11. APPENDICES

APPENDIX 1. SEARCH STRATEGIES

CLINICAL EFFECTIVENESS

Search strategies used to identify reports of randomised controlled trials and systematic reviews of laparoscopic surgery for colorectal cancer.

MEDLINE (2000 – May Week 1 2005) EMBASE (2000 – Week 19 2005) (Medline Extra 11th May 2005)
Ovid Multifile Search URL: http://gateway.ovid.com/athens

1 exp colorectal neoplasms/su use medf
2 exp colon cancer/su use emef
3 exp rectum cancer/su use emef
4 exp colectomy/
5 exp colon resection/ use emef
6 exp rectum resection/ use emef
7 (colectom$ or hemicolect$ or colotom$).tw.
8 (mesorect$ adj3 excision$).tw.
9 or/1-8
10 exp colorectal neoplasms/ use medf
11 exp colon cancer/ use emef
12 exp rectum cancer/ use emef
13 (cancer adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
14 (carcinoma adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
15 (neoplas$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
16 (adenocarcinoma$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
17 (malignan$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
18 or/10-17
19 adenocarcinoma/
20 carcinoma/
21 neoplasms/
22 or/19-21
23 exp colon/
24 rectum/ use medf
25 exp rectum/ use emef
26 or/23-25
27 22 and 26
28 colorectal surgery/
29 Surgical procedures,operative/ use medf
30 surgery/ use emef
31 su.fs.
32 (surgery or surgical or surgeon$).tw.
33 resect$.tw.
34 operat$.tw.
35 or/28-34
36 (18 or 27) and 35
37 9 or 36
38 laparoscopy/
39 laparoscopic surgery/ use emef
40 Surgical procedures,minimally invasive/ use medf
41 Minimally invasive surgery/ use emef
42 (minimal$ adj3 (invasiv$ or access$)).tw.
43 laparoscop$.tw.

44 (key hole or keyhole).tw.
45 hand assist$.tw.
46 robotic$.tw.
47 robotics/
48 or/38-47
49 37 and 48
50 limit 49 to yr=2000-2005
51 animal/ not human/ use medf
52 (animal/ or nonhuman/) not human/ use emef
53 50 not (51 or 52)
54 clinical trial.pt. use medf
55 exp controlled clinical trials/ use medf
56 randomised controlled trial/ use emef
57 clinical trial/ use emef
58 random allocation/ use medf
59 randomization/ use emef
60 random$.tw.
61 or/54-60
62 53 and 61
63 meta analysis.tw.
64 meta analysis.pt. use medf
65 meta analysis/ use emef
66 review.ab.
67 review.pt. use medf
68 systematic review/ use emef
69 or/63-68
70 53 and 69
71 62 or 70
72 remove duplicates from 71

Science Citation Index (2000 - 27th May 2005)
Web of Knowledge URL: http://wok.mimas.ac.uk/

#1 TS=(colectom* OR hemicolect* OR colotom*)
#2 TS=(mesorect* SAME excision*)
#3 TS=((colon or colorectal) SAME resect*)
#4 #1 OR #2 OR #3
#5 TS=(cancer SAME (colorectal or colon* OR rectal OR rectum OR intestin* OR bowel))
#6 TS=(carcinoma SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#7 TS=(neoplas* SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#8 TS=(adenocarcinoma* SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#9 TS=(malignan* SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#10 #5 OR #6 OR #7 OR #8 OR #9
#11 TS=laparoscop*
#12 TS=(minimal* SAME (invasiv* OR access*))
#13 TS=(key hole or keyhole)
#14 TS=robotic*
#15 TS=hand assist*
#16 #11 OR #12 OR #13 OR #14 OR #15
#17 (#4 OR #10) AND #16
#18 TS=(randomised OR randomized)
#19 TS=random* allocat*
#20 TS=review*
#21 TS=meta analysis
#22 TS= #18 OR #19 OR #20 OR #21
#23 #17 AND #22

BIOSIS (2000 – May 2005))
Edina URL: http://edina.ac.uk/biosis/

((al: (random*) or al: (trial*) or al: (control*)) and ((((((al: (minimal* n3 invasiv*) or al: (minimal* n3 access*)) or (al: (hand assist*) or al: (robotic*))) or (al: (laparoscop*) or al: (key hole) or al: (keyhole)))) and ((((((((((al: (rectum n3 surgical) or al: (intestin* n3 surgical) or al: (bowel n3 surgical)) or (al: (colorectal n3 surgical) or al: (colon* n3 surgical) or al: (rectal n3 surgical))) or (al: (rectum n3 surgery) or al: (intestin* n3 surgery) or al: (bowel n3 surgery))) or (al: (colorectal n3 surgery) or al: (colon* n3 surgery) or al: (rectal n3 surgery)))) and (al: (neoplas*) or al: (adenocarcinoma*)))) or (((((((al: (rectum n3 surgical) or al: (intestin* n3 surgical) or al: (bowel n3 surgical)) or (al: (colorectal n3 surgical) or al: (colon* n3 surgical) or al: (rectal n3 surgical))) or (al: (rectum n3 surgery) or al: (intestin* n3 surgery) or al: (bowel n3 surgery))) or (al: (colorectal n3 surgery) or al: (colon* n3 surgery) or al: (rectal n3 surgery)))) and (al: (cancer) or al: (carinoma) or al: (malignan*)))))) or (((al: (mesorect* n3 excision*) or al: (colon* n3 resect*)) or (al: (colectom*) or al: (hemicolectom*) or al: (colotom*)))))))))

Cochrane Library Issue 2, 2005
URL: http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/HOME

#1 MeSH descriptor Colorectal Neoplasms explode all trees with qualifier: SU in MeSH products
#2 MeSH descriptor Colectomy explode all trees in MeSH products
#3 colectom* in All Fields or hemicolect* in All Fields or colotom* in All Fields
#4 (mesorect* NEAR/3 excision*) in All Fields
#5 (#1 OR #2 OR #3 OR #4)
#6 MeSH descriptor Colorectal Neoplasms explode all trees in MeSH prodcuts
#7 (cancer NEAR/3 (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel)) in All Fields
#8 (carcinoma NEAR/3 (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel)) in All Fields
#9 (neoplas* NEAR/3 (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel)) in All Fields
#10 (adenocarcinoma* NEAR/3 (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel)) in All Fields
#11 (malignan* NEAR/3 (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel)) in All Fields
#12 (#6 OR #7 OR #8 OR #9 OR #10 OR #11)
#13 MeSH descriptor Adenocarcinoma, this term only in MeSH products
#14 MeSH descriptor Carcinoma, this term only in MeSH products
#15 MeSH descriptor Neoplasms, this term only in MeSH products
#16 (#13 OR #14 OR #15)
#17 MeSH descriptor Colon explode all trees in MeSH products
#18 MeSH descriptor Rectum, this term only in MeSH products
#19 (#17 OR #18)
#20 (#16 AND #19)
#21 MeSH descriptor Colorectal Surgery, this term only in MeSH products
#22 MeSH descriptor Surgical Procedures, Operative, this term only in MeSH products
#23 su.fs in All Fields
#24 (surgery OR surgical OR surgeon*) in All Fields
#25 (resect* OR operation*) in All Fields
#26 (#21 OR #22 OR #23 OR #24 OR #25)
#27 ((#12 OR #20) AND #26)
#28 (#5 OR #27)
#29 MeSH descriptor Laparoscopy, this term only in MeSH products
#30 MeSH descriptor Robotics, this term only in MeSH products
#31 MeSH descriptor Surgical Procedures, Minimally Invasive, this term only in MeSH products

#32 (minimal* NEAR/3 (invasiv* or access*)) in All Fields
#33 laparoscop* OR key hole OR keyhole OR hand assist* OR robotic* in All Fields
#34 (#29 OR #30 OR #31 OR #32 OR #33)
#35 (#28 AND #34), from 2000 to 2005

Journals@Ovid Full Text (21st July 2005)
URL: http://gateway.ovid.com/athens

Journals searched: Annals of Surgery; Archives of Surgery; British Journal of Surgery; Surgical Laparoscopy

1 annals of surgery.jn.
2 archives of surgery.jn.
3 british journal of surgery.jn.
4 surgical laparoscopy endoscopy & percutaneous techniques.jn.
5 or/1-4
6 (random$ or control$ or trial?).tw.
7 (colectom$ or hemicolect$ or colotom$).tw.
8 (mesorect$ adj3 excision$).tw.
9 ((colorectal or colon$ or rectal or rectum or intestin$ or bowel) adj3 (cancer or carcinoma or neoplas$ or surg$)).tw.
10 laparoscop$.tw.
11 (minimal$ adj3 (invasiv$ or access$)).tw.
12 (key hole or keyhole).tw.
13 hand assist$.tw.
14 robotic$.tw.
15 or/7-9
16 or/10-14
17 6 and 15 and 16
18 5 and 17
19 limit 18 to yr="2000 - 2005"

National Research Register (Issue 2,2005)
URL: http://www.update-software.com/National/

#1. COLORECTAL NEOPLASMS [su] explode all trees (MeSH)
#2. COLECTOMY single term (MeSH)
#3. colectom* or hemicolect* or colotom*
#4. (#1 or #2 or #3)
#5. COLORECTAL NEOPLASMS explode all trees (MeSH)
#6. (cancer near (colorectal or colon* or rectal or rectum or intestin* or bowel))
#7. (carcinoma near (colorectal or colon* or rectal or rectum or intestin* or bowel))
#8. (neoplasm* near (colorectal or colon* or rectal or rectum or intestin* or bowel))
#9. (adenocarcinom* near (colorectal or colon* or rectal or rectum or intestin* or bowel))
#10. (mailignan* near (colorectal or colon* or rectal or rectum or intestin* or bowel))
#11. (#5 or #6 or #7 or #8 or #9 or #10)
#12. ADENOCARCINOMA single term (MeSH)
#13. CARCINOMA single term (MeSH)
#14. NEOPLASMS single term (MeSH)
#15. (#12 or #13 or #14)
#16. COLON explode all trees (MeSH)
#17. RECTUM single term (MeSH)
#18. #16 or #17
#19. (#15 and #18)
#20. COLORECTAL SURGERY single term (MeSH)
#21. SURGICAL PROCEDURES, OPERATIVE single term (MeSH)

#22. (surgery or surgical or surgeon*)
#23. (resect* or operation*)
#24. (#20 or #21 or #22 or #23)
#25. ((#11 or #19) and #24)
#26. (#4 or #25)
#27. LAPAROSCOPY single term (MeSH)
#28. ROBOTICS single term (MeSH)
#29. SURGICAL PROCEDURES, MINIMALLY INVASIVE single term (MeSH)
#30. (minimal * near (invasiv* OR access*))
#31. (laparoscop* or key hole or keyhole or hand assist* or robotic*)
#32. (#27 or #28 or #29 or #30 or #31)
#33. (#26 and #32) from 2000 to 2005

Clinical Trials (May 2005)
URL: http://clinicaltrials.gov/ct/gui/c/r

Colorectal and laparoscopy

Current Controlled Trials (May 2005)
URL: http://www.controlled-trials.com/

Colorectal and laparoscop%

COST-EFFECTIVENESS & ECONOMIC EVALUATIONS

Search strategies used to identify reports of cost-effectiveness and economic evaluations of laparoscopic surgery for colorectal cancer.

MEDLINE (2000 – May Week 2 2005) EMBASE (2000 – Week 21 2005) (Medline Extra 23rd May 2005)
Ovid Multifile Search URL: http://gateway.ovid.com/

1 exp colorectal neoplasms/su use medf
2 exp colon cancer/su use emef
3 exp rectum cancer/su use emef
4 exp colectomy/ (8272)
5 exp colon resection/ use emef
6 exp rectum resection/ use emef
7 (colectom$ or hemicolect$ or colotom$).tw.
8 (mesorect$ adj3 excision$).tw.
9 or/1-8
10 exp colorectal neoplasms/ use medf
11 exp colon cancer/ use emef
12 exp rectum cancer/ use emef
13 (cancer adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
14 (carcinoma adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
15 (neoplas$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
16 (adenocarcinoma$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
17 (malignan$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
18 or/10-17
19 adenocarcinoma/
20 carcinoma/
21 neoplasms/
22 or/19-21
23 exp colon/
24 rectum/ use medf
25 exp rectum/ use emef
26 or/23-25

27 22 and 26
28 colorectal surgery/
29 Surgical procedures,operative/ use medf
30 surgery/ use emef
31 su.fs.
32 (surgery or surgical or surgeon$).tw.
33 resect$.tw.
34 operation$.tw.
35 or/28-34
36 (18 or 27) and 35
37 9 or 36
38 laparoscopy/
39 laparoscopic surgery/ use emef
40 Surgical procedures,minimally invasive/ use medf
41 Minimally invasive surgery/ use emef
42 (minimal$ adj3 (invasiv$ or access$)).tw.
43 laparoscop$.tw.
44 (key hole or keyhole).tw.
45 hand assist$.tw.
46 robotic$.tw.
47 robotics/
48 or/38-47
49 37 and 48
50 limit 49 to yr=2000-2005
51 exp "costs and cost analysis"/
52 economics/
53 exp economics,hospital/
54 exp economics,medical/
55 economics,pharmaceutical/
56 exp budgets/
57 exp models, economic/
58 exp decision theory/
59 ec.fs.
60 monte carlo method/
61 markov chains/
62 exp quality of life/
63 "Value of Life"/
64 cost of illness/
65 exp health status indicators/
66 cost$.ti.
67 (cost$ adj2 (effective$ or utilit$ or benefit$ or minimis$)).ab.
68 economics model$.tw.
69 (economics$ or pharmacoeconomic$ or pharmo-economic$).ti.
70 (price$ or pricing$).tw.
71 (financial or finance or finances or financed).tw.
72 (value adj2 (money or monetary)).tw.
73 quality adjusted life.tw.
74 disability adjusted life.tw.
75 (qaly? or qald? or qale? or qtime? or daly?).tw.
76 (euroqol or euro qol or eq5d or eq 5d).tw.
77 (hql or hqol or h qol or hrqol or hr qol).tw.
78 (hye or hyes).tw.
79 (health adj3 (indicator? or status or utilit?)).tw.
80 markov$.tw.
81 monte carlo.tw. (
82 (decision$ adj2 (tree? or analy$ or model$)).tw.
83 or/51-82
84 50 and 83
85 remove duplicates from 84

Science Citation Index (2000 - 27th May 2005)
Web of Knowledge URL: http://wok.mimas.ac.uk/

#1 TS=(colectom* OR hemicolect* OR colotom*)
#2 TS=(mesorect* SAME excision*)
#3 TS=((colon OR colorectal) SAME resect*)
#4 #1 OR #2 OR #3
#5 TS=(cancer SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#6 TS=(carcinoma SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#7 TS=(neoplas* SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#8 TS=(adenocarcinoma* SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#9 TS=(malignan* SAME (colorectal OR colon* OR rectal OR rectum OR intestin* OR bowel))
#10 #5 OR #6 OR #7 OR #8 OR #9
#11 TS=laparoscop*
#12 TS=(minimal* SAME (invasiv* OR access*))
#13 TS=(key hole OR keyhole)
#14 TS=hand assist*
#15 TS=robotic*
#16 #12 OR #13 OR #14 OR #15 OR #16
#17 (#4 OR #10) AND #16
#18 TS=economic*
#19 TS=cost*
#20 TS=(price* OR pricing*)
#21 TS=(financial or finance*)
#22 TS=(decision* SAME (tree* OR analy* or model*))
#23 TS=markov*
#24 TS=monte carlo
#25 TS=(health SAME (indicator* or status or utilit*))
#26 TS=quality of life
#27 TS=quality adjusted life
#28 TS=disability adjusted life
#29 TS=(qaly* or qald* or qale* or qtime* or daly*)
#30 TS=(euroqol* or euro qol* or eq5d or eq 5d)
#31 TS=(hql or hqol or h qol or hrqol or hr qol)
#32 TS=(hye or hyes)
#33 #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32
#34 #17 AND #30

NHS EED (May 2005)
URL: http://www.york.ac.uk/inst/crd/nhsdhp.htm

Colorectal-neoplasms (exploded)
and
laparoscop or surgery or surgical

GENERAL SEARCHES

Search strategies used to identify reports of clinical or cost effectiveness of laparoscopic surgery for colorectal cancer.

