

Bowel Cancer Services: Costs and Benefits

Final Report Appendices to the Department of Health

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APPENDIX A

Parameters and Outcomes

A.1 PARAMETERS AND OUTCOMES

A.1.1 Cost and Activity References for the Bowel Cancer Model Standard Pathway

A.1.1.1 Introduction

This section gives a detailed description of each action point (node) along the Bowel Cancer Baseline Model Standard Pathway. This goes from presentation, through treatment and on to follow up. This section shows what data is used to derive the activity and cost of each node along the way and also gives the references for that data and any comments that are appropriate.

This section also shows which distributions if any are attached to the activity and cost parameters. These distributions are fitted so that Monte Carlo simulations could be run on the model to generate 95% confidence intervals around the mean estimates. All activity distributions (with the exception of adjuvant chemotherapy) are Beta distributions. These all have the same probability of 'success' as the point estimate but the numbers used to define the distributions are either taken from the reference sources, the wider literature on that parameter/area or are based on an assumption. So for each parameter the activity distributions are referenced as either Beta defined by reference source, Beta defined by literature or Beta defined by assumption. All cost distributions are Normal distributions and they too used the mean cost as the average cost for the distribution but the standard deviation is informed by either the reference source, the wider literature or assumption.

To use this paper most effectively it is advised that the reader has either a printed or on screen version of the baseline model at hand. However it should be possible to understand this paper without having the baseline model nearby.

The information is displayed for each of the different treatment sections in the same order they appear in the baseline model, that is; Diagnosis, Rectal cancer surgery, Rectal cancer after surgery, Rectal cancer follow up, Colon cancer surgery, Colon cancer after surgery, Colon cancer follow up.

In some areas of the pathway data appears to be scarce in the majority of these cases the parameter has under gone elicitation, in some cases the elicitation could not provide the information we needed so assumptions were made. Where assumptions are made the distributions attached are wider so as to indicate the uncertainty around the parameters. There are more details about the areas that have limited data available given in the summary of this section.

A.1.1.2 Treatment Sections

Diagnosis

Area: Presenting

Node Number: 1

Activity Parameter: 767,108

Activity Reference: Vellacott (2002), Cancer Statistics Registrations, England MB1.34 (2003), Dunlop (2000)

Activity Comments: The diagnosis of those with positive cancer was 3.5% in Vellacott (2002). Therefore 794,286 individuals in England however need to subtract the FAP, HNPCC and UC patients Dunlop (2000) as they have a different pathway. The number of registrations 2003 were 27,800. Cancer Statistics Registrations, England MB1.34 (2003)

Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Direct presentation at A&E
Node Number: 2
Activity Parameter: 7%
Activity Reference: Department of Health Waiting Times Database (In Confidence) (2006)
Activity Comments: A&E direct presentation adapted from total A&E figures
Activity Distribution: Beta distribution defined by assumption

Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: GP Consultation
Node Number: 3
Activity Parameter: 71%
Activity Reference: Department of Health Waiting Times Database (In Confidence) (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Secondary Care
Node Number: 4
Activity Parameter: 22%
Activity Reference: Department of Health Waiting Times Database (In Confidence) (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Referred by GP
Node Number: 5
Activity Parameter: 60.6%
Activity Reference: Caper Dataset
Activity Comments: Provided by William Hamilton (Exeter PCT)
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Not referred by GP
Node Number: 6
Activity Parameter: 39.4%
Activity Reference: Caper Dataset
Activity Comments: Provided by William Hamilton (Exeter PCT)
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £54.75
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Standard GP appointment cost of £30 multiplied by 1.825 for the average number of GP visits without referral. Number of GP visits from Caper dataset provided by William Hamilton.
Cost Distribution: Normal distribution based on reference

Area: GP refers to A&E
Node Number: 7
Activity Parameter: 13%
Activity Reference: Department of Health Waiting Times Database (In Confidence) (2006)
Activity Comments: A&E via GP referral adapted from total A&E figures
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £67.20
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Standard GP appointment cost of £30 multiplied by 2.24 for the average number of GP visits before referral. Number of GP visits from Caper dataset provided by William Hamilton.
Cost Distribution: Normal distribution based on reference

Area: Standard GP referrals
Node Number: 8
Activity Parameter: 37.5% of GP referrals
Activity Reference: Department of Health Waiting Times Database (In Confidence) (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £67.20
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Standard GP appointment cost of £30 multiplied by 2.24 for the average number of visits before referral. Number of GP visits from Caper dataset provided by William Hamilton.
Cost Distribution: Normal distribution based on reference

Area: Fast Track GP referrals
Node Number: 9
Activity Parameter: 49.5% of GP referrals
Activity Reference: Department of Health Waiting Times Database (In Confidence) (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £67.20
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Standard GP appointment cost of £30 multiplied by 2.24 for the average number of visits before referral. Number of GP visits from Caper dataset provided by William Hamilton.
Cost Distribution: Normal distribution based on reference

Area: A&E Tests
Node Number: 10
Activity Parameter: 100%
Activity Reference: YHEC Pathway assumption
Activity Comments: YHEC Pathway assumption
Activity Distribution: None
Cost Parameter: £302.99
Cost Reference: Reference Costs, Department of Health (2005), Renehan et al (2004)
Cost Comments: Total cost of X-ray, blood tests, CT scan and general examination
Cost Distribution: Normal distribution based on references

Area: A&E Obstructed
Node Number: 11
Activity Parameter: 7.5%
Activity Reference: Law (2002)
Activity Comments: 15-20% of patients with primary colorectal cancer present with intestinal obstruction
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £62
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Charge for referral or discharge
Cost Distribution: Normal distribution based on reference

Area: A&E Other department
Node Number: 12
Activity Parameter: 25%
Activity Reference: None
Activity Comments: Parameter being elicited
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £62
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Charge for referral or discharge
Cost Distribution: Normal distribution based on reference

Area: A&E Sent home
Node Number: 13
Activity Parameter: 25%
Activity Reference: None
Activity Comments: Parameter being elicited
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £62
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Charge for referral or discharge
Cost Distribution: Normal distribution based on reference

Area: A&E not obstructed referred to clinic
Node Number: 14
Activity Parameter: 42.5%
Activity Reference: Law (2002)
Activity Comments: 15-20% of patients with primary colorectal cancer present with intestinal obstruction
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £62
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Charge for referral or discharge
Cost Distribution: Normal distribution based on reference

Area: Normal Clinic
Node Number: 15
Activity Parameters: All GP standard and Fast track referrals (nodes 7 and 8). 100% have rigid sigmoidoscopy and haemoglobin check.
Activity Reference: For GP referrals see appropriate nodes. Phillips (2002) for rigid sigmoidoscopy and haemoglobin check rates.
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameters: £194.55
Cost Reference: Reference Costs, Department of Health (2005), Renehan et al (2004)
Cost Comments: Cost of rigid sigmoidoscopy and haemoglobin check.
Cost Distribution: Normal distribution based on references

Area: Sent home
Node Number: 16
Activity Parameter: 10%
Activity Reference: Assumption
Activity Comments: The assumption was informed by other parameters in the model
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Prior Tests
Node Number: 17
Activity Parameter: 98.5%
Activity Reference: Assumption
Activity Comments: The assumption was informed by other parameters in the model
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Prior Diagnostic tests
Node Number: 18
Activity Parameter: 1.5%
Activity Reference: Assumption
Activity Comments: The assumption was informed by other parameters in the model
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £288.50
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Average cost of colonoscopy, flexible sigmoidoscopy and barium enema
Cost Distribution: Normal distribution based on reference

Area: Further Diagnostic tests
Node Number: 19
Activity Parameter: 90% from Normal Clinic and 100% of patients from No prior diagnostic tests (node 17) and A&E not obstructed (node 14)
Activity Reference: Assumptions
Activity Comments: The assumption was informed by other parameters in the model
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Normal Clinic- Colonoscopy

Node Number: 20

Activity Parameter: 41%

Activity Reference: Ward et al (2004) and Elicitation

Activity Comments: Elicitation was used to define % endoscopy compared to double contrast barium enema and Ward et al 2004 for colonoscopy and flexible sigmoidoscopy.

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £352

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Cost Distribution: Normal distribution based on reference

Area: Normal Clinic- Flexible Sigmoidoscopy

Node Number: 21

Activity Parameter: 34%

Activity Reference: Ward et al (2004) and Elicitation

Activity Comments: Elicitation was used to define % endoscopy compared to double contrast barium enema and Ward et al 2004 for colonoscopy and flexible sigmoidoscopy.

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £279

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Cost Distribution: Normal distribution based on reference

Area: Normal Clinic- Barium Enema

Node Number: 22

Activity Parameter: 25%

Activity Reference: Ward et al (2004) and Elicitation

Activity Comments: Elicitation was used to define % endoscopy compared to double contrast barium enema and Ward et al 2004 for colonoscopy and flexible sigmoidoscopy.

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £225

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Cost Distribution: Normal distribution based on reference

Area: Multiple tests required

Node Number: 23

Activity Parameter: 13%

Activity Reference: Smith (2001)

Activity Comments: Taken from IOCC

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £288.50

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: Average cost of colonoscopy, flexible sigmoidoscopy and barium enema

Cost Distribution: Normal distribution based on reference

Area: Multiple test not required
Node Number: 24
Activity Parameter: 87%
Activity Reference: Smith (2001)
Activity Comments: Taken from IOCC
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Perforation
Node Number: 25
Activity Parameter: 0.13% of colonoscopy, 0.00246% of flexible sigmoidoscopy, 0.001% of DCBE and 0.044% of multiple tests
Activity Reference: Bowles et al (2004) for colonoscopy, Atkin et al (2002) for flexible sigmoidoscopy, De Zwart et al (2001) for double contrast barium enema
Activity Comments: Multiple test perforation rates based on a weighted average of separate test perforation rates.
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,037.80
Cost Reference: Reference Costs, Department of Health (2005) and Osman et al (2000)
Cost Comments: Costs were calculated using a weighted average of Laproscopic surgery 90% and conservative treatment 10% as suggested by A.Veitch.
Cost Distribution: Normal distribution defined by assumption

Area: No Perforation
Node Number: 26
Activity Parameter: 99.87% of colonoscopy, 99.99754% of flexible sigmoidoscopy, 99.9999% of DCBE and 99.956% of multiple tests
Activity Reference: Bowles et al (2004) for colonoscopy, Atkin et al (2002) for flexible sigmoidoscopy, De Zwart et al (2001) for double contrast barium enema
Activity Comments: Multiple test none perforation rates based on a weighted average of separate test perforation rates.
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die
Node Number: 27
Activity Parameter: 0.006% of colonoscopy
Activity Reference: Bowles et al
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal defined by assumption

Area: Positive Cancer
Node Number: 28
Activity Parameter: 3.5%
Activity Reference: Vellacott (2002)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Negative Cancer
Node Number: 29
Activity Parameter: 96.5%
Activity Reference: Vellacott (2002)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Negative Cancer-polyps
Node Number: 30
Activity Parameter: 25%
Activity Reference: Tekkis et al (2005)
Activity Comments: None
Activity Distribution: Beta distribution based on assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Negative Cancer-no polyps
Node Number: 31
Activity Parameter: 75%
Activity Reference: Tekkis et al (2005)
Activity Comments: None
Activity Distribution: Beta distribution based on assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: MDT
Node Number: 32
Activity Parameter: All positive cancer (node 28). All A&E obstructed (node 11) and all Prior diagnostic tests (node 18). 100% under go MDT tests.
Activity Reference: Assumptions
Activity Comments: The assumption was informed by other parameters in the model
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £303.55
Cost Reference: Reference Costs, Department of Health (2005), Renehan et al (2004)
Cost Comments: Sum of CEA test, CT scan and MDT meeting
Cost Distribution: Normal defined by references

A.1.1.2.2 Rectal Cancer

Rectal cancer surgery

Emergency surgery pathways

Area: Rectal cancer
Node Number: 33
Activity Parameter: 29%
Activity Reference: ONS Data (2003)
Activity Distribution: Beta distribution defined by reference
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Operable Cancer
Node Number: 34
Activity Parameter: 79%
Activity Reference: *Mella et al.* (1997)
Activity Comments: An audit on the management of colorectal cancer in the UK
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Emergency procedure
Node Number: 35
Activity Parameter: 42.5%
Activity Reference: HES Data (2003/4)
Activity Comments: This figure is for both rectal and colon cancers
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Stented procedures

Area: Stenting Used
Node Number: 36
Activity Parameter: 2%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £1,673
Cost Reference: *Osman et al.* (2000)
Cost Comments: Uplifted price
Cost Distribution: Normal distribution defined by assumption

Area: Anterior Resection
Node Number: 37
Activity Parameter: 46%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,729
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of major and complex surgery
Cost Distribution: Normal distribution defined by reference

Area: Abdominal Resection APER
Node Number: 38
Activity Parameter: 21%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Hartmann's procedure
Node Number: 39
Activity Parameter: 6%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Other procedures
Node Number: 40
Activity Parameter: 27%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,164
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Average of all other surgery
Cost Distribution: Normal distribution defined by reference

Area: Complications
Node Number: 41
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: No Complications
Node Number: 42
Activity Parameter: 87%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 43
Activity Parameter: 67%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: Stoma not required
Node Number: 44
Activity Parameter: 33%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 45
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 46
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 47
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account after CRM involvement
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Non-stented procedures

Area: No stenting used
Node Number: 48
Activity Parameter: 99.944%
Activity Reference: Tekkis *et al.* (2005) NBOCAP and IOCC (2004)
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Anterior Resection
Node Number: 49
Activity Parameter: 46%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,729
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of major and complex surgery
Cost Distribution: Normal distribution defined by reference

Area: Abdominal Resection APER
Node Number: 50
Activity Parameter: 21%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Hartmann's procedure
Node Number: 51
Activity Parameter: 6%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Other procedures
Node Number: 52
Activity Parameter: 27%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,164
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Average of all other surgery
Cost Distribution: Normal distribution defined by reference

Area: Complications
Node Number: 53
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: No Complications
Node Number: 54
Activity Parameter: 87%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 55
Activity Parameter: 67%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: Stoma not required
Node Number: 56
Activity Parameter: 33%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 57
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 58
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 59
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account after CRM involvement
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Elective rectal surgery

Area: Rectal cancer
Node Number: 33
Activity Parameter: 29%
Activity Reference: ONS Data (2003)
Activity Distribution: Beta distribution defined by reference
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Operable Cancer
Node Number: 34
Activity Parameter: 79%
Activity Reference: Mella et al. (1997)
Activity Comments: An audit on the management of colorectal cancer in the UK
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Elective procedure
Node Number: 60
Activity Parameter: 57.5%
Activity Reference: HES Data (2003/4)
Activity Comments: This figure is for both rectal and colon cancers
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

R0 rectal cancer

Area: MRI predicts R0
Node Number: 61
Activity Parameter: 82%
Activity Reference: Chau (2003)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £313
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on reference

Area: Preoperative Chemoradiotherapy
Node Number: 62
Activity Parameter: 60%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £2,263
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Based on standard radiotherapy regime and 2 weeks of 5-FU chemotherapy
Cost Distribution: Normal based on assumption

Area: Anterior Resection
Node Number: 63
Activity Parameter: 46%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,729
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of major and complex surgery
Cost Distribution: Normal distribution defined by reference

Area: Abdominal Resection APER
Node Number: 64
Activity Parameter: 21%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Hartmann's procedure
Node Number: 65
Activity Parameter: 6%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Other procedures
Node Number: 66
Activity Parameter: 27%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,164
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Average of all other surgery
Cost Distribution: Normal distribution defined by reference

Area: Complications
Node Number: 67
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: No Complications
Node Number: 68
Activity Parameter: 87%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 69
Activity Parameter: 67%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: Stoma not required
Node Number:70
Activity Parameter: 33%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 71
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas
and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 72
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas
and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 73
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account after CRM involvement
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Pre operative radiotherapy
Node Number: 74
Activity Parameter: 40%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Anterior Resection
Node Number: 75
Activity Parameter: 46%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,729
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of major and complex surgery
Cost Distribution: Normal distribution defined by reference

