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All commercial in confidence data and information are highlighted in [redacted].

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AA	Advanced adenoma
ADR	Adenoma detection rate
AE	Adverse event
AI	Artificial intelligence
AMR	Adenoma miss rate
APC	Adenomas per colonoscopy
CADe	Computer-aided detection
CADx	Computer-aided diagnosis
CE	Cost-effectiveness
CEAC	Cost-effectiveness acceptability curve
CI	Confidence interval
CRC	Colorectal cancer
CSR	Clinical study report
DAC	Diagnostic Assessment Committee
DAR	Diagnostic assessment report
DSA	Deterministic sensitivity analysis
EAG	External Assessment Group
IBD	Inflammatory bowel disease
IRR	Incidence rate ratio
LRA	Low-risk adenoma
LT	Long-term
LYG	Life years gained
NHB	Net health benefit
NHS	National Health Service
NSBP	No significant bowel pathology
QALY	Quality-adjusted life year
RR	Risk ratio
SLR	Systematic literature review
WTP	Willingness-to-pay

1 Economic analysis for CADDIE™

1.1 Modelling methodology

In the diagnostic assessment report (DAR) presented for this appraisal, the CADDIE™ technology was excluded from the economic analysis as the manufacturer, Odin Vision, had not provided a cost for this technology. However, during stakeholder consultation on draft guidance after the first Diagnostic Assessment Committee (DAC), Odin Vision provided costs for CADDIE™ in a National Health Service (NHS) context, so the External Assessment Group (EAG) has now been able to provide the results of the economic analysis for CADDIE™.

The methodology for the economic analysis is identical to the methodology for the other technologies, detailed in the main DAR. The CADDIE™ technology includes both computer-aided detection (CADe) and computer-aided diagnosis (CADx) functionalities, with data parametrising technology effectiveness for both functionalities; therefore, exploratory analyses considering the impact of CADx functionalities were conducted alongside the base case analysis, which included only the impact of CADe functionalities. Subgroup data were also available for the screening, symptomatic/diagnostic and surveillance populations, and so subgroup analyses were also run for these populations.

1.1.1 Model inputs

All inputs, with the exception of technology costs and technology effectiveness inputs, were the same as for the other interventions detailed in the main DAR. Model input values and sources for technology effectiveness parameters for CADDIE™ are given in Table 1.

Table 1. CADDIE™ treatment effectiveness model inputs

Model parameter	Input value (95% CI)	Source
Base case		
ADR RR*	[redacted]	Clinical SLR and meta-analysis (Section 3.2.2.1.1.1 of the main DAR)
APC IRR	[redacted]	Clinical SLR and meta-analysis (Section 3.2.2.1.1.8 of the main DAR)
Subgroup analyses		
ADR RR (screening population)	[redacted]	Odin Vision 2024 EAGLE CSR – screening subgroup[6]
ADR RR (symptomatic/diagnostic population)	[redacted]	Odin Vision 2024 CADDIE™ CSR, whole study[7]
ADR RR (surveillance population)	[redacted]	Odin Vision 2024 EAGLE CSR – surveillance subgroup[6]
Sensitivity analyses exploring alternative polyp management strategies		
APC (mean difference compared to colonoscopy without CADe)	[redacted]	Clinical SLR and meta-analysis (Section 3.2.2.1.1.8 of the main DAR)
CADx sensitivity (all diagnoses)	[redacted]	Odin Vision 2024 CADDIE™ CSR[7]
CADx specificity (all diagnoses)	[redacted]	Odin Vision 2024 CADDIE™ CSR[7]
CADx proportion of diagnoses which are not high-confidence	[redacted]	Odin Vision 2024 CADDIE™ CSR (note, 95% CI derived from mean value and sample size using normal approximation)[7]
CADx sensitivity (high-confidence diagnoses)	[redacted]	Odin Vision 2024 CADDIE™ CSR[7]
CADx specificity (high-confidence diagnoses)	[redacted]	Odin Vision 2024 CADDIE™ CSR[7]

Footnote: *The EAG was unable to identify separate ADRs for LRA and AA; therefore, the overall ADR RR was applied for both LRA and AA.

