

National Institute for Health and Care Excellence

1

2

Polycystic Ovary Syndrome

Supplement B: Economic analysis report for laser hair reduction for hirsutism

3

4

NICE guideline [NGXX]

Evidence underpinning recommendations [XX to XX]

5

July 2026

6

7

DRAFT

8

9

Copyright

© NICE 2026. All rights reserved. Subject to [Notice of rights](#).

ISBN: [XXX]

1

Contents

1		
2	1	Introduction 4
3	2	Health economic modelling methods 6
4	2.1	Model overview 6
5	2.2	Model strategies 7
6	2.3	Utility data and QALYs..... 7
7	2.4	Resource use and costs 10
8	2.5	Handling uncertainty 12
9		Probabilistic analysis..... 12
10		Sensitivity analysis..... 12
11		Summary of model inputs 14
12	2.6	Cost effectiveness estimation and interpretation 17
13	2.7	Model validation..... 17
14	3	Results..... 18
15	3.1	Base-case analysis..... 18
16	3.2	Sensitivity analysis 19
17		1 year time horizon 19
18		Alternative correlation coefficient (0.7) for imputing change standard deviations.
19	20
20		Utility adjustments made to account for improvement in anxiety and depression
21	20
22	4	Discussion 21
23		Sensitivity and scenario analyses22
24		Strengths and limitations.....22
25		Generalisability and relevance24
26		Implications for future research.....24
27	5	Conclusion 24
28	6	References 25

29

1 Introduction

Hirsutism affects 70-80% of women with PCOS (Spritzer 2016). Management includes medication and physical hair removal methods. Of note the population of interest for this review question is women, trans men and non-binary people aged 18 and over who have not had, or are not having, gender affirming hormone therapy or surgery, this population will be referred to as adults with PCOS within this document as a shorthand. Where the International Guideline (IG) work is being referenced, the population term used was women to reflect the term used in their guidance.

The IG conducted a systematic review on the effectiveness of permanent mechanical hair reduction (electrolysis, lasers and pulsed light devices) alone or in combination with other treatments. Following this review, an evidence-based recommendation was made: “mechanical laser and light therapies should be considered for reducing facial hirsutism and for related depression, anxiety, and quality of life in women with PCOS”.

Mechanical laser and light therapies for reducing hirsutism in adults with PCOS was jointly identified by the committee and the guideline health economist as a high priority for new economic analysis because:

- There is no health economic evidence to support this recommendation (none presented by the IG nor any identified in the NICE HE systematic review of the economic evidence).
- Mechanical laser and light therapies for reducing hirsutism in adults with PCOS is not current practice in NHS and adapting the IG recommendation would lead to a significant change in current practice.
- Finally, a recommendation would have a significant resource impact on the NHS given the prevalence of PCOS and hirsutism and cost of these therapies.

Clinical evidence

The systematic review conducted as part of the IG identified eight studies relating to the use of mechanical laser and light therapies for hirsutism in women with PCOS: four RCTs and four cohort studies. Meta-analysis was not performed due to

1 significant heterogeneity of the types of permanent mechanical hair reduction
2 techniques used, and varying outcomes assessed across the studies. None of the
3 studies included electrolysis as an intervention or comparator.

4 Of these studies, only one could be considered a comparison of laser to no
5 treatment/sham. This was an RCT by Clayton 2005, which compared high fluence
6 (23.6 J cm^{-2}) to low-fluence (4.8 J cm^{-2}) alexandrite laser for facial hair in women
7 with PCOS and hirsutism. The low fluence treatment was described in the trial as
8 relatively ineffective and was convincing to use as a control. This trial reported two
9 outcomes that were potentially useful for health economic modelling: Hospital Anxiety
10 and Depression Scale (HADS) and WHOQOL-BREF.

11 Although a mapping study was identified for HADS, the authors of this study
12 cautioned against mapping this outcome to EQ-5D as it was not considered a good
13 predictor of EQ-5D scores (Brazier 2014). Therefore, the HADS data from Clayton
14 2005 could not be used to estimate QALYs.

15 WHOQOL-BREF is a general quality of life instrument which captures four domains:
16 physical health, psychological health, social relationships, and environmental health.
17 Three WHOQOL-BREF to EQ-5D-5L mapping studies were identified in the Health
18 Economics Research Centre database of mapping studies (Dakin 2025). The most
19 recent study (Kangwanrattanakul 2023) was in a Thai general population and used
20 the Thai EQ-5D-5L value set. This study reported that only the WHOQOL-BREF
21 physical health domain was significantly associated with EQ-5D-5L and provided an
22 equation to map this domain to EQ-5D-5L. As this mapping relies solely on the
23 physical health domain, it significantly limits its applicability to conditions where other
24 health dimensions are relevant. The other two mapping studies identified
25 (Sakthong 2021; Wee 2018) similarly only mapped the physical domain to EQ-5D-5L
26 and therefore share the same limitation.