Area: Abdominal Resection APER
Node Number: 76
Activity Parameter: 21%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Hartmann's procedure
Node Number: 77
Activity Parameter: 6%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Other procedures
Node Number: 78
Activity Parameter: 27%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,164
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Average of all other surgery
Cost Distribution: Normal distribution defined by reference

Area: Complications
Node Number: 79
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: No Complications
Node Number: 80
Activity Parameter: 87%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 81
Activity Parameter: 67%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: Stoma not required
Node Number: 82
Activity Parameter: 33%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 83
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 84
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 85
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account after CRM involvement
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

R1/R2 rectal cancer

Area: MRI predicts R0
Node Number: 86
Activity Parameter: 18%
Activity Reference: Chau (2003)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £313
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on reference

Area: Preoperative Long course Chemoradiotherapy
Node Number: 87
Activity Parameter: 100%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,263
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Based on standard radiotherapy regime and 2 weeks of 5-FU chemotherapy
Cost Distribution: Normal based on assumption

Area: Progress to surgery
Node Number: 88
Activity Parameter: 85%
Activity Reference: Elicitation
Activity Comments: Parameter undergoing elicitation
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Anterior Resection
Node Number: 89
Activity Parameter: 46%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,729
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of major and complex surgery
Cost Distribution: Normal distribution defined by reference

Area: Abdominal Resection APER
Node Number: 90
Activity Parameter: 21%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Hartmann's procedure
Node Number: 91
Activity Parameter: 6%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal distribution defined by reference

Area: Other procedures
Node Number: 92
Activity Parameter: 27%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS figures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: £5,164
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Average of all other surgery
Cost Distribution: Normal distribution defined by reference

Area: Complications
Node Number: 93
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: No Complications
Node Number: 94
Activity Parameter: 87%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 95
Activity Parameter: 67%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed to be included in the reference costs of surgery
Cost Distribution: None

Area: Stoma not required
Node Number: 96
Activity Parameter: 33%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 97
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 98
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 99
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account after CRM involvement
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Do not progress to surgery
Node Number: 100
Activity Parameter: 15%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Palliative Chemotherapy
Node Number: 101
Activity Parameter: 100%
Activity Reference: Elicitation
Activity Comments: Pathway Assumption
Activity Distribution: None
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: Based on weighted average of Cost of IRMDG (5FU followed by 5FU+irinotecan): £12,542.50 and Cost of Folfiri/Folfox: £22,864.46.
Cost Distribution: Normal based on assumptions

Area: Alive
Node Number: 102
Activity Parameter: 100%
Activity Reference: YHEC pathway assumption
Activity Comments: Mortality is taken into account after CRM involvement
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Inoperable rectal cancer

Area: Rectal cancer
Node Number: 33
Activity Parameter: 29%
Activity Reference: ONS Data (2003)
Activity Distribution: Beta distribution defined by reference
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Operable Cancer
Node Number: 103
Activity Parameter: 21%
Activity Reference: *Mella et al.* (1997)
Activity Comments: An audit on the management of colorectal cancer in the UK
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Palliative Stenting
Node Number: 104
Activity Parameter: 4%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £1,673
Cost Reference: *Osman et al.* (2000)
Cost Comments: Uplifted price
Cost Distribution: Normal based on assumption

Area: Stoma
Node Number: 105
Activity Parameter: 4.2%
Activity Reference: Assumption
Activity Comments: Assumption informed by elicitation of other model parameters
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Palliative Bypass
Node Number: 106
Activity Parameter: 4.2%
Activity Reference: Assumption
Activity Comments: Assumption informed by elicitation of other model parameters
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Cost of Hartmann's procedure
Cost Distribution: Normal based on reference

Area: Palliative Radiotherapy
Node Number: 107
Activity Parameter: 4.2%
Activity Reference: Assumption
Activity Comments: Assumption informed by elicitation of other model parameters
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £2,263
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Based on standard radiotherapy regime
Cost Distribution: Normal based on assumption

Area: Palliative Chemotherapy
Node Number: 108
Activity Parameter: 83.3%
Activity Reference: Elicitation
Activity Comments: Parameter undergoing elicitation
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: Based on weighted average of Cost of IRMDG (5FU followed by 5FU+irinotecan): £12,542.50 and Cost of Folfiri/Folfox: £22,864.46.
Cost Distribution: Normal based on assumptions

Area: Alive
Node Number: 109
Activity Parameter: 100%
Activity Reference: YHEC pathway assumption
Activity Comments: Mortality is taken into account on Rectal after surgery sheet
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

A.1.1.2.3 Rectal Cancer After Surgery

Following emergency surgery

Area: CRM involvement AR
Node Number: 110
Activity Parameter: 7%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Emergency surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement APER
Node Number: 111
Activity Parameter: 18%
Activity Reference: Tekkis *et al.* (2005) NBOCAP
Activity Comments: Emergency surgery APERs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 112
Activity Parameter: 27%
Activity Reference: Tekkis *et al.* (2005) NBOCAP
Activity Comments: Emergency surgery Hartmann's procedures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 113
Activity Parameter: 17.1%
Activity Reference: Tekkis *et al.* (2005) NBOCAP
Activity Comments: Emergency surgery other procedures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement AR
Node Number: 114
Activity Parameter: 93%
Activity Reference: Tekkis *et al.* (2005) NBOCAP
Activity Comments: Emergency surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement APER
Node Number: 115
Activity Parameter: 82%
Activity Reference: Tekkis *et al.* (2005) NBOCAP
Activity Comments: Emergency surgery APERs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 116
Activity Parameter: 73%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Emergency surgery Hartmann's procedures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 117
Activity Parameter: 82.9%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Emergency surgery other procedures
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemoradiotherapy
Node Number: 118
Activity Parameter: 11%
Activity Reference: CRO7 Trial (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £2,263
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Based on standard radiotherapy regime and 2 weeks of 5-FU chemotherapy
Cost Distribution: Normal based on assumption

Area: No Chemoradiotherapy
Node Number: 119
Activity Parameter: 89%
Activity Reference: CRO7 Trial (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Following R0 elective surgery with preoperative chemoradiotherapy

Area: CRM involvement AR
Node Number: 120
Activity Parameter: 7%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement APER
Node Number: 121
Activity Parameter: 18%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 122
Activity Parameter: 27%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 123
Activity Parameter: 17.1%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement AR
Node Number: 124
Activity Parameter: 93%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement APER
Node Number: 125
Activity Parameter: 82%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 126
Activity Parameter: 73%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 127
Activity Parameter: 82.9%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Chemoradiotherapy
Node Number: 128
Activity Parameter: 100%
Activity Reference: YHEC Pathway assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Following R0 elective surgery without preoperative chemoradiotherapy

Area: CRM involvement AR
Node Number: 129
Activity Parameter: 7%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement APER
Node Number: 130
Activity Parameter: 18%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 131
Activity Parameter: 27%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 132
Activity Parameter: 17.1%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement AR
Node Number: 133
Activity Parameter: 93%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement APER
Node Number: 134
Activity Parameter: 82%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 135
Activity Parameter: 73%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 without preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 136
Activity Parameter: 82.9%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R0 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemoradiotherapy
Node Number: 137
Activity Parameter: 11%
Activity Reference: CRO7 Trial (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £2,263
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Based on standard radiotherapy regime and 2 weeks of 5-FU chemotherapy
Cost Distribution: Normal based on assumption

Area: No Chemoradiotherapy
Node Number: 138
Activity Parameter: 89%
Activity Reference: CRO7 Trial (2006)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Following R1/R2 elective surgery with preoperative chemoradiotherapy

Area: CRM involvement AR
Node Number: 139
Activity Parameter: 7%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement APER
Node Number: 140
Activity Parameter: 18%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 141
Activity Parameter: 27%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 142
Activity Parameter: 17.1%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement AR
Node Number: 143
Activity Parameter: 93%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No CRM involvement APER
Node Number: 144
Activity Parameter: 82%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement Hartmann's procedure
Node Number: 145
Activity Parameter: 73%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: CRM involvement other
Node Number: 146
Activity Parameter: 82.9%
Activity Reference: Tekkis et al. (2005) NBOCAP
Activity Comments: Elective R1/R2 with preoperative chemoradiotherapy surgery ARs
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Chemoradiotherapy
Node Number: 147
Activity Parameter: 100%
Activity Reference: YHEC Pathway assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Adjuvant chemotherapy

Area: Dukes A
Node Number: 148
Activity Parameter: 16.25%
Activity Reference: Tekkis et al (2005)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Dukes B
Node Number: 149
Activity Parameter: 43.4%
Activity Reference: Tekkis et al (2005)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Dukes C
Node Number: 150
Activity Parameter: 40.3%
Activity Reference: Tekkis et al (2005)
Activity Comments: None
Activity Distribution: Beta distribution defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Dukes A

Area: No Chemotherapy
Node Number: 151
Activity Parameter: 100%
Activity Reference: YHEC Pathway assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Dukes B

Area: Chemotherapy
Node Number: 152
Activity Parameter: 28%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal distribution based on reference
Cost Parameter: £11,209
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal distribution based on assumptions

Area: No Chemotherapy
Node Number: 153
Activity Parameter: 62%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal distribution based on reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Dukes C

Area: Chemotherapy
Node Number: 154
Activity Parameter: 75%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal distribution based on reference
Cost Parameter: £11,209
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal distribution based on assumptions

Area: No Chemotherapy
Node Number: 155
Activity Parameter: 25%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal distribution based on reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Mortality

Area: Alive
Node Number: 156
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 157
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Inoperable Patients

Area: No Interventional Care
Node Number: 158
Activity Parameter: 100% of patients in palliative care at end of rectal surgery (nodes 102 and 109)
Activity Reference: YHEC Pathway assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 159
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 160
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Progress to Follow Up

Area: Progress to Follow Up
Node Number: 161
Activity Parameter: 100% of alive patients (156 and 159)
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

A.1.1.2.3 Rectal Cancer Follow Up

Year 1

Area: Year 1 Surveillance
Node Number: 162
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £268.10
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 163
Activity Parameter: 32.4%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local Recurrence
Node Number: 164
Activity Parameter: 3.5%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 165
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 166
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 167
Activity Parameter: 8%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 168
Activity Parameter: 46%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 169
Activity Parameter: 46%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 170
Activity Parameter: 67.63%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 171
Activity Parameter: 3.5%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 172
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 173
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 174
Activity Parameter: 96.5%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 175
Activity Parameter: 84.27%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die-Rectal Cancer
Node Number: 176
Activity Parameter: 15.51%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Die other
Node Number: 177
Activity Parameter: 0.23%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 2

Area: Year 2 Surveillance

Node Number: 178

Activity Parameter: 100% of alive patients

Activity Reference: IOCC

Activity Comments: None

Activity Distribution: None

Cost Parameter: £247

Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)

Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs

Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence

Node Number: 179

Activity Parameter: 27.4%

Activity Reference: CR07 Trial (2006)

Activity Comments: None

Activity Distribution: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Local Recurrence

Node Number: 180

Activity Parameter: 2.0%

Activity Reference: CR07 Trial (2006)

Activity Comments: None

Activity Distribution: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Re-resection

Node Number: 181

Activity Parameter: 50%

Activity Reference: Assumption

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £5,598.21

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: Weighted average of all rectal surgery

Cost Distribution: Normal based on assumption

Area: No re-resection

Node Number: 182

Activity Parameter: 50%

Activity Reference: Assumption

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Liver resection
Node Number: 183
Activity Parameter: 6%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 184
Activity Parameter: 47%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 185
Activity Parameter: 47%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 186
Activity Parameter: 72.6%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 187
Activity Parameter: 2%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 188
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 189
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 190
Activity Parameter: 98%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 191
Activity Parameter: 89.19%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die-Rectal Cancer
Node Number: 192
Activity Parameter: 6.45%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Die other
Node Number: 193
Activity Parameter: 4.36%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 3

Area: Year 3 Surveillance
Node Number: 194
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £247
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006),
Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of
component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 195
Activity Parameter: 17.61%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local Recurrence
Node Number: 196
Activity Parameter: 2.5%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 197
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 198
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 199
Activity Parameter: 4%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 200
Activity Parameter: 48%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 201
Activity Parameter: 48%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 202
Activity Parameter: 82.39%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 203
Activity Parameter: 2.5%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 204
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 205
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 206
Activity Parameter: 97.5%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 207
Activity Parameter: 87.82%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die-Rectal Cancer
Node Number: 208
Activity Parameter: 8.08%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Die other
Node Number: 209
Activity Parameter: 4.09%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 4

Area: Year 4 Surveillance
Node Number: 210
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £65.90
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 211
Activity Parameter: 12.01%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local Recurrence
Node Number: 212
Activity Parameter: 2%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 213
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 214
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 215
Activity Parameter: 2%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 216
Activity Parameter: 49%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 217
Activity Parameter: 49%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 218
Activity Parameter: 87.99%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 219
Activity Parameter: 2%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 220
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 221
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 222
Activity Parameter: 98%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 223
Activity Parameter: 88.11%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die-Rectal Cancer
Node Number: 224
Activity Parameter: 7.61%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Die other
Node Number: 225
Activity Parameter: 4.28%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 5

Area: Year 5 Surveillance

Node Number: 226

Activity Parameter: 100% of alive patients

Activity Reference: IOCC

Activity Comments: None

Activity Distribution: None

Cost Parameter: £417.90

Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)

Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs

Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence

Node Number: 227

Activity Parameter: 10.56%

Activity Reference: CR07 Trial (2006)

Activity Comments: None

Activity Distribution: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Local Recurrence

Node Number: 228

Activity Parameter: 1%

Activity Reference: CR07 Trial (2006)

Activity Comments: None

Activity Distribution: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Re-resection

Node Number: 229

Activity Parameter: 50%

Activity Reference: Assumption

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £5,598.21

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: Weighted average of all rectal surgery

Cost Distribution: Normal based on assumption

Area: No re-resection

Node Number: 230

Activity Parameter: 50%

Activity Reference: Assumption

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Liver resection
Node Number: 231
Activity Parameter: 0%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Interventional Care
Node Number: 232
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 233
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 234
Activity Parameter: 89.44%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 235
Activity Parameter: 1%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Re-resection
Node Number: 236
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £5,598.21
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Weighted average of all rectal surgery
Cost Distribution: Normal based on assumption

Area: No re-resection
Node Number: 237
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 238
Activity Parameter: 99%
Activity Reference: CR07 Trial (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 239
Activity Parameter: 87.56%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die-Rectal Cancer
Node Number: 240
Activity Parameter: 7.83%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Die other
Node Number: 241
Activity Parameter: 4.6%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

A.1.1.2.5 Colon Cancer

Colon cancer surgery

Elective surgery

Area: Colon Cancer
Node Number: 242
Activity Parameter: 71%
Activity Reference: ONS Data (2003)
Activity Distribution: Beta defined by reference
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Operable
Node Number: 243
Activity Parameter: 79%
Activity Reference: Mella et al (1997)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Elective Surgery
Node Number: 244
Activity Parameter: 70%
Activity Reference: Davies (2002)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Open surgery

Area: Open Surgery
Node Number: 245
Activity Parameter: 97.6%
Activity Reference: FAD NICE
Activity Comments: Estimate of current LAP surgery
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Left Hemicolectomy
Node Number: 246
Activity Parameter: 13%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Right Hemicolectomy
Node Number: 247
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Hartmann's procedure
Node Number: 248
Activity Parameter: 5%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Other procedures
Node Number: 249
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £3,516
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Average of other surgery costs
Cost Distribution: Normal based on reference

Area: Complication
Node Number: 250
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed complication costs covered in surgery cost
Cost Distribution: None

