

Fertility: assessment and treatment
for people with fertility problems
(update)

Costing report

Implementing NICE guidance

Following a review of the guideline in 2016, the costing tools remain valid to support the implementation of the guideline

February 2013

NICE clinical guideline 156



This costing report accompanies the clinical guideline: 'Fertility: assessment and treatment for people with fertility problems (update)' (available online at www.nice.org.uk/guidance/CG156).

Issue date: February 2013

This costing report is written in the following context

This costing report represents the view of NICE, which was arrived at after careful consideration of the available data and through consulting with healthcare professionals. It should be read in conjunction with the NICE guideline. The costing report and template are implementation tools and focus on the recommendations that were considered to have a significant impact on resource utilisation.

The cost and activity assessments in the report are estimates based on a number of assumptions. They provide an indication of the likely impact and are not absolute figures. Assumptions used in the report are based on assessment of the national average. Local practice may be different from this, and the template can be amended to reflect local practice.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this costing tool should be interpreted in a way that would be inconsistent with compliance with those duties.

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Executive summary

This costing report looks at the resource impact of implementing the updated NICE guideline 'Fertility: assessment and treatment for people with fertility problems' in England.

The costing method adopted is outlined in appendix A; it uses the most accurate data available, was produced in conjunction with key clinicians, and reviewed by clinical and financial professionals.

Significant¹ resource-impact recommendations

This report focuses on the new and updated recommendations that are considered to have the greatest resource impact and therefore require the most additional resources to implement or can potentially generate the biggest savings. They are:

- Revised criteria for referral for IVF; In women aged under 40 years who have not conceived after 2 years of regular unprotected intercourse or 12 cycles of artificial insemination (where 6 or more are by intrauterine insemination) offer 3 full cycles of IVF, with or without intracytoplasmic sperm injection (ICSI).
- Embryo transfer strategies to reduce the number of embryos transferred during IVF.
- Cryopreservation of semen, oocytes and embryos (at a local level).

Net resource impact

The additional resources associated with full implementation of this updated guideline are related to 2 factors: 1) the costs of meeting new or updated recommendations and 2) moving current practice to be consistent with

¹ The following impacts have been defined as significant:

- where the number of people affected by the guideline recommendations is estimated to be over 300 (equivalent to 1 patient per 170,000; in practice, smaller populations may have no patients or possibly more than 1, particularly if it is a disease that runs in families and there is a cluster in 1 area)
- where initial costing work indicates that the national cost is more than £1 million (equivalent to £2000 per 100,000 population).

existing guidance, in particular increasing the number of IVF treatments provided by the NHS.

New or updated recommendations

The updated guideline is anticipated to change resource use in 3 areas as follows:

- Criteria for referral for IVF. Under the previous NICE guideline ('Fertility: assessment and treatment for people with fertility problems' [NICE clinical guideline 11]) couples were required to have been trying to conceive for 3 years before they were eligible for IVF treatment. The new guideline recommends reducing this to 2 years. It is anticipated to take up to 3 years to implement the reduced time period.
- Embryo transfer strategies. The cost of multiple pregnancies based on current embryo transfer strategies is estimated to be £12,000. Future costs are estimated at £8000 because of a reduction in the number of multiple pregnancies. The change in practice is estimated to give an annual recurrent saving of £4000.
- Cryopreservation of semen, oocytes and embryos. Costs cannot be estimated because practice varies considerably across the country however the costing template allows a local estimate to be made.

The anticipated annual change in resource use for a population of 100,000 arising from implementing the updated recommendations considered in the costing analysis are set out in the table below.

Costs

For a population of 100,000, it is estimated there will be a non-recurrent cost of around £201,000 because the length of time couples are required to have been trying to conceive is being reduced from 3 to 2 years. This is anticipated to occur over 3 years.

There is likely to be an annual recurrent saving of around £4000 for embryo transfer strategies for a population of 100,000 because of a decrease in the expected number of multiple pregnancies resulting from IVF treatment. A multiple pregnancy is estimated to cost the NHS an average of £4000 more than a singleton pregnancy.

Commissioners are advised to review cryopreservation of semen, oocytes and embryos locally.

There may be costs associated with the provision of IVF to women aged 40–42. An estimate of this is not provided as there are a number of uncertainties and NICE assumptions cannot be made. The impact may be calculated locally using the costing template.

Summary of estimated annual costs and savings for a population of 100,000 following implementation of the updated recommendations

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Estimated savings to the NHS from reduced costs of embryo transfer strategies	-4	-4	-4	-4	-4
Reduction in the time to wait for IVF	52	70	79	0	0
Cryopreservation of semen, oocytes and embryos	Calculate locally				
Change in cost to the NHS	48	66	75	-4	-4

Moving current practice to be consistent with existing guidance

The estimated cost of IVF treatment currently provided by the NHS is £107,000 for a population of 100,000. A gradual increase in NHS provision of IVF services, as set out in the updated and previous guideline is shown in the table below.

Estimated additional cost of IVF treatment to the NHS: to be consistent with existing guidance for a population of 100,000

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Estimated future cost of IVF treatment provided by the NHS	159	210	236	236	236
Increased cost to the NHS	52	103	129	129	129

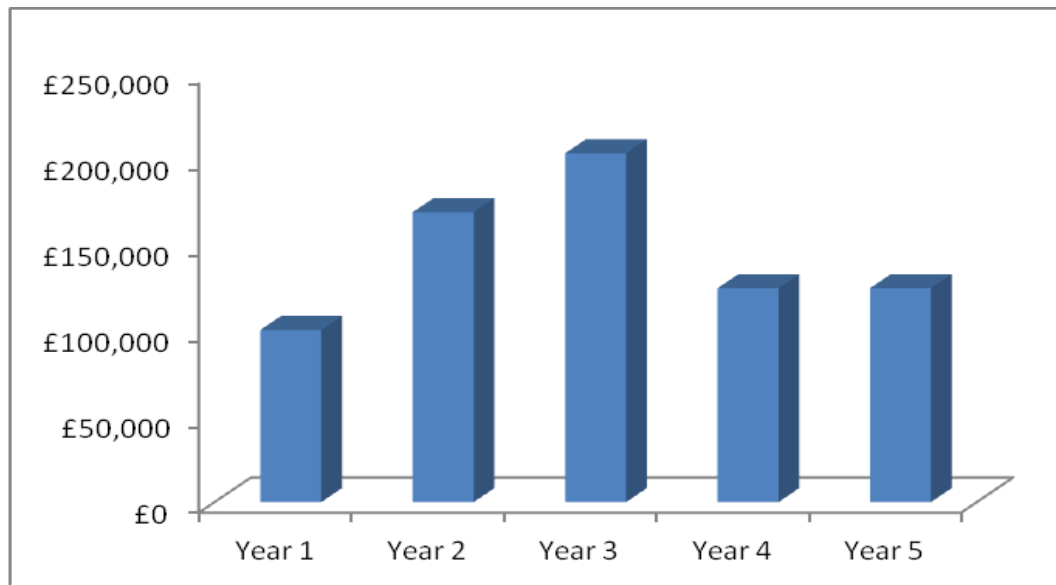
Costs

If commissioners move to being consistent with access to IVF services across the NHS, in line with the previous NICE guideline, there is likely to be an increase in the annual recurrent cost of around £129,000 for IVF treatment for a population of 100,000 once a steady state is reached.

