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Effective Health Care

Bulletin on the effectiveness of health service interventions for decision makers

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The management of colorectal cancer

- Colorectal (bowel) cancer is the second most common cause of cancer death in the UK. The disease is curable when not too far advanced and UK survival rates could be substantially improved with better management.
- Quality of diagnostic procedures should be monitored, particularly the completeness of the examination of all of the large bowel using colonoscopy, and associated complications. Training should be given, if necessary, to improve standards.
- Substantial variability in outcomes achieved by surgeons suggests that concentrating surgery in the hands of those with better results could improve survival.
- Histopathologists should provide detailed information on the nature and extent of the cancer and give feedback to surgeons.
- Sugeons should aim, wherever posssible, to use operations which conserve the anal sphincter and avoid the need for a stoma.
- Pre-operative radiotherapy should be routinely offered to patients with rectal cancer unless surgeons demonstrate low (<10%) local recurrence rates.
- Chemotherapy can be beneficial in more advanced cancers but agents other than 5-FU+ folinic acid (FUFA) should not be used outside the context of trials until their benefits have been clearly established.
- There is no evidence that routine intensive follow-up after primary treatment benefits patients. Reducing the intensity of follow-up could conserve NHS resources without compromising quality.

The contents of this bulletin are likely to be valid for around one year, by which time significant new research evidence may have become available.

A. Background

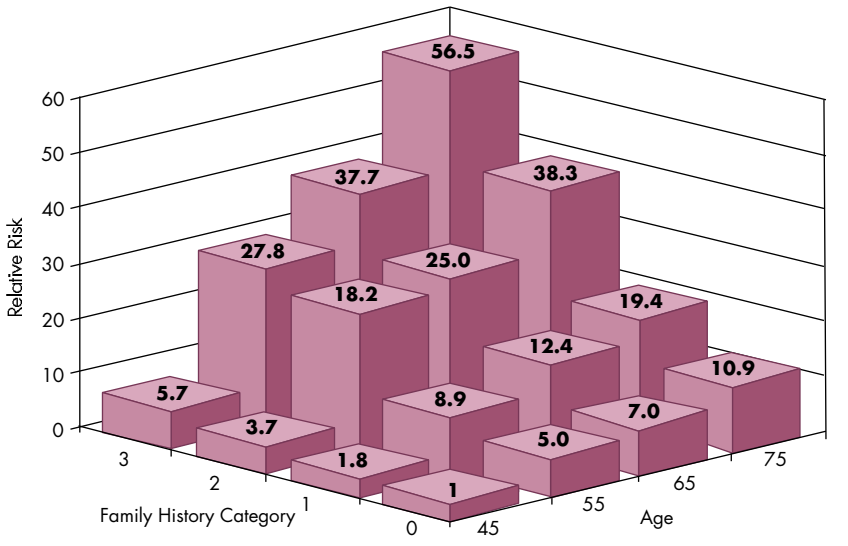
A.1. Incidence and mortality: Colorectal (large bowel) cancer was responsible for over 15,000 deaths in England and Wales in 1996 (68% colon, 32% rectal cancer).[1] The incidence rate per 100,000 (all ages) is 53.5 for men and 36.7 for women.

Incidence rises sharply with age. Age-standardised rates in 1992 were 4 per 100,000 among people aged under 50, 100 per 100,000 among those aged 50–69, and over 300 per 100,000 among people over the age of 70.

A.2 People at raised risk: Two genetic syndromes lead to cancer at a relatively early age: hereditary non-polyposis colorectal cancer (HNPCC) and familial adenomatous polyposis (FAP). The HNPCC mutation, which affects 2–5% of colorectal cancer patients, is associated with an 80% lifetime risk. Without treatment, people with FAP (1% of patients) would usually die of bowel cancer before the age of 40.[2,3]

In addition to these rare genetic syndromes, close relatives of people diagnosed with colorectal cancer are at increased risk. The risk is greater the larger the number of relatives affected, the closer the family relationship, and the younger they are at the time of diagnosis (Fig. 1).[2,4–6] However, the disease is so common that 10% of people over the age of 50 will have an affected relative.