HMIC 2000-May 2005
URL: http://gateway.ovid.com/

1 (colectom$ or hemicolect$ or colotom$).tw.
2 (mesorect$ adj3 excision$).tw.
3 ((colon$ or colrect$) adj3 resect$).tw.
4 1 or 2 or 3
5 (cancer adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
6 (carcinoma adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
7 (neoplas$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
8 (adenocarcinoma adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
9 (malignan$ adj3 (colorectal or colon$ or rectal or rectum or intestin$ or bowel)).tw.
10 or/5-9
11 (surgery or surgical or surgeon$).tw.
12 resect$.tw.
13 operat$.tw.
14 surgery/
15 or/11-14
16 4 or (10 and 15)
17 limit 16 to yr=2000 - 2005

DARE and HTA Databases (May 2005)
NHS Centre for Reviews & Dissemination
URL: http://nhscrd.york.ac.uk/welcome.htm

Colorectal-neoplasms (exploded)
and
laparoscop or surgery or surgical

Conference Proceedings Abstracts screened:

Association of Coloproctology of Great Britain & Ireland:
Annual meeting, Manchester, July 2002
Annual meeting, Edinburgh, July 2003
Annual meeting, Birmingham, June 2004

European Association of Coloproctology:
Scientific Annual Meeting, Barcelona, September 2003
Scientific Annual Meeting, Geneva, September 2004

Society of American Gastrointestinal & Endoscopic Surgeons:
8th World Congress, New York, March 2002
9th World Congress, Los Angeles, March 2003
10th World Congress, Colorado, March 2004
11th World Congress, Fort Lauderdale, April 2005

European Association for Endoscopic Surgery:
10th International Congress, Lisbon, June 2002
12th International Congress, Barcelona, June 2004
13th International Congress, Venice, June 2005

Association of Endoscopic Surgeons of Great Britain and Ireland (AESGBI):
Annual Meeting, Dublin, April 2002

American Society of Colon & Rectal Surgeons:
Annual Meeting, Chicago, April 2002
Annual Meeting, New Orleans, April 2003
Annual Meeting, Dallas, April 2004
Annual Meeting, Philadelphia, April 2005

Websites searched for other evidence-based reports and background information:

American Society for Colon & Rectal Surgeons
URL: http://www.fascrs.org/index.cfm [accessed July 2005]

Association of Coloproctology of Great Britain & Ireland
URL: www.acpgbi.org.uk/ [accessed June 2005]

Cancer Research UK
URL: http://www.cancerresearchuk.org/[accessed July 2005]

NHS Health & Social Care Cancer Information Services

URL: http://www.icservices.nhs.uk/cancer/pages/dataset/ [accessed July 2005]

Society of American Gastrointestinal & Endoscopic Surgeons
URL: http://www.sages.org/index.html [accessed July 2005]

Trip database.
URL: http://www.tripdatabase.com/ [accessed May 2005]

APPENDIX 2. STUDY ELIGIBILITY FORM

Efficacy and cost-effectiveness of laparoscopic surgery for colorectal cancer

Study eligibility form

Paper number: _____ Assessor initials: _____ Date assessed: _____

Study identifier

(surname of first author + year of publication)

Type of study

Q1. Is the study a systematic review or meta-analysis of randomized controlled trials, a randomised controlled trial, or a cohort study or UK registry with a minimum of three years follow-up?

Yes ⇩ Go to Next question | Unclear ⇩ Go to Next question | No ⇩ **Exclude**

(If Yes, please indicate which type of study design)

Participants in the study

Q2. Are some or all of the participants in the study adults with colorectal cancer?

Yes ⇩ Go to Next question | Unclear ⇩ Go to Next question | No ⇩ **Exclude**

Interventions in the study

Q3. Did some or all of the participants receive open surgical procedure, laparoscopic, laparoscopic-assisted or hand-assisted laparoscopic surgery?

Yes ⇩ Go to Next question | Unclear ⇩ Go to Next question | No ⇩ **Exclude**

Outcomes in the study

Q4. Does the study report short-term and/or long-term outcome data on the patients that underwent the intervention (s)?

Yes ⇩ **Include**, subject to clarification of 'unclear' points | Unclear ⇩ | No ⇩ **Exclude**

Final decision

Include **Unclear** **Exclude**

APPENDIX 3. DATA EXTRACTION FORM

Laparoscopic and hand-assisted laparoscopic versus Open surgery for the treatment of colorectal cancer

Reviewer ID: ☐

Study	
Study ID: **Country:** **Funding:** government / private / manufacturer / other (specify)	☐ **RCT** ☐ **Quasi-RCT** ☐ **Cohort study** ☐ **Unclear**

Participants
Recruitment dates: _____ Number of eligible patients: _____ Number of patients randomised: _____
Criteria for Inclusion:
Criteria for Exclusion:

Intervention		
	Surgical technique	**No of Patients**
Intervention 1		
Intervention 2		
Intervention 3		
Comments: **(i.e. operator information, adjuvant therapy, length of incision)**		

Patient Characteristics				
Specify	**Intervention 1**	**Intervention 2**	**Intervention 3**	**Overall**
Age (years)[a]				
Sex (M/F)				
Body Weight (kg)[a]				
Follow-up period: _____ Number of patients lost to follow-up: _____ _____				
***Comments*:**				

Location of cancer				
Specify	**Intervention 1**	**Intervention 2**	**Intervention 3**	**Overall**
Total (№) **Colon (№)** • **Caecum** • **Ascending colon** • **Hepatic flexure** • **Transverse colon** • **Splenic flexure** • **Descending colon** • **Sigmoid colon** • **Rectosigmoid junction** **Rectum (№)**				

Stage of cancer				
Specify	**Intervention 1**	**Intervention 2**	**Intervention 3**	**Overall**
TNM or Dukes stage (No) ***(Specify)***				
Comments:				

Short-term Outcomes			
Intra-operative	**Intervention 1**	**Intervention 2**	**Intervention 3**
Duration of operation (min)			
Blood Loss			
Anastomotic leakage			
Abdominal wound breakdown			
Lymph node retrieval			
Number of ports used for laparoscopic resection			
Opposite method initiated			
Completeness of resection/ margins of tumours clearance			
Conversion			
Post-operative			
Seroma			
Infection • Specify			
Port site hernia			
Vascular injury			
Visceral injury			
30 day mortality			
Length of hospital stay			
Post-operative pain • Specify			
Time to return to usual activities (days)			
Other			

Long-term Outcomes	Intervention 1	Intervention 2	Intervention 3
Survival (years)			
Disease-free survival (years)			
Health related quality of life			
Tumour recurrence type • Port site metastasis • Wound metastasis			
Time to recurrence (months)			
Incidence of incisional hernia			
Long term pain			
Other			

Additional information / Other comments

Contact with Author

Date: ……/……/…….. **Signature: ……**

APPENDIX 4. QUALITY ASSESSMENT FORM – SYSTEMATIC REVIEWS

(Laparoscopic vs. open surgery for colorectal cancer)

(Oxman, 1994)[43,44]

Reviewer ID: **Date:**

Question	Yes	No	Partially	Unknown
1. Were the search methods used to find evidence (primary studies) on the primary question(s) stated?				
2. Was the search for evidence reasonable comprehensive?				
3. Were the criteria used for deciding which studies to include in the review reported?				
4. Was bias in the selection of articles avoided?				
5. Were the criteria used for assessing the validity of the studies that were reviewed reported?				
6. Was the validity of all of the studies referred to in the text assessed using appropriate criteria (either in selecting studies for inclusion or in analysing the studies that are cited)?				
7. Were the methods used to combine the findings of the relevant studies (to reach a conclusion) reported?				
8. Were the findings of the relevant studies combined appropriately relative to the primary question the review address?				
9. Were the conclusions made by the author(s) supported by the data and/or the analysis reported in the review?				

APPENDIX 5. QUALITY ASSESSMENT FORM – RCTS

(Laparoscopic vs open surgery for colorectal cancer)

(Verhagen et al 1998)[45]

Reviewer ID: **Date:**

Question	Yes	No	Unclear
1. Was a method of randomisation performed? **Adequate approaches to sequence generation** • Computer-generated random tables • random number tables **Inadequate approaches to sequence generation** • Use of alternation, case record numbers, birth dates or week days			
2. Was the treatment allocation concealed? **Adequate approaches to concealment of randomisation** • centralised or pharmacy-controlled randomisation • serially-numbered identical containers • on-site computer based system with a randomisation sequence that is not readable until allocation • other approaches with robust methods to prevent foreknowledge of the allocation sequence to clinicians and patients **Inadequate approaches to concealment of randomisaton** • Use of alternation, case record numbers, birth dates or week days • open random number lists • serially numbered envelopes			
3. Were the groups similar at baseline regarding the most important prognostic indicators?			
4. Were the eligibility criteria specified?			
5. Was the outcome assessor blinded?			
6. Was the care provider blinded?			
7. Was the patient blinded?			
8. Were point estimates and measures of variability presented for the primary outcome measures?			
9. Did the analysis include an intention-to-treat analysis?			

APPENDIX 6. LIST OF INCLUDED STUDIES

Araujo 2003

Primary Reference

Araujo SE, da Silva eSousa AH Jr, de Campos FG, Habr-Gama A, Dumarco RB, Caravatto PP et al. Conventional approach x laparoscopic abdominoperineal resection for rectal cancer treatment after neoadjuvant chemoradiation: results of a prospective randomized trial. Rev Hosp Clin Fac Med Sao Paulo 2003;58(3):133-40.

Bonjer (unpublished)

Primary Reference

The Trans Atlantic Laparoscopically-Assisted versus Open Colectomy Trials Study Group. Laparoscopically assisted versus open colectomy for colon cancer – a meta-analysis.

COLOR 2005

Primary Reference

Veldkamp R, Kuhry E, Hop WC, Jeekel J, Kazemier G, Bonjer HJ et al. Laparoscopic surgery versus open surgery for colon cancer: short-term outcomes of a randomised trial. Lancet Oncol 2005;6(7):477-84.

Related References

Janson M, Bjorholt I, Carlsson P, Haglind E, Henriksson M, Lindholm E et al. Randomized clinical trial of the costs of open and laparoscopic surgery for colonic cancer. Br J Surg 2004;91(4):409-17.

Wu FP. Systenic and peritoneal inflammatory response after laparoscopic or conventional colon resection in cancer patients. Dis Colon Rectum 2003;46(2):147-55.

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APPENDIX 7. DETAILED QUALITY ASSESSMENT SCORE FOR EACH OF THE INCLUDED STUDIES

Randomised controlled trials

Study id	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Araujo 2003	Y	U	Y	Y	U	N	U	N	U
CLASICC 2005	Y	Y	Y	Y	U	N	U	Y	Y
COLOR 2005	Y	Y	Y	Y	N	N	N	Y*	Y
COST 2004	Y	Y	Y	Y	Y	N	U	Y*	Y
Curet 2000	Y	N	Y	Y	U	N	U	Y**	N
Hasegawa 2003	Y	U	Y	Y	U	N	U	Y**	N
Hewitt 1998	Y	U	N	Y	U	N	U	Y*	N
Kaiser 2004	Y	U	N	Y	U	N	U	Y**	N
Kim 1998	Y	N	N	Y	U	N	U	Y*	U
King 2005	Y	Y	Y	Y	U	N	U	Y	Y
Lacy 2002	Y	N	Y	Y	U	N	U	Y	U
Leung 2004	Y	Y	Y	Y	U	N	U	Y	N
Milsom 1998	Y	U	Y	Y	N	N	N	Y*	N
Neudecker 2003	Y	Y	Y	Y	U	N	N	Y*	U
Schwenk 1998a	Y	U	Y	Y	U	N	U	Y	Y
Stage 1997	Y	U	N	Y	U	N	U	Y*	N
Tang 2001	Y	N	Y	Y	U	N	U	Y*	Y
Vignali 2004	Y	N	N	Y	U	N	U	Y	Y
Zhou 2004	U	U	Y	Y	U	N	U	Y	U

Y Yes
N No
U Unclear
*median (range)
**mean (range)

Systematic reviews and meta-analyses

Study id	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Bonjer 2005	N	U	N	N	N	U	Y	Y	Y

Y Yes
N No
U Unclear

APPENDIX 8. CHARACTERISTICS OF INCLUDED STUDIES

a) Randomised controlled trials published from 2000 onwards

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Araujo 2003[47] **Study design:** RCT **Location:** Brazil **Mean Follow-up:** 47.2 months **Recruitment dates:** September 1997 to September 2000 **Funding:** not reported	**Inclusion criteria:** distal rectal adenocarcinoma with pre-operative staging favourable to radical resection by abdominoperineal resection. **Number of eligible patients:** 28 **Number of patients randomised:** 28	Laparoscopic (n=13) versus Open (n=15) **Additional information:** 4 trocars were used; all patients underwent chemoradiation before surgery.	**Mean age (range) yrs:** 59.1 (31 to 75) **Gender (M/F):** 9/4 **Mean BMI (range):** 23.5 (21.7 to 24.6) **Location of cancer:** Rectum **Stage of cancer (Aster-Coller):** A: 4 B_1: 1 B_2: 5 C_1: 2 C_2: 1 D: 0	**Mean age (range) yrs:** 56.4 (24 to 78) **Gender (M/F):** 10/5 **Mean BMI (range):** 25.6 (17.1 to 38.5) **Location of cancer:** Rectum **Stage of cancer (Aster-Coller):** A: 1 B_1: 5 B_2: 3 C_1: 2 C_2: 3 D: 0	Duration of operation Lymph node retrieval Conversion Abdominal wound breakdown Length of hospital stay Recurrence