Phasing of costs and savings

It is anticipated that implementation of the recommendations may occur over 3 years and that it would take this time to reach a steady state. The chart below shows the costs during the first 3 years and the annual recurrent cost once a steady state is reached. The significant decrease in costs from year 3 to year 4 is because the non-recurrent cost is expected to have been fully incurred by this point.

Total costs of implementing the guideline during the first 5 years for a population of 100,000



Local costing template

The costing template produced to support this guideline enables organisations in England, Wales and Northern Ireland to estimate the impact locally and replace variables with ones that depict the current local position.

1 Introduction

1.1 *Supporting implementation*

1.1.1 The NICE clinical guideline on fertility is supported by the following implementation tools available on our website

www.nice.org.uk/guidance/CG156:

- costing tools
 - a costing report; this document
 - a costing template; a spreadsheet that can be used to estimate the local cost of implementation
- implementation support tools
- clinical audit tools; measure current practice against the guideline and identify areas in which practice can be improved.

1.2 *What is the aim of this report?*

1.2.1 This report provides estimates of the cost impact arising from implementation of the guideline on fertility. These estimates are based on assumptions made about current practice and predictions of how current practice might change following implementation.

1.2.2 This report aims to help organisations plan for the financial implications of implementing NICE guidance.

1.2.3 This report does not reproduce the NICE guideline on fertility and should be read in conjunction with it (see www.nice.org.uk/guidance/CG156).

1.2.4 The costing template that accompanies this report is designed to help those assessing the resource impact at a local level in England, Wales or Northern Ireland.

1.3 *Epidemiology of infertility*

1.3.1 It is estimated that infertility affects 1 in 7 heterosexual couples in the UK.

1.3.2 The main causes of infertility in the UK are (percent figures indicate approximate prevalence):

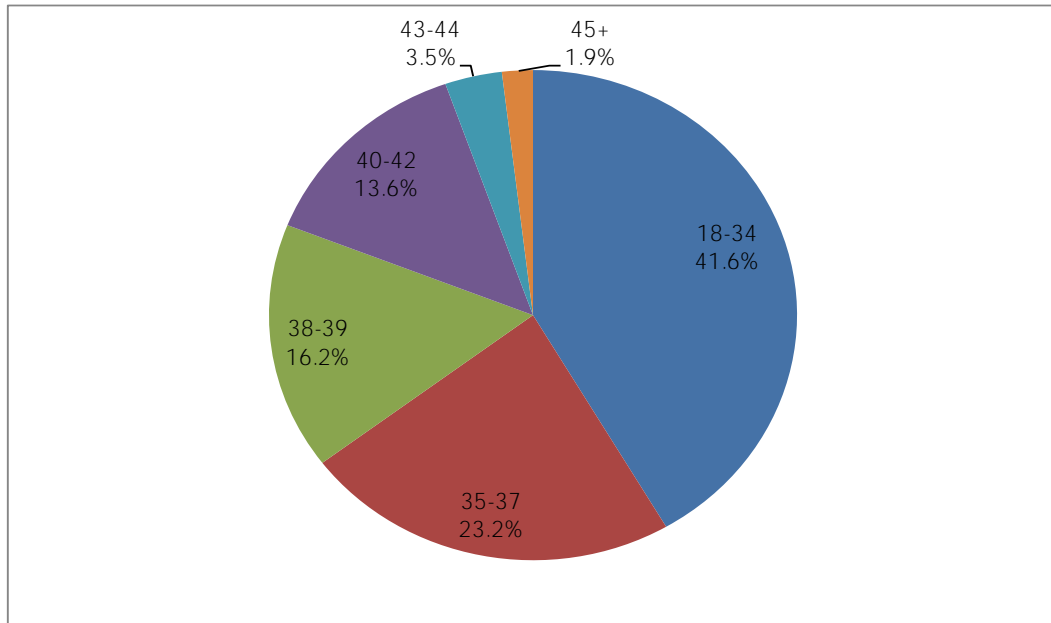
- unexplained fertility (no identified male or female cause) (25%)
- ovulatory disorders (25%)
- tubal damage (20%)
- factors in the male causing infertility (30%)
- uterine or peritoneal disorders (10%)

In about 40% of cases disorders are found in both the man and the woman.

1.3.3 In 2010 45,264 women had a total of 57,652 cycles of IVF, including procedures with ICSI (Human Fertilisation and Embryology Authority [HFEA], 2011). This includes cycles funded by the NHS and privately.

1.3.4 The average age of women receiving IVF treatment was 35.1 years in 2010. The average length of time women reported trying to conceive was 4.1 years. Chart 1 shows the age distribution of women who received IVF treatment (HFEA, 2011).

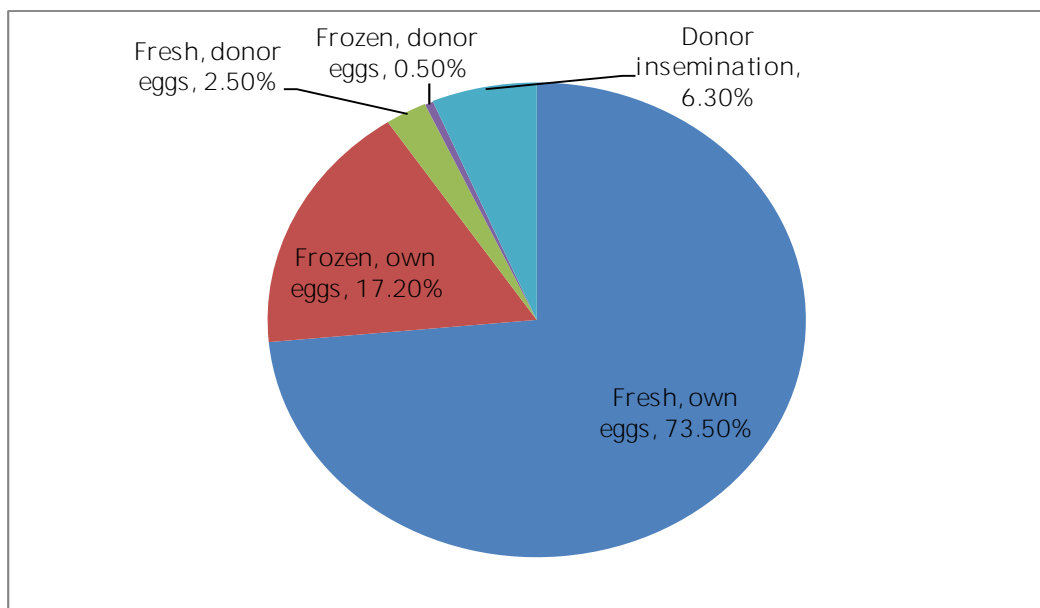
Chart 1 Percentage of all IVF cycles performed by age group, 2010 (Private and NHS treatment)



Source: Human Fertilisation Embryology Authority (2011) Fertility treatment in 2010 – trends and figures. Available at <http://www.hfea.gov.uk/104.html> [Accessed 14th August 2012]

1.3.5 Chart 2 shows the different types of IVF cycles that were started in 2010. In most (73.5%) treatment cycles the woman’s own freshly collected eggs were used. A smaller number used embryos which had been frozen previously and then thawed just before transfer (HFEA, 2011).