Those with a single relative diagnosed over the age of 60 have the same risk as the general population. About 25% of patients with colorectal cancer have a positive family history.



Family History Category

0 No family history
1 One affected first-degree relative, over 45 at diagnosis
2 One affected first-degree relative, under 45 at diagnosis
3 Two affected first-degree relatives

Fig. 1 Risk of colorectal cancer by age and family history (relative to risk in 45 year olds with no family history)

A.3 Staging: The effectiveness of treatment and prospects for survival depend crucially on the stage of the cancer at diagnosis, usually described in terms of a modified Dukes' classification (Table 1).[7–9]

The overall 5-year survival rate in England is 35%.[10] Within Britain, there is evidence of wide variations in treatment and outcomes.

A.4 The Guidance on Commissioning Cancer Services: In order to improve the standard of care for patients with colorectal cancer, the Department of Health's Clinical Outcomes Group (COG) commissioned the production of guidance. This was distributed with EL(97) 66 and is now available as a series of three related publications: *Improving Outcomes in Colorectal Cancer: The Manual*; *The Research Evidence*; and *Guidance for General Practitioners and Primary Health Teams*.[11–13] These may be obtained free of charge by calling the NHS Response Line on 0541 555 455.

This bulletin summarises the research evidence which informed the guidance, based on a series of interlinked systematic reviews of the research evidence. These reviews involved, at a minimum, searching MEDLINE from 1980, checking reference lists of papers retrieved and consulting experts in the various fields. For some topic areas, a meta-analysis which combined data on individual patients from several trials (individual patient data meta-analysis) was carried out. Further information on the review process, including the specific questions considered, is given in *Improving Outcomes in Colorectal Cancer: The Research Evidence*.[13]

Table 1 Colorectal cancer staging, stage distribution and survival*

Dukes' Stage (modified)	Definition	Approximate frequency at diagnosis	5-year survival
A	Cancer localised within the bowel wall	11%	83%
B	Cancer which penetrates the bowel	35%	64%
C	Cancer spread to lymph nodes	26%	38%
D	Cancer with distant metastases (most often in the liver)	29%	3%

* Data from St. Vincent's Hospital, Dublin. These figures should be taken as illustrative only, since stage frequency and survival statistics vary between published series from different centres.

B. Diagnosis

B.1. Early detection: Three randomised controlled trials have demonstrated that population screening of people over 50 years old for non-visible (occult) blood in faeces can reduce the colorectal cancer death-rate.[14–16] High quality case-control studies of screening with endoscopy suggest that this is also effective;[17, 18] this is being further evaluated in a UK trial. The case for the introduction of colorectal cancer screening is being considered by the national screening committee.

Routine surveillance of young people who are at substantial risk of colorectal cancer because of genetic syndromes, using invasive methods to examine the colon (colonoscopy), can prevent death from colorectal cancer.[2, 3, 19–22] However, genetic screening of the whole population to identify the small percentage with HNPCC would be very expensive relative to the small impact on survival.[23] Surveillance of people aged over 50 with a strong family history (e.g. >1 affected first-degree relative) using faecal-occult blood testing and sigmoidoscopy is likely to be cost-effective.[24, 25]

B.2. Symptoms: The most common presenting symptoms of colorectal cancer include change in bowel habit, rectal bleeding, abdominal pain and anaemia. These are non-specific, occur relatively frequently in the population and have a wide variety of causes. This varied symptomatology may lead to problems with diagnosis and to referral to a wide range of hospital specialities.