Abbreviations: AA, advanced adenoma; ADR, adenoma detection rate; APC, adenomas per colonoscopy; CADe, computer-aided detection; CADx, computer-aided diagnosis; CI, confidence interval; CSR, clinical study report; DAR, diagnostic assessment report; EAG, External Assessment Group; IRR, incidence rate ratio; LRA, low-risk adenoma; RR, risk ratio; SLR, systematic literature review.

The EAG were unable to identify an input value for the non-neoplastic polyp detection rate risk ratio (RR) for CADDIE™. Therefore, as for other interventions for which this model input could not be parametrised, in the base case, the non-neoplastic polyp detection rate RR was assumed to be equal to the input value for the comparator arm. However, a scenario analysis was also conducted in which the non-neoplastic polyp detection rate RR was aligned with the ENDO-AID™ technology, the intervention with the highest non-neoplastic polyp detection rate.

The EAG was also unable to identify an adenoma miss rate (AMR) RR; therefore, the scenario analysis conducted for some other interventions, in which CADe sensitivity was parametrised based on AMR rather than ADR, could not be performed.

Odin Vision provided costs for three-year and five-year contracts. The three-year contract incurred an upfront cost of £11,986.27, with additional annual software and maintenance costs of £6,488.78 and £2,242.89, respectively. The five-year contract incurred an upfront cost of £9,028.61, with annual software costs of £4,882.63, and the same annual maintenance cost as the three-year contract. Odin Vision also provided costs for a one-year contract, but stated that this would be unlikely to be used in an NHS context.

Since the five-year contract resulted in the lowest cost per year, the EAG chose to use this pricing framework for the analysis. Using the costing assumptions detailed in Section 4.2.1.10.2 of the main report, this resulted in an average cost of £10.45 per colonoscopy for the technology.

1.2 Results

Results for the economic analysis for CADDIE™ are presented in the following sections. Incremental net health benefit (NHB) calculations have been carried out assuming a willingness-to-pay (WTP) threshold of £30,000/quality-adjusted life year (QALY).

1.2.1 Base case results

The probabilistic and deterministic base case results are presented in Table 2 and Table 3. The probabilistic and deterministic results are very similar; both show that use of CADDIE™ rather than colonoscopy without artificial intelligence (AI) leads to a small reduction in total costs, and a small increase in overall quality-adjusted life years (QALYs) and life years gained (LYG). However, similarly to the other interventions, the magnitude of the differences in results compared to colonoscopy without AI is negligible.

The probabilistic and deterministic change in the number of procedures are presented in Table 4 and Table 5. Once again, the probabilistic and deterministic results are closely aligned. Overall, using CADDIE™ would be expected to result in a very small reduction in the number of therapeutic colonoscopies prior to diagnosis. The exploratory analysis of the impact on waiting times suggests that this would have a negligible impact on waiting times (a reduction of less than one day).

The probabilistic results are shown as a scatter plot in the cost-effectiveness (CE) plane in Figure 1, and a cost-effectiveness acceptability curve (CEAC) in Figure 2. As the WTP threshold increases, the probability of CADDIE™ being cost-effective rapidly converges to just over 50%. A convergence plot for the probabilistic analysis is given in Figure 3, showing good convergence with 1,000 iterations.

Table 2. Probabilistic cost-effectiveness results for CADDIE™

Technology	Total Costs	Total QALYs	Total LYG	Incremental costs vs colonoscopy without AI	Incremental QALYs vs colonoscopy without AI	Incremental LYG vs colonoscopy without AI *	ICER vs colonoscopy without AI (£/QALY)	Incremental NHB vs colonoscopy without AI
Colonoscopy without AI	£3,171.62	10.981	14.061					
CADDIE™	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Dominant	0.008

Footnote: * Undiscounted total and incremental LYG is presented to aid interpretability; all other results are discounted at a rate of 3.5% per year.

Abbreviations: AI, artificial intelligence; ICER, incremental cost-effectiveness ratio; LYG, life years gained; NHB, net health benefit; QALY, quality-adjusted life year.

Table 3. Deterministic cost-effectiveness results for CADDIE™

Technology	Total Costs	Total QALYs	Total LYG	Incremental costs vs colonoscopy without AI	Incremental QALYs vs colonoscopy without AI	Incremental LYG vs colonoscopy without AI *	ICER vs colonoscopy without AI (£/QALY)	Incremental NHB vs colonoscopy without AI
Colonoscopy without AI	£3,164.39	10.932	14.042					
CADDIE™		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Dominant	0.009

Footnote: * Undiscounted total and incremental LYG is presented to aid interpretability; all other results are discounted at a rate of 3.5% per year.