Chart 2 Proportion of treatment cycles started (Private and NHS treatment)



Source: Human Fertilisation Embryology Authority (2011) Fertility treatment in 2010 – trends and figures. Available at <http://www.hfea.gov.uk/104.html> [Accessed 14th August 2012]

1.3.6 Around 2% of babies born each year in the UK are conceived through IVF treatment (HFEA 2011).

1.4 Current service provision

1.4.1 About 85% of heterosexual couples having unprotected regular intercourse will conceive spontaneously within 12 months, and further assessment is normally indicated if conception does not occur within this time. For people attempting conception using donor insemination, and in the absence of any known cause of infertility, most successful conceptions will occur within 6 cycles. If conception does not occur after 6 cycles further assessment is normally indicated.

1.4.2 Couples who have not conceived but have been trying for less than the recommended time to qualify for fertility assessment and treatment are usually advised that they may successfully conceive during a period of 'expectant management'. This involves supportively offering them information and advice about the regularity and timing of intercourse and any lifestyle changes which might improve their chances of conceiving.

1.4.3 Given the range of causes of fertility problems, the provision of appropriate investigations is critical. These investigations include semen analysis; assessment of ovulation, tubal damage and uterine abnormalities; and screening for infections.

1.4.4 Once a diagnosis has been established, treatment falls into 3 main types:

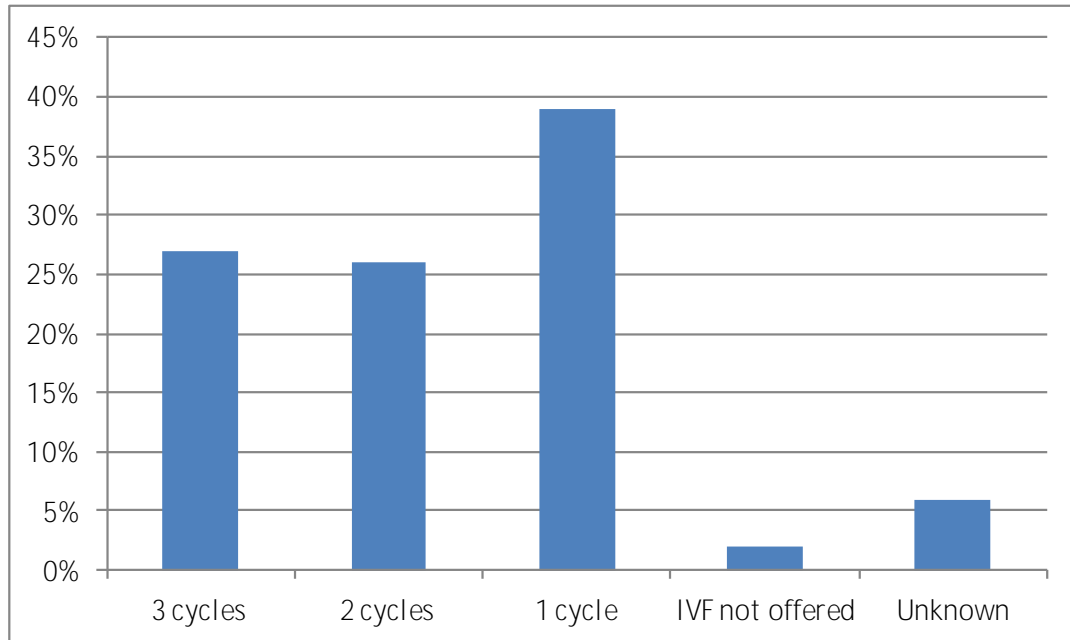
- medical treatment to restore fertility (for example, the use of drugs for ovulation induction)
- surgical treatment to restore fertility (for example, laparoscopy for ablation of endometriosis)

- assisted reproduction techniques – any treatment that deals with means of conception other than vaginal coitus. It frequently involves the handling of gametes or embryos.

- 1.4.5 NHS funding for investigation of infertility is generally available. However, there is wide variation and often limited access to NHS-funded treatment, particularly assisted reproduction techniques. Generally the management can be shared, at least in the early stages of investigation, between the GP and hospital-based specialist services.
- 1.4.6 In 2010, 40.6% of all IVF treatment cycles were funded by the NHS, the remainder being paid for privately. Assuming that IVF treatment received by women aged over 40 years is paid for privately, this indicates that 50% of IVF treatment cycles received by women aged 18–39 are currently funded by the NHS (HFEA, 2011). If the guideline is fully implemented in line with assumptions made in the costing model, the proportion of all IVF treatment cycles estimated to be funded by the NHS will be around 93%. The remaining 7% would be expected to pay privately because they are not eligible for NHS treatment. See paragraph 3.1.11 for further discussion of this.
- 1.4.7 In 2004, NICE published 'Fertility: assessment and treatment for people with fertility problems' (NICE clinical guideline 11). The recommendations included in this guideline have been adopted to varying degrees across England, with full implementation being achieved in only a minority of places.
- 1.4.8 A survey of PCTs carried out in March 2011 reported that of the PCTs offering IVF to patients, 39% only offered 1 cycle of treatment, 26% of PCTs offered 2 and 27% offered 3 cycles. A small number have addressed current financial challenges by temporarily suspending local NHS provision of IVF services (All

Party Parliamentary Group on Infertility, 2011). Based on data from this group, the average number of cycles offered is 1.8.

Chart 3 Number of IVF cycles offered by PCTs



Source: All Party Parliamentary Group on Infertility (2011). Holding back the British IVF revolution? A report into NHS IVF provision in the UK today. Available at http://www.bionews.org.uk/page_155601.asp [Accessed 30 January 2013 August 2012]

1.4.9 As well as the number of cycles available, some PCTs place restrictions on other factors such as age and existing children. This is discussed further in section 3.1.

1.4.10 Waiting times for IVF treatment are variable. However NHS clinics in England are required to work to an 'eighteen week policy'. This means that that a woman should be able to start fertility treatment within 18 weeks of referral to the fertility clinic (Department of Health, 2011)

2 Costing methodology

2.1 Process

2.1.1 We use a structured approach for costing clinical guidelines (see appendix A).

- 2.1.2 We have to make assumptions in the costing model. These are tested for reasonableness with members of the Guideline Development Group (GDG) and key clinical practitioners in the NHS.
- 2.1.3 Local users can assess local cost impact, using the costing template as a starting point, and update assumptions to reflect local circumstances.