Area: No Complication
Node Number: 251
Activity Parameter: 87%
Activity Reference: Martling et al
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 252
Activity Parameter: 14.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Cost of fitting stoma assumed in surgery cost
Cost Distribution: None

Area: No Stoma
Node Number: 253
Activity Parameter: 85.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 254
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 255
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 256
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account in After Surgery section
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Laparoscopic surgery

Area: Laparoscopic Surgery
Node Number: 257
Activity Parameter: 2.4%
Activity Reference: FAD NICE
Activity Comments: Estimate of current LAP surgery
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Left Hemicolectomy
Node Number: 258
Activity Parameter: 13%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,477
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Right Hemicolectomy
Node Number: 259
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,477
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Hartmann's procedure
Node Number: 260
Activity Parameter: 5%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined reference
Cost Parameter: £5,477
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Other procedures
Node Number: 261
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £3,516
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Average of other surgery costs
Cost Distribution: Normal based on reference

Area: Complication
Node Number: 262
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed complication costs covered in surgery cost
Cost Distribution: None

Area: No Complication
Node Number: 263
Activity Parameter: 87%
Activity Reference: Martling et al
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 264
Activity Parameter: 14.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Cost of fitting stoma assumed in surgery cost
Cost Distribution: None

Area: No Stoma
Node Number: 265
Activity Parameter: 85.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 266
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 267
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 268
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account in After Surgery section
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Emergency surgery

Area: Colon Cancer
Node Number: 242
Activity Parameter: 71%
Activity Reference: ONS Data (2003)
Activity Distribution: Beta defined by reference
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Operable
Node Number: 243
Activity Parameter: 79%
Activity Reference: Mella et al (1997)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Emergency Surgery
Node Number: 269
Activity Parameter: 30%
Activity Reference: Davies (2002)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Stented surgery

Area: Stent fitted
Node Number: 270
Activity Parameter: 2%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: £1,879.75
Cost Reference: Osman et al (2000)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Left Hemicolectomy
Node Number: 271
Activity Parameter: 13%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Right Hemicolectomy
Node Number: 272
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Hartmann's procedure
Node Number: 273
Activity Parameter: 5%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Other procedures
Node Number: 274
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £3,516
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Average of other surgery costs
Cost Distribution: Normal based on reference

Area: Complication
Node Number: 275
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed complication costs covered in surgery cost
Cost Distribution: None

Area: No Complication
Node Number: 276
Activity Parameter: 87%
Activity Reference: Martling et al
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 277
Activity Parameter: 14.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Cost of fitting stoma assumed in surgery cost
Cost Distribution: None

Area: No Stoma
Node Number: 278
Activity Parameter: 85.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 279
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 280
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 281
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account in After Surgery section
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Non-stented surgery

Area: Stent not fitted
Node Number: 282
Activity Parameter: 98%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Left Hemicolectomy
Node Number: 283
Activity Parameter: 13%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Right Hemicolectomy
Node Number: 284
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Hartmann's procedure
Node Number: 285
Activity Parameter: 5%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined reference
Cost Parameter: £5,249
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Major surgery cost
Cost Distribution: Normal based on reference

Area: Other procedures
Node Number: 286
Activity Parameter: 41%
Activity Reference: HES Data (2003/4) and NYCRIS Data (2003)
Activity Comments: Average of HES and NYCRIS data
Activity Distribution: Beta defined by reference
Cost Parameter: £3,516
Cost Reference: Reference costs, Department of Health (2005)
Cost Comments: Average of other surgery costs
Cost Distribution: Normal based on reference

Area: Complication
Node Number: 287
Activity Parameter: 13%
Activity Reference: Martling et al (2000)
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: Assumed complication costs covered in surgery cost
Cost Distribution: None

Area: No Complication
Node Number: 288
Activity Parameter: 87%
Activity Reference: Martling et al
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma required
Node Number: 289
Activity Parameter: 14.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: Cost of fitting stoma assumed in surgery cost
Cost Distribution: None

Area: No Stoma
Node Number: 290
Activity Parameter: 85.5%
Activity Reference: HES Data (2003/4)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stoma Closed
Node Number: 291
Activity Parameter: 26.6% of Stoma fitted
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: £1,279
Cost Reference: Clinical Communication
Cost Comments: Based on weighted average of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Stoma not closed
Node Number: 292
Activity Parameter: 73.4%
Activity Reference: Kairaluoma et al (2002)
Activity Comments: Weighted average based on 40% of all stomas being temporary stomas and 67% of these being closed.
Activity Distribution: Beta distribution defined by assumptions
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 293
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account in After Surgery section
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Inoperable cancer

Area: Colon Cancer
Node Number: 242
Activity Parameter: 71%
Activity Reference: ONS Data (2003)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Inoperable Cancer
Node Number: 294
Activity Parameter: 21%
Activity Reference: Mella et al (1997)
Activity Comments: None
Activity Distribution: Beta defined by reference
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Stenting
Node Number: 295
Activity Parameter: 4%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: £1,879.75
Cost Reference: Osman *et al.* (2000)
Cost Comments: Uplifted price
Cost Distribution: Normal based on assumptions

Area: Palliative Chemotherapy
Node Number: 296
Activity Parameter: 83.3%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumptions

Area: Stoma
Node Number: 297
Activity Parameter: 12.7%
Activity Reference: Assumption
Activity Comments: Assumed using elicitation of other parameters
Activity Distribution: Beta defined by assumption
Cost Parameter: £1,279
Cost Reference: Clinical communication
Cost Comments: Weighted average cost of 4 different types of stoma
Cost Distribution: Normal based on assumptions

Area: Alive
Node Number: 298
Activity Parameter: 100% of stoma closed, stoma not closed and no stoma
Activity Reference: YHEC pathway assumption
Activity Distribution: None
Activity Comments: Mortality is taken into account in After Surgery section
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

A.1.1.2.6 Colon after Surgery

Following colon surgery

Area: Histopathology Staging

Node Number: 299

Activity Parameter: 100% of those under going colon surgery

Activity Reference: None

Activity Distribution: None

Activity Comments: YHEC Pathway assumption

Cost Parameter: £14.65

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Cost Distribution: Normal based on assumption

Area: Histopathology result (T1 N0 M0, T2 N0 M0)

Node Number: 300

Activity Parameter: 12%

Activity Reference: NYCRIS Data (2003)

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Alive

Node Number: 301

Activity Parameter: 93%

Activity Reference: Tekkis et al (2005)

Activity Comments: Adapted from separate emergency and elective mortality rates

Activity Distribution: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Died

Node Number: 302

Activity Parameter: 7%

Activity Reference: Tekkis et al (2005)

Activity Comments: Adapted from separate emergency and elective mortality rates

Activity Distribution: None

Cost Parameter: £2,086

Cost Reference: Guest *et al.* (2006)

Cost Comments: Uplifted costs from 2000/01 costs

Cost Distribution: Normal based on assumptions

Area: Histopathology result (T3 N0 M0, T4 N0 M0)
Node Number: 303
Activity Parameter: 32%
Activity Reference: NYCRIS data (2003)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Adjuvant Chemotherapy
Node Number: 304
Activity Parameter: 39%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal based on elicitation
Cost Parameter: £11,209
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 305
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 306
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Area: No Adjuvant Chemotherapy
Node Number: 307
Activity Parameter: 61%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal based on elicitation
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 308
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 309
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Area: Histopathology result (Any T, N1-3, M0)
Node Number: 310
Activity Parameter: 28%
Activity Reference: NYCRIS data (2003)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Adjuvant Chemotherapy
Node Number: 311
Activity Parameter: 89%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal based on elicitation
Cost Parameter: £11,209
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 312
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 313
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Area: No Adjuvant Chemotherapy
Node Number: 314
Activity Parameter: 11%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Multi-Normal based on elicitation
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 315
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 316
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Area: Histopathology result (Any T, Any N, M1)
Node Number: 317
Activity Parameter: 28%
Activity Reference: NYCRIS data (2003)
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver re-section
Node Number: 318
Activity Parameter: 8%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference costs, Department of Health 2005
Cost Comments: None
Cost Distribution: Normal based on assumptions

Area: Alive
Node Number: 319
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 320
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Area: No Liver re-section
Node Number: 321
Activity Parameter: 92%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Downstaging Chemotherapy
Node Number: 322
Activity Parameter: 100%
Activity Reference: IOCC Manual Update
Activity Comments: None
Activity Distribution: None
Cost Parameter: £7,562.56
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: 5FU and Oxaliplatin
Cost Distribution: Normal based on assumption

Area: Chemotherapy successful
Node Number: 323
Activity Parameter: 8%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver- resection
Node Number: 324
Activity Parameter: 100%
Activity Reference: None
Activity Comments: YHEC Pathway assumption
Activity Distribution: None
Cost Parameter: £7,222
Cost Reference: Reference costs, Department of Health 2005
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 325
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 326
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Area: Chemotherapy Unsuccessful
Node Number: 327
Activity Parameter: 92%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Interventional Care
Node Number: 328
Activity Parameter: 100%
Activity Reference: None
Activity Comments: Pathway Assumption
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 329
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 330
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

No interventional care

Area: No Interventional Care
Node Number: 331
Activity Parameter: 100% of patients from Colon Surgery alive in palliative care (node 298)
Activity Reference: None
Activity Comments: YHEC Pathway Assumption
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Alive
Node Number: 332
Activity Parameter: 93%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Died
Node Number: 333
Activity Parameter: 7%
Activity Reference: Tekkis et al (2005)
Activity Comments: Adapted from separate emergency and elective mortality rates
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.* (2006)
Cost Comments: Uplifted costs from 2000/01 costs
Cost Distribution: Normal based on assumptions

Progress to follow up

Area: Progress to Follow up
Node Number: 334
Activity Parameter: 100% of all alive patients (nodes 301, 305, 308, 312, 315, 319, 325, 329, 332)
Activity Reference: IOCC Manual Update
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

A.1.1.2.7 Colon cancer follow up

Year 1

Area: Year 1 Surveillance
Node Number: 335
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £268.10
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 336
Activity Parameter: 34.7%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 337
Activity Parameter: 8%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 338
Activity Parameter: 46%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 339
Activity Parameter: 46%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 340
Activity Parameter: 65.3%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 341
Activity Parameter: 0%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 342
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die other
Node Number: 343
Activity Parameter: 0.51%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die Colon Cancer
Node Number: 344
Activity Parameter: 13.09%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 345
Activity Parameter: 86.40%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 2

Area: Year 2 Surveillance
Node Number: 346
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £247
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006),
Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of
component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 347
Activity Parameter: 22.6%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 348
Activity Parameter: 6%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 349
Activity Parameter: 47%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 350
Activity Parameter: 47%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 351
Activity Parameter: 77.4%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 352
Activity Parameter: 0%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 353
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die other
Node Number: 354
Activity Parameter: 4.62%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die Colon Cancer
Node Number: 355
Activity Parameter: 3.57%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 356
Activity Parameter: 91.81%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 3

Area: Year 3 Surveillance

Node Number: 357

Activity Parameter: 100% of alive patients

Activity Reference: IOCC

Activity Comments: None

Activity Distribution: None

Cost Parameter: £247

Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)

Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs

Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence

Node Number: 358

Activity Parameter: 15.8%

Activity Reference: Phillips (2002)

Activity Comments: None

Activity Distribution: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Liver resection

Node Number: 359

Activity Parameter: 4%

Activity Reference: Elicitation

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £7,222

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Cost Distribution: Normal based on assumption

Area: No Interventional Care

Node Number: 360

Activity Parameter: 48%

Activity Reference: Assumption

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Cost Distribution: None

Area: Chemotherapy

Node Number: 361

Activity Parameter: 48%

Activity Reference: Assumption

Activity Comments: None

Activity Distribution: Beta distribution defined by assumption

Cost Parameter: £20,324.30

Cost Reference: Elicitation

Cost Comments: None

Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 362
Activity Parameter: 84.2%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 363
Activity Parameter: 0%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 364
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die other
Node Number: 365
Activity Parameter: 4.70%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die Colon Cancer
Node Number: 366
Activity Parameter: 4.30%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 367
Activity Parameter: 91.00%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 4

Area: Year 4 Surveillance
Node Number: 368
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £65.90
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006), Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 369
Activity Parameter: 13.7%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 370
Activity Parameter: 2%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £7,222
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Interventional Care
Node Number: 371
Activity Parameter: 49%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 372
Activity Parameter: 49%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 373
Activity Parameter: 86.3%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 374
Activity Parameter: 0%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 375
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die other
Node Number: 376
Activity Parameter: 4.62%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die Colon Cancer
Node Number: 377
Activity Parameter: 4.49%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 378
Activity Parameter: 90.89%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Year 5

Area: Year 5 Surveillance
Node Number: 379
Activity Parameter: 100% of alive patients
Activity Reference: IOCC
Activity Comments: None
Activity Distribution: None
Cost Parameter: £417.90
Cost Reference: Survey conducted by RGJ through the Royal College of Oncologists (2006),
Reference Costs, Department of Health (2005)
Cost Comments: Average surveillance regime was taken from the survey and the costs of
component procedures from Reference costs
Cost Distribution: Normal distribution based on assumption

Area: Metastatic Recurrence
Node Number: 380
Activity Parameter: 13.1%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Liver resection
Node Number: 381
Activity Parameter: 0%
Activity Reference: Elicitation
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No Interventional Care
Node Number: 382
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Chemotherapy
Node Number: 383
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: Beta distribution defined by assumption
Cost Parameter: £20,324.30
Cost Reference: Elicitation
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: No Metastatic recurrence
Node Number: 384
Activity Parameter: 86.9%
Activity Reference: Phillips (2002)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Local recurrence
Node Number: 385
Activity Parameter: 0%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: No local recurrence
Node Number: 386
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die other
Node Number: 387
Activity Parameter: 4.69%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Area: Die Colon Cancer
Node Number: 388
Activity Parameter: 5.32%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: £2,086
Cost Reference: Guest et al (2006)
Cost Comments: None
Cost Distribution: Normal based on assumption

Area: Alive
Node Number: 389
Activity Parameter: 90.00%
Activity Reference: Model output (2006)
Activity Comments: None
Activity Distribution: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None
Cost Distribution: None

Summary

This paper has shown the references for each activity and cost parameter for every node in the bowel cancer baseline model. Often activity parameters have under gone elicitation or assumptions have been made where data is limited.

A.1.1.3 Cost and Activity References for the Bowel Cancer Model -High Risk Groups

Introduction

This paper/section gives a detailed description of each action point (node) along the Bowel Cancer Baseline Model for High Risk Groups. This paper shows what data is used to derive the activity and cost of each node along the way and also gives the references for that data and any comments that are appropriate.

To use this paper most effectively it is advised that the reader has either a printed or on screen version of the baseline model at hand. However, it should be possible to understand this paper with having the baseline model nearby.

The information is displayed for each of the different high risk groups in the same order they appear in the baseline model, that is; FAP, HNPCC and UC.

In some areas of the pathway data appears to be scarce so assumptions have been made. Due to the high level of uncertainty around these pathways we decided that fitting distributions to these parameters would give confidence intervals that will be too wide to be of relevance, as the results in this section have a high level of uncertainty.