27 All the other studies identified in the IG were either comparing different types of laser
28 or intense pulsed light (IPL) treatments to each other or were assessing the value of
29 adding either combined oral contraceptive pill (COCP) or metformin to laser or IPL.
30 Whilst this does not inform the relative effect of laser or IPL versus no treatment or
31 another form of hair reduction, consideration was given to the potential value of using
32 before and after data from these other studies to gain some information on the
Polycystic Ovary Syndrome: Supplement B – Economic analysis of laser hair reduction DRAFT (July 2026)

1 impact on QoL. The only study that reported quality of life outcomes was Dorgham
2 2021 which included three comparator groups: Group 1 laser hair reduction only,
3 Group 2 laser hair reduction + metformin 500mg, Group 3 laser hair reduction +
4 COCP Diane-35. This study did report two quality-of-life outcomes: Dermatology Life
5 Quality Index (DLQI) and Hirsutism Life Quality Index (HLQI), with improvements in
6 both scores observed following laser treatment. Unfortunately, no mapping study was
7 identified for mapping HLQI to EQ-5D and the mapping studies identified for DLQI
8 were in other dermatology populations such as psoriasis or acute dermatitis, raising
9 transferability concerns for a hirsutism population.

10 Given the importance of estimating the costs and cost-effectiveness of laser hair
11 reduction, it was agreed to undertake a simple cost utility analysis based on the
12 evidence provided by Clayton 2005 as this was the only study with an outcome that
13 could be mapped to estimate QALYs. Methods, results and limitations of this cost-
14 utility analysis are provided below.

15 **2 Health economic modelling methods**

16 **2.1 Model overview**

17 A simple cost utility analysis was undertaken in Microsoft Excel to assess the relative
18 cost effectiveness of alexandrite high fluence laser hair reduction compared to no
19 treatment for adults with PCOS and hirsutism, from the perspective of the NHS and
20 Personal Social Services in England, in line with the NICE reference case for health
21 interventions (see [NICE's guidelines manual](#)).

22 The population was based on an RCT (Clayton 205) which reported treatment
23 effectiveness in terms of quality-of-life outcomes. Trial subjects included women
24 diagnosed with PCOS and facial hirsutism and who were suitable for the alexandrite
25 laser (Clayton 2005).

26 The model was run over a time horizon of 6 months due to the limited follow-up data
27 available. A sensitivity analysis was conducted to explore a time horizon of 1 year,
28 which was considered the upper limit time horizon without requiring extensive
29 extrapolation or assumptions about the progression of the condition and long-term

1 impact of the intervention. Given the short time horizon no discounting was applied to
2 costs and QALYs. The cost year of the analysis was 2024/2025.

3 **2.2 Model strategies**

4 The following strategies were considered in the analysis:

- 5 • Intervention: High fluence alexandrite laser, 1 patch test followed by a mean of
6 4.8 treatments (4-6 week intervals) over a 6-month study period
- 7 • Comparator: No treatment. This was based on the low fluence alexandrite
8 laser arm in Clayton 2005. This arm received 1 sham patch test followed by a
9 mean of 4.4 treatments over a 6-month study period. The low fluence was
10 reported to be relatively ineffective and therefore acted as a sham treatment.

11 **2.3 Utility data and QALYs**

12 Outcomes were measured in quality-adjusted life years (QALYs). The QALY
13 combines the length of life and health related quality of that life (HRQoL) into a single
14 index, which allows for comparisons of effectiveness between the treatment groups.

15 The HRQoL used in Clayton 2005 was the WHOQOL-BREF and was collected at
16 baseline and at the end of follow-up (6 months). This was mapped to EQ-5D-5L
17 using an inverse model which was the best-fit regression model for prediction of the
18 EQ-5D-5L index scores reported in Kangwanrattanakul 2023. The mapping equation
19 was:

$$20 \quad \text{EQ5D5L index scores} = 1.252 - \frac{8.446}{\text{WHOQOLBREF physical health domain}}$$

21 This mapping equation requires the use of the raw scores for the WHOQOL-BREF
22 physical domain, rather than the scaled score reported in Clayton 2005. The raw
23 score was calculated using the following rearranged equation (WHOQOL-BREF
24 scoring instructions):

$$25 \quad \text{Transformed scale} = \left(\frac{(\text{actual raw score} - \text{lowest possible raw score})}{\text{possible raw score range}} \right) \times 100$$

26

2
3
4
1

Actual raw score

$$= (\text{possible raw score range} \times \left(\frac{\text{Transformed scale}}{100} \right)) + \text{lowest possible raw score}$$

5 Where the raw score range is 28 and lowest possible raw score is 7.

6 **Table 1. WHOQOL-BREF physical domain (Clayton 2005)**

WHOQOL-BREF physical	Intervention, mean (SD), n=51	Comparator, mean (SD), n=37
Baseline	64.3 (19.9)	68.7 (19.3)
6-month follow up	70.6 (18.9)	67.9 (20.5)

7 Abbreviations: SD: standard deviation

8 **Table 2. Mapped EQ-5D-5L (Clayton 2005, Kangwanrattanakul 2023, WHOQOL-BREF)**

EQ-5D-5L	Intervention, mean (SD)	Comparator, mean (SD)
Baseline	0.914 (0.077)	0.930 (0.069)
6-month follow up	0.936 (0.064)	0.927 (0.075)

10 Abbreviations: SD: standard deviation

11

12 Expected QALYs were calculated by multiplying the utility by the number of life years
13 lived in that state (6 months). A sensitivity analysis was conducted using a time
14 horizon on 1 year.