Dutch, Australian and US studies have shown that visible rectal bleeding in older people is an important indicator of possible colorectal cancer. Around 20% of patients aged over 60,[26] and 10% of those aged over 40[27] reporting visible rectal bleeding had colorectal cancer. In the US study none of the cancers occurred in people aged under 50.[28]

B.3 Delay in diagnosis: UK studies report delays of around 10 months between the onset of symptoms and treatment of colorectal cancer.[29–33] Median patient delay is approximately three months, usually because patients do not think the symptoms signify serious illness.[29, 34–37] Professional delay may be the result of mis-diagnosis, often due to the assumption that symptoms are caused by haemorrhoids. There is little evidence that such delays affect health outcomes.[8, 29–33, 38–40]

B.4 Diagnostic methods: In cases of suspected colorectal cancer, the large bowel can be completely examined by one of two methods: colonoscopy, or sigmoidoscopy plus double-contrast barium enema. In colonoscopy, a flexible tubular device (endoscope) is inserted into the anus and threaded along the whole of the large bowel. In sigmoidoscopy, a shorter instrument (rigid or flexible) is used to examine the lower part of the bowel (Fig. 2). The whole bowel is then visualised using X-rays.

A US randomised controlled trial[41] and UK and Swedish studies[42, 43] found that these diagnostic methods have similar yields and costs. This equivalence depends, however, on operator competence.

B.5 Achieving competence in endoscopy: Colonoscopy is a technically difficult procedure which can yield reliable results if the tip of the colonoscope reaches the caecum (or proximal end) of the colon – 'completion' (Fig. 2). Although published series, mainly from the US, report completion rates of 85% or more,[2] audit data from the Trent Region and Wales suggest that completion rates in many British hospitals may be below 50%.

Colonoscopy technique improves with practice.[44–47] A study of training in colonoscopy found that physicians are normally able to achieve completion 80% of the time after 50 colonoscopies, rising to 95% after 200.[48]

Competence in flexible sigmoidoscopy can be achieved after 24 to 30 examinations.[49] A US study found that trained nurses were as likely to discover cancers by sigmoidoscopy as gastroenterologists (and patients were more willing to return for a repeat procedure after examination by a nurse).[50] Further research on nurse endoscopy is being commissioned by the NHS Health Technology Assessment Programme.

B.6 Pre-operative staging: Patients diagnosed with colorectal cancer should undergo further investigation to provide information on cancer stage unless

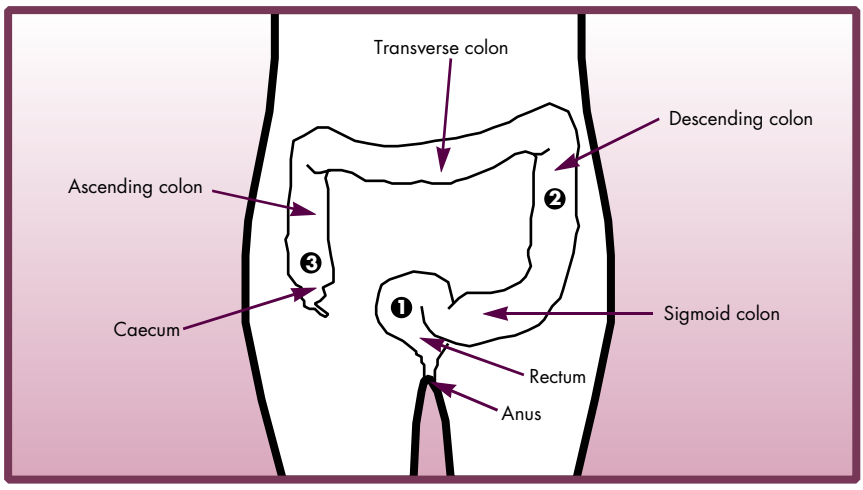


Fig. 2 The large intestine: 1. Limit of rigid sigmoidoscope; 2. Limit of flexible sigmoidoscope; 3. Limit of colonoscope

the findings are unlikely to influence management. More accurate staging (e.g. detection of liver metastases) facilitates more appropriate treatment.

A range of imaging techniques is available – ultrasound, CT scanning, immunoscintology and MRI – but none of them appear to be very accurate.[51, 52] Ultrasound examination of the liver correctly identifies around 52–58% of patients who have metastatic cancer.[53] CT or MRI of the liver is more accurate, with detection rates of 62% and 70% and true negative rates of 97% and 94%, respectively.[54] Because ultrasound is relatively cheap and readily available, it may be most appropriately used as the first of a possible series of investigations, only progressing on to more expensive technologies in the case of a negative finding.[53]

C. Management

Surgery

About 80% of patients undergo surgery, usually with the hope of being cured. Fewer than half survive more than 5 years.[55–57]

C.1. Effectiveness of surgery: Surgery is the first-line treatment and its effectiveness has been demonstrated, for example, by trials of early detection and treatment by surgery.[14–16] The quality of surgery has been shown to affect its impact on local recurrence and survival.