FAP

Area: FAP Patients

Node: 390

Activity Parameter: 3,703

Activity Reference: ONS England Population = 50.1 million (2004 Q2)

Dunlop (2002) - FAP 1/13528: Therefore, 3703

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Flexible Sigmoidoscopy

Node: 391

Activity Parameter: 100%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £279

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Area: FAP Positive Cancer

Node: 392

Activity Parameter: 22.5%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Cancer Tests

Node: 393

Activity Parameter: 100%

Activity Reference: YHEC pathway assumption

Activity Comments: None

Cost Parameter: £483.55

Cost Reference: Reference Costs, Department of Health (2005) for CT scan and MRI scan costs, Renehan *et al.* (2004) for CEA costs

Cost Comments: Combination cost of (CT scan, CEA test and MRI scan)

Area: MDT

Node: 394

Activity Parameter: 100%

Activity Reference: YHEC Pathway assumption

Activity Comments: None

Cost Parameter: £133

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Area: MDT decide No Interventional Care

Node: 395

Activity Parameter: 20%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Die

Node: 396

Activity Parameter: 70%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £2,086

Cost Reference: Guest *et al.*

Cost Comments: Cost Comments: Uplifted costs from 2000/01 costs

Area: Alive

Node: 397

Activity Parameter: 30%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Negative Cancer

Node: 398

Activity Parameter: 77.5%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Proctocolectomy

Node: 399

Activity Parameter: 40% of positive cancer (node 392) and 50% of negative cancer (node 396)

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £5,969

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: Complex Surgery

Area: Colectomy

Node: 400

Activity Parameter: 40% of positive cancer (node 392) and 50% of negative cancer (node 396)

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £5,969

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: Complex Surgery

Area: Surveillance of rectum: No polyps
Node: 401
Activity Parameter: 40%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £232
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Combined rigid and flexible sigmoidoscopy costs

Area: Surveillance of rectum: Polyps
Node: 402
Activity Parameter: 60%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £232
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Combined rigid and flexible sigmoidoscopy costs

Area: Excision of rectum
Node: 403
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Area: Duodenal Surveillance: Negative
Node: 404
Activity Parameter: 70%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £232
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Combined rigid and flexible sigmoidoscopy costs

Area: Duodenal Surveillance: Positive
Node: 405
Activity Parameter: 60%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £232
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Combined rigid and flexible sigmoidoscopy costs

Area: No Interventional Care
Node: 406
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Die
Node: 407
Activity Parameter: 70%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.*
Cost Comments: Cost Comments: Uplifted costs from 2000/01 costs

Area: Alive
Node: 408
Activity Parameter: 30%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Whipple's Procedure
Node: 409
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £5969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex Surgery

HNPCC

Area: HNPCC Patients
Node: 410
Activity Parameter: 15,960
Activity Reference: ONS population: 50.1 million as of 2004 Q2
Dunlop (2002) HNPCC 1/3139: Therefore, 15,960
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Bienennial Colonoscopy
Node: 411
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £352
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Area: HNPCC Positive Cancer
Node: 412
Activity Parameter: 7%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Cancer Tests

Node: 413

Activity Parameter: 100%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £483.55

Cost Reference: Reference Costs, Department of Health (2005) for CT scan and MRI scan costs, Renehan *et al.* (2004) for CEA costs

Cost Comments: Combination cost of (CT scan, CEA test and MRI scan)

Area: MDT

Node: 414

Activity Parameter: 100%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £133

Cost Reference: Reference Costs, Department of Health (2005)

Cost Comments: None

Area: MDT decide No Interventional Care

Node: 415

Activity Parameter: 20%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Die

Node: 416

Activity Parameter: 80%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: £2,086

Cost Reference: Guest *et al.*

Cost Comments: Cost Comments: Uplifted costs from 2000/01 costs

Area: Alive

Node: 417

Activity Parameter: 20%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: HNPCC Negative Cancer

Node: 418

Activity Parameter: 93%

Activity Reference: Assumption

Activity Comments: None

Cost Parameter: None

Cost Reference: None

Cost Comments: None

Area: Surgery
Node: 419
Activity Parameter: 20%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: No Surgery
Node: 420
Activity Parameter: 80%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Proctocolectomy
Node: 421
Activity Parameter: 40% of positive cancer (node 412) and 50% of negative cancer surgery (node 417)
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex Surgery

Area: Colectomy
Node: 422
Activity Parameter: 40% of positive cancer (node 412) and 50% of negative cancer surgery (node 417)
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: Complex Surgery

Area: Surveillance
Node: 423
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £279
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Area: Surveillance: Negative
Node: 424
Activity Parameter: 60%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Surveillance: Positive
Node: 425
Activity Parameter: 40%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Excision of rectum
Node: 426
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £5,249
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Ulcerative colitis

Area: UC Patients
Node: 427
Activity Parameter: 7,515
Activity Reference: Phillips (2002)
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Colonoscopy
Node: 428
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £352
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Area: Positive Cancer
Node: 429
Activity Parameter: 3%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Cancer Tests
Node: 430
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £483.55
Cost Reference: Reference Costs, Department of Health (2005) for CT scan and MRI scan costs, Renehan *et al.* (2004) for CEA costs
Cost Comments: Combination cost of (CT scan, CEA test and MRI scan)

Area: MDT
Node: 431
Activity Parameter: 100%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £133
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Area: MDT decide surgery
Node: 432
Activity Parameter: 80%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £5,969
Cost Reference: Reference Costs, Department of Health (2005)
Cost Comments: None

Area: MDT decide No Interventional Care
Node: 433
Activity Parameter: 20%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: Die
Node: 434
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: £2,086
Cost Reference: Guest *et al.*
Cost Comments: Cost Comments: Uplifted costs from 2000/01 costs

Area: Alive
Node: 435
Activity Parameter: 50%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Area: UC Negative Cancer
Node: 436
Activity Parameter: 93%
Activity Reference: Assumption
Activity Comments: None
Cost Parameter: None
Cost Reference: None
Cost Comments: None

Summary

This paper has shown the references for each activity and cost parameter for every node in the bowel cancer baseline model. This paper has identified that for each of the High Risk groups activity data is very scarce. Often for activity parameters assumptions have been made.

A.1.1.4 Stoma Care Costs

Rectal Cancer Stoma Care Costs

Cohort	Yearly Survival Rectal	Rectal Cancer patients with stoma	Total Costs
1	84.27%	2473	£3,163,420
2	89.19%	2084	£2,665,751
3	87.82%	1859	£2,377,516
4	88.11%	1633	£2,088,017
5	87.56%	1438	£1,839,815
6	83.76%	1260	£1,610,997
7	89.63%	1055	£1,349,310
8	89.90%	946	£1,209,407
9	90.62%	850	£1,087,202
10	91.83%	770	£985,224
11	92.18%	707	£904,737
12	93.89%	652	£833,943
13	92.52%	612	£782,954
14	92.90%	566	£724,380
15	91.80%	526	£672,969
16	90.59%	483	£617,767
17	92.85%	438	£559,614
18	89.94%	406	£519,581
19	91.88%	365	£467,328
20	90.68%	336	£429,403
21	88.10%	304	£389,370
22	87.22%	268	£343,016
23	89.86%	234	£299,191
24	87.93%	210	£268,851
25	87.17%	185	£236,403
26	87.73%	161	£206,063
27	84.62%	141	£180,779
28	89.26%	120	£152,967
29	84.57%	107	£136,532
30	84.67%	90	£115,463
31	84.48%	76	£97,764
32	84.18%	65	£82,594
33	84.85%	54	£69,530
34	80.71%	46	£58,995
35	87.61%	37	£47,618
36	78.79%	33	£41,718
37	74.36%	26	£32,869
38	82.76%	19	£24,441
39	85.42%	16	£20,227
40	68.29%	14	£17,277
41	67.86%	9	£11,799
42	100.00%	6	£8,007
43	68.42%	6	£8,007
44	61.54%	4	£5,478
45	62.50%	3	£3,371
Total		21695	£27,747,664

Colon Cancer Stoma Care Costs

Cohort	Yearly Survival Colon	Colon Cancer patients with stoma	Costs
1	86.40%	1770	£2,263,283
2	91.81%	1625	£2,077,924
3	91.00%	1478	£1,890,927
4	90.89%	1344	£1,718,667
5	90.00%	1209	£1,546,735
6	88.95%	1076	£1,375,785
7	91.03%	979	£1,252,322
8	91.13%	892	£1,141,303
9	92.31%	824	£1,053,535
10	92.70%	764	£976,575
11	92.76%	708	£905,837
12	92.95%	658	£841,977
13	92.65%	610	£780,081
14	91.73%	559	£715,566
15	92.59%	518	£662,512
16	92.09%	477	£610,114
17	91.14%	435	£556,078
18	92.05%	400	£511,867
19	91.17%	365	£466,673
20	89.54%	327	£417,877
21	88.87%	290	£371,374
22	89.15%	259	£331,092
23	88.13%	228	£291,794
24	88.89%	203	£259,372
25	85.98%	174	£223,021
26	86.20%	150	£192,237
27	83.99%	126	£161,453
28	84.58%	107	£136,563
29	82.01%	88	£112,002
30	84.80%	74	£94,972
31	85.86%	64	£81,545
32	87.15%	56	£71,065
33	81.57%	45	£57,966
34	78.53%	36	£45,521
35	76.98%	27	£35,041
36	77.57%	21	£27,182
37	78.31%	17	£21,287
38	76.92%	13	£16,374
39	72.00%	9	£11,790
40	69.44%	6	£8,187
41	76.00%	5	£6,222
42	63.16%	3	£3,930
43	41.67%	1	£1,637
44	80.00%	1	£1,310
45	25.00%	0	£327
Total		19022	£24,328,903

A.1.2 Key Outcomes Section

The section includes all outcomes appropriate to the study. The model reference point relates directly to the point in the model for cross referencing between the papers. The superscript on each reference relates where the data has been used directly from this study for the purpose of populating the model.

Presentation and Diagnostics

Study:	Outcomes:
Colonoscopy: Model Reference Point - ¹⁶	
Bowles CJA (2004)¹⁶ Grade: 2 ++	Colonoscopy – The overall completion rates were 76.9% which included surveillance and therapeutic colonoscopy. The completion rate for a general district hospital was 74.5%. This compared to 76.6% for a teaching hospital. Perforation rates were reported at 0.13%, bleeding in 0.07% of patients. The reported mortality rate was 0.07%.
De Zwart (2001) Grade: 2 ++	This study considered outcomes for colonoscopy. In this study the completion rates ranged from 54% to 98%. Perforation rates were 0.08%.
Ball (2004) Grade: 2 +	This study considered the completion rates by gender and age. The study showed that for males there was a slightly higher completion rate of 80.5% in comparison to 73.4% for females. The completion rates in this study were shown to fall with age. For example, those patients under 16 had a completion rate of 77.5%, between 17 and 75 had a completion rate in the range of 75% to 78.1% and those over 70 had a completion rate of 70.7%
Thomas Gibson (2002) Grade: 2 +	This study considered patient pain outcomes as a result of colonoscopy. The VAS score system of pain was used. The median reported pain score was 26/100. The pain scores were lower where Carbon dioxide was used. The satisfaction rate recorded was 96/100.
Bretthauer (2002) Grade: 1 ++	The overall pain rating was significantly less when carbon dioxide was given to the patient. In combination with carbon dioxide no pain was recorded in 50% of patients. There are few studies that look at patient pain studies.
Tekkis et al. (2005) Grade: 2 ++	One of the sections of the ACGBI audit considered failure rates for colonoscopy by age. For those aged under 60 failure rates were 9.5%, 61 to 70, 9%, for those 71 to 80, 11.2% and for those over 80, 11.6%. Those undergoing colonoscopy were reported to have the following Dukes staging: Dukes A: 18%; Dukes B: 29%; Dukes C; 23.7% and Dukes D: 12.7%.
Gorard (2003) Grade: 2+	The colonoscopy completion rates to the Caecum were 89.1%. The number of colonoscopies that were incomplete due to scope failure or inadequate bowel preparation was 8%. The recorded serious complication rate was 0.14%. Colorectal carcinomas were detected in 3.9% of all colonoscopies of which 17% occurred proximal to the caecum and 16% in the ascending colon. The other completed colonoscopies showed 40.4% had normal colons and 25% had polyps.

<p>Varma (2004)</p> <p>Grade: 2+</p>	<p>The overall completion rate was 86% for consultant and specialist registrars reaching the caecum in 90% of procedures and 'others' in 74% of procedures. The main reasons for failure to reach the colon were looping (5.4%), poor preparation (2.7%), patient intolerance (1.9%) and obstructing tumours (1.9%). The bowel preparation was judged adequate in 92.6% of cases and sedation was judged as satisfactory in 87% of patients. 39% of patients experienced discomfort during the procedure. The pain levels were judged using the Hayward pain score (1-5). The mean pain score on this scale was 1.47 when a consultant performed the colonoscopy and 2 when performed by other trainees. (Significant P<0.001)</p>
<p>Johnson (2003)</p> <p>Grade: 2+</p>	<p>This study considers outcomes for Computed Tomographic Colonoscopy (CT Colonoscopy.) In the study:</p> <ul style="list-style-type: none"> 18% had no lesions; 16% had lesions smaller than 5mm; 18% had at least one lesion that was between 5mm and 10mm; 47% had a lesion that was larger than 10mm. <p>The analysis of these lesions found the following results:</p> <ul style="list-style-type: none"> 57% of lesions were adenomas; 37% of lesions were hyperplastic; 4% were cancers; 2% had no pathological characteristics. <p>The median interpretation time was 15 minutes (range 4 to 83 minutes.) It was found that 10% of the examinations failed due to poor quality. There were no complications reported in this study.</p>
<p>Flexible Sigmoidoscopy: Model Reference Point - 17</p>	
<p>Blom (2004)</p> <p>Grade: 2+</p>	<p>This study considers a range of different outcomes from mean depth reached, pain, anxiety and other discomfort. The study showed a mean depth of 59cm (28 to 60cm range.) Significant pain was received in 19% of patients. (That is a pain rating of greater than 50/100 on the Vass scale.) A small amount of pain was reported in 50% (Vass scale <25/100.) The anxiety levels experienced were reported at 70% under 25/100 on the Vass score before. 73% during the procedure were under 25/100 (Vass scale.) The majority of patients, 95%, reported a Vass scale of under 25/100 when measuring how exposed they felt.</p>
<p>Atkin (2002)</p> <p>Grade: 1 +</p>	<p>The perforation rates reported in this study were 1/40,674. Flexible Sigmoidoscopy detected Adenomas or cancer in 12% of cases (range 9%-15%.) Cancers were detected in 0.3% of people examined with the prevalence in men more than double that in women with 62% having Duke's stage A cancer. 72% of those who underwent flexible sigmoidoscopy had no pathological specimens removed and were discharged, whilst 22% had pathological samples taken but were discharged due to them being of no significance or low risk polyps. In total 5.3% of those undergoing flexible sigmoidoscopy were referred for colonoscopy (4% directly, 0.1% via surgery and 1.2% after pathological specimens showed high-risk polyps.) 25% of those screened had one or more polyps removed at either the flexible sigmoidoscopy or colonoscopy stage. 7.6% of those referred for colonoscopy were sent for surgery which was about 0.4% of all those undergoing flexible sigmoidoscopy.</p>
<p>Verma (2001)</p> <p>Grade: 2 +</p>	<p>The outcomes in this study relate to open-access hospital-initiated flexible sigmoidoscopy. The open access (OAS) had a shorter waiting time compared to the hospital initiated (HIS) with 3.1 weeks for OAS and 11.4 weeks for HIS. The diagnostic yield was higher in OAS 44% compared to 29% in HIS. Those patients that were 40 years old or less the diagnostic yields were 35% for OAS and 10% for HIS. The majority of patients proved normal by OAS (50.6%) and HIS (70.7%)</p>