15 The area under the curve method was used to calculate the differences in QALYs
16 between the two treatment groups. The equation used for the area under the curve
17 was:

$$Area = \frac{(utility_{baseline} + utility_{follow-up})}{2} \times (Time_{follow-up} - Time_{baseline})$$

18

1 Given the trial population mean age of 33 years and the short time horizon, mortality
2 was not included in the analysis.

3 To capture baseline differences between intervention and comparator arms, it was
4 decided that using EQ-5D change scores (i.e. change from baseline in the laser and
5 control groups) would be a more precise way of using the data from the trial. The
6 baseline utility used in the calculations was that of the no treatment arm. The change
7 from baseline for no treatment and the mean difference in change from baseline for
8 laser versus no treatment were then calculated. However, as the trial reported
9 baseline and follow-up EQ-5D, not change scores, this meant that although change
10 scores could be calculated by taking the difference between the baseline and follow-
11 up QoL, there is no such simple method to calculate the standard deviation around
12 change scores if it is not reported in the study. The [Cochrane handbook](#) suggests a
13 method whereby standard deviations for changes from baseline can be imputed. This
14 involves calculating a correlation coefficient from a study that is reported in
15 considerable detail and then using this coefficient to impute a change from standard
16 deviation in another study. The correlation coefficient describes how similar the
17 baseline and final measurements were across participants.

18 Equation 1: Correlation coefficient equation

$$\text{Corr}_E = \frac{SD_{E, \text{baseline}}^2 + SD_{E, \text{final}}^2 - SD_{E, \text{change}}^2}{2 * SD_{E, \text{baseline}} * SD_{E, \text{final}}}$$

Corr = correlation coefficient

E = experimental group (the correlation coefficient needs to be calculated per group)

SD = standard deviation

19

20 Cochrane methodology states that a simple average across the interventions if the
21 coefficients are similar will provide a reasonable measure of the similarity of baseline
22 and final measurements across all individuals in the study. If a value less than 0.5 is
23 obtained, then there is no value in using change from baseline, and an analysis of
24 final values will be more precise. As no study was available that reported both EQ-5D
25 change from baseline standard deviations as well as baseline and final value
26 standard deviations, then the correlation coefficient was assumed to conservatively

1 be 0.5. This assumption has been used elsewhere in the literature (NICE CG72,
2 NICE NG193, Pearson 2018).

3 As Clayton 2005 study did not show any large differences in baselines between the
4 groups, then this estimate seemed appropriate. A sensitivity analysis was undertaken
5 varying the correlation coefficient to a higher value of 0.7 to assess the impact of this.
6 See the sensitivity analysis section for more explanation on this. The equation
7 showing how standard deviations were imputed using this correlation coefficient is
8 shown below. Confidence intervals (around the mean baseline and mean follow-up
9 EQ-5D) and the number of participants in the study were used to derive the standard
10 deviations of baseline and final values needed for the below equation.

11 **Equation 2: Imputing standard deviations using correlation coefficient.**

$$SD_{E, \text{change}} = \sqrt{SD_{E, \text{baseline}}^2 + SD_{E, \text{final}}^2 - (2 * \text{Corr} * SD_{E, \text{baseline}} * SD_{E, \text{final}})}$$

Corr = correlation coefficient
E = experimental group (the correlation coefficient needs to be calculated per group)
SD = standard deviation

12

13 **2.4 Resource use and costs**

14 Intervention costs were estimated by combining the resource use associated with
15 each intervention with respective unit costs as outlined below.

16 The cost of laser hair reduction would include referral to a dermatologist, a laser
17 patch test and laser hair reduction treatment sessions. The cost of an initial GP
18 appointment was not included as it was assumed that this would be received by all
19 adults with PCOS and hirsutism, irrespective of whether they went on to have laser
20 hair reduction. The mean number of treatment sessions used in the 6-month time
21 horizon was based on the mean reported in Clayton 2005: 4.8 sessions. The authors
22 noted that in a clinical setting they would expect patients to continue with treatment
23 for longer than the 6 months of the study. The dermatologist on the committee noted
24 that in clinical practice adults with PCOS usually have 4-8 sessions occurring every 1
25 to 2 months, some may need 2-3 top-up treatments. When a 1-year time horizon was
26 used, it was assumed that 8 sessions would be received, which represents the

1 maximum number of sessions (excluding top-ups) occurring in clinical practice and
 2 allows for a 6-week interval between sessions.

3 [NHS England National Cost Collection Data 2024/25](#) (previously known as NHS
 4 Reference Costs) were used as the source of unit cost for a dermatology referral.

5 No appropriate unit cost could be obtained from these sources for the cost of laser
 6 treatment, therefore values published on the Salisbury Laser Clinic were used
 7 ([Salisbury Laser Clinic](#) 2026). This clinic is based within an NHS setting, and they
 8 note that laser treatment for hair reduction is not routinely funded on the NHS but that
 9 in severe or exceptional conditions the Exceptional Funding Panel in your area may
 10 consider this. They explain that if NHS funding is not possible people can self-fund
 11 and provide prices for this. The costs vary depending on the size of the area treated,
 12 from the smallest facial area (upper lip) to largest facial area (full face).