C.2. Variability between surgeons: Prospective and retrospective studies have shown substantial variability between surgeons in the outcomes they achieve, which persists after chance variation and differences in patient case-mix and surgeon grade are taken into account.[58–62] For example, a study in Scotland of patients managed by 13 consultant surgeons shows up to a 3-fold variation between surgeons in 5-year mortality rates after controlling for local spread of tumour, Dukes' stage, differentiation, age and sex of patient and emergency admission.[60]

C.3 Surgery for rectal cancer: Long-term survival is only likely when the tumour is completely removed. Microscopic cancer cells left behind after surgery in tissue close to the rectum (the mesorectum) can become foci of incurable local recurrence. These are especially common around the circumference of the segment of bowel where the cancer originated.[63, 64] In a prospective series from Leeds, 90% (95% CI: 84%, 96%) of patients had no local recurrence at 5 years when the circumferential margin of tissue removed during surgery was clear of cancer cells, compared with 22% of patients with margin involvement (95% CI: 6%, 38%).[65]

Pathologists can play an important role in reporting surgical margin status, both for decisions on adjuvant treatment and to give feedback to surgeons. However, many pathologists do not report on involvement of the crucial circumferential margin.[66]

Total mesorectal excision (TME) is an approach to surgery in which meticulous care is taken to remove all the tissue surrounding the tumour. There is some evidence from studies using historic controls[67] and non-randomised comparative studies[68] that TME may reduce recurrence rates and improve survival. However, there have been no randomised trials comparing TME with conventional surgery.

An advantage of TME is that it can preserve the anal sphincter. This avoids the need for a stoma (a new opening of the bowel at the abdominal surface for the evacuation of bowel contents) which impairs patients' quality of life.[69] When the tumour is very low in the rectum, there may be no alternative to abdomino-perineal resection (APER), which necessitates stoma formation. However, the wide range of reported APER rates (from 68% to 9%) suggests that some stomas could be avoided.[70, 71]

C.4 Emergency surgery: Outcomes are worse after emergency surgery.[55, 59, 61, 72–75] The Trent/Wales and Wessex audits reported 20% and 14% emergency rates respectively.[55, 59] Analysis of case-mix adjusted data from the Trent/Wales audit shows that the odds of death within 30 days for emergency admissions was 3.5 times higher (95% CI: 1.9, 6.6) than for elective surgery for colon cancer, and 13.3 times higher (95% CI: 3.5, 50.1) for rectal cancer. However, after exclusion of perioperative deaths, long term mortality was not affected.[59] It is not clear from the research evidence how such emergencies could be avoided or how the poorer outcomes associated with emergency admission could be improved.

C.5. Effects of specialisation and volume: There is contradictory evidence that specialisation and increased patient throughput improves outcomes. No volume or specialisation effects were found in either McArdle's Scottish study,[60] nor in an analysis of outcomes for around 2,000 patients included in the Trent/Wales audit of colorectal cancer,[59] or in a small study comparing teaching and district general hospitals.[76] On the other hand, a Finnish study found improved 5-year survival in regions served by university hospitals compared with those served by non-university hospitals, although it is not clear whether this is due to the presence of a radiotherapy unit in some hospitals, teaching hospital status or degree of specialisation.[77] Unpublished data from East Anglia and from Northern and Yorkshire cancer registries suggest that patients treated in larger hospitals or oncology centres have improved survival.