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
CLASICC 2005[3] **Study design:** RCT **Location:** UK **Recruitment dates:** July 1996 to July 2002 **Follow-up range:** 1 to 3 months **Funding:** UK Medical Research Council	**Inclusion criteria:** patients suitable for hemicolectomy, left hemicolectomy, sigmoid colectomy, anterior resection, or abdominoperineal resection. **Exclusion criteria:** adenocarcinoma of the colon, contraindications to pneumoperitoneum (chronic cardiac or pulmonary disease), acute intestinal obstruction, malignant disease in the past 5 years, synchronous adenocarcinoma, pregnancy and associated gastrointestinal disease needing surgical intervention. **Number of eligible patients:** 794 **Number of patients randomised:** 794	Laparoscopic-assisted (n=526) versus Open (n=268) **Additional information:** the trial design required that every surgeon had undertaken at least 20 lap-assisted resections.	**Mean age (SD) yrs:** 69 (11) **Gender (M/F):** 296/230 **Mean BMI (SD):** 25 (4) **Location of cancer:** Colon: 273 Rectum: 253 **Stage of cancer** (TNM): T stage: T0: 4 T1: 26 T2: 68 T3: 261 T4: 70 N stage: N0: 244 N1: 107 N2: 72 M stage: M0: 167 M1: 12	**Mean age (SD) yrs:** 69 (12) **Gender (M/F):** 145/123 **Mean BMI (SD):** 26 (4) **Location of cancer:** Colon: 140 Rectum: 128 **Stage of cancer** (TNM): T stage: T0: 1 T1: 12 T2: 35 T3: 136 T4: 33 N stage: N0: 129 N1: 52 N2: 38 M stage: M0: 91 M1: 7	Anastomotic leakage Lymph node retrieval Completeness of resection/margins of tumour clearance Conversions Wound infection 30 day mortality Quality of life Post-operative pain

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
COLOR 2005[4] **Study design:** RCT **Location:** Europe **Recruitment dates:** March 1997 to March 2003 **Follow-up:** not reported **Funding:** Ethicon Endo-Surgery (Hamburg, Germany) *Linked reports:* Wu, 2003[84]. 2004[85] Janson, 2004[66]	**Inclusion criteria:** patients with adenocarcinoma localised in the caecum, ascending colon, descending colon, or sigmoid colon above the peritoneal deflection who were age 18 years or older and who gave written informed consent. **Exclusion criteria:** BMI>30kg/m^2; adenocarcinoma of the transverse colon or splenic flexure; metastases in the liver or lungs; acute intestinal obstruction, multiple primary tumours of the colon; scheduled need for synchronous intra abdominal surgery; preoperative evidence of invasion of adjacent structures, as assessed by CT, MRI, or ultrasonography; previous epsilateral colon surgery; previous malignant disease (except those who had had curative treatment for basocellular carcinoma of the skin or in-situ carcinoma of the cervix); absolute contraindications to general anaesthesia; and a long-term pneumoperitoneum. After randomisation patients were excluded if metastasis was detected during surgery, microscopic examination of the resected sample showed no signs of malignant disease, other malignant disease was discovered before or during surgery, patients needing emergency surgery, or if patients withdrew consent. **Number of eligible patients:** 1248 **Number of patients randomised:** 1248	Laparoscopic (n=627; 536 analysed) versus Open (n=621; 546 analysed) 153 patients were excluded post-randomisation, 13 had missing data. **Additional information:** for laparoscopy, all surgical teams had done at least 20 laparoscopic assisted colectomies. All open surgeries were done by surgical teams who had at least one staff member with credentials in colon surgery.	**Median age (range) yrs:** 71 (27 to 92) **Gender (M/F):** 326/301 **Median BMI (range):** 24.5 (12.1 to 37.1) **Location of cancer:** Right colon: 259 Left colon: 57 Sigmoid colon: 199 Other: 21 **Stage of cancer** (TNM): I: 129 II: 218 III: 181 Data was missing for some patients	**Median age (range) yrs:** 71 (31 to 95) **Gender (M/F):** 336/285 **Median BMI (range):** 24.9 (14.5 to 40.5) **Location of cancer:** Right colon: 253 Left colon: 56 Sigmoid colon: 212 Other: 25 **Stage of cancer** (TNM): I: 125 II: 239 III: 175 Data was missing for some patients	Duration of operation Blood loss Abdominal wound breakdown Lymph node retrieval Conversion Wound infection Urinary tract infection Length of hospital stay

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
COST 2004[2] **Study design:** RCT **Location:** USA **Recruitment dates:** August 1994 to August 2001 **Median Follow-up:** 4.4 years **Funding:** National Cancer Institute *Linked reports:* Nelson, 2001[73], 2004[74] Stocchi, 2005[81] Weeks, 2002[82] Winslow, 2002[83] Young-Fadok, 2002[86]	**Inclusion criteria:** clinical diagnosis of adenocarcinoma of the colon (histologic confirmation was required at surgery), an age of at least 18 years, and the absence of prohibitive abdominal adhesions. **Exclusion criteria:** advanced local or metastatic disease, rectal or transverse colon cancer, acute bowel obstruction or perforation from cancer, and severe medical illness. Inflammatory bowel disease, familial polyposis, pregnancy, or concurrent or previous malignant tumour. **Number of eligible patients:** 872 **Number of patients randomised:** 872	Laparoscopic-assisted (n=435) versus Open (n=437; 428 analysed, 9 excluded post-randomisation) **Additional information:** 66 credentialed surgeons at 48 institutions. Each surgeon had performed at least 20 laparoscopically assisted colorectal operations. Length of incisions was 18 cm (3-35) in the open group and 6 cm (2-35) in the lap-assisted group.	**Median age (range) yrs:** 70 (28 to 96) **Gender (M/F):** 223/212 Location of cancer Right colon: 237 Left colon: 32 Sigmoid colon: 166 **Stage of cancer** (TNM): 0: 20 I: 153 II: 136 III: 112 IV: 10 Unknown: 4	**Median age (range) yrs:** 69 (29 to 94) **Gender (M/F):** 208/220 Location of cancer Right colon: 232 Left colon: 32 Sigmoid colon: 164 **Stage of cancer** (TNM): 0: 33 I: 112 II: 146 III: 121 IV: 16 Unknown: 0	Duration of operation Lymph node retrieval Conversion 30 day mortality Length of hospital stay Disease free survival Recurrence Number of ports used for laparoscopic resection Wound infection Incidence of incisional hernia Survival Post-operative pain Quality of life

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Curet 2000[48] **Study design:** RCT **Location:** USA **Recruitment dates:** January 1993 to November 1995 **Follow-up range:** 2.5 to 63 months (mean: 4.9 years) **Funding:** not reported	**Inclusion criteria:** patients with colon cancer. **Exclusion criteria:** individuals undergoing colostomy placement alone or its removal, patients age < 18 years, concurrent pregnancy, complete colon obstruction resulting in significant proximal distention and the presence of malignant fistulization or fixation in adjacent tissues. **Number of eligible patients:** 43 **Number of patients randomised:** 43	Laparoscopic-assisted (n=25) versus Open (n=18) **Additional information:** all surgery was performed either by attending surgeons or residents under direct supervision. All attending surgeons had performed multiple laparoscopically assisted colectomies for benign disease and palliatation before participation in this study. A total of 4 and 5 laparoscopic trocars were used	**Mean age (range) yrs:** 65.6 (45 to 83); converted: 66.3 (51 to 76) **Gender (M/F):** 11/7; converted: 4/3 Location of cancer (conversion): Right colon: 6 (4) Left colon: 1 (1) Sigmoid colon: 7 (1) Low anterior resection: 4 (1) **Stage of cancer** (Dukes): (Conversion) A: 1 (0) B: 10 (2) C: 7 (3) D: 0 (2)	**Mean age (range) yrs:** 69.2 (49 to 82) **Gender (M/F):** 14/4 **Location of cancer:** Right colon: 5 Left colon: 5 Sigmoid colon: 3 Low anterior resection: 5 **Stage of cancer** (Dukes): A: 0 B: 2 C: 3 D: 2	Duration of operation Blood loss Lymph node retrieval Conversion Infection Length of hospital stay Recurrence Late mortality
Hasegawa 2003[49] **Study design:** RCT **Location:** Japan **Recruitment dates:** June 1998 to October 2000 **Follow-up:** not reported **Funding:** not reported *Linked reports:* Hasegawa 2001[65]	**Inclusion criteria:** patients with preoperative diagnosis of T_2 or T_3 colorectal cancer (N_0) who underwent curative surgery. **Exclusion criteria:** patients with T_{is} and T_1 tumours. Patients with T_3 tumours in the upper and lower rectum. Patients with T_3 tumours in the transverse colon. **Number of eligible patients:** 97 **Number of patients randomised:** 59	Laparoscopic (n=29; 24 analysed) versus Open (n=30; 26 analysied) **Additional information:** length of incision was 5.9 (3-12) cm in the laparoscopic group as compared to 17.8 (12-23) cm in the open group; 5 port technique in the laparoscopic group and bowel was delivered through a small wound and divided extra corporeally.	**Mean age (range) yrs:** 61 (33 to 75) **Gender (M/F):** 14/10 **Location of cancer:** Caecum: 1 Ascending colon: 7 Descending colon: 1 Sigmoid colon: 13 Rectosigmoid junction: 2 **Stage of cancer** (Dukes): A: 2 B: 14 C: 8 D: 0	**Mean age (range) yrs:** 61 (37 to 78) **Gender (M/F):** 18/8 **Location of cancer:** Caecum: 8 Ascending colon: 4 Descending colon: 0 Sigmoid colon: 12 Rectosigmoid junction: 2 **Stage of cancer** (Dukes): A: 1 B: 16 C: 9 D: 0	Duration of operation Blood loss Anastomotic leakage Lymph node retrieval Conversion Wound infection Length of hospital stay Recurrence

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Kaiser 2004[51] **Study design:** RCT **Location:** USA **Recruitment dates:** January 1995 to February 2001 **Follow-up range:** 3 to 69 months (median: 35 months) **Funding:** not reported	**Inclusion criteria:** patients diagnosed with colon cancer and scheduled for an elective colon resection, elective surgery in curative intent, primary right, left or sigmoid colon adenocarcinoma, age >18 years, ability to participate in follow-up evaluation, American Society of Anaesthesiology class I to III. **Exclusion criteria:** emergency or urgent surgery (acutely obstructed or perforated colon cacer); tumour stage IV; rectal or transverse colon cancer; known prohibitive adhensions from previous abdominal surgery; ASA class IV, V; associated gastrointestinal disease (Crohn's disease, chronic ulcerative colitis, FAP); pregnancy. **Number of eligible patients:** 49 **Number of patients randomised:** 49	Laparoscopic-assisted (n=28; 13 were converted) versus Open (n=20) **Additional information:** surgical teams headed by two surgeons who had previously demonstrated experience in laparoscopic-assisted colon surgery for either benign or malignant disease before participation in this study.	**Mean age (range) yrs:** 59.0 (4 to 83); converted: 60.5 (48 to 68) **Gender (M/F):** 7/8; converted: 5/8 **Location of cancer; conversion:** Caecum: 3; 3 Ascending colon: 6; 4 Sigmoid colon: 6; 6 **Stage of Cancer; conversion:** I: 2; 2 II: 10; 5 III: 3; 2 IV: 0; 4	**Mean age (range) yrs:** 60.5 (42 to 80) **Gender (M/F):** 9/11 **Location of cancer**: Caecum: 6 Ascending colon: 6 Sigmoid colon: 8 **Stage of Cancer**: I: 7 II: 3 III: 10 IV: 0 **Additional information**: Patients in this group had significantly more advanced disease than the intervention group.	Duration of operation Blood loss Lymph node retrieval Conversion Infection Length of hospital stay Recurrence Survival

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
King 2005[40] **Study design:** RCT **Location:** UK **Recruitment dates:** January 2002 to March 2004 **Follow-up:** not reported **Funding:** NHS Developments in the Organisation of Care Project Grant	**Inclusion criteria:** patients diagnosed with adenocarcinoma of the colon or rectum. Patients with transverse colon carcinomas and those who had had another cancer within the preceding 5 years. **Exclusion criteria:** any non-elective admission, those with pre-operative evidence of haematogenous metastases, patients less than 18 years old, those who were pregnant and patients who did not consent to randomisation. Patients not able to have epidural anaesthetic. **Number of eligible patients:** 94 **Number of patients randomised:** 62	Laparoscopic-assisted (n = 43; 41 analysed) versus Open (n = 19) **Additional information:** Laparoscopic-assisted and open surgeries are both embedded in an enhanced recovery program	**Mean age (SD) yrs:** 72.3 (11) **Gender (M/F):** 23/18 **Body weight (SD) (kg):** 26.1 (3.8) **Location of cancer:** Colon: 27 Rectum: 14 **Stage of cancer** (Dukes): A: 9 B: 19 C_1: 11 C_2: 2	**Mean age (SD) yrs:** 70.4 (10.5) **Gender (M/F):** 8/11 **Body weight (SD) (kg):** 27.2 (4.6) **Location of cancer:** Colon: 14 Rectum: 5 **Stage of cancer** (Dukes): A: 1 B: 11 C_1: 6 C_2: 1	Duration of operation Blood loss Abdominal wound breakdown Anastomotic leakage Conversion Wound infection Length of hospital stay Quality of life

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Lacy 2002[22] **Study design:** RCT **Location:** Spain **Recruitment dates:** November 1993 to July 1998 **Follow-up range:** 27 to 85 months (median: 43 months) **Funding:** Fonde de Investigaciones Sanitarias, Ministerio de Ciencia y Tecnologia, and Agencia d'Avaluacio de Tecnologia Medica of the Generalitat de Catalunya. *Linked reports:* Delgado, 2000[63], 2001[64] Lacy, 1995[68], 1998[69], 2001[67], 2002[70]	**Inclusion criteria:** adenocarcinoma of the colon, 15 cm above the anal verge. **Exclusion criteria:** cancer located at the transverse colon, distant metastasis, adjacent organ invasion, intestinal obstruction, past colonic surgery, and no consent to participate in the study. **Number of eligible patients:** 442 **Number of patients randomised:** 219	Laparoscopic-assisted (n = 111) versus Open (n = 108) **Additional information:** both laparoscopic-assisted and open colectomies were done by a single gastrointestinal surgical team with wide experience in laparoscopic procedures. After surgery, 68 (61%) of the laparoscopic assisted group received adjuvant chemotherapy according to the established protocol.	**Mean age (SD) yrs:** 68 (12) **Gender (M/F):** 56/55 **Location of cancer:** Caecum: 32 Ascending colon: 7 Hepatic flexure: 10 Descending colon: 8 Sigmoid colon: 54 **Stage of cancer** (TNM): I: 27 II: 42 II: 37 IV: 5	**Mean age (SD) yrs:** 71 (11) **Gender (M/F):** 50/58 **Location of cancer:** Caecum: 21 Ascending colon: 17 Hepatic flexure: 11 Descending colon: 11 Sigmoid colon: 48 **Stage of cancer** (TNM): I: 18 II: 48 III: 36 IV: 6	Duration of operation Blood loss Anastomotic leakage Infection Length of hospital stay Recurrence Port site metastasis Time to recurrence Survival Disease-free survival Opposite method initiated