2.2 *Scope of the cost-impact analysis*

- 2.2.1 The guideline offers best practice advice on the care of people with fertility problems. It covers a wide range of clinical management issues involved with assisting people of reproductive age who have problems conceiving.
- 2.2.2 The guideline does not cover multiple or recurrent miscarriage or surrogacy. Therefore, these issues are outside the scope of the costing work.
- 2.2.3 We worked with the GDG and other professionals to identify the recommendations that would have the most significant resource-impact (see table 1). Costing work has focused on these recommendations.

Table 1 Recommendations with a significant resource impact

Recommendation	Recommendation number	Guideline key priority?
<u>Criteria for referral for IVF</u>		
<p>In women aged under 40 years who have not conceived after 2 years of regular unprotected intercourse or 12 cycles of artificial insemination (where 6 or more are by intrauterine insemination), offer 3 full cycles of IVF, with or without intracytoplasmic sperm injection (ICSI). If the woman reaches the age of 40 during treatment, complete the current full cycle but do not offer further full cycles.</p>	1.11.1.3	✓
<p>In women aged 40–42 years who have not conceived after 2 years of regular unprotected intercourse or 12 cycles of artificial insemination (where 6 or more are by intrauterine insemination), offer 1 full cycle of IVF, with or without ICSI, provided the following 3 criteria are fulfilled:</p> <ul style="list-style-type: none"> • they have never previously had IVF treatment • there is no evidence of low ovarian reserve (see recommendation 1.3.3.2) • there has been a discussion of the additional implications of IVF and pregnancy at this age. 	1.11.1.4	✓
<u>Embryo transfer strategies</u>		
<p>When considering the number of fresh or frozen embryos to transfer in IVF treatment:</p> <ul style="list-style-type: none"> • For women aged under 37 years: <ul style="list-style-type: none"> – In the first full IVF cycle use single embryo transfer. – In the second full IVF cycle use single embryo transfer if 1 or more top-quality embryos are available. Consider using 2 embryos if no top-quality embryos are 	1.12.6.5	✓

Recommendation	Recommendation number	Guideline key priority?
<p>available.</p> <ul style="list-style-type: none"> – In the third full IVF cycle transfer no more than 2 embryos. • - For women aged 37–39 years: <ul style="list-style-type: none"> – In the first and second full IVF cycles use single embryo transfer if there are 1 or more top-quality embryos. Consider double embryo transfer if there are no top-quality embryos. – In the third full IVF cycle transfer no more than 2 embryos. • - For women aged 40–42 years consider double embryo transfer. 		
Where a top-quality blastocyst is available, use single embryo transfer.	1.12.6.8	✓
Offer cryopreservation to store any remaining good-quality embryos after embryo transfer.	1.12.6.10	✗
<u>Cryopreservation of semen, oocytes and embryos</u>		
Offer sperm cryopreservation to men and adolescent boys who are preparing for medical treatment for cancer that is likely to make them infertile.	1.16.1.8	✗
<p>Offer oocyte or embryo cryopreservation as appropriate to women of reproductive age (including adolescent girls) who are preparing for medical treatment for cancer that is likely to make them infertile if:</p> <ul style="list-style-type: none"> • they are well enough to undergo ovarian stimulation and egg collection and • this will not worsen their condition and • enough time is available before the start of their cancer treatment. 	1.16.1.10	✗
In cryopreservation of oocytes and embryos, use vitrification instead of controlled-rate	1.16.1.11	✗

Recommendation	Recommendation number	Guideline key priority?
freezing if the necessary equipment and expertise is available.		
Store cryopreserved material for an initial period of 10 years.	1.16.1.12	✘

2.2.4 Ten of the recommendations in the guideline have been identified as key priorities for implementation, and 4 of these are also among the 9 recommendations considered to have significant resource impact. The following key priorities were deemed not to have a significant resource impact.

Table 2 Key priority recommendations that are not expected to have a significant resource impact

Recommendation	Number	Reason not considered to have significant resource impact
A woman of reproductive age who has not conceived after 1 year of unprotected vaginal sexual intercourse, in the absence of any known cause of infertility, should be offered further clinical assessment and investigation along with her partner.	1.2.13.5	Based on GDG experience this does not represent a change from current practice.
Offer an earlier referral for specialist consultation to discuss the options for attempting conception, further assessment and appropriate treatment where: <ul style="list-style-type: none"> • the woman is aged 36 years or over • there is a known clinical cause of infertility or a history of predisposing factors for infertility. 	1.2.13.7	Based on GDG experience this does not represent a change from current practice.
Do not offer oral ovarian stimulation agents (such as clomifene citrate, anastrozole or letrozole) to women with unexplained infertility.	1.8.1.1	There are expected to be savings from a reduction in the use of oral ovulation stimulation agents, but these are not expected to be significant as the drugs are inexpensive.
Offer IVF treatment to women with unexplained infertility who have not conceived after 2 years (this can include up to 1 year before their fertility investigations) of regular unprotected sexual intercourse.	1.8.1.4	The women affected by this recommendation are covered by 1.11.1.3, which is considered in section 3.1 below.
For people with unexplained infertility, mild endometriosis or 'mild male factor infertility', who are having regular unprotected sexual intercourse: <ul style="list-style-type: none"> • do not routinely offer intrauterine insemination, either with or without ovarian stimulation (exceptional circumstances include, for example, when people have social, cultural or religious objections to 	1.9.1.3	There will be savings here from an expected decrease in the use of intrauterine insemination. Based on Hospital Episode Statistics data the number of cycles of intrauterine insemination in 2010–11 was 1477 (NHS Information Centre, 2011) and the cost per cycle is between £145 and £910 (Reference cost code MC09Z, Intra-uterine insemination without super ovulation, outpatient and day-case costs respectively). Therefore the savings are not expected to be significant.

<p>IVF).</p> <ul style="list-style-type: none"> advise them to try to conceive for a total of 2 years (this can include up to 1 year before their fertility investigations) before IVF will be considered. 		
<p>Inform people that normally a full cycle of IVF treatment, with or without intracytoplasmic sperm injection (ICSI), should comprise 1 episode of ovarian stimulation and the transfer of any resultant fresh and frozen embryo(s).</p>	<p>1.11.1.2</p>	<p>No resource impact is anticipated.</p>

2.2.5 We have limited the consideration of costs and savings to direct costs to the NHS that will arise from implementation. We have not included consequences for the individual, the private sector or the not-for-profit sector. If applicable, any realisable cost savings arising from a change in practice have been offset against the cost of implementing the change.

2.3 General assumptions made

2.3.1 The number of cycles included in the model is based on data provided in a report by the statutory IVF regulator, the HFEA. In 2010, 45,264 women had a total of 57,652 cycles of IVF, including procedures with ICSI (HFEA, 2011).

2.3.2 It is estimated that the NHS currently funds 50% of all cycles of IVF received by women aged 18–39 years (HFEA, 2011).

2.3.3 It is assumed that the NHS does not usually currently fund IVF treatment in women aged over 40 years.

2.3.4 Although the NHS does incur costs with an ongoing IVF pregnancy and birth these were not included in the costing model because they do not impose costs above those that would occur from natural conception. However, the additional cost of a twin

pregnancy and care immediately following the birth is included, as the chance of a multiple pregnancy is significantly higher for double embryo transfer than for single embryo transfer or natural conception.