13 Intervention costs are shown in **Table 3**.

14 **Table 3. Intervention costs (2025 prices)**

Intervention	Resource use details and unit costs	Total intervention cost per person
Laser treatment	Dermatology appointment, £184	Upper lip, 6 months: £503
	Patch test, £55	Full face, 6 months: £767
	Upper lip, £55 per session	Upper lip, 1 year: £679
	Full face, £110 per session	Full face, 1 year: £1,119
	Number of sessions over 6 months: 4.8	
	Number of sessions over 1 year: 8	

15 Sources: [NHS England National Cost Collection Data 2024/25](#), accessed 23 March 2026
 16 (Non-Admitted Face-to-Face Attendance, First, Consultant-led, Currency code: WF01B,
 17 Service code: 330), [Salisbury Laser Clinic](#) accessed 23 March 2026, Clayton 2005,
 18 committee expert opinion.

1 **2.5 Handling uncertainty**

2 **Probabilistic analysis**

3 Probabilistic analysis was employed in the base-case analysis. Model input
4 parameters were assigned probability distributions rather than expressed as point
5 estimates (which is the approach adopted in a deterministic analysis). This allowed
6 for a more comprehensive consideration of the uncertainty surrounding the input
7 parameters and accounted for the non-linearity inherent in the economic model
8 structure. As a result, more accurate estimates were produced than those generated
9 by deterministic analysis, which relies solely on the mean value of each input
10 parameter and disregards the associated uncertainty (Briggs et al., 2006).

11 The type of distribution was determined with reference to the properties of data of
12 that type. When possible, each distribution was parameterised using dispersion data
13 from the source from which the value was obtained.

14 A beta distribution was assigned to the no treatment baseline utility, as it is bound
15 between 0 and 1. The mean “change from baseline for no treatment” and “mean
16 difference in change from baseline for laser versus no treatment” was assigned a
17 normal distribution as this is unbounded and does not constrain direction of change.
18 Unit cost and resource use were fixed as these values are known. Finally, due to a
19 lack of patient level data it was not possible to account for uncertainty in the mapping
20 algorithm.

21 **Sensitivity analysis**

22 Various sensitivity analyses were undertaken to test the robustness of model
23 assumptions. In these analyses, one or more inputs were changed at the same time,
24 and the analysis was rerun to evaluate the impact on the results and whether the
25 conclusions would change.

26 The following one-way, two-way and scenario analyses were explored:

- 27 • A range of laser treatment costs were explored to reflect the different costs for
28 different areas of treatment: upper lip (base case) to full face (sensitivity analysis).
- 29 • The different treatment areas were compared using both a 6-month (base case)
30 and 1-year (sensitivity analysis) time horizon. For a 1-year time horizon it was

1 assumed 8 laser sessions were required and that the utility score at 6 months was
2 maintained at 1 year.

- 3 • Alternative correlation coefficient (0.7) for imputing change standard deviations. A
4 value of 0.7 was arbitrarily chosen as this would be less conservative than 0.5.
5 The value itself is of less importance, but rather the purpose of this analysis is to
6 assess whether a different value to 0.5 would affect the results at all. Using a
7 different correlation coefficient will not change the point estimates of treatment
8 effect in the analysis, but it will lead to smaller standard deviations, which would
9 have an impact on the confidence intervals of the point estimates, and lead to
10 some impact on the probabilistic sensitivity analysis.
- 11 • Utility adjustments made to account for improvement in anxiety and depression,
12 see below for further detail on these scenario analyses.

13 **Scenario analyses to explore HRQoL**

14 As stated previously, the mapping between WHOQOL-BREF and EQ-5D does not
15 incorporate the psychological health domain. To address this gap, additional scenario
16 analyses were performed using EQ-5D-5L disutility values from the Thai value set for
17 the anxiety/depression dimension (EuroQol 2018). The EQ-5D-5L anxiety/depression
18 domain includes five levels, each associated with a specific disutility adjustment see

19 **Table 4.**

20 **Table 4. EQ-5D-5L Thai value set**

Anxiety/Depression Level	Description	Disutility Adjustment
Level 1	Not anxious or depressed	0.000
Level 2	Slightly anxious or depressed	0.058
Level 3	Moderately anxious or depressed	0.096
Level 4	Severely anxious or depressed	0.233
Level 5	Extremely anxious or depressed	0.295

21

1 Using a 6-month time horizon, several hypothetical scenarios were explored to
2 assess potential HRQoL benefits associated with improvements in psychological
3 health following laser treatment. Using a 6-month time horizon, the following
4 scenarios were explored deterministically (**Table 5**), assuming no change in “anxiety
5 and depression” domain for no treatment arm.

6 **Table 5. Scenarios exploring changes in anxiety and depression domain level**

Level change after laser	Utility gain (Laser vs No Treatment)
Level 3 → Level 2	0.038
Level 2 → Level 1	0.058
Level 3 → Level 1	0.096

7

8 **Summary of model inputs**

9 Table 6 presents the point estimates of all input parameters used in the economic
10 model (employed in deterministic sensitivity analysis) and provides details on the
11 types of distributions assigned to each input parameter and the methods used to
12 define their ranges. Values used in sensitivity and scenario analyses are also
13 included.