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Leung 2004[53] **Study design:** RCT **Location:** Hong Kong **Recruitment dates:** September 1993 to October, 2002 **Follow-up:** Median (IQR): Laparoscopic group 52.7 (38.9) months Open group 49.2 (35.4) months **Funding:** not reported *Linked reports:* Leung, 2000[71], 2003[72]	**Inclusion criteria:** patients diagnosed to have rectosigmoid carcinoma seen in Prince of Wales hospital, Hong Kong. From July 1995 onwards, patients from United Christian Hospital, Hong Kong were included. **Exclusion criteria:** patients with distal tumour requiring anastomosis within 5 cm of the dentate line, patients with tumours larger than 6 cm or with tumour infiltration to the adjacent organs on sonography or CT, patients with previous abdominal operations near the field of the colorectal operation, patients who did not give consent to the procedure, and patients with intestinal obstruction or perforation. **Number of eligible patients:** 825 **Number of patients randomised:** 403	Laparoscopic (n = 203) versus Open (n = 200) **Additional information:** The operations were performed by surgeons experienced in both laparoscopic and colorectal surgery.	**Mean age (SD) yrs:** 67.1 (11.7) **Gender (M/F):** 104/99 **Location of cancer:** Rectosigmoid junction **Stage of cancer** (TNM): I: 31 II: 72 III: 64 IV: 36	**Mean age (SD) yrs:** 66.5 (12.3) **Gender (M/F):** 114/86 **Location of cancer:** Rectosigmoid junction **Stage of cancer** (TNM): I: 28 II: 73 III: 69 IV: 30	Duration of operation Blood loss Anastomotic leakage Lymph node retrieval Completeness of resection/ margins of tumour clearance Conversion Wound infection Urinary tract infection 30 day mortality Post-operative pain Survival Disease-free survival Recurrence
Neudecker 2003[55] **Study design:** RCT **Location:** Germany **Recruitment dates:** April 1999 to August 2000 **Follow-up:** not reported **Funding:** Deutsche Forschunsgemeinschaft *Linked reports:* Neudecker, 2002[75]	**Inclusion criteria:** patients scheduled to elective colorectal cancer resection. Only sigmoidectomies, anterior rectal resections, and right hemicolectomies. **Exclusion criteria:** emergency surgery, operative risk greater ASA class III; coagulopathy, trombopathy, or history of thromboembolic complications; tumour size >8cm in preoperative CT scan, BMI > 30kg/m^2; intraabdominal abcess or sepsis **Number of eligible patients:** 30 **Number of patients randomised:** 30	Laparoscopic (n = 14) versus Open (n = 16)	**Median age (range) yrs:** 62 (46-76) **Gender (M/F):** 7/7 **BMI (Kg/m^2) (range):** 25.7 (21.3-28.5) **Location of cancer:** Right colon: 3 Sigmoid colon: 11	**Median age (range) yrs:** 64 (52-82) **Gender (M/F):** 10/6 **BMI (Kg/m^2) (range):** 26.2 (22.7-29.6) **Location of cancer:** Right colon: 4 Sigmoid colon: 12	Duration of operation

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Tang 2001[58] **Study design:** RCT **Location:** Singapore **Recruitment dates:** March 1997 to August 1999 **Follow-up:** not reported **Funding:** National Medical Research Council	**Inclusion criteria:** patients with clinical diagnosis of colorectal cancer based on colonoscopy or barium enema following histological confirmation. At least 18 years old and suitable for elective surgical resection or abdominoperineal resection. **Exclusion criteria:** adenocarcinoma of the transverse colon, any contraindications to pneumoperitoneum, acute intestinal obstruction, any malignancy within the previous 5 years, synchronous multiple adenocarcinomas and pregnancy. **Number of eligible patients:** 236 **Number of patients randomised:** 236	Laparoscopic (n = 118) versus Open (n = 118) **Additional information**: incision length was 9 cm (1-40) for the laparoscopic group and 15 cm (5-40) for the open group	**Median age (range) yrs:** 64 (33-87) **Gender (M/F):** 61/57 **Location of cancer:** Colon **Stage of cancer** (Dukes): A: 9 B: 45 C: 42 D: 14 Histopathological examination not performed in some patients	**Median age (range) yrs:** 62 (31-89) **Gender (M/F):** 70/48 **Location of cancer:** Colon **Stage of cancer** (Dukes): A: 8 B: 50 C: 43 D: 11 Histopathological examination not performed in some patients	Duration of operation Anastomotic leakage Conversion Wound infection Urinary tract infection
Vignali 2004[59] **Study design:** RCT **Location:** Italy **Recruitment dates:** from February 2001 **Funding:** not reported *Linked reports:* Braga, 2002[62]	**Inclusion criteria:** age at least 18 years and suitability for elective surgery. **Exclusion criteria:** cancer infiltrating adjacent organs as assessed by computer tomography or magnetic resonance imaging, cardiovascular dysfunction (New York Heart Association class >3), respiratory dysfunction (arterial P_{O2} < 70mmHg), hepatic dysfunction (Child-Pugh class C), ongoing infection, and plasma neutrophil level less than 2.0 x 10^9/L. **Number of eligible patients:** 384 **Number of patients randomised:** 384	Laparoscopic (n = 190 including 144 with cancer) versus Open (n = 194 including 145 with cancer)	**Location of cancer:** Right colon: 48 Transverse colon: 2 Descending colon: 27 Sigmoid colon: 21 Rectum: 48 **Stage of cancer** (TNM): I: 34 II: 38 III: 57 IV: 15	**Location of cancer:** Right colon: 44 Transverse colon: 2 Descending colon: 25 Sigmoid colon: 23 Rectum: 49 **Stage of cancer** (TNM): I: 32 II: 35 III: 64 IV: 14	Lymph node retrieval

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Zhou 2004[60] **Study design:** RCT **Location:** China **Recruitment dates:** June 2001 to September 2002 **Follow-up range:** 1 to 16 months **Funding:** National Outstanding Youth Foundation of China	**Inclusion criteria:** Patients diagnosed with rectal carcinoma, with the lowest margin of tumour located under the peritoneal reflection and 1.5 cm above the dentate line. Obese patients and those with a history o inferior abdominal surgery, hypertension (blood pressure well controlled), chronic cholecystitis or/and cholecystolithiasis, pediculotorsion of ovarian cysts and multiple primary rectal cancer. **Exclusion criteria:** Patients diagnosed with low rectal cancer of other pathological type (e.g. lymphoma), those with the lowest margin of tumour within 1.5 cm above the dentate line, those in emergency situations (e.g. acute obstruction during enema, haemorrhage, and perforation), those in Dukes stage D with local infiltration affecting adjacent organs, and those unwilling to take part in the study. **Number of eligible patients:** 171 **Number of patients randomised:** 171	Laparoscopic (n = 82) versus Open (n = 89) **Additional information:** all 171 patients underwent total mesorectal excision and anal sphincter preservation. Both laparoscopic and open procedures were performed by 4 colon and rectal surgeons.	**Mean age (range) yrs:** 44 (26 to 85) **Gender (M/F):** 46/36 **Stage of cancer** (Dukes): A: 5 B: 10 C_1: 33 C_2: 30 D: 4	**Mean age (range) yrs:** 45 (30 to 81) **Gender (M/F):** 43/46 **Stage of cancer** (Dukes): A: 6 B: 8 C_1: 35 C_2: 33 D: 7	Duration of operation Blood loss Anastomotic leakage Infection Length of hospital stay Recurrence

b) Randomised controlled trials published before 2000

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Hewitt 1998[50] **Study design:** RCT **Location:** Hong Kong **Recruitment dates:** not reported **Follow-up:** not reported **Funding:** Chinese University of Hong Kong	**Exclusion criteria:** Age older than 80 years; previous abdominal surgery; a rectal tumour less than 10 cm from the anal verge; advanced local disease; evidence of metastatic disease; concurrent debilitating disease or infection; administration of any immune-modulating drugs, blood, or blood products within six months of surgery. **Number of eligible patients:** 25 **Number of patients randomised:** 16	Laparoscopic-assisted (n=8) versus Open (n=8) **Additional information:** all operations were performed by surgeons who have significant experience with both laparoscopic and open techniques.	**Median age (range) yrs:** 54 (40 to 72); **Gender (M/F):** 4/4; **Location of cancer:** Transverse colon: 1 Sigmoid colon: 4 Anterior resection : 3 **Stage of cancer** (Dukes): A: 1 B_1: 1 B_2: 2 C_1: 1 C_2: 3	**Median age (range) yrs:** 70 (38 to 77) **Gender (M/F):** 3/5 **Location of cancer:** Sigmoid colon: 4 Anterior resection: 3 Left hemicolectomy: 1 **Stage of cancer** (Dukes): A: 1 B_1: 2 B_2: 1 C_1: 1 C_2: 3	Duration of operation Length of hospital stay
Kim 1998[52] **Study design:** RCT **Location:** USA **Recruitment dates:** June 1996 to May 1997 **Follow-up range:** 1 to 12 months **Funding:** Minimally Invasive Surgery Center, The Cleveland Clinic Foundation	**Inclusion criteria:** Patients diagnosed with colorectal cancer. **Exclusion criteria:** patients who had a lesion in the lower or middle rectum that requires a sphincter-saving operation or a lesion located at the splenic flexure. If diagnostic laparoscopy revealed a direct invasion of cancer to adjacent organs (*en bloc* resection is not suitable using a laparoscopic technique), distant metastasis, or peritoneal carcinomatosis, the patient was excluded. **Number of eligible patients:** 38 **Number of patients randomised:** 38	Laparoscopic (n=19) versus Open (n=19)	**Median age (range) yrs:** 70 (43 to 84) **Gender (M/F):** 8/11 **Location of cancer:** Right coloectomy: 9 Extended right colectomy: 2 Left colectomy: 0 Proctosigmoidectomy: 8 **Stage of cancer** (TNM): I: 7 II: 3 III: 9	**Median age (range) yrs:** 65 (40 to 81) **Gender (M/F):** 8/10 **Location of cancer:** Right coloectomy: 7 Extended right colectomy: 1 Left colectomy: 1 Proctosigmoidectomy: 9 **Stage of cancer**: I: 9 II: 3 III: 6	Tumour recurrence

Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Milsom 1998[54] **Study design:** RCT **Location:** USA **Recruitment dates:** October 1993 to July 1997 **Follow-up range:** 1.5 to 48 months (median in the laparoscopic group: 1.5 years months; median in the open group: 1.7 years) **Funding:** US Surgical Corporation and the Minimally Invasive Surgery Center of The Cleveland Clinical Foundation	**Inclusion criteria:** curative elective surgery; primary right or sigmoid colon cancer or polyps; upper or lower primary rectal cancers or polyps; American society of anaesthesiology class I-III; aged >18 years. **Exclusion criteria:** emergency or urgent surgery; evidence for dissemination disease or adjacent organ invasion; primary tumour size> 8cm in cancer or polyps; BMI>32kg/m^2. **Number of eligible patients:** 109 **Number of patients randomised:** 109	Laparoscopic (n = 55, including 42 with cancer) versus Open (n = 54, including 38 with cancer) **Additional information:** Incision length in the intervention group was 15 ± 1.5 versus 22 ± 5 cm in the comparator group.	**Median age (range) yrs:** 69 (41-89) **Gender (M/F):** 26/29 **Stage of cancer** (TNM): I: 10 II: 13 II: 16 IV: 3	**Median age (range) yrs:** 69 (44-86) **Gender (M/F):** 36/18 **Stage of cancer** (TNM): I: 9 II: 11 III: 14 IV: 4	Duration of operation Blood loss *Lymph node retrieval *Completeness of resection Conversion Length of hospital stay 30 day mortality *Recurrence (*Cancer patients only)

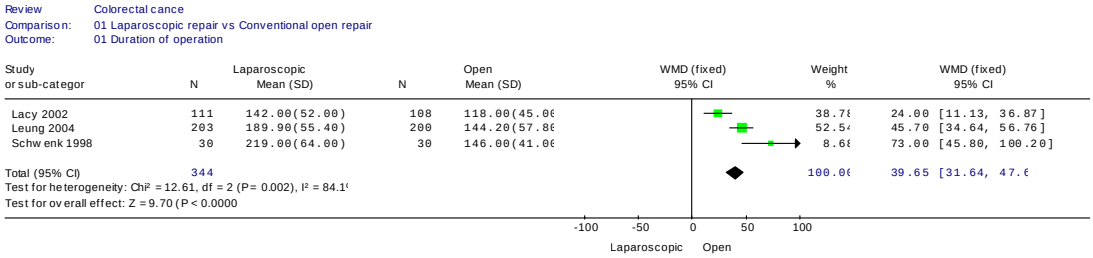
Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Schwenk 1998a[56] **Study design:** RCT **Location:** Germany **Recruitment dates:** May 1995 to November 1996 **Follow-up:** not reported **Funding:** not reported *Linked reports:* Bohm 1999[61] Ordemann 2001[76] Schwenk 1998b[77], 1998c[78], 1999[79], 2000[80]	**Inclusion criteria:** colorectal tumour, elective resection by right colectomy, sigmoid resection, anterior rectum resection or abdominoperineal rectum extirpation. **Exclusion criteria:** rectum carcinoma within 12 cm of the anus, scheduled for sphincter-preserving anterior rectum resection with total mesorectal excision; tumour of the transverse colon or flexures scheduled for extended colectomy; tumour infiltration of adjacent organs; anaesthesia risk >ASA III; scheduled for abdominoperineal rectum extirpation with dynamic gracilis plasty; excessive obesity with a BMI>32 kg/m^2; pronounced peritoneal adhesions from previous interventions; synchronous second tumour in extracolonic location; coagulopathy not responding to treatment; intestinal obstruction; transverse tumour diameter more than 8 cm on CT; immunopathy; pregnancy. **Number of eligible patients:** 60 **Number of patients randomised:** 60	Laparoscopic (n = 30) versus Open (n = 30)	**Mean age ±SD yrs:** 63.3 ± 12.2 **Gender (M/F):** 14/16 **Location of cancer:** Right colectomy: 4 Sigmoid resection: 15 Abdominal peritoneal extirpation: 4 Rectum: 7 **Stage of cancer** (TNM): 0: 1 I: 9 II: 12 III: 6 IV: 2	**Mean age ±SD yrs:** 64.8 ± 14.7 **Gender (M/F):** 16/14 **Location of cancer:** Right colectomy: 3 Sigmoid resection: 17 Abdominal peritoneal extirpation: 3 Rectum: 7 **Stage of cancer** (TNM): 0: 3 I: 8 II: 5 III: 8 IV: 6	Duration of operation Infection Length of hospital stay Post-operative pain Quality of life