Abbreviations: AI, artificial intelligence; ICER, incremental cost-effectiveness ratio; LYG, life years gained; NHB, net health benefit; QALY, quality-adjusted life year.

Table 4. Probabilistic results: change in number of procedures for CADDIE™

Absolute number of index colonoscopies					Incremental number of index colonoscopies vs colonoscopy without AI				*Change in waiting time (weeks)†*
Technology	**Total***	**Diagnostic**	**Therapeutic**	**Polypectomies with no underlying pathology**	**Total***	**Diagnostic colonoscopies**	**Therapeutic colonoscopies**	**Polypectomies with no underlying pathology**	
Colonoscopy without AI	1.109	0.650	0.447	0.090					
CADDIE™	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Abbreviations: AI, artificial intelligence.									

Table 5. Deterministic results: change in number of procedures for CADDIE™

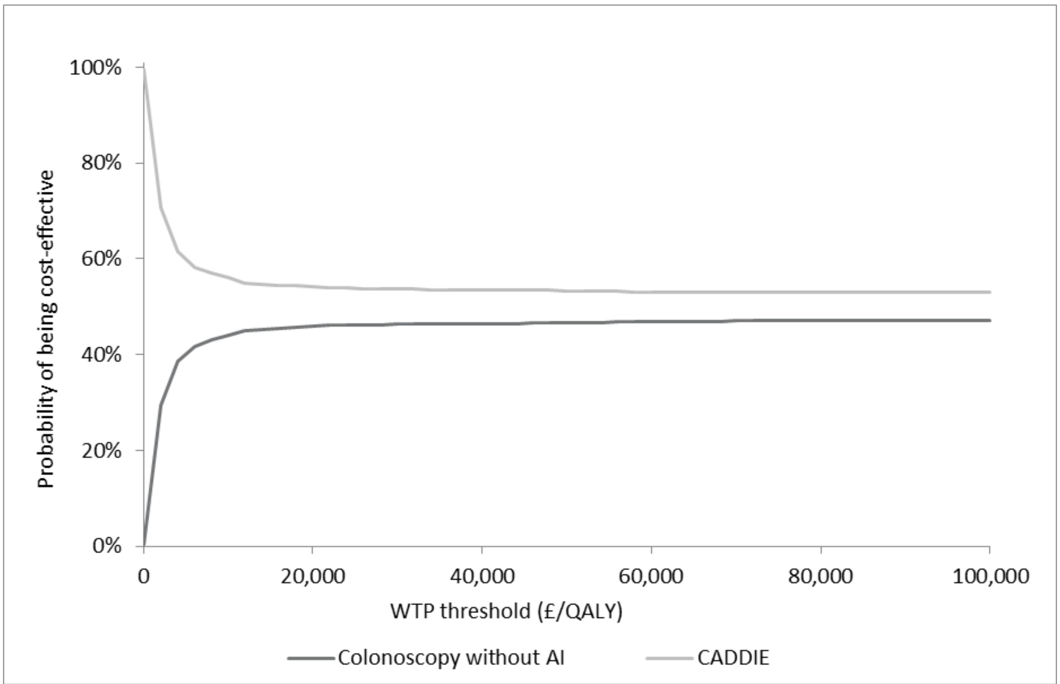
Absolute number of index colonoscopies					Incremental number of index colonoscopies vs colonoscopy without AI				*Change in waiting time (weeks)†*
Technology	**Total***	**Diagnostic**	**Therapeutic**	**Polypectomies with no underlying pathology**	**Total***	**Diagnostic colonoscopies**	**Therapeutic colonoscopies**	**Polypectomies with no underlying pathology**	
Colonoscopy without AI	1.109	0.650	0.447	0.090					
CADDIE™	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Abbreviations: AI, artificial intelligence.									

Figure 1. CADDIE™ vs colonoscopy without AI cost-effectiveness plane

[redacted]

Abbreviations: AI, artificial intelligence; QALY, quality-adjusted life year; WTP, willingness-to-pay.

