not measured in either clinical or reported studies

Calculation of all health care costs of an unintended pregnancy (including child health costs in first year)

	Calculated cost in 2011	Proportion in clinical trials following EHC	Proportion in studies about unintended pregnancy
Abortion	£714	66%	72%
Miscarriage	£554	15%	5%
Ectopic pregnancy	£1228	1%	1%
Stillbirth	£3,765	0.5%	0.5%
Live birth	£6,158	17.5%	21.5%
Weighted average for unintended pregnancy		£1,663	£1,897

Calculation of all health and social costs of an unintended pregnancy

	Calculated cost in 2011	Proportion in clinical trials following EHC	Proportion in studies about unintended pregnancy
Abortion	£714	66%	72%
Miscarriage	£554	15%	5%

Ectopic pregnancy	£1,228	1%	1%
Stillbirth	£7,228	0.5%	0.5%
Live birth	£13,253	17.5%	21.5%
Weighted average for unintended pregnancy		£2,922	£3,440

Sources:

1 Appendix A for cost calculations and sources

2 EHC Clinical trial outcomes: Thomas CM, Schmid R, Cameron S. Is it worth paying more for emergency contraception? The cost-effectiveness of ulipristal acetate versus LNG , J Fam Plann Reprod Health Care 2010;36(4):197-201.

3 Applying the percentages from Cameron ST, Glasier A. Identifying women in need of further discussion about the decision to have an abortion and eventual outcome. Contraception 2013;88(1):128-32 (86% of abortions, 6.8% of deliveries and 11% of miscarriages) to the 2011 National maternity figures cited in Appendix A and including standard rates of 1% ectopic pregnancy and 0.5% stillbirth gives these percentages.

Appendix E: Cost-effectiveness analysis of EHC including sensitivity analyses

Base case: efficacy within 72 hours of UPSI and cost of unintended pregnancy £1,663 (all health care costs)

	UPA	LNG
Pregnancy rate	1.4%	2.2%
Cost of drug	£16.95	£5.20
Cost of pharmacy consultation	£10	£10
Cost of pregnancy in failures	£23.28	£36.59
Total cost	£50.23	£51.79
Difference in total cost Difference in efficacy (failure rate)	-£1.5 0.8%	
Cost of preventing on additional pregnancy (negative denotes saving)	-£194	

Efficacy within 72 hours of UPSI and cost of unintended pregnancy £1,519 (pregnancy health care costs only)

	UPA	LNG
Pregnancy rate	1.4%	2.2%
Cost of drug	£16.95	£5.20
Cost of pharmacy consultation	£10	£10
Cost of pregnancy in failures	£21.27	£33.43
Total cost	£48.22	£48.63
Difference in total cost Difference in efficacy (failure rate)	-£0.41 0.8%	
Cost of preventing on additional pregnancy (negative denotes saving)	-£51	

Efficacy within 72 hours of UPSI and cost of unintended pregnancy £2,922 (including all health costs and social costs of births)

	UPA	LNG
Pregnancy rate	1.4%	2.2%
Cost of drug	£16.95	£5.20
Cost of pharmacy consultation	£10	£10
Cost of pregnancy in failures	£40.91	£64.28
Total cost	£67.86	£79.48
Difference in total cost Difference in efficacy (failure rate)	-£11.63 0.8%	
Cost of preventing on additional pregnancy (negative denotes saving) ICER	-£1,453	

Impact of using the different cost of unintended pregnancy (based on observational rather than clinical studies) with failure rate within 72 hours as above and drug/consultation costs the same as base case

	UPA total cost	**LNG total cost**	**ICER UPA compared to LNG**
All health care costs = £1,835	£52.64	£55.58	-£367
Pregnancy health care costs = £1,667	£50.29	£51.87	-£198
Health and social costs = £3,307	£73.25	£87.95	-£1,838

Using failure rate within 24 hours of presenting for EHC following UPSI (0.9% for ellaOne and 2.5% for levonorgestrel) with the different costs of unintended pregnancy as below and drug/consultation costs the same as base case.

Cost of unintended pregnancy	UPA total cost	LNG total cost	ICER UPA compared to LNG
All healthcare costs = £1,663	£41.92	£56.78	-£929
Direct pregnancy healthcare costs = £1,519	£40.62	£53.19	-£785
Health and social care costs = £2,922	£53.25	£88.25	-£2,188
All healthcare costs = £1,835	£43.47	£61.08	-£1,101
Direct pregnancy health care costs = £1,667	£41.95	£56.87	-£933
Health and social care costs = £3,307	£56.71	£97.87	-£2,573

Appendix F: Budget impact of EHC provision in 2011

Drug	Number of prescriptions issued	Average drug cost	Total expenditure
Ellaone_Tab 30mg (UPA)	11,164	£16.95	£189,671
Levonelle One Step_Tab 1.5mg (LNG)	33,099	£12.25	£409,225
Levonelle_Tab 1.5mg (LNG)	200,731	£4.60	£941,694
Levonelle-2_Postcoital Tab 750mcg (LNG)	6	£2.56	£20
Total	244,994		£1,540,610

Source: Prescription Cost Analysis 2011http://www.hscic.gov.uk/pubs/prescostanalysis2011

These represent 244,994 women who went to primary care provider and were issued a prescription for EHC

A further 128,100 women presented at community contraception clinics and were issued with EHC directly.

Source: NHS Contraceptive Services: England, 2011/12 - Table 7 Number of contacts for emergency contraceptives at NHS community contraceptive clinics, by type and age, 2011/12 https://catalogue.ic.nhs.uk/publications/public-health/contraception/nhs-cont-serv-comm-cont-clin-eng-2011-2012/nhs-cont-serv-comm-cont-clin-eng-11-12-rep.pdf

The following table shows the cost of providing all the women who presented in 2011 with either LNG or UPA, assuming that they all presented within 72 hours of UPSI:

If 373,094 presented within 72 hours of UPSI	**LNG**	**UPA**
Drug cost (average cost above)	£1,716,232	£6,323,943
Health costs of pregnancy (pregnancy rate 0-72 hours x £1,663 health cost of unintended pregnancy)	£13,650,017	£8,686,375
Social cost of pregnancy (pregnancy rate 0-72 hours x social cost of unintended pregnancy £1,259)	£10,333,958	£6,576,155
Total cost of EHC provision (sum of above)	£25,700,207	£21,586,473
Potential saving for using UPA rather than LNG	**£4,113,734**	

In the comparative clinical trials between ellaOne and levonorgestrel 34% of women presented within 24 hours of UPSI. Taking this proportion of women and applying it to the number of women presenting in 2011 provides the following comparison if all these 134,313 women were given levonorgestrel or ellaOne:

If 126,851 presented within 24 hours of UPSI	**LNG**	**UPA**
Drug cost (average cost above)	£583,515	£2,150,124
Health costs of unintended pregnancy (pregnancy rate 0-24 hours x £1,663)	£5,273,830	£1,898,579
Social cost of unintended pregnancy (pregnancy rate 0-24 hours x £1,663)	£3,992,635	£1,437,349
Total cost of EHC provision (sum of above)	£9,849,980	£5,486,052
Potential saving for using UPA rather than LNG	**£4,363,928**	