<p>Mathew (2004)</p> <p>Grade: 2 +</p>	<p>There were two groups in terms of assessment of outcomes for flexible sigmoidoscopy in this study. The first group comprised those patients that were over 45 years old and the second group were those patients that were under 45 years old. In group 1 flexible sigmoidoscopy showed that 16.6% had polyps and 3.5% resulted in a diagnosis of positive cancer. The histopathology confirmed that these were cancers and 40.9% of patients with polyps had adenomatous polyps. In group 2, flexible sigmoidoscopy revealed that 7.9% had polyps and 0.4% had cancer. Histopathology revealed this one patient did not have cancer and found that 26.3% of those patients with polyps had adenomatous polyps. The cost reported of a flexible sigmoidoscopy in this study was approximately £330.</p>
<p>Barium Enema: Model Reference Point - 18</p>	
<p>Connolly (2002)</p> <p>Grade: 2+</p>	<p>The sensitivity rate of Double Contrast Barium Enema (DCBE) for the detection of colorectal carcinoma was 90.2% and the specificity rate was 99.5%. The accuracy rate was 94.9%. in the 880 patients, 0.45% were given false positives and 0.9% were given false negatives.</p>
<p>Culpan (2002)</p> <p>Grade: 2+</p>	<p>The DCBE sensitivity rate was 90.6% with a 6.3% false negative rate and a 1.6% abandonment rate. The mean delay in diagnosis due to false negatives was 9.7 months. In total 10% of cancers failed to be diagnosed by DCBE.</p>
<p>De Zwart (2001)</p> <p>Grade: 2+</p>	<p>The sensitivity for detection of colorectal cancer ranged from 62% to 100%. The sensitivity rate for polyps over 10mm ranged from 48% to 100%. Those where polyps were under 10mm the sensitivity rate ranged from 62% to 100%. The specificity for polyps ranged from 67% to 85% for all sizes of polyps.</p>
<p>Halligan (2003)</p> <p>Grade: 2+</p>	<p>This study considered observer variation in the detection of colorectal neoplasia on Double Contrast Barium Enemas (DCBE). The experts in this study were significantly more likely to correctly identify neoplasia than the trainees. The odds ratios of a correct diagnosis of cancer were 2.79 for cancer, 2.36 for large polyps and 3.5 for small polyps. 60% of experts missed at least one cancer compared to 90% of consultants and 80% of trainees. All cancers were only diagnosed by 27% of all of the radiologists.</p>
<p>Leslie (2002)</p> <p>Grade: 2+</p>	<p>In this study 70% of colorectal cancer patients had a Double Contrast Barium Enema (DCBE). The DCBE missed 7% of colorectal cancer cases. (This compares to a miss rate of 15-24% for other studies). The delay in diagnosis ranged from 4 to 30 months.</p>

<p>Rex (1997)</p> <p>Grade: 2+</p>	<p>The mean overall sensitivity rate of Barium enema for the detection of colorectal cancer was 83%. This compares to a mean overall sensitivity rate of colonoscopy of 95%. The odds ratio of miss by barium enema in comparison with miss by colonoscopy was 3.93. The mean delay in diagnosis for missed cancers was 10.8 months for Barium enema and 10.9 months for colonoscopy. For those cancers that were detected by Barium enema they were staged as follows: Dukes A – 9.8%; Dukes B – 44.6%; Dukes C - 29.3%; Dukes D – 16.4%</p> <p>Those that underwent colonoscopy were staged as follows: Dukes A – 24.9%; Dukes B – 38.2%; Dukes C - 24.1%; Dukes D – 12.7%</p> <p>The sensitivity rate of colonoscopy was higher when performed by a gastroenterologist (97.3%) compared to a non-gastroenterologist (87.0%).</p>
<p>Tawn (2005)</p> <p>Grade: 2++</p>	<p>This was an audit of the sensitivity of Double Contrast Barium Enema (DCBE). The mean diagnosis rate for Double Contrast Barium Enema (DCBE) was 85.9% (range 50% to 100%) which is lower than the target rate of 90%. The mean lesion demonstrated rate was 92.6%. The mean equivocal rate (lesion reported but carcinoma not mentioned) was 6.9%.</p>

Stenting

Study:	Outcomes:
Stenting – Model Reference Point: 26	
Khot (2002) Grade: 2+	This systematic review reported results of those with colorectal cancer that had undergone stenting for either emergency or palliative reasons. The technical success rate was reported at 92% (IR range of 88% to 100%). Those patients that underwent emergency stenting had a clinical pre-operative success rate of 88%. The mean time to surgical excision of the tumour was 8.9 days. (IR range of 2 to 115) In those cases that were successful only 5% underwent a Hartmann's procedure. The technical failure rate was reported at 8% and a clinical failure rate of 5%.
Mainar (1999) Grade: 2+	The study evaluated the efficacy of the treatment of those with self-expandable stents for acute obstruction. In the group of patients that underwent stenting, 13% had minor complications that required no further treatment. (7% had minor rectal bleeding, 6% had mild anorectal pain and 1.6% was the perforation rate that required additional surgery.) The mean time between stent placement and surgery was 9.6 days.
Law (2003) Grade: 2+	This study reported outcomes for those patients that were obstructed and inoperable. The reported completion rate was 96%, the perforation rate was 3.3% and the stent migrated in 10% of cases. The median hospital stay of those that underwent stenting was 4 days in comparison with 8 days for those not undergoing the procedure (P=0.008). The median survival between the two groups was not statistically significant with 107 for those undergoing stenting and 119 for the other group (P=0.088).
Hunnerbein (2005) Grade: 2+	In patients that underwent stenting, placement was successful in 97% of patients. This study reported a re-obstruction rate of 12% due to tumour in growth or over growth. The study reported that all of these patients were treated successfully by re-stenting.
Davies (2005) Grade: 2+	The site of the stent was found not to affect the outcomes for the patient. The insertion of self expanding metal stents (SEMS) was technically successful in 76% of cases. The median bowel frequency was 3.5 times a day (range 1 to 7). It was reported that 75% of patients had a marked disturbance in bowel function. The median survival after SEMS was 12 months.
Watson (2004) Grade: 2+	The median age of those patients undergoing stenting in this study was 75 years. The technical success rate was 93% and 97% of patients had their colonic obstruction successfully alleviated.
Baron (1998) Grade: 2+	In this study stent placement was technically successful in 94% of patients. The overall effectiveness at relieving obstruction was 85%. (This was 82% for palliative patients and 90% for pre-operative patients.) For the palliative group the mean stent duration was 17.3 weeks. In 30% of patients major complications occurred.

<p>Binkert (1998)</p> <p>Grade: 2-</p>	<p>The mean age of patients in this study was 67 years. The placement of the stent was successful in 92% of patients. The patient sample was a mix of palliative and pre-operative patients.</p>
<p>Sebastian (2004)</p> <p>Grade: 2+</p>	<p>The median technical success rates were 94% for those patients undergoing stenting. The clinical success rate for those patients that had stents as a bridge to surgery was 71.7%. The main reasons for major complications were perforation (3.76%), stent migration (11.81%) and re-obstruction (7.34%). The stent related mortality was 0.58% in this study.</p>

Pathology – Rectal Cancer, MRI and pathology reporting

Study:	Outcomes:
MRI for Rectal Cancer – Model Reference Point: 44 & 61	
Brown et al. (2004) Grade: 2+	The comparison of outcomes between MRI and endoluminal ultrasound found that the agreement between the staging by MRI and the histopathology assessment was 94% for MRI compared with 69% for endoluminal ultrasound.
Beets-Tan et al. (2001) Grade: 2+	MRI predicted staging correctly for 83% in the first sample of the study and 67% in the second sample. The MRI scanning in this study used planned array coil.
Brown (2003) Grade: 2+	High resolution MRI suggests 94% agreement between MRI and the pathology assessment for T stage. There was 85% agreement for the N stage. The MRI predicted CRM involvement in 92% of cases which were consistent with the histopathology assessment.
Salerno (2004) Grade: 3	The low rectal cancers have the highest rates of local recurrence reported at around 30%.
Tekkis et al. (2004) Grade: 2++	The data relates to those patients that had large malignant bowel obstruction caused by colorectal cancer. The patient's characteristics were as follows. The study reports post-operative deaths and in-hospital mortality: Dukes A: 2.2%; Dukes B: 34.3%; Dukes C: 33.2%; Dukes D: 25%. The age of patients with large malignant bowel obstruction are: <65 years: 26.1%; 65-7 years: 30.0%; 75-84 years: 30.4%; >85 years: 12.7%. The respective postoperative deaths for these patients were: <65 years: 5.4%; 65-7 years: 13.1%; 75-84 years: 21.9%; >85 years: 27.0%. The operative urgency of those patients was as follows: Scheduled: 39.5%; Urgent: 46.5%; Emergency: 13.1%. The post-operative deaths by urgency were as follows: Scheduled: 12.8%; Urgent: 17.2%; Emergency: 20.0%. The postoperative deaths in relation to the time of the surgical procedure are as follows: 08:00-17:00: 14.8%; 17:00-24:00: 18.7%; 24:00-08:00: 9.1%. The average post-operative mortality in this study was 16.5%.

Rectal Cancer: Surgery including TME

Study:	Outcomes:
Surgery including Total Mesorectal Excision for Rectal Cancer – Model Reference Point: 27	
<p>Dahlberg et al. (1998)</p> <p>Grade: 2+</p>	<p>This study considers the introduction of Total Mesorectal Excision in Sweden. The study showed that the introduction of TME improved 5 year survival rates from 44.1% to 61.9% when it was introduced in 1985.</p> <p>1 year survival prior to TME = 74.9% 1 year survival after TME = 78.4% 5 year survival prior to TME = 44.1% 5 year survival after TME = 61.9%</p>
<p>Cecil et al (2004)</p> <p>Grade: 2+</p>	<p>This study had prospective data on colorectal cancer patients operated on in Basingstoke:</p> <p>AR and TME Dukes stage: Dukes A: 19%; Dukes B: 32%; Dukes C: 30%; Dukes D: 18%.</p> <p>The overall local recurrence rate for curative anterior resections with TME was 4.5%. The overall systemic recurrence rate was 24%.</p> <p>The following LR rates were found by stage: Dukes A: 2%; Dukes B: 4%; Dukes C: 7.5%.</p> <p>The systemic recurrence rates were: Dukes A: 8%; Dukes B: 18%; Dukes C: 37%.</p>
<p>Guren et al (2005)</p> <p>Grade: 2+</p>	<p>This study concentrated on those patients that were without recurrent or metastatic disease following one of two techniques (AR and APR). The median age was 73 and the median time since surgery was 64 months.</p> <p>The mean quality of life scores for body image and male sexual function were better for patients following AR than APR. Those patients that had undergone AR had higher mean constipation scores. Those patients with a low anastomosis usually had more incontinence for gas and solid stools and more incontinence in comparison with those patients that had higher anastomosis. There was, however, no difference in the quality of life between the two groups. The mean age of the AR group was 72 years old and the mean age of the APR was 75 years old. The mean score for body image for AR was 83.7 in comparison to 71 for the APR group. This was significant. (P<0.001).</p>

<p>Heald et al (1986)</p> <p>Grade: 3</p>	<p>This is a 7 1/2 year consecutive series of Basingstoke district hospital. The cumulative survival rates presented at 5 years by stage are as follows: Dukes A: 94%; Dukes B: 87%; Dukes C: 58%. The local recurrence rate for the series of patients in this study was 3.7% at 5 years.</p>
<p>Haward et al. (2005)</p> <p>Grade: 2++</p>	<p>The outcomes presented in this study are for both Abdominoperineal (APR) and anterior resection (AR) for potentially curative surgery. The study considers differences in outcomes for those that underwent AR as opposed to APR. Figure 1 of the graph shows the survival differences. The 5 year survival advantage of those undergoing Anterior resection as opposed to Abdominoperineal resection was 6.7%. Anterior resection was also more likely to be performed by a specialist colorectal cancer surgeon.</p>
<p>Heald et al (1998)</p> <p>Grade: 3</p>	<p>This study considered the Basingstoke experience of Total Mesorectal excision between 1978 and 1997. The statistics for survival outcomes presented here are for all operations performed in this period. (TME comprises 78% of cases.) Cancer Specific survival rates were: 5 years: 68%; 10 years: 66%. Local Recurrence rates: 5 years: 6% (95 CI 2%-10%); 10 years: 8% (95CI 2%-14%). In the curative resections (405), Local Recurrence rates were: 5 years: 3% (95 CI 0%-5%); 10 years: 4% (95 CI 0%-8%). Disease –free survival in this group was: 5 years: 80%; 10 years: 78%.</p>
<p>Martling et al. (2000)</p> <p>Grade: 2+</p>	<p>This study looked at surgical training for TME. There were no differences between the Stockholm I and Stockholm II, TME study in terms of 30 day mortality ([4%] I, [1%] II, [3%] TME) anastomotic leakage ([10%] I, [9%] II, [9%] TME) or all complications ([30%] I, [35%] II, [35%] TME.) Local recurrence occurred in significantly fewer of the TME group than I, II (21 [6%] TME, 103[15%] I, 66[14%] II @ p<0.001) as were cancer related deaths (35[9%] TME vs 104 [15%] I, 77 [16%] @ p<0.002.)</p>
<p>Tekkis et al (2004)</p> <p>Grade: 2++</p>	<p>This study used routinely collected data from the Association of Coloproctology of Great Britain (ACPGBI) Bowel Cancer Audit database. 1403 newly diagnosed patients with rectal cancer undergoing either restorative (anterior resection (AR)) or non restorative Abdominoperineal excision of rectum (APER) surgery. Operations carried out in 39 hospitals during a variable period between April 1999 to March 2002. Log regression analysis was used to control for variables associated with circumferential margin involvement. 136 patients satisfied the inclusion criteria. The average CMI was 12.5% (range 0-33.3%between hospitals). CMI for anterior resection was 7.5% (n=629) compared with a CMI of 16.7% for APER 9n=306) and a CMI of 331.7% for Hartmann's procedure (n=101); p<=0.001. CMI for patients undergoing curative surgery was 7.1% (423 anterior resections, CMI3.8% (n=16); 181 APER, CMI 13.3% (n=24); 29 Hartmann's procedure, CMI 17.2%). On multivariate analysis, having controlled for Dukes' stage and operative intent, the CMI was significantly different between APER and AR (odds ratio 3.3, 95% CI 2.0-5.4), but less so between Hartmann's procedure and AR (odds ratio 2.2, 95%CI 1.1-4.2).</p>

Colon Cancer: Surgery including Laparoscopic

Study:	Outcomes:
Surgery including Laparoscopic surgery for Colon Cancer – Model Reference Point: 224	
<p>Barlehner et al. (2004)</p> <p>Grade: 2+</p>	<p>The study considered outcomes for 995 colorectal laparoscopic procedures between November 1992 and July 2003.</p> <p>The mean number of lymph nodes removed in patients with colon carcinoma was 28 (mean length: 29cm). After a mean follow-up of 46.1 months (approx. 3 3/4 years) distant metastases developed in 13.3% of the curative colon cancer patients. Overall survival rate at 1 year: 88.0%; 3 years: 80.7%; 5 years: 76.0%.</p> <p>The overall 5-year survival rate was 81.4% after a curative resection.</p> <p>The cancer related survival rate was: 1 year: 95.6%; 3 years: 89.0%; 5 years: 87.0%.</p> <p>The cancer related rate after curative resection was 91.3% at 5 years.</p> <p>At 5 years the survival rate was: Stage 1: 95.0%; Stage 2: 91.8%; Stage 3: 87.7%; Stage 4: 65.1%.</p> <p>The postoperative complication rate was 12.5% for colon cancer patients. 44.5% were sigmoid resections 21.0% were Left hemicolectomy 28.5% were right hemicolectomy.</p>
<p>Co Co et al. (2005)</p> <p>Grade: 2+</p>	<p>The study considers the impact of emergency surgery outcome for left colon carcinoma. The most common occurrence of those cases that were emergency was in the sigmoid colon (62%). The reasons for emergency surgery were: 84% obstruction; 14% perforation; 2% bleeding.</p> <p>30% of these emergency cases underwent a Hartmann's procedure.</p> <p>The overall surgical morbidity was 44% vs 12% for those compared to an elective admission. P=0.0004. Length of stay was 16, 64 vs 10, 97 days P=0.0026) and post-operative mortality was 4% vs 0% P=0.4949.</p>
<p>Guillou et al (2005)</p> <p>Grade: 1++</p>	<p>This study presents outcomes from a multicentre randomised controlled MRC trial. 253 received open surgery and 484 received laparoscopic assisted treatment. The procedures were undertaken with a curative intention. Hospitals stay for colon resections were the same in both treatments. For rectal resections hospital stay was two days shorter for laparoscopic than for open surgery. Complication rates between the two groups did not differ. The quality of life measure QLQ-CR38 had many symptoms which were worse at 2 weeks but then returned to the original baseline rates at 3 months. 252 out of the 794 (32%) of patients had a stoma. The results overall showed no short term difference between open surgery and laparoscopic-assisted surgery. Laparoscopic-assisted surgery for cancer of the colon is as effective as open surgery in the short term and likely to produce similar long term outcomes.</p>