3 Significant resource-impact recommendations

3.1 Criteria for referral for IVF

Recommendations

Recommendation 1.11.1.3

In women aged under 40 years who have not conceived after 2 years of regular unprotected intercourse or 12 cycles of artificial insemination (where 6 or more are intrauterine insemination) offer 3 full cycles of IVF, with or without ICSI. If the woman reaches the age of 40 during treatment, complete the current full cycle but do not offer further full cycles.

Recommendation 1.11.1.4

In women aged 40–42 years who have not conceived after 2 years of regular unprotected intercourse or 12 cycles of artificial insemination (where 6 or more are by intrauterine insemination), offer 1 full cycle of IVF, with or without ICSI, provided the following 3 criteria are fulfilled:

- they have never previously had IVF treatment
- there is no evidence of low ovarian reserve (see recommendation 1.3.3.2)
- there has been a discussion of the additional implications of IVF and pregnancy at this age.

Background

3.1.1 Provision of IVF treatment is variable across England. The costing model is based on the average level of provision as identified in a report by the All Party Parliamentary Group on Infertility and shown in section 1.4, chart 3. However, the assumptions in the costing template should be amended to reflect local practice. In some

areas, 3 cycles of IVF are currently being provided and there would be no additional annual recurrent cost in meeting the recommendation.

3.1.2 Most PCTs offer IVF to women under the age of 40 years. However some PCTs set the cut-off at a lower age and some place restrictions on the male partner's age. Many PCTs also put other restrictions on the provision of IVF, including restrictions that are contrary to the NICE guideline. For example, the NICE guideline does not recommend restricting IVF to non-smokers, but PCTs often do so. Some PCTs also put restrictions in place regarding BMI limits and existing children.

Assumptions made

3.1.3 Fertility services are not included in the payment by results tariff and there are no applicable NHS reference cost data available. Unit costs were taken from the health economics section of the full guideline, where estimates were derived from published UK sources and GDG estimates. Commissioners should amend the unit costs in the costing template to reflect local practice.

Table 3 Unit costs used in the costing model

IVF Treatment	Cost
IVF fresh cycle	£3,123
IVF fresh cycle – cancelled pre-harvest	£1,000
IVF fresh cycle – cancelled post-harvest	£2,565
IVF frozen cycle	£1,343
IVF frozen cycle – cancelled	£800
Additional cost of ICSI	£500

Source: Page 235 of the full guideline for Fertility: assessment and treatment for people with fertility problems (update). Available at www.nice.org.uk/guidance/CG156

3.1.4 The average number of cycles estimated to be currently offered in England is 1.8 (All Party Parliamentary Group on Infertility, 2011). As the live birth rate is around 27.9% (HFEA, 2011), the actual number of cycles expected to be paid for is 1.5.

3.1.5 Where commissioners fully implement the guideline and offer 3 full cycles of IVF to women under 40 years, the average number of cycles expected to be paid for in the future is estimated to be 2.2 per eligible woman when the live birth rate is taken into account. Table 4 provides a summary of the maximum number of cycles commissioned and the average number women are expected to receive. The calculations are shown in the costing template.

Table 4 Summary of the number of cycles which may be commissioned for women aged under 40 years and the anticipated number paid for

Maximum number of cycles commissioned per eligible woman	Number of cycles expected to be received based on live birth rate of 27.9%
1.8 (national average)	1.5
3	2.2
2	1.7
1	1
0	0

3.1.6 The NICE assumptions should be amended in the costing template to reflect local circumstances regarding commissioning of IVF treatment.

3.1.7 An additional increase in the number of cycles expected to be offered in the future to women aged under 40 years has been built into the costing model to reflect an anticipated change in practice by commissioners regarding the removal of restrictions related to

criteria such as age and smoking status. A 50% increase has been estimated, but this is likely to be subject to much variation and should be amended to reflect local practice. Where commissioners' practice is consistent with current guidance, this figure should be 0%.

- 3.1.8 It is assumed that half of the additional cycles that are expected as a result of removing restrictions will be received by women who would otherwise be expected to obtain IVF treatment in private clinics and that half will be received by women who would not obtain IVF treatment at all if they were unable to obtain NHS-funded treatment.
- 3.1.9 The costing model includes assumptions regarding the types of IVF treatment cycles, the proportion that are cancelled, the stage at which they are cancelled and the proportion using ICSI. These are based on available data about fertility treatment in 2010 (HFEA, 2011).
- 3.1.10 The total cost of offering IVF treatment to women aged 40–42 years in line with the recommendations is not included in the costing model, as standard assumptions are not available. However, relevant unit costs are provided in the template, and users may then use data on the number of women that may be applicable locally to estimate a cost for the service. Based on expert opinion, women aged 40–42 years do not currently receive NHS-funded IVF treatment and it is anticipated that only a small number of women will become eligible to receive such treatment under recommendation 1.11.1.4.

Cost summary

- 3.1.11 If the guideline recommendations on criteria for referral for IVF are fully implemented, this would result in an expected future rate of 93% of all IVF cycles received in England by women aged 18–39 years being funded by the NHS (the remaining 7% of cycles would

be expected to be paid for privately because they do not meet the criteria for NHS treatment, such as trying to conceive for 2 years). The current proportion is around 50%. The future rate is based on the assumption set out in paragraph 3.1.8 above.

- 3.1.12 A non-recurrent cost is expected initially because the length of time couples are recommended to have been trying to conceive for is being reduced from 3 to 2 years. This has been phased across the first 3 years as it is assumed there will be a lead time in implementing this change in practice.
- 3.1.13 There is likely to be an incremental annual recurrent cost because of an increase in the number of cycles of IVF treatment that are offered to women aged under 40 years. Where commissioners already commission the recommended 3 cycles no incremental recurring costs are expected.
- 3.1.14 The cost of providing IVF to women aged 40–42 can be estimated by inserting relevant local data into the costing template. It is estimated that the cost per cycle is between £3,000 and £8,000 on average, depending on whether ICSI is used and if the treatment results in a live multiple birth.
- 3.1.15 It is estimated that full implementation of the recommendations will be phased over 3 years, with the cumulative implementation level for recurrent costs being 40% by the end of year 1, 80% by the end of year 2 and 100% by the end of year 3. The non-recurrent cost is assumed to be phased evenly over the first 3 years. See section 6 for further details of expected costs over time.
- 3.1.16 The cost of the recommendations on criteria for referral for IVF are summarised in table 5 and 6 below.
- 3.1.17 Table 5 shows the estimated additional recurrent cost of changing current practice to be consistent with existing guidance, in

particular increasing the number of IVF treatments provided by the NHS.

Table 5 Estimated additional recurrent cost of IVF treatment to be consistent with existing guidance for a population of 100,000

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Estimated future cost of IVF treatment provided by the NHS	159	210	236	236	236
Increased cost to the NHS	52	103	129	129	129

3.1.18 Table 6 shows the estimated non-recurrent costs of changing practice to meet the recommendations in the updated guidance.