1 **Table 6. Model inputs (deterministic values and associated probability distributions)**

Utility data	Point estimate	Probability distribution	Sources and Notes
EQ5D-5L baseline (No treatment)	0.930	Beta: $\alpha=469.996$; $\beta=35.335$	Clayton 2005, Mapping equation WHOQOL-BREF physical domain raw score to EQ-5D-5L using Kangwanrattanakul 2023
EQ5D-5L change from baseline – 6 months (No treatment)	-0.003	Normal: $\mu=-0.003$; $\sigma=0.012$	Clayton 2005, Mapping equation WHOQOL-BREF physical domain raw score to EQ-5D-5L using Kangwanrattanakul 2023
EQ5D-5L mean difference in change from baseline – 6 months (Laser versus No treatment)	0.025	Normal: $\mu=0.025$; $\sigma=0.016$	Clayton 2005, Mapping equation WHOQOL-BREF physical domain raw score to EQ-5D-5L using Kangwanrattanakul 2023
Scenario Analysis: utility adjustment to account for improvement in anxiety and depression (level 3 to 2)	0.038	Deterministic scenario only	EuroQoL EQ5D-5L Thai value set (2018)
Scenario Analysis: utility adjustment to account for improvement in anxiety and depression (level 2 to 1)	0.058	Deterministic scenario only	EuroQoL EQ5D-5L Thai value set (2018)
Scenario Analysis: utility adjustment to account for improvement in anxiety and depression (level 3 to 1)	0.096	Deterministic scenario only	EuroQoL EQ5D-5L Thai value set (2018)
Cost data	Point estimate	Probability distribution	Sources and Notes
Laser upper lip – 6 months	£503	Fixed	Unit cost: NHS National Cost Collection Data 2024/2025, Salisbury Laser Clinic April 2025. Resource use: Clayton 2005, GC expert opinion

Sensitivity analysis: Laser full face – 6 months	£767	Fixed	Unit cost: NHS National Cost Collection Data 2024/2025, Salisbury Laser Clinic April 2025. Resource use: Clayton 2005, GC expert opinion
Sensitivity analysis: Laser upper lip – 1 year	£679	Fixed	Unit cost: NHS National Cost Collection Data 2024/2025, Salisbury Laser Clinic April 2025. Resource use: GC expert opinion
Sensitivity analysis: Laser full lip – 1 year	£1119	Fixed	Unit cost: NHS National Cost Collection Data 2024/2025, Salisbury Laser Clinic April 2025. Resource use: GC expert opinion

1

1

2 **2.6 Cost effectiveness estimation and interpretation**

3 To assess cost effectiveness, the incremental cost–effectiveness ratio (ICER) was
4 estimated. The ICER represents the additional cost per additional unit of
5 effectiveness (QALY) associated with one strategy relative to its comparator. The
6 ICER was calculated by dividing the difference in total costs between 2 alternative
7 strategies by the difference in their QALYs. If the ICER falls below a specified cost
8 per QALY threshold, the assessed strategy is then considered cost effective relative
9 to its comparator. A threshold of £20,000 per QALY has typically been used in
10 analyses done for NICE guidelines (see [NICE’s guidelines manual](#)).

11
$$ICER = \frac{Costs(B) - Costs(A)}{QALYs(B) - QALYs(A)}$$

12 Where B is the assessed strategy and A is the comparator. Strategy B is cost
13 effective if the ICER is less than the threshold.

14 Above a most plausible ICER of £20,000 per QALY gained, or £100,000 per QALY
15 gained for highly specialised technologies, decisions about the acceptability of the
16 technology as an effective use of NHS resources specifically consider the following
17 factors (see [NICE’s health technology evaluations manual](#)):

- 18 • the degree of certainty and uncertainty around the ICER
19 • aspects that relate to uncaptured benefits and non-health factors
20 • aspects that relate to health inequalities.

21 A strategy is considered cost effective if it results in higher QALYs and lower costs
22 than its comparator. In this case, the strategy is dominant, and the estimation of the
23 ICER is not needed (and it is not meaningful).

24 **2.7 Model validation**

25 The economic model was developed by the guideline health economist in
26 consultation with committee members. The modelling approach and methods for
27 identifying and selecting input parameters were presented to, and agreed by the
28 committee, who also provided clinical validation. All inputs and model formulas were

1 systematically checked. The model was tested for logical consistency by setting input
 2 parameters to null and extreme values to examine whether the results were plausible
 3 given the inputs and changed in the expected direction. The base-case results and
 4 results of sensitivity analysis were discussed with the committee to confirm their
 5 plausibility and support interpretation. The model was peer reviewed by a second,
 6 independent health economist with relevant experience, this included a systematic
 7 check of the model calculations.

8 **3 Results**

9 **3.1 Base-case analysis**

10 The probabilistic and deterministic results for upper lip laser versus no treatment and
 11 full face laser versus no treatment at 6 months are presented in **Table 7** and **Table 8**.
 12 Both upper lip laser and full-face laser hair treatment were associated with higher
 13 costs and QALYs compared to no treatment. The ICER for upper lip laser versus no
 14 treatment (6-month time horizon) was £79,243 per QALY gained in the probabilistic
 15 analysis and £80,377 per QALY gained in the deterministic analysis. ICER for upper
 16 lip laser versus no treatment (6-month time horizon) was £120,834 per QALY gained
 17 in the probabilistic analysis and £122,562 per QALY gained in the deterministic
 18 analysis. The difference between the probabilistic and deterministic results are due to
 19 the small incremental QALYs. When incremental QALYs are small, even modest
 20 uncertainties in model inputs can lead to large differences between deterministic and
 21 probabilistic results. The probability of upper lip or full-face laser hair reduction being
 22 cost-effective compared to no treatment at £20,000 per QALY gained was 0%.