Figure 2. CADDIE™ vs colonoscopy without AI CEAC



Abbreviations: AI, artificial intelligence; CEAC, cost-effectiveness acceptability curve; QALY, quality-adjusted life year.

Figure 3. CADDIE™ vs colonoscopy without AI incremental NHB convergence plot

[redacted]

Abbreviations: AI, artificial intelligence; CI, confidence interval; NHB, net health benefit.

1.2.2 Deterministic sensitivity analysis

Results for the deterministic sensitivity analysis (DSA) are presented as tornado plots in the figures below. Similar to other interventions, the model parameters to which NHB is most sensitive are the long-term QALY payoffs for patients with low-risk adenomas (LRA) and advanced adenomas (AA). This is due to the fact that the benefits of the CADe functionality are mostly related to the avoidance of long-term negative outcomes due to delayed diagnosis of underlying conditions, specifically related to polyp detection (i.e., not detecting inflammatory bowel disease [IBD] or colorectal cancer [CRC]). Since the incremental QALYs were very small, changes to the long-term QALY payoffs had a relatively large impact on the incremental QALYs, and hence to the overall incremental cost-effectiveness ratio (ICER) and NHB.

Figure 4. CADDIE™ vs colonoscopy without AI incremental NHB tornado plot

[redacted]

Footnote: the lower and upper bounds used to generate results were aligned with the endpoints of the 95% confidence interval, where available; otherwise, a 95% confidence interval was estimated by assuming a standard error of 20% of the mean value.

Abbreviations: AA, advanced adenoma; AI, artificial intelligence; CRC, colorectal cancer; LRA, low-risk adenoma; LT, long-term; NHB, net health benefit; QALY, quality-adjusted life year; RR, risk ratio.

Figure 5. CADDIE™ vs colonoscopy without AI incremental costs tornado plot

[redacted]

Footnote: the lower and upper bounds used to generate results were aligned with the endpoints of the 95% confidence interval, where available; otherwise, a 95% confidence interval was estimated by assuming a standard error of 20% of the mean value.

Abbreviations: AA, advanced adenoma; AI, artificial intelligence; CRC, colorectal cancer; LRA, low-risk adenoma; LT, long-term; NSBP, no significant bowel pathology; RR, risk ratio.

Figure 6. CADDIE™ vs colonoscopy without AI incremental QALYs tornado plot

[redacted]

Footnote: the lower and upper bounds used to generate results were aligned with the endpoints of the 95% confidence interval, where available; otherwise, a 95% confidence interval was estimated by assuming a standard error of 20% of the mean value.

Abbreviations: AA, advanced adenoma; AI, artificial intelligence; CRC, colorectal cancer; LRA, low-risk adenoma; LT, long-term; NSBP, no significant bowel pathology; QALY, quality-adjusted life year; RR, risk ratio.

Figure 7. CADDIE™ vs colonoscopy without AI incremental LYG tornado plot

[redacted]

Footnote: the lower and upper bounds used to generate results were aligned with the endpoints of the 95% confidence interval, where available; otherwise, a 95% confidence interval was estimated by assuming a standard error of 20% of the mean value.

Abbreviations: AA, advanced adenoma; AI, artificial intelligence; CRC, colorectal cancer; LRA, low-risk adenoma; LT, long-term; LYG, life years gained; NSBP, no significant bowel pathology; RR, risk ratio.

1.2.3 Subgroup analyses

Subgroup analyses were conducted for the screening, symptomatic/diagnostic, and surveillance populations; results are presented in Table 6. Subgroup analyses have been presented deterministically, due to time constraints; however, for the base case, the probabilistic results are generally closely aligned with the deterministic results, and the same is expected to be true of the subgroup and scenario analyses.

For the screening and symptomatic populations, outcomes were very similar to the full population, albeit with a very small reduction in cost savings and QALY gains. However, in the surveillance population, the cost savings and QALY gains were much greater than for the full population, suggesting that the benefits of CADDIE™ might be more fully realised in the surveillance population.

Table 6. Deterministic subgroup analyses: cost-effectiveness results vs colonoscopy without AI for CADDIE™

Subgroup	Incremental costs (£)	Incremental QALYs	Incremental LYG*	ICER (£/QALY)	Incremental NHB
Full population	[redacted]	[redacted]	[redacted]	Dominant	0.009
Screening	[redacted]	[redacted]	[redacted]	Dominant	0.002
Symptomatic/ diagnostic	[redacted]	[redacted]	[redacted]	Dominant	0.003
Surveillance	[redacted]	[redacted]	[redacted]	Dominant	0.100
Abbreviations: ICER, incremental cost-effectiveness ratio; LYG, life years gained; NHB, net health benefit; QALY, quality-adjusted life year.					