Table 6 Estimated additional non-recurrent cost of IVF treatment following implementation of the updated recommendations for a population of 100,000

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Reduction in the time to wait for IVF	52	70	79	0	0
Increased cost to the NHS	52	70	79	0	0

Other considerations

3.1.19 Implementation of the recommendations is expected to result in an increase in the number of NHS-funded cycles of IVF treatment. It is anticipated that part of this increase will relate to women who would not have otherwise have received any IVF treatment and part will be from a decrease in the number of privately funded cycles of IVF treatment.

3.2 Embryo transfer strategies in IVF

Recommendations

Recommendation 1.12.6.5

When considering the number of fresh or frozen embryos to transfer in IVF treatment:

- For women aged under 37 years:
 - In the first full IVF cycle use single embryo transfer.
 - In the second full IVF cycle use single embryo transfer if 1 or more top-quality embryos are available. Consider using 2 embryos if no top-quality embryos are available.
 - In the third full IVF cycle transfer no more than 2 embryos
- For women aged 37–39 years:
 - In the first and second full IVF cycles use single embryo transfer if there are 1 or more top-quality embryos. Consider double embryo transfer if there are no top-quality embryos.
 - In the third full IVF cycle transfer no more than 2 embryos
- For women aged 40–42 years consider double embryo transfer.

Recommendation 1.12.6.8

Where a top-quality blastocyst is available, use single embryo transfer.

Background

3.2.1 Elective single embryo transfer (eSET) is increasingly promoted as an alternative to double embryo transfer (DET), which is currently the most commonly used strategy in the UK, in order to reduce the rate of multiple births.

3.2.2 There has been a recent policy drive to reduce multiple births associated with IVF, which has led to initiatives such as ‘One at a time’ (Available at www.oneatatime.org.uk). This is a site led by healthcare professionals aimed at reducing the risks of multiple

pregnancies that result from fertility treatment. This aim is backed by the HFEA, which set a 15% target for multiple births for fertility clinics for April 2011, with a longer-term target of no more than 10% multiple births. In order to achieve these targets there has to be a move from DET to eSET, especially in younger women where the embryo quality is high and the multiple pregnancy rates with DET are greater.

3.2.3 There is also a current trend to extend the culture of embryos to day 5 or 6 (blastocyst) rather than the conventional day 2 or 3 (cleavage), which is thought to improve the chances of a live full-term singleton birth.

Assumptions made

3.2.4 The costing model includes assumptions about the number of embryos transferred, rate of pregnancy and rate of multiple pregnancies. These are based on available data about fertility treatment in 2010 (HFEA, 2011).

3.2.5 In order to estimate the rates of live births and multiple live births following implementation of the recommendations, assumptions have been made about the number of embryos that are expected to be transferred in the future in women aged under 40 years. These estimates shown in table 7.

Table 7 Current and predicted future rates of the number of embryos transferred

	Current rate (2010 data)	Predicted future rate for women under 37 years (estimate)	Predicted future rate for women aged 37–39 years (estimate)
Rate of single embryo transfers	15.9%	15.9%	15.9%
Rate of elective single embryo transfers	14.9%	64.1%	54.1%
Rate of double embryo transfers	69.2%	20%	30%

This results in a future multiple pregnancy rate of around 8% which is just less than the aim of 10% set by the HFEA.

3.2.6 Estimates of the rates of pregnancy and multiple pregnancies in women aged 40–42 that receive a cycle of IVF are provided in the costing template. A rate of 12.7% live births (of which 14.5% are expected to be multiple live births) are used (HFEA, 2011). These may be amended by the user of the template to reflect local circumstances such as the rates of double embryo or single embryo transfers.

3.2.7 The average additional cost of a multiple pregnancy compared with a single pregnancy is estimated to be £4127. This is based on ‘Multiple pregnancy: the management of twin and triplet pregnancies in the antenatal period’ (NICE clinical guideline 129). This is calculated as the sum of £851 for additional appointments and £3276 for a preterm birth at 36 weeks (without complications). The cost would be greater than this if there is a preterm birth at an earlier gestation or if there are complications. There may also be further costs associated with multiple births if the child requires an increased level of medical or social care in the future. Local estimates should be used where available.

Cost summary

3.2.8 The net saving of the recommendations regarding embryo transfer strategies is summarised in table 8.

Table 8 Summary of estimated savings for embryo transfer strategies for a population of 100,000

	Current cost (£000s)	Predicted future cost (£000s)	Incremental saving (£000s)
Annual recurrent cost – additional cost of multiple pregnancies	12	8	-4

3.2.9 This saving is generated by a reduction in the number of multiple births that are expected following implementation of the guideline.

Other considerations

3.2.10 There are expected to be additional costs associated with extending the culture of embryos to blastocyst rather than cleavage stages, as this needs more laboratory time. These costs are not included in the costing model as the guideline does not make a direct recommendation in this area. Any additional resources may be offset by the lower obstetric, neonatal and paediatric resources needed as a result of lower multiple birth rates.

3.3 Cryopreservation

Recommendations

Recommendation 1.12.6.10

Offer cryopreservation to store any remaining good-quality embryos after embryo transfer.

Recommendation 1.16.1.8

Offer sperm cryopreservation to men and adolescent boys who are preparing for medical treatment for cancer that is likely to make them infertile.

Recommendation 1.16.1.10

Offer oocyte or embryo cryopreservation as appropriate to women of reproductive age (including adolescent girls) who are preparing for medical treatment for cancer that is likely to make them infertile if:

- they are well enough to undergo ovarian stimulation and egg collection **and**
- this will not worsen their condition **and**
- enough time is available before the start of their cancer treatment.

Recommendation 1.16.1.11

In cryopreservation of oocytes and embryos, use vitrification instead of controlled-rate freezing if the necessary equipment and expertise is available.

Recommendation 1.16.1.12

Store cryopreserved material for an initial period of 10 years.

Background

- 3.3.1 Cryopreservation in IVF treatment is the process of freezing any embryos that were harvested but not implanted. They may then be transferred later. One cycle of IVF is defined as the implantation of any fresh embryos and the subsequent transfer of any embryos that were available for freezing.
- 3.3.2 It may be possible to freeze more than 1 embryo for subsequent transfer, or conversely there may be no embryos of good enough quality to be used for a frozen transfer. The quality and quantity of available embryos is partly based on the woman's age.
- 3.3.3 Cryopreservation may also be used to help preserve fertility prior to the use of radiotherapy and/or chemotherapy for cancer treatment. One of the side effects of such cancer treatment is an impact on fertility either by direct injury to the ovaries or testes from radiotherapy or indirect injury from systemically administered chemotherapeutic agents.
- 3.3.4 In some cases the individual's fertility will return after the cancer treatment is completed, but in other cases fertility never returns, or is severely impaired.
- 3.3.5 Methods used in current clinical practice involve cryopreservation of semen, oocytes, and embryos.

Costing considerations

- 3.3.6 The freezing of semen, oocytes and embryos as part of a fertility service is currently funded by a number of commissioners, but practice varies across the country. Services for the storage of material to preserve fertility whilst patients undergo cancer treatment are particularly variable.