23 **Table 7. Probabilistic results – time horizon: 6 months**

Strategy	Mean cost per person	Mean QALYs per person	Inc. cost	Inc. QALYs	ICER vs no treatment
No treatment	-	0.465	-	-	-
Laser - upper lip	£503	0.471	£503	0.006	£79,243
Laser - full face	£767	0.471	£767	0.006	£120,834

24 • QALYs: quality adjusted life years; ICER: incremental cost-effectiveness ratio

1

2 **Table 8. Deterministic results – time horizon: 6 months**

Strategy	Mean cost per person	Mean QALYs per person	Inc. cost	Inc. QALYs	ICER vs no treatment
No treatment	£0	0.464	-	-	-
Laser - upper lip	£503	0.471	£503	0.006	£80,377
Laser - full face	£767	0.471	£767	0.006	£122,562

3 • QALYs: quality adjusted life years; ICER: incremental cost-effectiveness ratio

4

5 **3.2 Sensitivity analysis**6 **1 year time horizon**

7 A 1-year time horizon was explored for both upper lip and full-face laser hair
8 reduction compared to no treatment, where it was assumed 8 laser sessions were
9 required and that the utility score at 6 months was maintained at 1 year. The
10 probabilistic results are presented in **Table 9**. Both upper lip laser and full-face laser
11 hair treatment were associated with higher costs and QALYs compared to no
12 treatment. The ICER for upper lip laser versus no treatment was £35,828 per QALY
13 gained and for full face laser versus no treatment £59,046 per QALY gained.

14 **Table 9. Probabilistic results – time horizon: 1 year**

Strategy	Mean cost per person	Mean QALYs per person	Inc. cost	Inc. QALYs	ICER vs no treatment
No treatment	£0	0.929	-	-	-
Laser - upper lip	£679	0.948	£679	0.019	£35,828
Laser - full face	£1,119	0.948	£1,119	0.019	£59,046

15 • QALYs: quality adjusted life years; ICER: incremental cost-effectiveness ratio

16

1 **Alternative correlation coefficient (0.7) for imputing change standard**
2 **deviations.**

3 A probabilistic sensitivity analysis was conducted using a value of 0.7 for the
4 correlation coefficient for imputing standard deviations for change scores. This was
5 arbitrarily chosen as this would be less conservative than 0.5. The purpose of this
6 analysis was to assess whether a different value to 0.5 would affect the results at all.
7 The ICER at 6-months for upper lip was £79,380 per QALY gained with the 0.7
8 correlation coefficient compared to £79,243 per QALY gained with the 0.5 correlation
9 coefficient. The choice of correlation coefficient has not affected the results of the
10 analysis.

11 **Utility adjustments made to account for improvement in anxiety and**
12 **depression**

13 Using a 6-month time horizon, three scenario analyses were conducted to explore
14 changes in the EQ-5D-5L anxiety and depression domain level. This was done by
15 applying a utility gain associated with an improvement in anxiety and depression
16 (reported earlier in **Table 5**) for those receiving laser at 6 months, in addition to the
17 utility gain observed in Clayton. These scenarios were evaluated deterministically.

18 They aim to illustrate the potential HRQoL impact if laser treatment were to improve
19 psychological well-being, as these effects are not captured in the base-case
20 mapping. This provides a broader understanding of possible benefits and supports
21 exploration of uncertainty around psychological outcomes.

22 In these scenarios the ICERs for laser compared to no treatment reduced as the
23 utility gain as a result of improvement in anxiety and depression increased. The
24 results are reported in **Table 10**, **Table 11** and **Table 12**. In one scenario, where a
25 hypothetical improvement in anxiety and depression domain from level 3 to 1 is
26 included (**Table 12**), the ICER for upper lip laser was considered cost effective at
27 £16,651 per QALY gained compared to no treatment. In all other scenarios, despite
28 capturing some hypothetical benefit in psychological outcomes, the ICER remains
29 above £20,000 per QALY gained compared to no treatment.

30 **Table 10. Utility adjustments for anxiety and depression: Level 3 to 2**
31 **(deterministic, 6 months)**

Strategy	Mean cost per person	Mean QALYs per person	ICER vs no treatment
No treatment	-	0.464	-
Laser - upper lip	£503	0.480	£32,073
Laser - full face	£767	0.480	£48,906

- QALYs: quality adjusted life years; ICER: incremental cost-effectiveness ratio

Table 11. Utility adjustments for anxiety and depression: Level 2 to 1 (deterministic, 6 months)

Strategy	Mean cost per person	Mean QALYs per person	ICER vs no treatment
No treatment	-	0.464	-
Laser - upper lip	£503	0.485	£24,202
Laser - full face	£767	0.485	£36,905

- QALYs: quality adjusted life years; ICER: incremental cost-effectiveness ratio

Table 12. Utility adjustments for anxiety and depression: Level 3 to 1 (deterministic, 6 months)