<p>Harris et al. (2002)</p> <p>Grade: 2+</p>	<p>The outcomes produced in this study were for colon cancer patients that had undergone curative resections. In the sample of 1,031 patients 3.1% had detected local recurrences. The least common sites for recurrence of the tumour were in the ascending colon, hepatic flexure, transverse colon, splenic flexure and descending colon. The other factors that were associated with recurrence were tumour perforation and fistulation. Advanced tumour stage was also associated with recurrence. Stage A: 0%; Stage B: 2.05%; Stage C: 7.0%; Stage D: 6.1%. This was similar for tumour differentiation: Well differentiated: 0%; Moderately differentiated: 2.8%; Poorly differentiated: 6.8%.</p>
<p>Hilska et al. (2004)</p> <p>Grade: 2+</p>	<p>This study considered the different outcomes with respect to the experience and training level of the clinician. There were no significantly different results between the 3 groups of training for postoperative morbidity and mortality. The 5 year cancer related survival rates for the three groups were (Group 1 were the least experienced surgeons and group 3 the most experienced surgeons): Group 1: 51%; Group 2: 63%; Group 3: 55%. The 5 year survival rates for colon cancer were Group 1: 52%; Group 2: 69%; Group 3: 58%. There was a tendency for fewer local recurrences in those patients operated on by specialist surgeons (group 3).</p>
<p>Jestin et al. (2005)</p> <p>Grade: 2+</p>	<p>This study considered the risk factors in emergency surgery for colon cancer. It was found that those patients that had emergency surgery had more advanced tumours and lower survival rate than those that underwent an elective procedure. The staging for the two groups is as follows: Emergency – Stage I: 4.2%; Stage II: 33.7%; Stage III: 35.4%; Stage IV: 26.7%. Elective – Stage I: 14.9%; Stage II: 40.9%; Stage III: 27.3%; Stage IV: 16.9%. The 5 year survival rate for emergency versus elective was 29.8 versus 52.4 per cent (P<0.001). Emergency surgery was associated with a longer hospital stay 18 versus 10 days than elective surgery.</p>
<p>Link et al (2005)</p> <p>Grade: 3</p>	<p>This paper discusses variation in outcomes such as survival of colon cancer patients. It can be seen in the literature that there are remarkable variations between studies for the reported survival rate which may be due to the surgical technique used, training status, individual case volume and referral patterns. The 5 year survival rates dependent on UICC stage and stage 1: 68%-100%; Stage 2: 58% to 90%; Stage 3: 33% to 76%; Stage 4 <5% to 9%.</p>

Schrag et al. (2000)	This study considered outcomes in terms of hospital volume and long term survival.
Grade: 2++	<p>The study found small differences in 30-day postoperative mortality for patients treated at low- vs high-volume hospitals (3.5% at hospital in the top-volume quartile vs 5.5% at hospitals in the bottom-volume quartile). However, the correlation was statistically significant and persisted after adjusted for age at diagnosis, sex, race, cancer stage, comorbid illness, socioeconomic status, and acuity of hospitalization (p<.001). The association was evident for subgroups with stage I, II, and III disease.</p> <p>Hospital volume directly correlated with survival beyond 30-days and also was not attributable to differences in case mix (p<.001). {The difference in 5-year mortality for patients operated on at the very high- vs low-volume hospitals was 4.4% (54.8%-50.4%)}</p> <p>The association between hospital volume and long-term survival was concentrated among patients with stage II and III disease (P<.001 for both). Among stage III patients, variation in use of adjuvant chemotherapy did not explain this finding. (51.2% of patients at low-volume; 56.6% at medium-volume; 55.6% at high-volume; and 55.5% at very high-volume hospitals received chemotherapy within 3 months of prior surgery.)</p>

Stoma Care

Study:	Outcomes:
Stoma Care – Model Reference Point: 31	
Edwards et al. (2001)	<p>The overall leakage rate for both types of defunctioning stoma was reported at 4% (3 out of 67). The two different types of stoma, loop ileostomy and transverse colostomy showed no difference in difficulty in the formation or closure or in the postoperative recovery group. The median time for formation of the stoma in the loop ileostomy group was 15 minutes and 16 minutes in the transverse colostomy. The median time to closure in both groups was 48 minutes. Hospital discharge occurred in 6 days for both of the types of stoma.</p>
Grade: 1-	
Law et al. (2002)	<p>Postoperative intestinal obstruction and prolonged ileus occurred more commonly in patients with an ileostomy. The main results showed that 17% of patients that had a temporary ileostomy resulted in intestinal obstruction in comparison to 3% of those patients that had a loop transverse colostomy. There was no difference in time to resumption of diet, length of hospital stay.</p>
Grade: 1+	
Gastinger et al. (2005)	<p>The study showed that 32.3% of patients followed in a two year multicentre study received a protective stoma after low anterior resection. Overall anastomotic leakage rates were similar for those with and without a stoma. 14.5% versus 14.2%. The logistic analysis showed that provision of a stoma was the most powerful independent variable for avoiding anastomotic leakage.</p>
Grade: 2+	

<p>Bailey et al (2002)</p> <p>Grade: 2-</p>	<p>This study looks at the incidence and causes of permanent stoma after anterior resection. AR – (38%) had a defunctioning stoma. Of these (56%) had a loop ileostomy and (44%) had a loop colostomy. (49%) of these were Anterior resections (AR) and 51% were low anterior resections (LAR). When comparing these two groups (16%) of the AR patients had a defunctioning stoma in comparison with (60%) of the LAR patients. The study found that of the Anterior resections (8%) will have a permanent stoma. The anastomotic leakage rate following AR is reported to be between 3% and 19%.</p>
<p>Hollyoak (1998)</p> <p>Grade: 2-</p>	<p>These results are for general surgical formation of stomas not solely of those patients that were diagnosed with colorectal cancer. The number of patients that were having a stoma formed because of colorectal cancer was approximately 60% in this study. The mean operating time for laparoscopic surgery was 54.3 minutes in comparison to 72.7 minutes for open surgery. The average length of hospital stay for laparoscopic surgery was 7.4 days in comparison to 12.6 days for open surgery. The average age of the sample for laparoscopic was 65.2 in comparison to 67.1 in the open group.</p>
<p>Kairaluoma (2002)</p> <p>Grade: 3</p>	<p>The rectal cancer surgical procedure of Anterior Resection (AR) and TME results in fewer permanent Stoma procedures. There appears to be controversy over whether a temporary stoma should be used to stop anastomotic leakage and infections with varied evidence for TME. The overall stoma complication rate was 50%. Pure stoma related complication rates were observed in 12% of patients. The final closure rate of temporary stomas was 67%. The closure rate was significantly higher if the temporary stomas were of the double barrel type. The data showed that most of the temporary stoma procedures performed on patients over the age of 70 years resulted in permanent stoma.</p>

APPENDIX B

Elicitation Methods and Calibration

B.1 ELICITATION METHODS

Elicitation of subjective expert judgement was used for important parameters where there was an absence of relevant objective information. The object of this elicitation was to obtain a parametric description of the uncertainty for such parameters, including expert's best estimates, usually interpreted as median values.

Where clinical experts believed that parameters did not display any important covariate structures that would be important to capture in the model simple distributions were elicited based upon quartiles.

Experimental elicitation methods were used to elicit parametric descriptions of uncertainty in the presence of covariates, whereby the clinician gives estimates of the response variable at various combinations of values of the covariates. This elicitation process is facilitated by software being developed by Open University statisticians. The elicitation process is outlined below.

1. Input names and descriptions of all covariates (R_i) and whether each is continuous or a factor.
2. Determine maximum and minimum values for each covariate and the response from the expert. Determine the reference point from the expert. Calculate the knot points (this will be done by facilitator "by hand" and programmed into the software for each expert):
 - If covariate is continuous a formula is used to calculate the knot points;
 - If covariate is a factor:
 - Identify levels of the factor;
 - Expert ranks them from "best" to "worse" (where "best" gives highest/lowest value of $\square(r)$ for \cap -/U-shaped curves). Best level is made the reference level.
3. Elicit median, LQ and UQ at the reference point, using dialogue box. Store as a vector.
4. For each variable in turn:
 - Present graph, with knots marked on x-axis, and plot the assessed median at the reference level (elicited at stage 3);
 - Elicit median at the remaining knots, given that the median at the reference level is correct. Store as a vector.
5. For each variable in turn:
 - Present graph, with knots marked on x-axis, and plot the alternative value at the reference level. (Example is to use the UQ elicited at stage 3);
 - Plot the suggested values onto the graph (as per paper section 5.2);
 - Elicit median at the remaining knots, given that the alternative value at the reference level is correct. Store as a vector.
6. For each variable in turn:
 - Present graph, with knots marked on x-axis, plot the assessed median at the reference level (elicited at stage 3) and plot the suggested values (as per section 5.2);
 - Elicit LQ and UQ at each of the other knots, given that the median at the reference level is correct. Store them as vectors;

- Present graph as above but with the median assessments at the reference knot and the next knot in the indexing fixed at the values elicited (at stages 3 and 4). Plot the suggested values onto it (as per section 5.2);
 - Elicit the LQ and UQ at each of the other knots, given that the medians at the first two knots (in the indexing) are correct. Store them as vectors;
 - Repeat last two steps, adding the next knot in the indexing to the list of knots fixed at their median values (elicited at stage 4).
7. Generate mean vector and covariance matrix of the multivariate normal distribution as required.

The mean vector and covariance matrix and underlying linear model are then used directly within the options assessment model to generate mean values and Monte Carlo samples for the required parameters.

B.2 DOCUMENT CIRCULATED TO CLINICAL EXPERTS AND STATISTICAL ADVISORS PRIOR TO ELICITATION EXERCISE DETAILING QUESTIONS, BACKGROUND MATERIAL AND OUTCOMES

Overview

This document outlines the items for elicitation within the Department of Health study on the costs and benefits of bowel cancer services in England. Nine groups of parameters for elicitation are detailed below. For each item, we have provided a brief description of the current evidence of which we are aware, as well as the questions we wish to ask in order to elicit parameter estimates to populate the health economic model.

Group 1: Time from onset of symptoms to presentation

Description of elicitation item

The time from which patients take to present to their GP following the onset of symptoms related to colorectal cancer.

Available evidence on elicitation item

There is limited good quality evidence concerning the time from the onset of symptoms associated with colorectal cancer through to presentation to their GP. Whilst there is some evidence concerning the interval between symptom onset and GP presentation, the methods used within these studies are unlikely to be accurate as they have either recorded the date of onset of symptoms based on the dates given in the doctor's referral letter, or they have relied on patients' recollections after the diagnosis had been made.¹⁻³

Covariates

- Sex (male/female);
- Age (continuous);
- Underlying disease (no adenomas or cancer, adenoma, Dukes A/B, Dukes C/D).
- Symptoms of obstruction (present/absent).

Assumptions

- The patient is not necessarily referred upon presentation to their GP;
- Patients who present to A&E do so due to symptoms of obstruction. Presentation of these patients is immediate.

Questions for elicitation

1. Of those patients with symptoms that would result in a referral for investigation (rectal bleeding, anaemia, abdominal pain, persistent change in bowel habit) upon first GP presentation:
 - a. What proportion would have had symptoms for over 2 years?
 - b. Given that it is less than 2 years, what proportion would have had symptoms for more than 1 year?
 - c. Given that it is less than 1 year, what proportion would have had symptoms for more than 6 months?

- d. Given that it is less than 6 months, what proportion would have had symptoms for more than 3 months?

Group 2: Use of alternative diagnostic investigations for symptoms of colorectal cancer

Description of elicitation item

The proportion of patients referred for investigation of symptoms associated with colorectal cancer who undergo flexible sigmoidoscopy, colonoscopy, barium enema, CT pneumocolon (colonography).

Available evidence on elicitation item

A positive diagnosis of CRC is arrived at using flexible sigmoidoscopy, colonoscopy, barium enema, or CT pneumocolon (colonography). The first two are endoscopic whilst the last two are radiological. National Hospital Episode Statistics (HES) could be used to estimate the proportion of patients who undergo each investigation; however these are restricted to inpatient appointments only.⁴ In addition, there are published audits⁵⁻⁶ on the use of these procedures; the estimated proportions of patients from these studies sharply contrast with those obtained from the HES data, include small numbers of patients, and are restricted to specific areas of the country. Elicitation of expert judgement on the use of these investigative procedures will be useful to reinforce and validate these published estimates.

Covariates

- Patient fitness (fit/unfit for surgical intervention);
- Type of presentation (normal/emergency).

Assumptions

- Elicitation item should relate to current practice given available resources.

Questions

1. What proportion of patients referred do not undergo diagnostic testing (i.e. go straight to surgical intervention)?
2. What proportion of patients referred for investigation of symptoms of bowel cancer undergo endoscopy (flexible sigmoidoscopy or colonoscopy) as their first investigation rather than a radiological scan (barium enema, colonography)?
3. Of those patients undergoing endoscopy, what proportion undergo colonoscopy as their first investigation?
4. Of those patients undergoing colonoscopy, what proportion then have a barium enema?
5. Of those patients who undergo flexible sigmoidoscopy, what proportion then have a colonoscopy?
6. Of those patients undergoing a radiological scan, what proportion undergo barium enema as their first investigation?

Other questions

- If colonoscopy use was increased to 90%, how would this affect the other diagnostic modalities?

Group 3: Use of emergency stenting

Description of elicitation item

The proportion of patients who present as emergency cases who currently undergo/potentially could undergo stenting in England.

Available evidence on elicitation item

Stenting may be used as a bridge to surgery i.e. to relieve obstructed patients so that they may be treated as elective cases rather than emergencies. The benefit of this is mainly seen in terms of reduced operative mortality and long-term recurrence. Alternatively, stenting may be used to relieve obstruction in patients who are unfit for surgery. There is very little evidence concerning the current uptake of stenting across the UK as this is not often used in many cancer centres.

Covariates

- Location of tumour (colon/rectum).

Assumptions

- All patients in this group have obstructing colorectal tumours.

Questions

1. What proportion of patients with confirmed obstruction would be considered fit for surgery?
2. Of those patients who are unfit for surgery, what proportion undergoes palliative stenting?
3. Of those patients who are fit for surgery, what proportion currently undergo stenting as a bridge to surgery as oppose to immediate surgery with no prior stenting?
4. OPTIONS QUESTION: What would be the maximum feasible proportion for question (3)?

Group 4: Use of adjuvant chemotherapy in colorectal cancer

Description of elicitation item

The proportion of patients with Dukes' B/C colorectal cancer who receive adjuvant chemotherapy following complete resection of their primary tumour in England.

Available evidence on elicitation item

There is uncertainty concerning the proportion of patients with colorectal cancer who receive adjuvant chemotherapy following complete resection of their tumour. Recent NICE guidance issued in 2006 recommended the use of capecitabine and oxaliplatin as agents for the adjuvant treatment of Dukes C colon cancer.⁷ However, adjuvant chemotherapy may also be used to treat patients with rectal cancers or Dukes' B cancers.

Covariates

- Tumour location (Colon/rectum);
- Underlying disease status (Dukes B, Dukes C);
- Perforation or obstruction (yes/no);
- Fitness (fit for cytotoxic therapy/unfit for cytotoxic therapy).

Assumptions

- All patients receive bolus 5-FU/FA in the base case in line with pre-2006 NICE guidance.

Questions

1. What proportion of patients receive adjuvant chemotherapy?

Group 5: Uptake of different palliative chemotherapies for metastatic CRC

Description of elicitation item

The proportion of patients who receive alternative sequences of chemotherapy for metastatic colorectal cancer.