1.2.4 Scenario analyses

The scenario analyses presented in the main DAR and in the first addendum to the DAR (October 2025) were rerun for CADDIE™, with the exception of scenario 6 from the DAR (CADe sensitivity of interventions calculated using AMR), which was excluded, as no AMR data were available for CADDIE™. Detailed descriptions of each scenario are given in Section 4.2.1.15 of the main DAR and Section 2 of the first addendum to the DAR.

Similar to the other interventions, all scenario analyses gave results very similar to the base case; CADDIE™ consistently dominated colonoscopy without AI, although the cost reductions and increase in QALYs and LYG were very small. In particular, the use of alternative polyp management strategies did not substantially affect the cost-effectiveness results. The exploratory analyses, which included the impact of the CADx functionality of CADDIE™, were also very similar to the base case results, suggesting that the CADx functionality has a relatively small impact on cost-effectiveness.

Table 7. Deterministic scenario analysis results for CADDIE™

Scenario	Deterministic ICER vs colonoscopy without AI	Deterministic NHB vs colonoscopy without AI
Base case	Dominant	0.009
1a. Diagnose-and-leave polyp management strategy	Dominant	0.006
1b. Diagnose-and-leave (high-confidence) polyp management strategy	Dominant	0.007
2. Resect-and-discard polyp management strategy	Dominant	0.009
*3a. Diagnose-and-leave polyp management strategy with CADx**	Dominant	0.004
*3b. Diagnose-and-leave (high-confidence) polyp management strategy with CADx**	Dominant	0.003
*4. Resect-and-discard polyp management strategy with CADx**	Dominant	0.009
5. Alternative values for sensitivity of detection for colonoscopy without AI	Dominant	0.014
7. CADe sensitivity of interventions calculated using APC	Dominant	0.012
8a. Alternative rate of CRC detection: 100% for all technologies	Dominant	0.009
8b. Alternative rate of CRC detection: 90% for all technologies	Dominant	0.009
8c. Alternative rate of CRC detection: informed by ADR RR	Dominant	0.010
9a. Alternative rate of IBD detection: 100% for all technologies	Dominant	0.009
9b. Alternative rate of IBD detection: 80% for all technologies	Dominant	0.009
10. Alternative values for sensitivity of detection for AA for missing values	Dominant	0.003
11. Alternative approach to parametrising unnecessary polyp removal for missing values	Dominant	0.009
12. Alternative costing for failed initial colonoscopies: 0% of diagnostic colonoscopy cost	Dominant	0.009
13a. Alternative proportion of patients receiving secondary therapeutic colonoscopies: 0%	Dominant	0.009
13b. Alternative proportion of patients receiving secondary therapeutic colonoscopies: 50%	Dominant	0.009
13c. Alternative proportion of patients receiving secondary therapeutic colonoscopies: informed by ADR RR	Dominant	0.009
14a. Alternative expected lifetime of AI technologies: three years	Dominant	0.009
14b. Alternative expected lifetime of AI technologies: five years	Dominant	0.009
14c. Alternative expected lifetime of AI technologies: ten years	Dominant	0.009
15. AE costs removed for patients who die	Dominant	0.009
16*. Resect-and-discard polyp management strategy with updated histopathology cost	Dominant	0.009

17. Resect-and-discard polyp management strategy with CADx, and updated histopathology cost**	Dominant	0.009
18*. Alternative failure rate for index colonoscopy	Dominant	0.008

Footnote: *Scenarios 16, 17 and 18 were included as additional scenario analyses in the first DAR addendum.

Abbreviations: AA, advanced adenoma; AE, adverse event; AI, artificial intelligence; ADR, adenoma detection rate; APC, adenomas per colonoscopy; CADx, computer-aided diagnosis; CRC, colorectal cancer; DAR, diagnostic assessment report; IBD, inflammatory bowel disease; ICER, incremental cost-effectiveness ratio; NHB, net health benefit; RR, risk ratio.

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