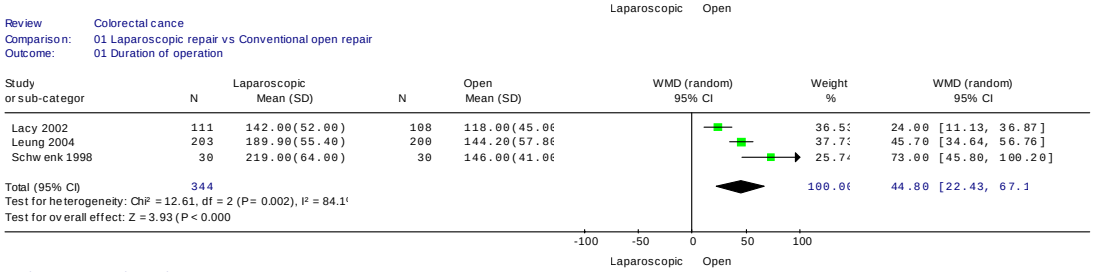
Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Stage 1997[57] **Study design:** RCT **Location:** Denmark **Recruitment dates:** not reported **Follow-up range:** 7 to 19 months (median: 14 months) **Funding:** not reported	**Exclusion criteria:** patients with preoperative signs of extensive local tumour growth, as judged from these investigations, and patients scheduled for low anterior resection and abdominoperineal resection; patients randomised to laparoscopic surgery in whom the operation was converted to open surgery. **Number of eligible patients:** 34 **Number of patients randomised:** 29	Laparoscopic (n = 15) versus Open (n = 14) **Additional information:** incision for tumour removal 3-5cm	**Median age (range) yrs:** 72 (61-93) **Gender (M/F):** 8/7 **Location of cancer:** Right side colon: 7 Left side colon: 2 Sigmoid resection: 6 **Stage of cancer** (Dukes): A: 3 B: 8 C: 2 D: 2	**Median age (range) yrs:** 73 (48-87) **Gender (M/F):** 5/9 **Location of cancer:** Right side colon: 7 Left side colon: 3 Sigmoid resection: 4 **Stage of cancer** (Dukes): A: 4 B: 4 C: 2 D: 4	Duration of operation Conversion Blood loss Lymph node retrieval Number of ports used Completeness of resection Length of hospital stay Post operative pain Recurrence

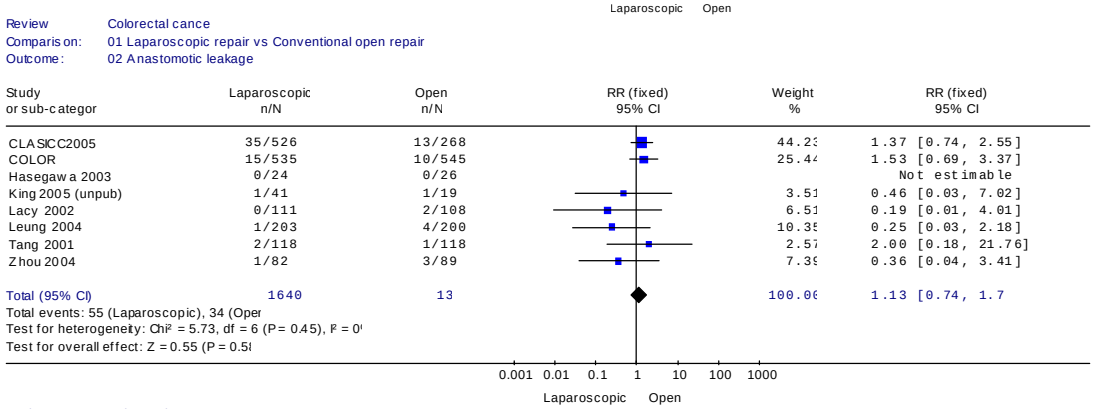
c) Individual patient data meta-analysis

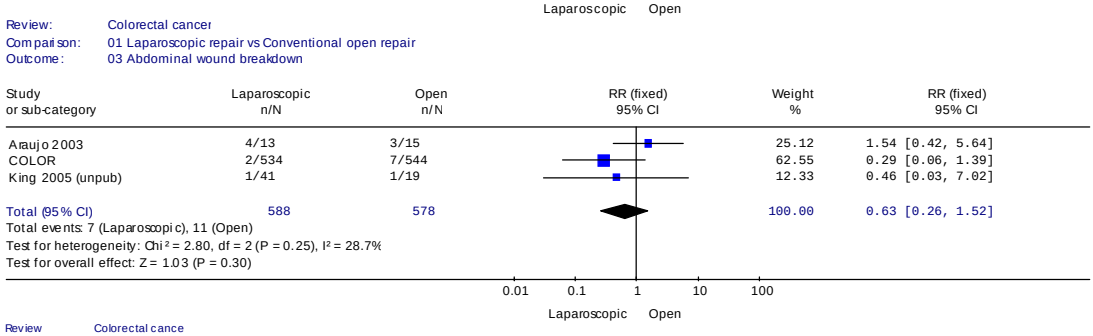
Study details	Participant characteristics	Intervention/comparator	Intervention population characteristics	Comparator population characteristics	Outcomes
Bonjer 2005 (unpublished) **Study design:** Individual patient data meta-analysis **Location:** Multicenter **Recruitment dates:** Before April 2000 **Follow-up:** at least 3 years **Funding:** not reported	**Inclusion criteria:** Randomised clinical trials comparing laparoscopic and open surgery for colonic cancer. Only trials which accrued more than 150 patients with colonic cancer were included: Barcelona, CLASICC, COST and COLOR trials.	Laparoscopic (including laparoscopic assisted) (796) versus open (740) **Additional information:** The different trials contributed to the meta-analysis as follows: COST: 640 patients, COLOR:520 patients, Barcelona: 208 patients, and CLASICC: 168 patients.	**Mean age:** 69 years **Stage of cancer:** I: 28% II: 40% III: 31%	**Mean age:** 69 years **Stage of cancer:** I: 28% II: 40% III: 31%	Conversion Postoperative mortality Disease-free survival Overall survival Recurrence

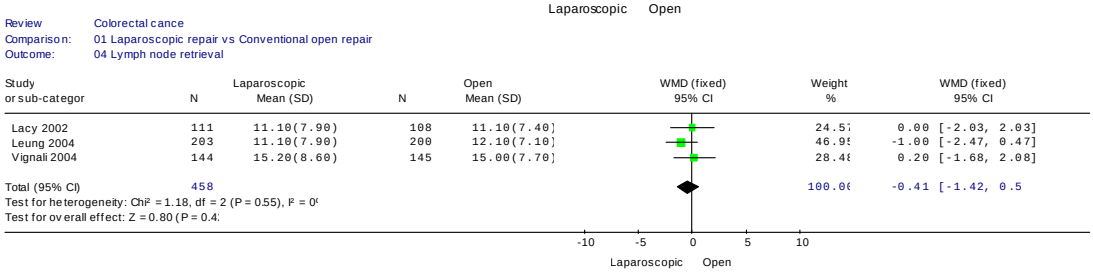
APPENDIX 9. RESULTS OF META-ANALYSIS: LAPAROSCOPIC RESECTION VERSUS CONVENTIONAL OPEN RESECTION



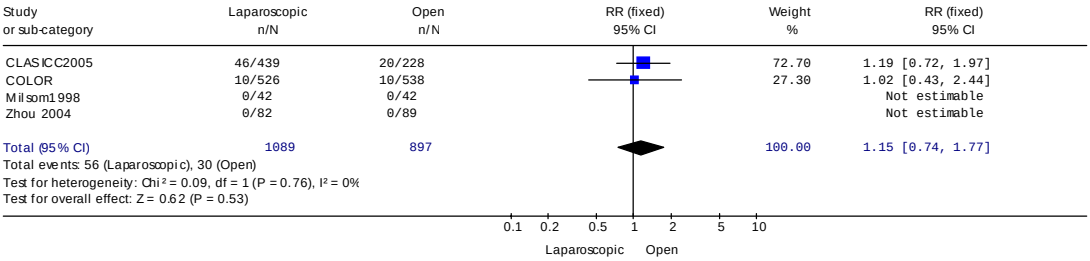




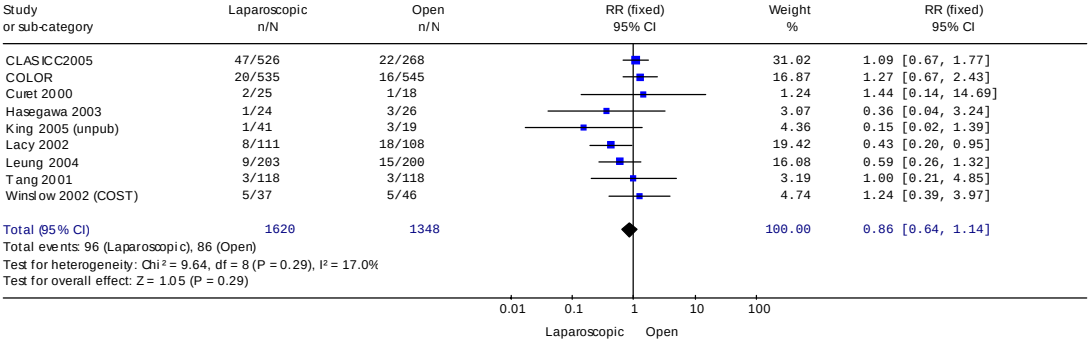




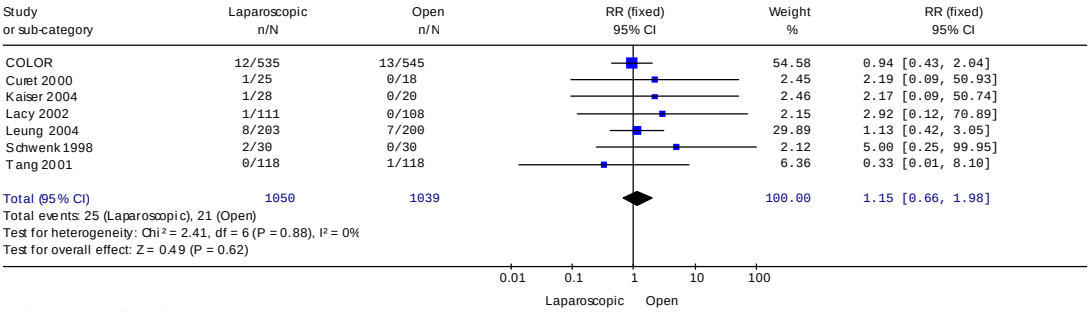
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 05 Completeness of resection - positive resection margins



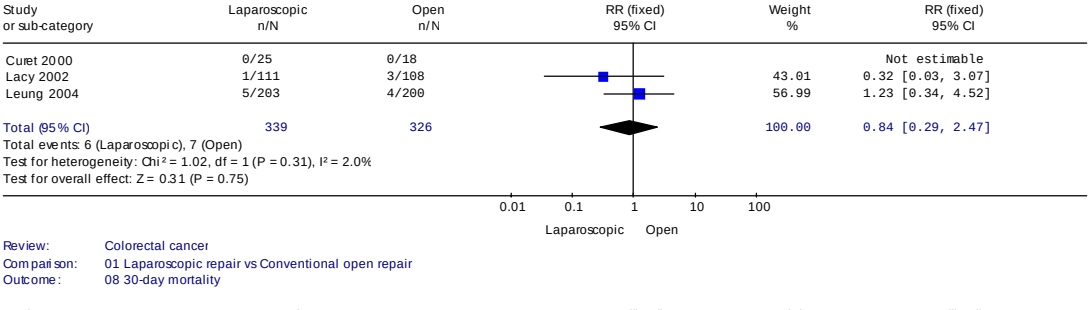
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 06 Wound infection



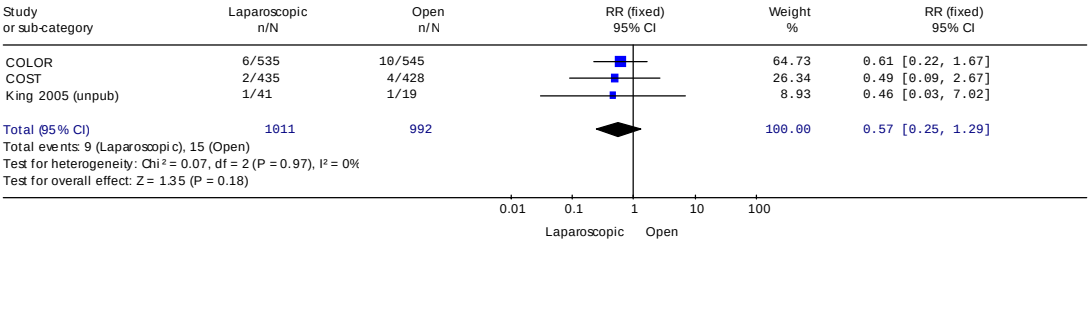
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 07 Urinary tract infections



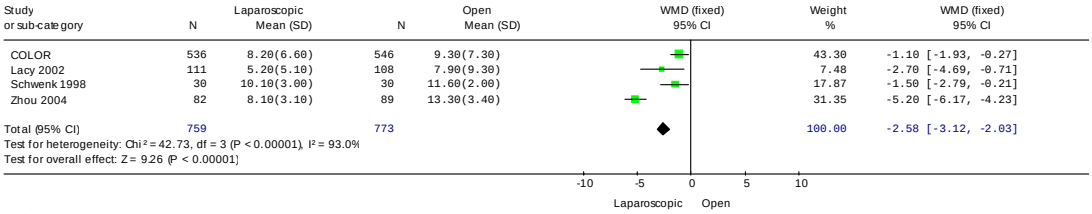
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 08 Operative mortality



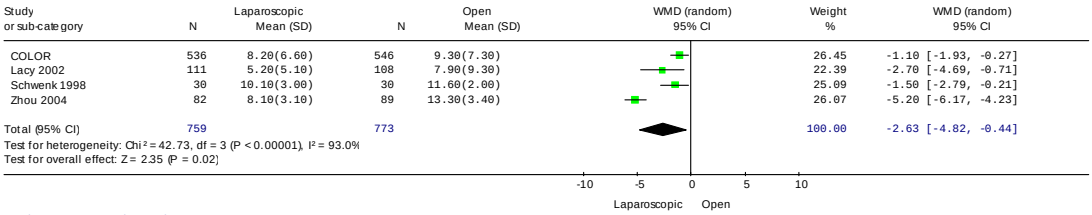
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 08 30-day mortality