Strategy	Mean cost per person	Mean QALYs per person	ICER vs no treatment
No treatment	-	0.464	-
Laser - upper lip	£503	0.495	£16,651
Laser - full face	£767	0.495	£25,391

- QALYs: quality adjusted life years; ICER: incremental cost-effectiveness ratio

4 Discussion

This economic analysis evaluated the cost effectiveness of high-fluence alexandrite laser hair reduction compared with no treatment for adults with PCOS and hirsutism. At 6 months, in the base case, upper lip laser hair reduction was associated with higher costs and QALYs compared to no treatment. The ICER was substantially above the £20,000 per QALY threshold. The probability that laser hair reduction was cost effective at £20,000 per QALY was 0%. The HRQoL gains for laser were small due to reliance on a mapping algorithm that only captures the physical health domain of WHOQOL-BREF. As a result, incremental QALYs were very small (<0.01), leading to high ICERs.

1 **Sensitivity and scenario analyses**

2 Full-face laser hair reduction generated larger total costs, and the same QALY gains,
3 resulting in higher ICERs than upper-lip laser hair reduction.

4 Extending the time horizon to 1 year increased incremental QALYs more than
5 incremental costs, however the ICER for both upper lip and full face remained well
6 above the £20,000 per QALY threshold.

7 A sensitivity analysis was also conducted around the assumption for the correlation
8 coefficient for imputing change-score standard deviations. This sensitivity analysis
9 used a less conservative correlation coefficient (0.7) than in the base case (0.5). This
10 higher correlation coefficient resulted in smaller standard deviations, however this
11 had a negligible impact on the probabilistic results and did not alter the conclusion,
12 suggesting that the choice of correlation coefficient has not impacted the results.

13 Scenario analyses exploring potential improvements in psychological health used
14 EQ-5D-5L (Thai value set) disutility weights for the anxiety/depression domain.
15 These analyses illustrate that if laser treatment meaningfully improves psychological
16 wellbeing, the resulting QALY benefit could be substantially larger than reflected in
17 the base case. Under the most optimistic scenario (improvement from
18 anxiety/depression level 3 to 1), the ICER fell to £16,651 per QALY gained, below the
19 NICE threshold. However, these analyses were hypothetical, based on external utility
20 weights, and not grounded in clinical evidence from the trial. Therefore, they should
21 be interpreted cautiously as exploratory assessments of potential benefit rather than
22 plausible estimates.

23 **Strengths and limitations**

24 A key strength of this analysis is that it uses the best available comparative evidence
25 and applies good-practice methods for capturing uncertainty, including probabilistic
26 analysis and validation of assumptions with the NICE committee. The model is
27 transparent, simple, and avoids over-extrapolation in a context of sparse evidence.

28 However, the analysis has substantial limitations:

- 29 1. Limited HRQoL gain captured by mapping WHOQOL-BREF to EQ-5D-5L.

1 The mapping algorithm relies solely on the physical health domain. Because
2 hirsutism in PCOS has a substantial psychological impact the mapping almost
3 certainly underestimates true HRQoL benefit. This limitation constrained the
4 estimated QALY gain. Furthermore, the mapping from WHOQOL-BREF to EQ-5D
5 relies on a Thai valuation dataset, not a UK tariff, because this is the only mapping
6 available. This introduces structural uncertainty.

7 2. Limited clinical evidence base.

8 Only one RCT (Clayton 2005) provided data suitable for economic modelling. The
9 study sample size was small (n=88) and the technology used may not reflect the
10 current laser technology available. The control arm was a “low-fluence” laser, which
11 may produce contextual or placebo-like effects, potentially reducing the apparent
12 incremental benefit of high-fluence treatment.

13 In addition, the model cannot capture longer-term benefits because no such data
14 exist. Laser hair reduction may produce sustained improvements in wellbeing and
15 reduced treatment burden beyond 6 months, but these were not possible to model
16 without substantial extrapolation. In addition, it is unclear how long the benefits of
17 laser hair reduction last and what level of additional laser treatment sessions may be
18 required.

19 3. Cost uncertainty

20 Laser hair reduction is not routinely commissioned by the NHS, therefore, the true
21 cost of establishing and delivering such a service is uncertain. Costs used in the
22 model were drawn from an NHS clinic offering self-funded treatment and are likely
23 lower than actual NHS delivery costs, meaning the analysis may underestimate true
24 costs.

25 The analysis only captures the costs of providing laser treatment, it does not capture
26 the costs associated with leaving hirsutism untreated. For example, the mental health
27 cost and costs associated with potential weight gain due to depression. Ideally these
28 would be measured as part of HRQoL and resource use, however this analysis is
29 limited as it is unlikely to adequately capture HRQoL and no outcome data related to

1 healthcare resource use was reported in the trial. These omissions may
2 underestimate opportunity costs and the wider system burden.

3 4. Lack of evidence on comparators

4 No data were available for electrolysis, which may be more effective for some hair
5 types. There were also no robust data on the impact of combining laser with COCP,
6 metformin or topical treatments.

7 **Generalisability and relevance**

8 Due to limited evidence outside PCOS and hirsutism-specific subgroups, the results
9 cannot be generalised to all people with hirsutism. The analysis also excludes key
10 practical implementation considerations, such as workforce, capital set-up, training,
11 and equitable access for those with darker skin tones who may require different laser
12 types.