- 3.3.7 A local costing template has been provided to enable organisations to calculate the expected cost of implementing the recommendations about cryopreservation.
- 3.3.8 Based on information provided by the GDG, the cost of storing tissue can be considerable. Legally, the stored tissue cannot be disposed of without patient consent and can remain in storage for a maximum of 55 years if there is evidence of 'significant or premature infertility' (HFEA, 2012).
- 3.3.9 Vitrification is a relatively new method of cryopreservation and training and resource needs are expected when switching to this method. Users should include input costs in the template that reflect local circumstances.

4 Sensitivity analysis

4.1 Methodology

- 4.1.1 There are a number of assumptions in the model for which no empirical evidence exists; these are therefore subject to a degree of uncertainty.
- 4.1.2 Appropriate minimum and maximum values of variables were used in the sensitivity analysis to assess which variables have the biggest impact on the net cost or saving. This enables users to identify the significant cost drivers.
- 4.1.3 It is not possible to arrive at an overall range for total cost because the minimum or maximum of individual lines are unlikely to occur simultaneously. We undertook one-way simple sensitivity analysis, altering each variable independently to identify those that have greatest impact on the calculated total cost.
- 4.1.4 Appendix B contains a table detailing all variables modified, and the variables that were found to be most sensitive in the model are discussed below.

4.2 *Impact of sensitivity analysis on costs for a population of 100,000*

Number of cycles of IVF treatment currently offered and that will be offered following implementation of the guideline

4.2.1 These factors are the significant drivers of costs in the model. There is wide variation in the number of cycles of IVF treatment currently offered. The national average of 1.8 used in the costing model should be adjusted (to 0, 1, 2 or 3) to reflect local circumstances. Where the recommendation is not expected to be fully implemented and 3 cycles will not be offered, the local figure should be used in the model.

Live birth rate

4.2.2 A rate of 27.9% has been used in the costing model, based on national data. This figure should be amended as applicable where local data is available as the costing model is sensitive to this variable.

Impact of current approach to funding IVF treatment

4.2.3 An estimate of 50% has been used in the model to reflect the additional number of cycles that may be offered to women on the NHS following full implementation of the guideline. The arrangements vary greatly across England, so users are encouraged to input their own estimate of this effect.

Unit cost of fresh cycles

4.2.4 A cost of £3,123 per fresh cycle of IVF treatment is used in the costing model. Where the actual cost is different, local data should be used where as the costing model is sensitive to this variable.

5 Impact of guidance for commissioners

5.1.1 The cost of implementing the guideline is outside of the payment by results tariff. Providers and commissioners should agree a price

locally. It is anticipated that there will be an increased cost in the commissioning of fertility services.

- 5.1.2 Costs fall under budgeting code 18 – Maternity and Reproductive Health.

6 Conclusion

6.1 *Total cost for a population of 100,000*

- 6.1.1 The annual impact of implementing this guideline for a population of 100,000 has been estimated using the significant resource-impact recommendations shown in table 1 and assumptions specified in section 3. There is an estimated annual recurrent cost of around £125,000 from year 3 onwards when a steady state is reached, and a non-recurrent cost of around £201,000 which is expected to be split across the 3 years following implementation. Table 9 shows the assumed phasing of implementing the guideline.

Table 9 Phasing of implementing the guideline

	Year 1	Year 2	Year 3	Year 4	Year 5
Incremental annual recurrent cost of criteria for referral for IVF					
Rate of progression towards full implementation	40%	80%	100%	100%	100%
Non-recurrent cost of criteria for referral for IVF					
Rate of progression towards full implementation	33.3%	33.3%	33.3%	0%	0%
Incremental annual recurrent saving for embryo transfer strategies					
Rate of progression towards full implementation	100%	100%	100%	100%	100%

- 6.1.2 Tables 10–12 show the breakdown of the expected annual costs and savings of each significant resource-impact recommendation. Chart 4 shows the total expected annual cost for each of the 5 years following implementation.

Table 10 Estimated additional recurrent cost of IVF treatment to be consistent with existing guidance for a population of 100,000

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Estimated future cost of IVF treatment provided by the NHS	159	210	236	236	236
Increased cost to the NHS	52	103	129	129	129

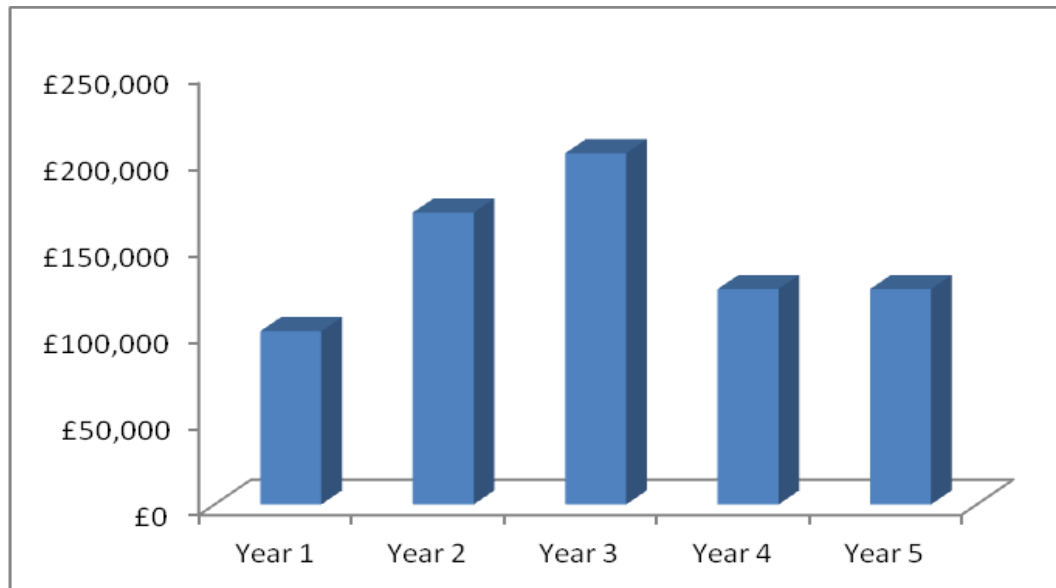
Table 11 Estimated additional non-recurrent cost of IVF treatment following implementation of the updated recommendations for a population of 100,000

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Reduction in the time to wait for IVF	52	70	79	0	0
Increased cost to the NHS	52	70	79	0	0

Table 12 Estimated recurrent saving of IVF treatment (embryo transfer strategies) following implementation of the updated recommendations for a population of 100,000

Recommendation area	Year 1 £'000	Year 2 £'000	Year 3 £'000	Year 4 £'000	Year 5 £'000
Estimated saving from embryo transfer strategies	-4	-4	-4	-4	-4
Saving to the NHS	-4	-4	-4	-4	-4

Chart 4 Costs of implementing the guideline during the first 5 years for a population of 100,000