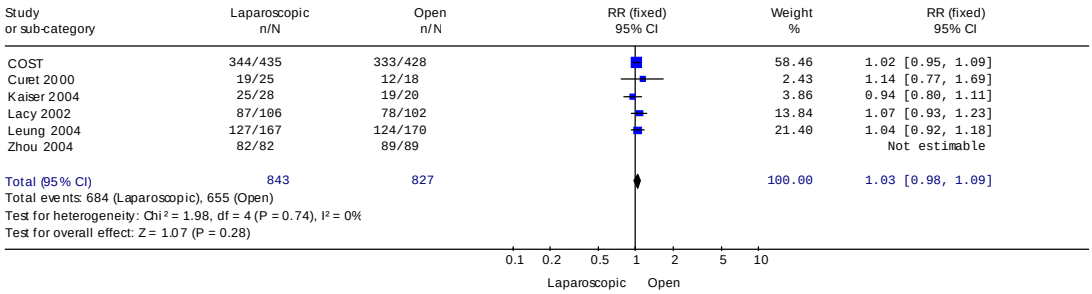
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 09 Length of hospital stay



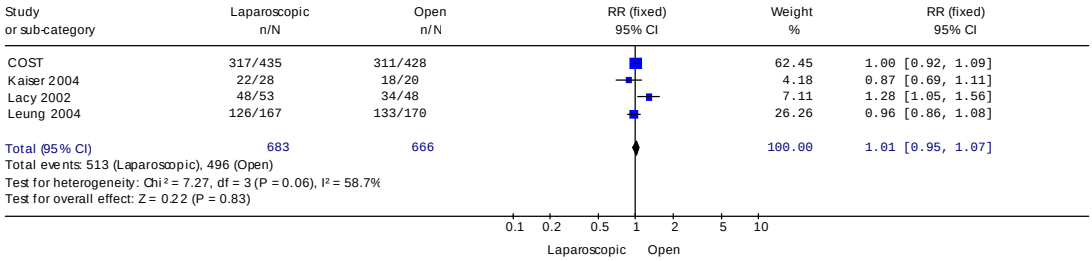
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 09 Length of hospital stay



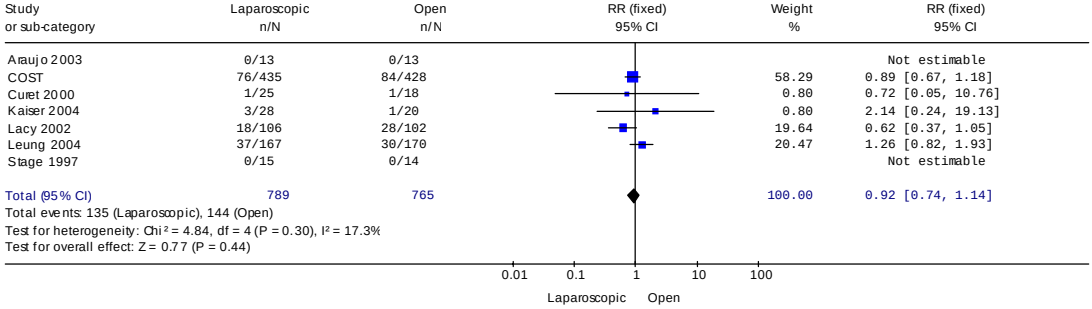
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 10 Overall survival



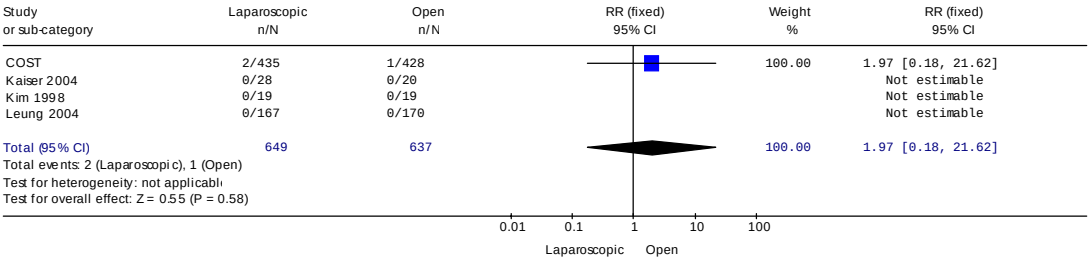
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 11 Disease-free survival



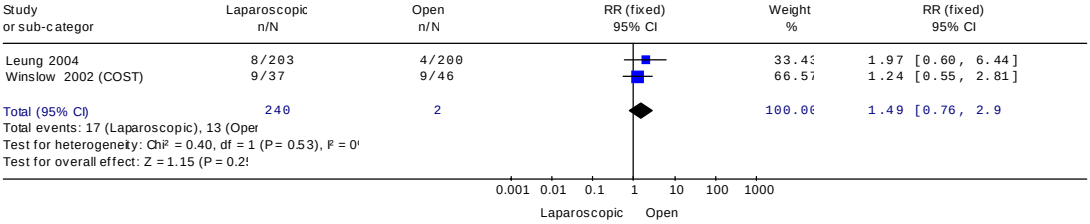
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 12 Tumour recurrence - total



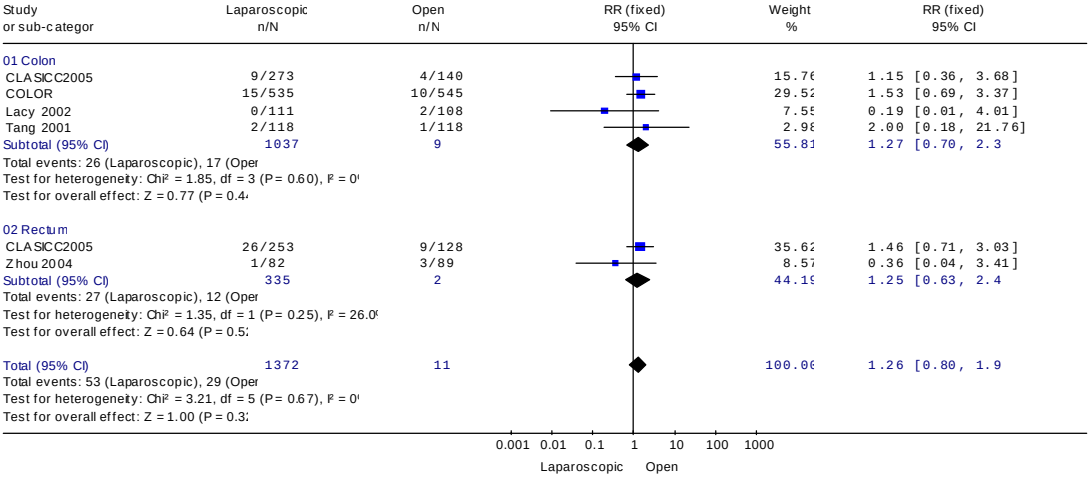
Review: Colorectal cancer
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 13 Tumour recurrence - wound



Review: Colorectal cance
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 14 Incisional hernia



Review: Colorectal cance
Comparison: 01 Laparoscopic repair vs Conventional open repair
Outcome: 15 Anastomotic leakage



APPENDIX 10. SUMMARY OF OUTCOMES REPORTED IN CONVERTED PATIENTS

Study id	Laparoscopic n		Open n		Converted n		p value	Comments
Duration of operation (minutes)								
Curet 2000[48]	18	210 (128-275)	18	138 (95-240)	7	194 (105-485)	<0.05 *	
CLASICC 2005[3]	345	180 (140-220)	276	135 (100-175)	143	180 (135-223)		Median (IQR)
Kaiser 2004[51]	15	125 (70-155)	20	65 (45-125)	13	125 (80-270)	<0.05†	Mean (range)
Blood loss (ml)								
Curet 2000[48]	18	284 (100-700)	18	407 (100-1000)	7	683 (100-12000)	<0.05 *	
Kaiser 2004[51]	15	100 (100-300)	20	100 (100-800)	13	200 (100-1000)		Mean (range)
Anastomotic leakage								
CLASICC 2005[3]	345	20	276	15	143	13		
Lymph node retrieval								
Curet 2000[48]	18	11 (2-23)	18	10 (1-21)	7	12 (1-29)		
Kaiser 2004[51]	15	11 (4-26)	20	14 (3-27)	13	16 (1-32)		Mean (range)
Wound infection								
Curet 2000[48]	18	1	18	1	7	1		
CLASICC 2005[3]	345	24	276	23	143	21		
Urinary tract infection								
Curet 2000[48]	18	0	18	0	7	1		
Kaiser 2004[51]	15	1	20	0	13	0		
Length of hospital stay (days)								
Curet 2000[48]	18	5.2	18	7.3	7	8	<0.05 *	
CLASICC 2005[3]	345	9 (7-13)	276	11 (8-15)	143	12 (9-16)		Median (IQR)
Kaiser 2004[51]	15	5 (3-8)	20	6 (5-9)	13	7 (5-13)	<0.05 *	Mean (range)
Overall survival								
Curet 2000[48]	18	14	18	12	7	6		Follow-up: 2.5 to 6.3 years, mean 4.9
Kaiser 2004[51]	15	14	20	19	13	11		Follow-up 3 to 69 months, median 35
Disease-free survival								
Kaiser 2004[51]	15	14	20	18	13	8		Follow-up 3 to 69 months, median 35
Recurrence								
Curet 2000[48]	18	0	18	1	7	1		Follow-up: 2.5 to 6.3 years, mean 4.9
Kaiser 2004[51]	15	0	20	1	13	3		Follow-up 3 to 69 months, median 35

* Laparoscopic compared to open procedure

† Open compared with laparoscopic procedure

APPENDIX 11. SUMMARY OF INCLUDED ECONOMIC EVALUATIONS

Study Identification Franks 2005 (Franks, Thames Valley University, 2005)	**Author and year**	**Franks 2005. UK**
	Interventions studied / Comparators	Laparoscopic resection compare with open resection in the treatment of colorectal cancer
	Hypothesis / Question	1) Total cost to society of laparoscopic resection would be similar or less than those of open resection within 3 months of operation. The authors reported the societal perspective was adopted for the analysis.
Key elements of the study	Type of Study	This is a cost minimisation analysis based on a RCT (CLASICC trial).
	Target Population/ Study sample	A subset of the patients recruited to the CLASICC trial. Included patients were those who agreed to participate in the quality of life/health economics component or for whom details of the operative procedure were missing at the time of the analysis (n=682 in economic analysis, n= 794 in trial). Details of inclusion/exclusion criteria not described in this paper but are described elsewhere (see descriptions of the CLASICC trial reported earlier).
	Setting	Secondary care. 27 centres and 32 surgeons.
	Dates to which data relate	Patients recruited to the trial from 1996
	Source of effectiveness data	The effectiveness data were derived from the whole sample (n=794) of the CLASICC RCT.
	Modelling	NA
	Link between effectiveness and cost data	Costs are derived from a sub-group of the patients included in the CLASICC trial. Approximately 86% of the whole sample from CLASICC was included in the economic study. It is assumed (although not stated) that the costs of those recruited into the economic study are applicable to the patients included in the whole study (which provides evidence on effectiveness).
Details about clinical evidence: study design and main outcomes	Eligibility/ Patient group / study sample	Details of the eligibility and study sample were not reported but are provided elsewhere. For details see the summary of the CLASSIC trial provided earlier. The data from the CLASICC trial was stratified by surgeon, site of operation, presence of liver metastases and pre-operative radiotherapy. Sub-group analysis was conducted by colon and rectum cancer.
	Study design	This is a multicentre RCT with 27 centres and 32 surgeons contributing data.
	Analysis of effectiveness	The analysis was done on an intention to treat basis. The primary endpoints were resection margins, Dukes C tumours, and in hospital mortality. Secondary outcomes were complication rates, transfusion requirements and quality of life up to three months after surgery.
	Effectiveness results / Outcome measures	Details of primary and secondary endpoints were not reported. The short-term end points from the whole CLASICC trial indicated similar outcomes in terms of resection margins, Dukes C tumours, and in hospital mortality. Similar outcomes were also reported for secondary outcomes of complication rates, transfusion requirements and quality of life up to three months after surgery. No indication is provided about the statistical precision of these results.

	Clinical conclusions	It was assumed that the short-term benefits of surgery were equivalent.
Economic analysis	Measure of health benefits used in the economic analysis	No summary of health benefit was used in the economic analysis and as effects were assumed to be equal a cost-minimisation analysis was performed.
	Direct costs	The 682 patients who consented to be part of the economic study and for whom operative data were available. In CLASICC patients were randomised in a 2:1 ratio to either laparoscopic or open resection and costs were based on 452 patients allocated to laparoscopic resection and 230 open patients. The costing was undertaken prospectively on a subset of the whole trial population. Detailed theatre resource use was based on a sub-group of patients (10 laparoscopic and 10 open patients for each recruiting surgeon). These data were used to impute values for the rest of the sample. Hospital stay was from date of operation to discharge (or death) plus one day for a pre-operative admission. Stay was divided into intensive, high dependency and surgical ward care. Post-operative complications were obtained for each patient. For complications resulting in surgery costs were based on detailed descriptions of the operation, which included anaesthetic time, length of hospitalisation (including stay in ICU and HDU). Other complications were costed according to national figures. Post discharge resource use was based on patient completed questionnaires. Unit costs were based on national figures or study specific estimates based on data from manufacturers. The same unit costs were used all patients.
	Indirect costs	Cost of productivity loss were based on the time taken for individuals to return to employment and costed using average salary costs for full or part time workers based on the Department of work and pensions.
	Currency	Pounds sterling. Year not stated but between 2002 and 2004.
	Statistical analysis of quantities / costs	Non-parametric bootstrap method was used to provide confidence intervals around each the difference in cost for area or resource use and the difference in total cost.
	Sensitivity analysis	One-way sensitivity analysis on the peri-operative costs, equipment costs, recovery costs, ICU costs and hospital costs (ward, ICU and HDU). Costs were varied by either +20% or –20% of base case values. Sub-group analysis was conducted by site of the cancer (colon or rectum).
Results	Estimated benefits used in the economic evaluation	No health benefit summary measure for economic analysis was used. It was assumed that benefits were the same between groups.