13 **Implications for future research**

14 The committee identified significant gaps that future studies must address:

- 15 • high-quality RCTs powered to detect changes in psychological wellbeing using
16 EQ-5D (or other mappable measures)
- 17 • longer follow-up (≥ 12 –24 months) to capture durability and top-up patterns
- 18 • inclusion of all relevant comparators (such as electrolysis, IPL, combinations
19 with COCP or topical therapies)
- 20 • subgroup analyses to identify populations for whom treatment may be
21 cost-effective
- 22 • NHS-specific cost data and implementation modelling.

23 **5 Conclusion**

24 The cost-effectiveness of the intervention remains highly uncertain, reflecting the
25 limited evidence base, the constraints inherent in the mapping approach, substantial
26 uncertainty around costs, and the short duration of follow-up. Across both the
27 6-month and 1-year time horizons, the resulting ICERs exceed typical NICE

Polycystic Ovary Syndrome: Supplement B – Economic analysis of laser hair reduction DRAFT (July 2026)

1 thresholds, suggesting that cost-effectiveness is not demonstrated under current
2 assumptions. Key benefits of laser hair reduction, particularly psychological health
3 impacts are likely to be underestimated within the QALY framework. Taken together,
4 these factors indicate that the results should be interpreted with caution.

5 **6 References**

- 6 Brazier J, Connell J, Papaioannou D, Mukuria C, Mulhern B, Peasgood T, et al.
7 (2014) A systematic review, psychometric analysis and qualitative assessment of
8 generic preference-based measures of health in mental health populations and the
9 estimation of mapping functions from widely used specific measures. *Health*
10 *Technology Assessment* 18 (34)
- 11 Briggs A, Sculpher M, Claxton K (2006) *Decision Modelling for Health Economic*
12 *Evaluation*. New York, NY: Oxford University Press
- 13 Clayton WJ, Lipton M, Elford J, Rustin M, Sherr L (2005) A randomized controlled
14 trial of laser treatment among hirsute women with polycystic ovary syndrome. *The*
15 *British Journal of Dermatology* 152 (5): 986–992.
- 16 Dakin H, Burns R, Abel L, Koleva-Kolarova R, Yang Y, Mallon K, 2025. HERC
17 database of mapping studies, Version 10.0 (Last updated: 7th November
18 2025). <https://doi.org/10.5287/ora-bdrvmy9mn>. Available
19 at: <http://www.herc.ox.ac.uk/downloads/herc-database-of-mapping-studies>.
- 20 Dorgham N, Sharobim A, Haggag H, El-Kalioby M, Dorgham D (2021) Adding
21 combined oral contraceptives or metformin to laser treatment in polycystic ovarian
22 syndrome hirsute patients. *Journal of Drugs in Dermatology* 20 (3): 302–306.
- 23 [EuroQol Thai EQ5D-5L value set 2018](#) [online; accessed 23 March 2026]
- 24 Kangwanrattanakul K (2022) Mapping of the World Health Organization Quality of
25 Life Brief (WHOQOL-BREF) to the EQ-5D-5L in the general Thai population.
26 *PharmacoEconomics* 7: 139–148.
- 27 National Institute for Health and Care Excellence. Chronic pain (primary and
28 secondary) in over 16s: assessment of all chronic pain and management of chronic
29 primary pain (NG193). Available from: <https://www.nice.org.uk/guidance/ng193>
Polycystic Ovary Syndrome: Supplement B – Economic analysis of laser hair reduction DRAFT (July
2026)

1 National Institute for Health and Care Excellence. Addendum to Clinical Guideline 72,
2 Attention deficit hyperactivity disorder [dietary interventions]: Clinical Guideline
3 Addendum 72.1. London. National Institute for Health and Care Excellence, 2016.
4 Available from: [https://www.nice.org.uk/guidance/ng87/evidence/dietary-](https://www.nice.org.uk/guidance/ng87/evidence/dietary-interventions-pdf-4844210798)
5 [interventions-pdf-4844210798](https://www.nice.org.uk/guidance/ng87/evidence/dietary-interventions-pdf-4844210798)

6 Pearson MJ, Smart NA (2018) Reported methods for handling missing change
7 standard deviations in meta-analyses of exercise therapy interventions in patients
8 with heart failure: A systematic review. PloS One 13 (10): e0205952.

9 Sakthong P (2021) Mapping World Health Organization Quality of Life-BREF onto
10 5-level EQ-5D in Thai patients with chronic diseases. Value in Health 24 (8): 1089–
11 1094.

12 Spritzer PM, Barone CR, Oliveira FB (2016) Hirsutism in Polycystic Ovary Syndrome:
13 Pathophysiology and Management. Curr Pharm Des 22(36):5603–5613.

14 Wee HL, Yeo KK, Chong KJ, Khoo EYH, Cheung YB (2018) Mean rank,
15 equipercntile, and regression mapping of World Health Organization Quality of Life
16 Brief (WHOQOL-BREF) to EuroQoL 5 Dimensions 5 Levels (EQ-5D-5L) utilities.
17 Medical Decision Making 38 (3): 319–333.

18 [WHOQOL BREF Scoring Instructions](#) [online; accessed 23 March 2026]

19