Available evidence on elicitation item

There is uncertainty concerning the number of patients with metastatic disease who receive chemotherapy. This is complicated by the fact that of those patients who do receive chemotherapy, there are a number of alternative therapies, which may be given as monotherapy or combination therapy, in various sequences (i.e. most therapies are switched upon disease progression), as either infusional or bolus regimens. Until August 2005, NICE recommended the use of 5-FU/FA followed on progression by single-agent irinotecan.⁸ Following a review of this guidance, NICE recommended the use of irinotecan in combination with 5-FU/FA as first-line therapy or as monotherapy following disease progression, and the use of oxaliplatin plus 5-FU/FA as either first- or second-line therapy.⁹ Some proportion of patients may also receive salvage therapies following progression on irinotecan/5-FU/oxaliplatin; this is likely to be mitomycin-C.

Covariates

- Fitness (fit for cytotoxic therapy/unfit for cytotoxic therapy);
- Prior disease (patient presented with metastatic disease/recurrence within 6-months of receiving adjuvant chemotherapy/recurrence greater than 6-months since receiving adjuvant chemotherapy).

Assumptions

- Patients in this group have unresectable metastatic colorectal cancer and would not be considered for downstaging chemotherapy (downstaging is considered as the next item).

Questions

1. What proportion of patients with unresectable metastatic colorectal cancer do not receive any palliative chemotherapy?
2. Of those patients who do receive palliative chemotherapy, what proportion receive 5-FU/FA alone?
3. Of those patients who do receive combination chemotherapy, what proportion receive 5-FU/FA, oxaliplatin and irinotecan during their sequence of treatment?

Other questions

1. For the last group of patients who receive some other chemotherapy regimen, which regimen is used for these patients? Why might they not receive 5-FU/FA/irinotecan followed on progression by 5-FU/FA/oxaliplatin or the reverse sequence?

Group 6: Use of downstaging chemotherapy

Description of elicitation item

The proportion of patients with metastatic colorectal cancer who receive downstaging chemotherapy.

Available evidence on elicitation item

Patients with unresectable liver metastases may become resectable through the use of downstaging chemotherapy. In a recent systematic review of irinotecan and oxaliplatin for the treatment of metastatic colorectal cancer, estimates of resection rates for irinotecan combination therapy ranged from nine to 35%, whilst resection rates for oxaliplatin/5-FU combination therapy ranged from 7 to 51%.¹⁰

Covariates

None specified.

Assumptions

- Patients receive oxaliplatin/5-FU/FA as downstaging chemotherapy;
- All patients in this group have metastatic colorectal cancer;
- Patients are sufficiently fit to receive further surgical intervention.

Questions

1. What proportion of patients with metastatic colorectal cancer undergo downstaging chemotherapy in England?

Group 7: Uptake of hepatic/pulmonary resection for patients with metastatic colorectal cancer

Description of elicitation item

The proportion of patients with metastatic colorectal cancer who currently undergo/could undergo liver/pulmonary resection.

Available evidence on elicitation item

For patients with metastatic CRC, the only chance of long-term survival is through liver resection.¹⁰ This is usually done only if the tumour which is restricted to the liver, although in a small number of cases, extra-hepatic resection may provide some survival benefit.¹¹ We have some national data on the number of procedures undertaken each year from HES.¹

Covariates

None specified.

Assumptions

- Patients have not received any prior downstaging chemotherapy.

Questions

1. What proportion of patients with metastatic colorectal cancer undergo hepatic/pulmonary resection?
2. What proportion of patients with metastatic colorectal cancer are initially resectable?

Group 8: Use of adjuvant radiotherapy for rectal cancer

Description of elicitation item

The proportion of rectal cancer patients that undergo pre-operative/post-operative radiotherapy (with/without chemotherapy).

Available evidence on elicitation item

Evidence on the benefits of radiotherapy approaches is constantly evolving. Radiotherapy may be used pre- or post-operatively, as a short- (5 fractions over 1 week) or long-course (25-28 fractions over about 5 weeks), and with or without adjuvant chemotherapy. There is considerable uncertainty and limited evidence concerning the uptake of these alternative RT options across England.

Covariates

- Underlying histological status (Dukes B, Dukes C);
- Fitness (fit for surgery/unfit for surgery).

Assumptions

- This group of patients have not received prior radiotherapy.

Questions

1. What proportion of patients with rectal cancer do not receive any radiotherapy?
2. Given that patients have radiotherapy, what proportion have pre-operative radiotherapy compared to post-operative radiotherapy?
3. Given that patients receive pre-operative radiotherapy, what proportion of patients also receive chemotherapy at the same time?

4. Given that patients receive post-operative radiotherapy, what proportion of patients also receive chemotherapy at the same time?

Other questions

1. You have said that x% of patients currently receive pre-operative radiotherapy. What proportion of patients with rectal cancer could receive pre-operative radiotherapy?

Group 9: Survival of patients with metastatic colorectal cancer who receive best supportive care

Description of elicitation item

The survival duration for patients with metastatic colorectal cancer who receive best supportive care (i.e. no further active intervention).

Available evidence on elicitation item

We are unaware of any studies which provide survival estimates for patients with metastatic colorectal who receive best supportive care alone without any active intervention. A systematic review of the clinical and cost-effectiveness of bevacizumab and cetuximab identified three studies which reported survival estimates for patients who had received one or more lines of active therapy.¹²⁻¹⁴

Covariates

- Previous therapy for metastatic disease (none, previous therapy);
- Fitness (fit to receive cytotoxic therapy/unfit to receive cytotoxic therapy).

Assumptions

- None specified.

Questions

1. Of those patients who receive best supportive care for metastatic colorectal cancer:
 - What proportion survive for more than 1 year?
 - Given that it is less than 1 year, what proportion survive for more than 6 months?
 - Given that it is less than 6 months, what proportion survive for more than 3 months?
 - Given that it is less than 3 months, what proportion survive for more than 1 months?

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B.3 RESULTS OF ELICITATION

Group 1: Time from onset of symptoms to presentation

Description of elicitation item

The time from which patients take to present to their GP following the onset of symptoms related to colorectal cancer.

Clinical expert 1

Submitted relevant data.

Clinical expert 2

Submitted relevant data.

15% symptoms at first consultation are multiple.

Symptom	Lower quartile	Median	Upper quartile
Diarrhoea	14 days	42 days	70 days
Abdominal pain	14 days	42 days	122 days
Rectal bleeding	3 days	7 days	14 days
Constipation	14 days	35 days	56 days
Weight loss	Symptom discounted – not commonly associated with CRC		

Over 2 years, none
1-2 years, very small

Group 2: Use of alternative diagnostic investigations for symptoms of colorectal cancer

Description of elicitation item

The proportion of patients referred for investigation of symptoms associated with colorectal cancer that undergoes flexible sigmoidoscopy, colonoscopy, barium enema, CT pneumocolon (colonography).

Clinical expert 1

Patients who do present as emergencies would have an instant enema and plain X-ray.

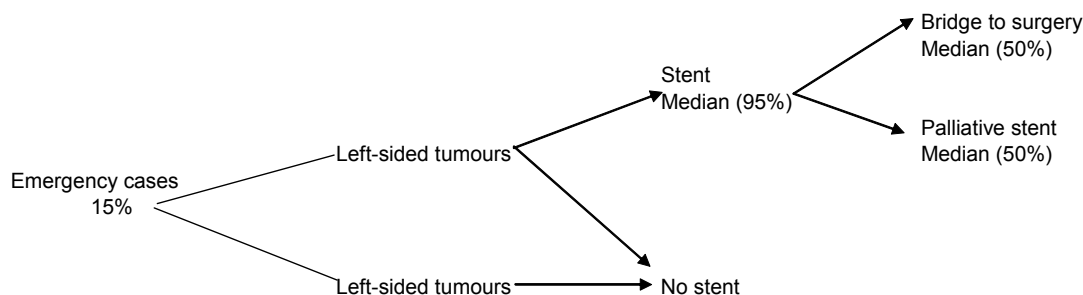
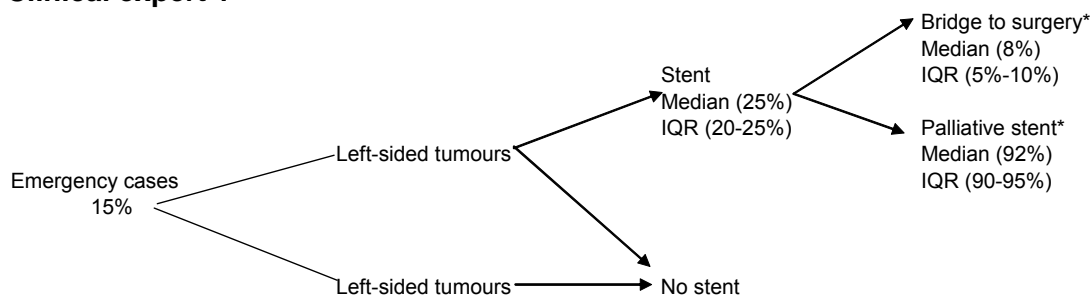
Question	Fitness	Lower quartile	Normal	Upper quartile
What proportion of patients referred via their GP do not undergo diagnostic testing?	Fit	0.4	0.5	0.6
	Unfit	0.4	0.5	0.6
What proportion of patients referred for investigation of symptoms of bowel cancer undergo endoscopy (flexible sigmoidoscopy or colonoscopy) as their first investigation rather than a radiological scan (barium enema, colonography)?	Fit	0.6	0.75	0.9
	Unfit	0	0.05	0.1
Of those patients undergoing endoscopy, what proportion undergo colonoscopy as their first investigation?	Fit	0.7	0.8	0.9
	Unfit	0.1	0.2	0.3
Of those patients undergoing colonoscopy, what proportion then have a barium enema?	Fit	0.05	0.1	0.15
	Unfit	0.01	0.02	0.03
Of those patients who undergo flexible sigmoidoscopy, what proportion then have a colonoscopy?	Fit	0.1	0.12 (0.1 polyps)	0.15
	Unfit	0.01	0.02	0.03
Of those patients undergoing a radiological scan, what proportion undergo barium enema as their first investigation?	Fit	0.7	0.8	0.9
	Unfit	0.15	0.2	0.25

Group 3: Use of emergency stenting

Description of elicitation item

The proportion of patients who present as emergency cases who currently undergo/potentially could undergo stenting in England.

Clinical expert 1



*Mike Thompson is checking these estimates

Clinical expert 2

1. Proportion of patients with confirmed obstruction considered fit for surgery?
 - a. Referred elsewhere.
2. Of those patients who are unfit for surgery, what proportion undergo palliative stenting? Referred elsewhere.
3. Of those who are fit, proportion undergoing bridge stenting? - [17%, 20%, 25%]
4. OPTIONS QUESTION: What would be the maximum feasible proportion for question (3)? - 100% of left-sided tumours with obstruction. No right-sided.

Clinical expert 3

Expert 3's centre stents 8-10 patients a year – see audit figures.
All will get a stent if fit.

Group 4: Use of adjuvant chemotherapy in colorectal cancer

Description of elicitation item

The proportion of patients with Dukes' B/C colorectal cancer who receive adjuvant chemotherapy following complete resection of their primary tumour in England.

Clinical expert 1

Carried out using elicitation software.

Covariates

- Tumour location (Colon/rectum);
- Underlying disease status (Dukes B, Dukes C);
- Perforation or obstruction (yes/no);
- Fitness (fit for cytotoxic therapy/unfit for cytotoxic therapy);
- Age (40-50/ 50-60/ 60-70/ 70-80/ 80-90).

Vector of means

No.	Covariate description	Mean
1	Constant	2.9444
2	Tumour location (colon/ rectum)	-0.9792
3	Underlying disease state (Dukes B/ Dukes C)	-3.3478
4	Perforation or obstruction (yes/ no)	0.8454
5	Fitness (fit/ unfit for cytotoxic therapy)	-6.4379
6	Age (40-50)	-0.0388
7	Age (50-60)	-0.0252
8	Age (60-70)	-0.0066
9	Age (70-80)	-0.0832
10	Age (80-90)	-0.4460

Covariates

	1	2	3	4	5	6	7	8	9	10
1	0.90	0.08	0.01	-0.19	0.23	0.02	-0.12	0.20	-0.02	-0.04
2	0.08	1.95	0.00	-0.02	0.02	0.00	-0.01	0.02	0.00	0.00
3	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	-0.19	-0.02	0.00	23.17	-0.05	0.00	0.03	-0.04	0.00	0.01
5	0.23	0.02	0.00	-0.05	3.35	0.00	-0.03	0.05	-0.01	-0.01
6	0.02	0.00	0.00	0.00	0.00	0.07	-0.03	0.00	0.00	0.00
7	-0.12	-0.01	0.00	0.03	-0.03	-0.03	0.04	-0.03	0.00	0.00
8	0.20	0.02	0.00	-0.04	0.05	0.00	-0.03	0.10	-0.06	0.00
9	-0.02	0.00	0.00	0.00	-0.01	0.00	0.00	-0.06	0.10	-0.02
10	-0.04	0.00	0.00	0.01	-0.01	0.00	0.00	0.00	-0.02	0.03

Clinical expert 2

Dukes' C colon – 70% [90% c.i. 60%, 80%]

Dukes' B colon – 50%

Dukes' C rectal – 25%

Dukes' B rectal – 15% [90% c.i. 10%, 30%]

Expert commented that whilst you might expect these proportions to be very high, audits suggest they are lower.

The model uses expert 1's responses as part of a generalised linear model & is validated by expert 2's responses.

Group 5: Uptake of different palliative chemotherapies for metastatic CRC

Description of elicitation item

The proportion of patients who receive alternative sequences of chemotherapy for metastatic colorectal cancer.

Clinical expert 1

Per yr	Number of patients	Min	Max	Prop	Min	Max
Population	3000000	-	-	-	-	-
Incidence	1800	-	-	-	-	-
Present to Christie	1200	-	-	-	-	-
Incident metastases	900	-	-	-	-	-
No treatment	150	100	200	16.7%	11.1%	22.2%
Palliative chemo	750	650	850	83.3%	72.2%	94.4%
Cap - Focus	200			26.7%	20.0%	33.3%
Other - Tournigand	550	500	600	73.3%	66.7%	80.0%

Clinical expert 2

1. What proportion of patients with unresectable metastatic colorectal cancer do not receive any palliative chemotherapy?
Below 75 90% [85%, 95%] , above 75 60% [30%, 70%] get chemo.
2. Of those patients who do receive palliative chemotherapy, what proportion receive 5-FU/FA alone?
Single agent 5-FU / capecitabine 25% [15% - 40%] <75, 60% [50-80%] over 75 (tolerability, oral, acceptability).
3. Of those patients who do receive combination chemotherapy, what proportion receive 5-FU/FA, oxaliplatin and irinotecan during their sequence of treatment?
85% oxali, 15% irinotecan [15% on irinotecan to change to about 50% in next couple of years] 80% of patients fit for second-line.

The model uses expert 1's data which captures the same proportion of patients without chemo as suggested by expert 2.

Group 6: Use of downstaging chemotherapy

Description of elicitation item

The proportion of patients with metastatic colorectal cancer who receive downstaging chemotherapy.

Clinical expert 1

1. Proportion of patients with mCRC receiving downstaging chemo?
[IQR 5%, 10%, 20%]

Clinical expert 2

Area is shifting.

Already resectable 15%, 30%-50% of these will get prior chemo.

Potentially resectable 15-20%, 30-50% will get chemo.
[shifting – more conservative in the future]

Never resectable 65-70%.

	Percentage in group	% who get downstaging chemo min	% who get downstaging chemo max	Min prop	Max prop
Initially resectable	15%	30%	50%	5%	8%
Possibly resectable	20%	30%	50%	6%	10%
Never resectable	65%	3%	3%	2%	2%
				12%	19%

The model uses expert 2's responses which are very similar to expert 1's.