	Costs results	Total cost, including productivity loss, were not significantly different between laparoscopic and open groups (laparoscopic resection was £268 more costly 95% CI –689 to 1458). Costs to the health care sector. Costs to the health care system were greater (£229) for laparoscopic surgery (although CI were not available). Key determinants of cost were theatre costs (greater for laparoscopic), hospitalisation costs (less for laparoscopic) and complications (greater for laparoscopic even though rates were the same). The results were not greatly influenced by any of the sensitivity analyses except for the reduction in equipment costs, which reduced the difference in total costs to £87. For patients with colon cancer laparoscopic resection the total costs of laparoscopic resection was slightly higher although this was not statistically significant (£84; 95% -642 to 792). When productivity costs were excluded laparoscopic resection was slightly less costly. For rectal cancer the total cost of laparoscopic was greater (£439 95% CI –1294 to 2858). The cost difference was £542 when productivity costs were excluded. The principle cost drivers were the same for the base case analysis although for rectal cancers the cost of managing complications was significantly higher for laparoscopic surgery.
	Synthesis of costs and benefits	The principle cost drivers were the theatre costs (greater for laparoscopic), hospital costs (less for laparoscopic) and complications (greater for laparoscopic although this appeared to be driven by the complication costs of rectal cancer patients). It should be noted that the analysis assumes no difference in short-term effectiveness. This would be incorrect if either the risk of complications or the severity of the complications differed. No attempt was made to consider the uncertainty surrounding estimates of effects; it was assumed that they were equal on the basis that statistically significant differences were not detected.
	Author's conclusions	At 3 months the costs of laparoscopic and open resection were similar and that until long term effectiveness data are available both surgical options are equally acceptable.

Study Identification Janson 2004[66]	**Author and year**	**Janson 2004. Sweden**
	Interventions studied / Comparators	Laparoscopic colonic resection (LCR) compare with open colonic resection (OCR) in the treatment of colonic cancer
	Hypothesis / Question	1) Total cost to society of LCR would be less than those of OCR within 12 weeks of operation. 2) Higher operating room costs of LCR would be compensated for by a faster recovery, shorter duration of hospital stay and reduction in use of outpatient healthcare resources. The authors reported the societal perspective was adopted for the analysis.
Key elements of the study	Type of Study	This is a CCA based on a RCT (COLOR trial).
	Target Population/ Study sample	A subset of the Swedish contribution to the COLOR trial. The inclusion criteria focus on selection of patients admitted for elective surgery with potentially curable colonic cancer best treated by right or left hemicolectomy or sigmoid resection. Exclusion criteria: cancer in the transverse colon or rectum, synchronous colonic cancers, distant metastases, BMI>30, previously treated malignant disease, pregnancy, and preop signs of a fixed tumour or acute intestinal obstruction.
	Setting	Secondary care. 10 centres from Sweden.
	Dates to which data relate	January 1999 to May 2002
	Source of effectiveness data	The effectiveness data were derived from this subgroup of the COLOR trial (RCT).
	Modelling	NA
	Link between effectiveness and cost data	The costing was undertaken prospectively on the same sample as the used for the effectiveness study. Allocation for all inpatient services costs were retrieved from one centre, which contributed to 33% of the patients to the cost analysis. This centre has a well developed cost per patient accounting system.
Details about clinical evidence: study design and main outcomes	Eligibility/ Patient group / study sample	12 Swedish centres that contributed to the COLOR trial were invited to participate, and 10 agreed. These centres contributed with 263 patients to the trial and 234 entered into the cost analysis (111 LCR, 123 OCR). From these 234 patients 24 were excluded from the primary cost analysis (13 LCR, 11 OCR); then, 98 patients were included in the cost analysis for LCR group and 112 for the OCR group.
	Study design	This is a multicentre RCT. 10 centres agreed to participate. Randomisation was performed in the original trial. Follow-up was 3 years.
	Analysis of effectiveness	The analysis was done on an intention to treat basis. The primary endpoint was cancer free 3-year survival. Other outcomes were number of complications and reoperations, and deaths. Complications include: Anastomotic leak, Bowel perforation, Wound rupture, Ileus, Postoperative bleeding, Incarcerated abdominal hernia, Endoscopic dilatation, Closure loop ileostomy.

	Effectiveness results / Outcome measures	Primary endpoint results were not reported. During the first admission 21 patients had complications in the LCR group and 18 in the OCR group. 8 patients had reoperations in the LCR group and 4 in the OCR group (anastomotic leak: 4 LCR, 1 OCR; Bowel perforation 1 LCR, 0 OCR; Wound rupture 1 LCR, 3 OCR; Ileus: 1 LCR, 0 OCR; Postoperative bleeding: 1 LCR, 0 OCR). After discharge 12 patients had complications in the LCR group and 8 in the OCR group. There was 1 death in the LCR group while 0 in the OCR group. 6 patients had reoperations in the LCR group and 3 in the OCR group (anastomotic leak: 1 LCR, 1 OCR; Wound rupture 1 LCR, 0 OCR; Ileus: 1 LCR, 1 OCR; Incarcerated abdominal hernia: 1 LCR, 0 OCR; Endoscopic dilatation: 1 LCR, 1 OCR; Closure loop ileostomy: 1 LCR, 1 OCR).
	Clinical conclusions	The result from the present cohort of patients showed significant but clinically modest differences in HRQoL 2 and 4 weeks after operation (data not showed).
Economic analysis	Measure of health benefits used in the economic analysis	No summary of health benefit was used in the economic analysis. Clinical outcomes were left disaggregated. A cost-consequences had been performed.
	Direct costs	Data related to perioperative period and postoperative follow-up were retrieved by use of case record forms (CRFs) which were completed by the relevant surgical departments. Data on costs after discharge were registered by the patient in a diary. Direct cost included: staff, drugs, physicians, laboratory testing, overheads and maintenance, operating room resources, anaestegiology and recovery room services. Capital costs of expensive equipment were calculated after estimating the yearly use of these items at Huddings University Hospital (HUH). Mean cost per item of disposable material between centres were used in the analysis. Cost of medical services, including radiological and endoscopic investigations, blood products and bacteriological testing, were allocated using the internal price list of services at HUH. Costs of outpatient care services were retrieved from the internal reinbursements system in the county of Stockholm, Sweden. Discounting was performed at 5% rate. This was relevant as the follow-up period was over 2 years.
	Indirect costs	Cost of productivity loss were calculated from officials Swedish statistics. Average income rates were converted to a daily cost of productivity loss. Whether a patient was retired or not was taken into account when considering number of days off work. No commuting costs were considered as they were not relevant. Discounting was performed at 5% rate.
	Currency	Euros. 2001 prices.
	Statistical analysis of quantities / costs	non-parametric bootstrap method was used for checking the robustness of results from standard parametric approaches. Other statistical tests used were t-test, chi-square and Fisher's exact test. $P<0.05$ was considered statistically significant.
	Sensitivity analysis	One-way sensitivity analysis on the cost per minute for the operating room, anaesthesia and recovery room time were explored (-50% to +100% range from original mean values).

Results	Estimated benefits used in the economic evaluation	No health benefit summary measure for economic analysis was used. A cost-consequences analysis was performed. However, the authors stated that the results from the present cohort of patients showed significant but clinically modest differences in Health Related Quality of Life at 2 and 4 weeks after operation
	Costs results	Total cost, including productivity loss, were not significantly different between LCR and OCR groups (€11,660 vs. €9814; P=0.104). Total costs, excluding productivity loss, that is cost to the healthcare system, were significantly higher for LCR (€9474 vs. €7235; P=0.018), as were costs related to the first admission (€6931 vs. €5375; P=0.015), and costs of primary surgery (€3493 vs. €2322, P=0.001). The secondary cost analysis, which included 24 patients who were excluded in the primary analysis after randomisation, yielded similar data; figures calculated in a secondary analysis were within a range of €-35 to +316, and the statistical significance of the results remained unchanged.
	Synthesis of costs and benefits	The cost of extra resources consumed during the first admission and resources used after discharge, because of readmissions and reoperations, appeared to be higher in the LCR group. Although there was no difference in complication rates, reoperations were more frequent in the LCR group during the first admission and after discharge. However, this difference was not tested for statistical significance owing to the small number of observations. The mean total costs, excluding productivity loss, for reoperated patients were €19,376 (range €5543-€49,835) for LCR and €13,637 (range €6080-€29,305) for OCR.
	Author's conclusions	Within 12 weeks of surgery for colonic cancer, there was no difference in total costs to society incurred by LCR and OCR. The LCR procedure, however, was more costly to the healthcare system.

Study Identification King 2005[40]	**Author and year**	**King unpublished 2005b**
	Interventions studied / Comparators	Laparoscopic resection versus open resection for colorectal cancer with enhanced recovery program.
	Hypothesis / Question	This study examined the null hypothesis that there is no difference in short term outcomes after laparoscopic or open resection for colorectal cancer when both are embedded within an enhanced recovery programme.
Key elements of the study	Type of Study	CCA based on a RCT
	Target Population/ Study sample	Adult patients diagnosed with colorectal cancer. Exclusion criteria: any non-elective admission, those patients with pre-operative evidence of haematogenous metastases, patients less than 18 years old, those who were pregnant and patients who did not consent to randomisation. A protocol amendment to exclude patients not able to have epidural anaesthesia was made after one year.
	Setting	Secondary care. Yeovil District Hospital, Yeovil, UK
	Dates to which data relate	January 2002 to March 2004
	Source of effectiveness data	The evidence for effectiveness data was derived from a single study.
	Modelling	NA
	Link between effectiveness and cost data	Costing was undertaken in the same sample as that used for the effectiveness study. Cost outcomes were collected prospectively.
Details about clinical evidence: study design and main outcomes	Eligibility/ Patient group / study sample	During the study period 94 patients were assessed for entry into the trial. 21 did not meet the inclusion criteria and 5 patients were excluded as they were not suitable for laparoscopic surgery and 6 patients were excluded for other reasons. 62 patients with adenocarcinoma of the colon or rectum were randomised (2:1) to receive either laparoscopic (n=43) or open surgery (n=19) and were entered into an enhanced recovery programme. Sample size was determined by a calculation performed for a parallel study involving the same patients, comparing enhanced recovery with a historic cohort of patients receiving conventional care.
	Study design	This is a single centre randomised controlled trial. Maximum follow-up was 3 months. 3 patients were lost to follow-up in the laparoscopic arm (1 benign histology, 1 unsuitable for epidural, 1 death), while 1 patient was lost to follow-up in the open arm (1 death).
	Analysis of effectiveness	The analysis of effectiveness data was based on intention to treat. Hospital stay was calculated as the date of operation to the date of discharge. Hospital stay including convalescent stay and readmission stay was a secondary outcome. Other clinical end points included mortality, requirement of opioid analgesia and anti-emetic administration. Major morbidity was defined as haemorrhage (requiring transfusion), re-operation, readmission, anastomotic leak, wound dehiscence and sepsis requiring at least high dependency support. Patient based outcomes included Quality of Life (measure by EORTC QLQ-C30 and QLQ-CR38 colorectal module). A series of performance tests to assess balance, gait, and lower extremity strength and endurance were taken before and after surgery. Sleep and oxygen saturation were also monitored.

	Effectiveness results / Outcome measures	Patients undergoing laparoscopic surgery had a 32% (95%CI: 7% - 51%, p=0.018) shorter hospital stay than those in open surgery. Geometric mean for post-operative stay for Laparoscopic group 5.2 days (95%CI: 4.2-6.5) and 7.4 (95%CI: 6.0-9.2) for Open group. Hospital + convalescent stay 5.4 (4.2-6.8) for Laparoscopic group and 7.4 (6.0-9.2) for Open group; ratio Lap vs. Open 0.69 (0.49-0.78), p=0.036. Hospital + convalescent + readmission stays were also significantly shorter after laparoscopic surgery: 5.5 (4.3-7.0) for Lap group and 8.3 (6.3-10.8) for Open group; ratio Lap vs. Open 0.63 (0.44-0.90), p=0.012. There were 11 cases (27%) of Blood loss >100mls. in the Lap group while 18 (95%) cases in the Open group, P<0.001. Statistically significant differences were reported also for Epidural insufficiency requiring opioid supplements 9 (22%) Lap group and 14 (74%) Open group, P<0.001, Duration of surgery in minutes (geometric mean): 187 for Lap group (95%CI: 168 to 207), Open group 140 (95%CI: 121 to 163), P=0.00
	Clinical conclusions	Laparoscopic resection for colorectal cancer within an enhanced recovery programme is likely to provide the best short-term clinical outcomes for patients with resectable colorectal cancer.
Economic analysis	Measure of health benefits used in the economic analysis	No summary of health benefit is used in the economic analyses and clinical outcomes are left disaggregated, a cost consequences analysis was performed.
	Direct costs	Cost analysis was undertaken from the NHS perspective. The follow-up was three months postoperatively. Information on cost of theatre equipment was provided from hospital invoices. Detailed records were taken of staffing including surgical/anaesthetic and nursing grades present at each operation. Disposable equipments were routinely recorded and were considered to be additional to standard theatre costs. One day preoperative was included for hospital stay analysis purposes. Patient were sent questionnaires about their use of health resources at both two weeks and three months after operation (in-patient days, out-patient visits, general practitioner visits, use of district (community) and stoma nursing services. Staffing costs were estimated as a mid point in the scale given the UK literature. Cost of theatre equipment specific to procedures undertaken was provided from the manufacturers' invoices. Post discharge health resource unit costs were estimated from national published figures. Discounting was not performed.
	Indirect costs	Indirect costs were assessed by determining the number of days the patients in paid work (full or part time) took off for their condition, and multiplying by the average daily pay.
	Currency	2002 Sterling pounds (£)
	Statistical analysis of quantities / costs	Costs data was treated stochastically. The authors used bootstrap estimates (10,000 iterations) to derive values for mean and confidence intervals.

	Sensitivity analysis	The base case analysis indicated the there were two areas where costs were likely to vary between groups, namely, the duration of in-patient stay, and the consumption of community resources after hospital discharge. The costs of these resources were challenged using a sensitivity analysis, with each varying + - 20%of the base case.
Results	Estimated benefits used in the economic evaluation	A cost consequences analysis was developed, then, the reader is referred to the effectiveness results reported previously.
	Costs results	As expected the theatre costs were higher in patients randomised to laparoscopic surgery (£2885 versus £1964, Dif:-921.6 95%CI: -1250.6 to -586.0), partly reflecting the increased duration of these procedures, but also that increased used of disposable equipment in theatre. These costs were more than offset by lower post-operative costs such as reoperations (£287 for laparoscopic group and £1039 for open group; Dif: 752, 95%CI: -278.5 to 2466.6), and indirect costs (£448 for laparoscopic group vs. £721 for open group, Dif: £274.2, 95%CI:-386.2 to 983.2). Total cost for laparoscopic group was £6433.4 while for open group was £6789.8, difference £353.4 95%CI: -2167.1 to 2991.5). Sensitivity analysis made little to this overall mean difference, with variations in perioperative and in-patient costs affecting the difference by less than £100 in either direction.
	Synthesis of costs and benefits	Not combined
	Author's conclusions	The authors' conclusion was that laparoscopic resection of colorectal cancer within the enhanced recovery programme is likely to provide the best short-term clinical outcomes for patients with resectable colorectal cancer. Despite applying enhanced recovery techniques to open surgery for colorectal cancer, short-term outcomes are better with laparoscopic assisted surgery. There is no deterioration in quality of life or increased cost associated with laparoscopic surgery compared with the open approach.