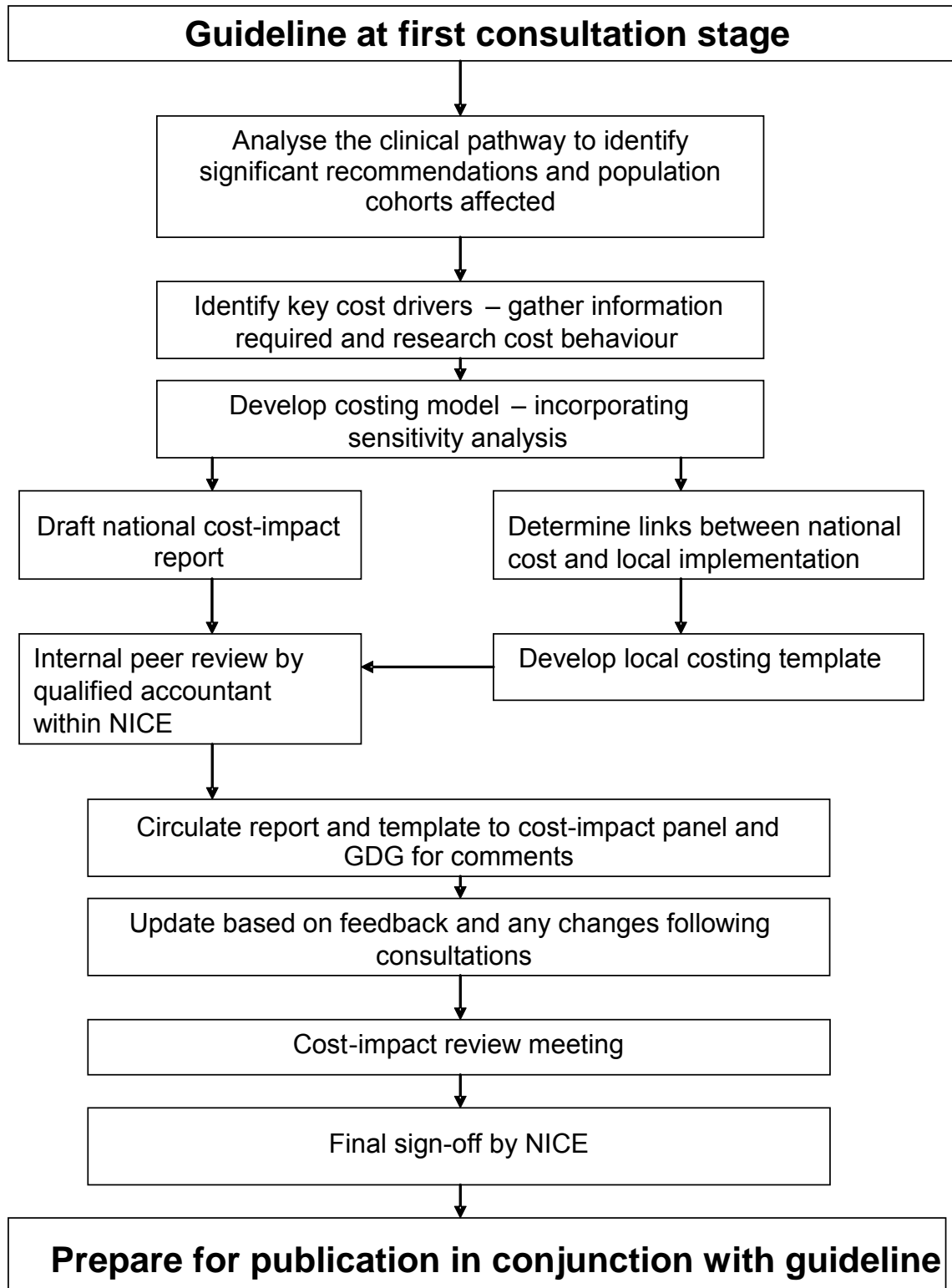
6.1.3 These costs exclude any additional costs associated with providing IVF for women aged 40–42. This should be calculated locally using the costing template.

6.1.4 The costs presented are estimates and should not be taken as the full cost of implementing the guideline.

6.2 Next steps

6.2.1 The costing template produced to support this guideline enables organisations such as PCTs or health boards in Wales and Northern Ireland to estimate the impact locally and replace variables with ones that depict the current local position.

Appendix A. Approach to costing guidelines



Appendix B. Results of sensitivity analysis

	Baseline value	Minimum value	Maximum value	Recurrent costs				Sensitivity ratio
				Baseline costs (£000's)	Minimum costs (£000's)	Maximum costs (£000's)	Change (£000's)	
Maximum number of cycles currently commissioned	1.8	0.0	3.0	125	71	245	174	0.84
Proportion of IVF using intracytoplasmic sperm injection (ICSI)	52.1%	30.0%	70.0%	125	120	128	8	0.08
Live birth rate	27.9%	20.0%	36.0%	125	103	150	47	0.66
Additional increase in number of cycles expected to be provided if current restrictions are removed	50%	0%	80%	125	46	176	130	0.65
Additional cost of multiple pregnancies	£4,127	£4,127	£10,000	125	119	125	6	0.03
Unit cost of fresh cycles – completed	£3,123.00	£2,500.00	£4,000.00	125	105	152	47	0.78
Unit cost of fresh cycles – cancelled pre-harvest	£1,000.00	£500.00	£1,500.00	125	123	126	3	0.02
Unit cost of fresh cycles – cancelled post-harvest	£2,565.00	£2,000.00	£3,000.00	125	123	126	3	0.06
Unit cost of frozen cycles – completed	£1,343.00	£1,000.00	£2,000.00	125	122	130	8	0.09
Unit cost of frozen cycles – cancelled	£800.00	£600.00	£1,000.00	125	125	125	0	0.00
Additional cost of ICSI	£500.00	£300.00	£700.00	125	121	129	8	0.08

Appendix C. References

All Party Parliamentary Group on Infertility (2011) Holding back the British IVF revolution? A report into NHS IVF provision in the UK today. Available at http://www.bionews.org.uk/page_155601.asp [Accessed 30 January 2013]

Department of Health (2010) Final report of the expert group on commissioning NHS infertility provision. Available at www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_111363 [Accessed 6 September 2012]

Department of Health (2009) Primary Care Trust survey: provision of IVF in England 2008. Available at www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_101073 [Accessed 6 September 2012]

Department of Health (2011) The Operating Framework for the NHS in England 2012/13. Available at http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_131360 [Accessed 6 February 2013]

Department of Health (2011) National Schedule of Reference Costs 2010-11 for NHS Trusts and PCTs combined

Human Fertilisation and Embryology Authority (2012) Storage of gametes and embryos. Available at www.hfea.gov.uk/505.html?fldSearchFor=storing%20tissue [Accessed 6 September 2012]

Human Fertilisation Embryology Authority (2011) Fertility treatment in 2010 – trends and figures. Available at www.hfea.gov.uk/104.html [Accessed 14th August 2012]

National Institute for Health and Clinical Excellence (2004) [Fertility: assessment and treatment for people with fertility problems](#). NICE clinical guideline 11.

National Institute for Health and Clinical Excellence (2011) [Multiple pregnancy: the management of twin and triplet pregnancies in the antenatal period](#). NICE clinical guideline 129.

The NHS Information Centre, Hospital Episode Statistics for England. Inpatient statistics, 2010-11.