Group 7: Uptake of hepatic/pulmonary resection for patients with metastatic colorectal cancer

Description of elicitation item

The proportion of patients with metastatic colorectal cancer who currently undergo/could undergo liver/pulmonary resection.

Clinical expert 1

1. Proportion of patients with mCRC undergoing hepatic resection.

Liver - Range 50, 60, 80 out of 750, lung 10-15 out of 750.

2. Initially resectable? 15/50 [?Definition].

Clinical expert 2

80-90% (IQR) of the 15% already resectable. 15% [10-20%] of 15% potentially resectable become resectable [Adams]. Hurwitz – 3% [2%-5%] resected from never respectable.

The model uses expert 1's audit data as central estimates with greater uncertainty than specified to allow for expert 2's estimates.

Group 8: Use of adjuvant radiotherapy for rectal cancer

Description of elicitation item

The proportion of rectal cancer patients that undergo pre-operative/post-operative radiotherapy (with/without chemotherapy).

Clinical expert 1

1. What proportion of patients with rectal cancer do not receive any radiotherapy?
90% range [40%, 50%, 60%].
2. Given that patients have radiotherapy, what proportion have pre-operative radiotherapy compared to post-operative radiotherapy?
IQR [45%, 70%, 80%] 90% range [20%-90%].
3. Given that patients receive pre-operative radiotherapy, what proportion of patients also receive chemotherapy at the same time?
IQR [20%, 50%, 90%].
4. Given that patients receive post-operative radiotherapy, what proportion of patients also receive chemotherapy at the same time?
90% range [70%, 90%, 95%].

Clinical expert 2

Staging MRI just coming in – CR07. 96% pre-op compliance, 60% post-op. 30-40% patients high risk – long fraction 25f. More RT in future.

100 rectal. 20% [90% c.i. 15%-25%] will have mets – some operated, some will get chemo, some will get RT.

80% non-mets
10% [5%-15%] will be unresectable.

Of remaining 70%, 20-25% [90% RANGE 15-40%] will be borderline resectable – defined on MRI.

Borderline resectable and unresectable will get long course chemoradiation.

Of 45% left, 15%-20% [90% c.i. 15-40%] will get surgery alone.
20-25% will get short-course RT.

RECTAL TME
60% [60-80%]

Further relevant data available from CR07.

Group 9: Survival of patients with metastatic colorectal cancer who receive best supportive care

Description of elicitation item

The survival duration for patients with metastatic colorectal cancer who receive best supportive care (i.e. no further active intervention).

Clinical expert 1

Interquartile range: 3-4 months fit.
Range: 6weeks to 6 months.

B.4 CALIBRATION

Table B.4: Calibration table

Part of pathway	Baseline modelled cost per patient	Options modelled cost per patient
Diagnosis	£379	£344
Colon cancer treatment	£8,808	£6,186*
Rectal cancer treatment	£12,037	£8,812*
Follow up	£997	£587
Palliative care	£7,360	£10,051*

* The cost of a stoma has been included in palliative care rather than treatment costs. The cost per cancer patient in the model of having a stoma is £2,056.37. The baseline model includes stoma care in the colon and rectal treatment and is why the options colon and rectal treatment cost are lower.

APPENDIX C

Options Model

C.1 MODEL PARAMETERS

Table A: Probability of each characteristic

Characteristic	Sub group	Parameterisation	Source	
Entry type	No CRC	35.40%	Department of Health Working Times Database (in confidence 2006)	
	GP	36.35%		
	A&E	3.58%		
	Secondary care	21.25%		
	Dukes A	Dukes A	14%	Tekkis (2005)
		Dukes B	35%	
		Dukes C	36%	
		Dukes D	15%	
Age		Triangular (50, 72, 97)	Tekkis (2005)	
Fit for surgery		0.86		
Health utility score (polyps)	Age 16 – 24	Normal (0.905, 0.01)	Ramsey <i>et al.</i> (2000)	
	Age 25 – 34	Normal (0.91, 0.01)		
	Age 35 – 44	Normal (0.88, 0.01)		
	Age 45 – 54	Normal (0.845, 0.01)		
	Age 55 – 64	Normal (0.79, 0.01)		
	Age 65 – 74	Normal (0.78, 0.01)		
	Age 75+	Normal (0.735, 0.01)		
Relative health utility score (CRC)		Beta (22.05, 2.45)	Assumption	
Colon or rectal cancer	Colon	69%	NYCRIS data (2003)	
	Rectal	31%		
Of colon, primal or distal	Primal	30%	Personal communication with Dr. Sebag Montefiore	
	Distal	70%		
Obstructed	Dukes A	2.2	Tekkis <i>et al.</i> (2005)	
	Dukes B	34.3		
	Dukes C	33.2		
	Dukes D	29.4		
Palpable mass		4%	Dunne et al (2002)	
If rectal cancer, R0 or R1/R2	R0	70%	Personal communication with Dr. Sebag Montefiore	
	R1/R2	30%		

Table B: Time to next event

From	Until	Distribution (days)
GP presentation	Referral	Weibull (1.14, 71.04)
Referral	Diagnosis	Weibull (0.72, 67.18)
A&E presentation	Diagnosis	Weibull (0.77, 62.82)
Preoperative/ postoperative RT (with or without chemotherapy)		Log normal (35.0, 2.0)
Open colon cancer resection		Log normal (2.27, 1.41)
Laparoscopic colon cancer resection		Log normal (2.05, 1.55)
Rectal cancer surgery		Log normal (2.52, 1.24)

Source: Assumptions based on a number of sources; literature and personal communication.

Table C: Probability of being referred by GP

Referral from GP	Referred	Sent home
Cancer	77	23
No cancer	7	93

Source: Personal communication with Dr. W. Hamilton (2006).

Tables D: Probability of being diagnosed correctly

Colonoscopy

Low risk distal polyps	Diagnosed	Sent home
Cancer	76%	24%
No cancer	0%	100%

Source: Rex et al. (1997).

Other polyps & CRC	Diagnosed	Sent home
Cancer	94% - 97%	3% - 6%
No Cancer	0%	100%

Flexible sigmoidoscopy

Low risk distal polyps	Diagnosed	Sent home
Cancer	76%	24%
No cancer	0%	100%

Source: Rex et al. (1997).

Other polyps & CRC	Diagnosed	Sent home
Cancer	97%	3%
No Cancer	0%	100%

Barium enema

Small polyps	Diagnosed	Sent home
Cancer	53% - 96%	4% - 47%
No cancer	15% - 33%	67% - 85%

Large polyps	Diagnosed	Sent home
Cancer	48% - 100%	0% - 52%
No Cancer	15% - 33%	67% - 85%

CRC	Diagnosed	Sent home
Cancer	62% - 100%	0% - 38%
No cancer	15% - 33%	67% - 85%

Source: De Zwart et al. (2001).

Table E: Probability of requiring further diagnostic tests

	% of inadequate results
Colonoscopy (requiring barium enema)	10
Flexible sigmoidoscopy (requiring colonoscopy)	6

Source: Rex *et al.* (1997).

Table F: Probability of death as a result of surgery

	30-day mortality		Source
	Elective	Emergency	
Rectal cancer surgery	5.5%	21.7%	Heald (1997)
Colon cancer surgery	5.5%	21.7%	Heald (1997)
Emergency stenting	11.8%		Assumption based on Targownik et al (2004)
Liver resection	5.5%		Assumption based on Garden et al (2006)

Table G: State transition probabilities

	Low risk polyp	High risk polyp	Dukes A	Dukes B	Dukes C	Dukes D
Low risk polyp	0.9786	0.0214				
High risk polyp		0.9786	0.0214			
Dukes A			0.5497	0.4503		
Dukes B				0.4588	0.5412	
Dukes C					0.4875	0.5125

APPENDIX D

Research Brief

D.1 BRIEF FOR RESEARCH ON THE COSTS AND BENEFITS OF BOWEL CANCER SERVICES IN ENGLAND

1. The Department of Health's Policy Research Programme invites full proposals for a research study to characterise the costs and benefits of bowel cancer services in England.

Background

2. The Government set out the details of its commitment to improving cancer services in The NHS Cancer Plan¹ in September 2000. The Plan's key priorities include:
 - Saving lives;
 - Bringing survival rates up to the best in Europe;
 - Improving patients' experience of care throughout the care pathway;
 - Reducing inequalities;
 - Reducing waits.
3. Bowel cancer (cancer of the colon, rectosigmoid junction and rectum) is the second largest cancer killer in England, accounting for 14,097 deaths in 2003 (ONS), 27,529 cases in 2001 (ONS) and historically poor survival rates (45% in England to over 50% in Sweden/Finland).
4. The Department of Health is therefore considering how best to ensure that investment in bowel cancer services is directed to areas which will give maximum benefit to patients.
5. It is committed to introducing a national bowel cancer screening programme and to improving symptomatic services. These issues are being addressed with the assistance of key stakeholders from the voluntary sector, patient and professional groups and the National Health Service (NHS) through the NHS Bowel Cancer Programme and the Bowel Cancer Advisory Group.
6. The best methodology for a screening programme is not yet clear. In May 2003 the results of a pilot using faecal occult blood testing were published², and an ongoing trial of flexible sigmoidoscopy is also showing potential. A formal options appraisal is due to report in September 2004³.
7. Work is also ongoing on the expansion, training and modernisation of bowel cancer workforce, streamlining services for patients with bowel cancer symptoms, and considering communications issues for the general public and health professionals.

Research Context

8. A study is required which will identify expenditure at a national level in England on bowel cancer services as a whole and on the different elements of service provision. There is also a need to quantify - even if approximately - the likely benefits of different service developments against the key priorities; this should include the likely time scale for benefits to take effect.

9. The aim is to produce a report which will be helpful to ministers and policy makers in allocating resources. It should help to identify any areas in which current expenditure levels may be out of line with the effectiveness and cost-effectiveness evidence base, and hence inform decisions about what might be appropriate increases in expenditure in individual services. It could also provide a template to facilitate comparisons of expenditure at a network level and also internationally.
10. The study will involve synthesis of existing activity data and published costs but additional field work is likely to be required.
11. The Policy Research Programme is now looking to fund such a study and has allocated a maximum of £200,000 for this purpose.

Research Requirements

12. The work consists of two phases:

Phase 1:

- What is the overall expenditure and activity on bowel cancer within the NHS and its partners (e.g. hospices)?

A detailed estimate is required.

- What is current expenditure yielding in terms of outputs/outcomes?

Phase 2:

- What improvements might be achievable? With what cost and to what timescale? Where might savings be made?

This should include identification of activities that are not evidence-based and those that are changing because of the evidence base

It would be helpful if workforce costs and implications could be identified, particularly for medical staff. Also there is interest in the quantity of resources involved e.g. bed-days, admissions, consultations, number and type of staff, laboratory tests etc.

13. The study will need to include the costs and benefits of services relating to:

- Screening (FOBT, flexible sigmoidoscopy);
- Earlier presentation and improved assessment in primary care;
- Optimising diagnostic services (e.g. endoscopy, imaging, laboratory services);
- Optimising potentially curative treatments (surgery, radiotherapy, chemotherapy etc.);
- Optimising palliative treatment and care.

This work will need to take into account any NICE technology appraisals of relevance to bowel cancer. Additional field work may be required in some areas.

14. As mentioned in paragraph 6, an options appraisal is currently being carried out by SchARR to model various scenarios for a national screening programme. A summary of its coverage is contained in Annex D, but the final report from this study is not due until October 04. In taking forward the commissioning process DH will take this into account, and will also try to make available as much information as possible during October 04 (see paragraph 16). However, it would be helpful if applicants could consider what additional work is likely to be needed on screening out with the options appraisal in order to fulfil the above brief.

15. Key sources of information will include:

Screening:

- Report of the independent evaluation of the UK colorectal cancer pilot;
- Options appraisal of screening from the School of Health and Related Research in Sheffield (SchARR) (due October 04).

Services (general):

- Improving Outcomes in Colorectal Cancer (update) - manual and research evidence documents. Update 2004. NICE;
- NHS activity data from analyses of HES data;
- Cost-effectiveness appraisals from NICE technology appraisals;
- Cost-effectiveness and cost studies from the general literature.

Epidemiology:

- Cancer Registry data on population outcomes and EURO CARE data on outcomes which could be achieved if England is to match the best in Europe.

Other sources of data may include:

- Reference costs;
- National tariff;
- HES data;
- Prescribing data;
- Workforce data (identification of consultants by Trust);
- Laboratory work statistics.

Applications

16. It would be helpful if likely applicants (one per team) could register their interest by sending an e-mail to the address at the bottom of the brief. This will enable DH to send further information on the screening options appraisal when this is available, and will also help us gauge the level of staff resources required for the commissioning process.

17. Applicants are encouraged to develop collaborative multi-disciplinary applications covering health economics, epidemiology and relevant clinical specialties.

- 18.** Full proposals are required and must be submitted on the form detailed below. The proposal should:
- Indicate the policy relevance of the proposed research;
 - State clear objectives for the study;
 - Describe the research plan, including the research design, methods of data collection required and forms of analysis proposed;
 - Identify the staff required and their role and expertise;
 - Lay out clear arrangements for project management and delivery;
 - State the costs of the project, and include a detailed breakdown to enable an assessment to be made of how resources will be used and value for money.

Proposals should be as short as is reasonably possible, and under no circumstances should exceed 20 pages (including cost sheets).

- 19.** Please note that brief CVs for each named applicant should be typed in to Appendix 1 of the form. Please do not attach separate CVs, or any other documents, to the application form. These will not be circulated.
- 20.** Because of the need to use the outcomes from the study to influence policy making the duration should be as short as is consistent with delivering a high quality study. Applications of longer than 2 years duration are unlikely to be successful. The study should be designed to enable phased delivery of results during the course of the project.
- 21.** The Department is likely to set up an advisory structure - perhaps including reference panels - and frequent feedback and liaison with policy staff will probably be required. The team commissioned to undertake the work may also have responsibility for the routine organisation and administration of the advisory group meetings, in collaboration with the Department.

References

1. The NHS Cancer Plan. A plan for investment, a plan for reform. September 2000 (Department of Health).
2. Report of the evaluation of UK colorectal cancer screening pilot. Profs David Weller and Freda Alexander (University of Edinburgh) and collaborators. NHS Cancer Screening website (www.cancerscreening.nhs.uk/colorectal/pilot-evaluation.html).
3. Options Appraisal: screening for bowel cancer. SCHARR, commissioned by NHS Cancer Screening Programme. Report due October 2004.
4. Improving Outcomes in Colorectal Cancer - update. NICE, June 2003.

ANNEX D

Bowel Cancer Screening: Options Appraisal

In 2004 the NHS Cancer Screening Programme commissioned SchARR to conduct a detailed assessment of research evidence on two alternative screening methods, faecal occult blood testing (FOBT) and flexible sigmoidoscopy, and to produce a mathematical model to estimate the costs, benefits and capacity implications of these two methods. This work will inform the work of the Bowel Cancer Advisory Group in England.

The study report will review existing economic evaluations of these two screening methods and also identify the best available evidence for populating a model, for example, expert knowledge from the research steering group and other expert clinicians together with data from:

- England incidence and prevalence estimates;
- The Nottingham RCT on the effectiveness of FOBT;
- The multicentre randomised controlled trial of 'once only' flexible sigmoidoscopy;
- The FOBT UK colorectal cancer screening pilot undertaken in England and Scotland;
- The use of flexible sigmoidoscopy from Kaiser Permanente in California;
- Data from existing modelling studies.

The aim is to develop a mathematical model to enable health economic comparisons of the screening options for a population at average risk, as well as modelling the expected resource impact on the NHS as a whole. It will enable incremental analysis of no screening, FOBT alone, flexible sigmoidoscopy and combinations of FOBT and flexible sigmoidoscopy.

The output of this study will be a final report and a software model that can be used for further analysis as appropriate.