Study Identification Leung 2004[53]	**Author and year**	**Leung 2004**
	Interventions studied / Comparators	Laparoscopic assisted or conventional open resection for rectosigmoid carcinoma.
	Hypothesis / Question	The authors aimed to test the null hypothesis that there was no difference in survival after laparoscopic and open resection for rectosigmoid cancer.
Key elements of the study	Type of Study	CCA based on an RCT.
	Target Population/ Study sample	The study involved adult patient with rectosigmoid carcinoma.
	Setting	Secondary care. 2 Institutions (Prince of Wales Hospital and United Christian Hospital) from Hong Kong, China.
	Dates to which data relate	September 21st 1993 to October 21st 2002.
	Source of effectiveness data	The effectiveness data were derived from a single study.
	Modelling	NA
	Link between effectiveness and cost data	Costing was undertaken in the same sample as that used in the effectiveness study. Cost outcomes were collected prospectively.
Details about clinical evidence: study design and main outcomes	Eligibility/ Patient group / study sample	The authors determined the study sample in a planning phase: to show a difference of 15% in 5-year survival (from 60% to 70%) with an 80% probability (beta=0.2) and a 5% significance threshold (alfa=0.05), 150 patients were needed in each group). Patients diagnosed to have rectosigmoid carcinoma seen in the participating institutions were randomly allocated to laparoscopic assisted or conventional open sigmoid colectomy or anterior resection. There were 825 eligible patients and 422 were excluded as they did not fulfil the inclusion criteria. 203 patients were allocated to laparoscopic group and 200 to the open group. Exclusion criteria: distal tumour needing anastomosis within 5 cm of the dentate line; tumour larger than 6 cm or with tumour infiltration to adjacent organs on sonography with or without CT scan; patients with previous abdominal operations near the region of the colorectal operation; individuals who did not consent to randomisation; and those with intestinal obstruction or perforation.
	Study design	The patients were recruited from two Hospitals. Patients were randomly allocated to laparoscopic assisted or conventional open sigmoid colectomy or anterior resection by a computer generated random sequence kept concealed by an independent operating theatre coordinator. The follow up time of living patients (months) was 52.7 SD: 38.9) for laparoscopic group and 49.2 (SD: 35.4) for the open group. Patients were followed up regularly at 3-monthly intervals in the first 2 years, and then 6-monthly thereafter for clinical examination and carcinoembryonic antigen testing. One patient was lost to follow up in the laparoscopic group and 3 in the open group.

	Analysis of effectiveness	Survival and disease free interval were the main outcomes. Other outcomes were: Duration of operation, Blood loss, Anastomotic leakage, Lymph node retrieval, Completeness of resection/ margins of tumour clearance, Conversion, Wound infection, Urinary tract infection, 30 day mortality, Post-operative pain, Recurrence. Operation time and hospital length of stay were also collected. The analysis was based on intention to treat. The two groups of patients had similar baseline demographic data.
	Effectiveness results / Outcome measures	No statistically significant differences were reported for overall Mortality 38 (22.8%) for lap group and 40 (23.5%) for open group, P=0.97; probability of survival at 5 years 76.1% (3.7%) for lap group and 72.9% (4.0%) for open group, P=0.61, recurrence 37 (22.2%) for lap group and 30 (17.6%) for open group, P=0.37, or probability of disease free at 5 years 75.3% (3.7%) for lap group and 78.3% (3.7%) for open group, P=0.45. Operation time was statistically significant higher in the lap group 189.9 minutes (SD: 55.4) and 144.2 minutes (SD: 57.2) for the open group. Hospital stay was also statistically significant higher in the lap group 8.2 days (range: 2-99) while 8.7 days (range: 3-39) in the open group. 40 complications were reported for the lap group and 45 for the open group (anastomotic bleeding 2 lap, 3 open; anastomotic leak 1 lap, 4 open; wound infection 9 lap, 15 open; strangulated incisional hernia 2 lap, 0 open; reoperation 6 lap, 5 open; operative death 5 lap, 4 open; others: 15 lap, 17 open).
	Clinical conclusions	Laparoscopic resection did not worsen survival and disease control for patient with rectosigmoid cancer compared to open resection, and its benefits in reducing pain and allowing earlier postoperative recovery were confirmed. The justification for preferential use of laparoscopic technique would depend on the perceived value of its effectiveness in improving short-term postoperative outcomes.
Economic analysis	Measure of health benefits used in the economic analysis	No summary of health benefit is used in the economic analyses and clinical outcomes are left disaggregated, a cost consequences analysis was performed.
	Direct costs	Direct cost of operation was estimated by market value of theatre time, the disposable instrument, and hospital in-patient service. Operation time and hospital length of stay were reported for the two groups but no further details on disposable instruments or unit costs were reported. No adjustments for inflation or Discounting were reported and no details on unit price dates were presented. Average costs for each arm were reported.
	Indirect costs	No indirect costs were reported
	Currency	US$ dollars
	Statistical analysis of quantities / costs	t-test were used to test significance of operational time, hospital stay and direct cost differences.
	Sensitivity analysis	The authors explored the cost implications of the subgroups with local invasion.
Results	Estimated benefits used in the economic evaluation	A cost consequences analysis was developed, then, the reader is referred to the effectiveness results reported previously

	Costs results	Direct cost of operation for the lap group was US$9297 (SD:2091) and US$7148 (SD:2164) for the open group, P<0.001. The direct cost of operation for the local invasion subgroups were: US$9729 (SD:2854) for the lap subgroup and US$9850 (SD:2955) for the open subgroup, respectively.
	Synthesis of costs and benefits	Not combined
	Author's conclusions	Laparoscopic resection of rectosigmoid carcinoma does not jeopardise survival and disease control of patients. The justification for adoption of laparoscopic technique would depend on the perceived value of its effectiveness in improving short-term post-operative outcomes.

Study Identification Zheng[109]	**Author and year**	**Zheng 2005**
	Interventions studied / Comparators	Laparoscopic versus open right hemicolectomy for colon carcinoma.
	Hypothesis / Question	This study was designed to compare the outcomes of laparoscopic right hemicolectomy (LRH) with open right hemicolectomy (ORH) in the treatment of colon carcinoma. The authors did not state the perspective of the analysis but Hospital perspective seems to have been adopted.
Key elements of the study	Type of Study	CCA based on a matched cohort study.
	Target Population/ Study sample	Patient with colon carcinoma.
	Setting	Secondary care. 1 institution (Ruijin Hospital) from Shanghai, China.
	Dates to which data relate	September 2000 to February 2003.
	Source of effectiveness data	The evidence for effectiveness data was derived from a single study.
	Modelling	NA
	Link between effectiveness and cost data	Costing was undertaken in the same sample as that used in the effectiveness study. Cost outcomes were collected prospectively.
Details about clinical evidence: study design and main outcomes	Eligibility/ Patient group / study sample	30 patients with colon carcinoma underwent laparoscopic-assisted right hemicolectomy (LHR) in the setting hospital. 34 patients for the comparative open right hemicolectomy (ORH) group. Exclusion criteria: patients with tumors larger than 6 cm in diameter, or with tumors infiltrating the adjacent organs as detected by ultrasonography and/or computerised tomography, patient who did not consent to the procedure, patients with intestinal obstruction or perforation, and patients whose oncological staging was Duke's D.
	Study design	This is a matched cohort study. Patients for the ORH control group were matched in gender, age, Duke's staging, tumor site, previous abdominal operation and extent of resection, were randomly selected from 87 patients who underwent ORH during the same period. The mean duration of follow-up time was 27.15 months (range 12-40 months) for LRH group and 26.19 months (range 13-40 months) for the ORH group. No lost to follow-up patients. No blinding methods were reported in the study.
	Analysis of effectiveness	The analysis of effectiveness data was based on intention to treat. The following parameters were measure prospectively: operation time, blood loss, analgesic requirements, time to flatus passage, time to resume normal diet and duration of hospitalisation, morbidity and mortality, specimen length and lymph node yield, pathological staging (Duke's staging), local recurrence rate and metachronous metastasis rate, and cumulative survival probability. Major complications include: Massive haemorrhage, Anastomotic leak, Pulmonary infection, Urinary tract infection, Wound infection, Ileus. There was no significant difference in age, gender, Duke's staging, previous abdominal operation and tumor site between LRH and ORH groups.

	Effectiveness results / Outcome measures	Statistically significant differences were found in blood loss 112.94ml (SD: 96.36mL) for the LRH group and 274.5mL (SD: 235.43ml) for the ORH group (P=0.009), analgesia required postoperatively by 14 patients in LRH group while 26 in the ORH group. Time to flatus passage, hospital stay, and time to resume early activity in LRH group were 2.24 days (SD:0.56 days), 13.94 days (SD: 6.5 days), and 3.94 (SD: 1.64 days), respectively, which were significantly shorter than those in ORH group (3.25 days SD:1.29days, 18.25 days SD: 5.96 days, and 5.45 days SD: 1.82 days, respectively), P<0.05 for all differences. Five patients in LRH group experienced postoperative complications (2 pulmonary infection, 2 wound infection, 1 Ileus), and 10 patients in the ORH group (1 massive haemorrhage, 1 anastomotic leak, 3 pulmonary infection, 1 urinary tract infection, 4 wound infection), (16.7% vs. 29.4%, respectively, P=0.23).
	Clinical conclusions	LRH in patients with colon cancer has statistically significant advantages over ORH. Thus, LRH can be regarded as a safe and effective procedure.
Economic analysis	Measure of health benefits used in the economic analysis	No summary of health benefit is used in the economic analysis and clinical outcomes are left disaggregated, a cost consequences analysis was performed.
	Direct costs	Total cost for operation, cost for drugs and total cost (sum of these two) was presented. No details of how these figures were calculated were reported in the study.
	Indirect costs	No indirect costs were reported
	Currency	Chinese Renminbi Yuan
	Statistical analysis of quantities / costs	t-tests were used to test significance of cost difference between groups.
	Sensitivity analysis	No sensitivity analysis was reported
Results	Estimated benefits used in the economic evaluation	A cost consequences analysis was developed, the reader is referred to the effectiveness results reported previously
	Costs results	The cost of operation in LRH group was 7810.7RMByuan (SD:1719.07RMByuan), which was significantly higher than that in ORH group 5018.92RMByuan (SD:845.62RMByuan), P<0.01. While the cost of drugs in LRH group (3687.85RMByuan SD:1977.42RMByuan) was significantly less than that in the ORH group (5209.42RMByuan SD: 2212.37RMByuan), P<0.05. No significant difference was observed in the total cost of operation and drugs between the two groups: 11,498.54RMByuan SD:2618.86RMByuan vs. 10,228.34 SD:2372.57RMByuan , P=0.131.
	Synthesis of costs and benefits	Not combined
	Author's conclusions	LRH for right-sided colon cancer have the same oncological clearance, surgical safety, cost effectiveness, and patient survival as ORH. In addition, patients can benefit from quicker postoperative recovery of laparoscopic surgery.

APPENDIX 12. ESTIMATION OF PARAMETER ESTIMATES USED IN THE ECONOMIC MODEL

Derivation of the risk of hernia per cycle

The table below outlines the data available on the risk of hernia in the open arms of the identified studies.

Studies providing data to enable the risk of hernia per cycle to be estimated

Study id	Events	Sample	Cumulative rate	Follow-up (months)	Events per cycle	Risk per cycle
Winslow (COST) 2004[83]	9	46	19.6%	30.1	1.8	0.039
Leung 2004[53]	4	200	2.0%	43	.6	0.003
Patankar 2003[127] (nr)	2	172	1.2%	59	.2	0.001
Champault 2002[128] (nr)	3	83	3.6%	60	.3	0.004
Median						**0.003***

* estimated 25 and 75 percentile observations 0.002 and 0.012. nr = non-randomised study

Ideally data on the time to event would have been used to estimate the risk of hernia. However due to the limited data available it has been assumed that the risk per cycle is constant. The number of events per cycle (i.e. per six month period) is the observed number of events divided by the follow-up in months. The product of this is multiplied by the cycle length in months. The risk per cycle is the product of the number of events per cycle divided by the sample size. The value used in the model is the median of the values of provided by the included studies. From these data the 25 and 75 percentile were calculated using the percentiles command in Microsoft Excel and a triangular distribution assumed using these and the median rates.

Derivation of the risk of emergency re-operation

The Table below reports the data on risk of anastomic leakages reported in the open arms of the RCTs included in the systematic review of effectiveness. As described in Section 5.3.1 the risk of an anastomic leakage has been assumed to be the same as the risk of an emergency re-operation to treat a post-operative complication.

Studies providing data to enable the risk of emergency operation to be estimated

Study id	Events	Sample	%
COLOR 2005[4]	10	545	0.018
King 2005[40]	1	19	0.053
Leung 2004[53]	4	200	0.020
Zhou 2004[60]	3	89	0.034
Hasegawa 2003[49]	0	26	0.000
Lacy 2002[22]	2	108	0.019
Tang 2001[58]	1	118	0.008
Median			**0.019**

Estimated interquartile range 0.008 to 0.034

The value used in the model is the median of the values of provided by the included studies (1.9%). From these data the interquartile range was estimated and a triangular distribution assumed using these and the median rates.

Estimation of the costs of non-operable management

The table below describes the drugs used for the management of non-operable recurrent disease. The description of resource use was provided by a MacMillan Nurse (Personal communication: Flora O'Dea, Hospital Specialist Palliative Care Team, Grampian University Hospital NHS Trust, 2005). The cost of these drugs was obtained from the British National Formulary.[129]

Drug costs used for model for typical patients being treated for non-operable disease

Drug	Dose per day	Cost per cycle	Source
Paracetemol	1g 4xday	£10.95	BNF
Diclofenac	50mg 3xday	£21.05	BNF
Oxycodone (oxycontin)	40mg 2xday	£633.67	BNF
Oxynorms	20mg 2xday	£289.07	BNF
Co-danthramer	10mg 2xday	£31.29	BNF
Docusate (dioctyl)	200mg 2xday	£58.40	BNF
Metaclopramide	10mg 4xday	£22.68	BNF
Omeprazole	10mg 2xday	£148.61	BNF
Total		**£1215.72**	

APPENDIX 13. MARKOV MODEL FOR THE MANAGEMENT OF COLORECTAL CANCER

Markov model for the management of colorectal cancer

Appendix 13 displays the unpopulated model for the laparoscopic arm. The tree structure for the open and laparoscopic arms are identical.