Three US observational studies looked for associations between in-hospital mortality and volume of surgery.[78–80] Of the two studies

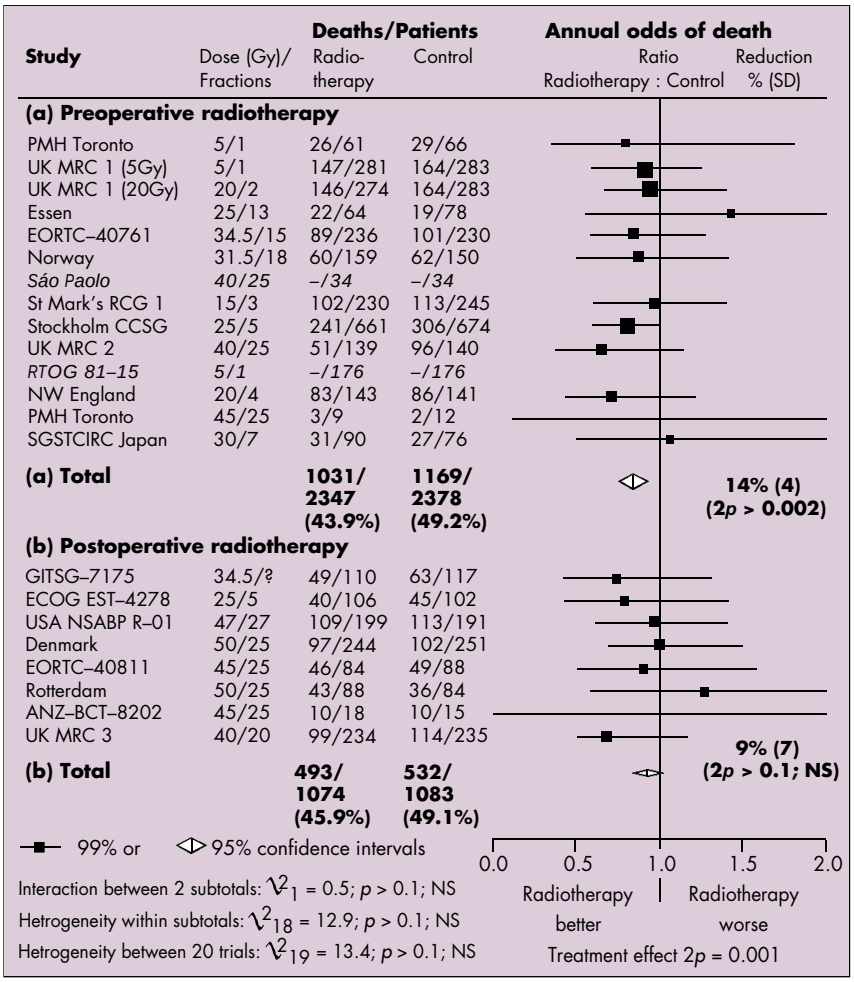


Fig. 3 Mortality from colorectal cancer in trials of radiotherapy versus the same management without radiotherapy in rectal cancer

which adequately adjusted for case -mix, one found lower mortality in hospitals where the number of patients treated for colorectal cancer was higher than the median, compared with lower volume hospitals (SMR 0.94 vs. 1.14, $p<0.05$);[78] the other found no volume effects.[79]

There is some evidence that volume of activity and specialisation may be associated with better surgical technique or practice. Surgeons who carry out more operations have been shown to be more likely to re-join the bowel successfully after removing the tumour (4.2% of the junctions (anastomoses) created by 5 higher-volume surgeons leaked, compared with 14% of those by 23 lower-volume surgeons, $p<0.05$).[81] In Oxford, surgical teams headed by specialists were more likely to perform primary resection (potentially curative surgery) and immediate anastomosis in emergency situations than those not headed by specialists (67% vs. 41%, $p<0.05$).[82]

Radiotherapy

C.6. Radiotherapy for rectal cancer: The effectiveness of radiotherapy was assessed in a series of meta-analyses by the Colorectal Cancer Collaborative Group. This included individual data on 6,000 patients in 12 studies of pre-operative radiotherapy[83–94] and 2,000 patients in eight studies of post-operative radiotherapy.[87, 95–101]

Pre-operative radiotherapy was associated with 14% (SD 4, $p = 0.002$) fewer deaths from colorectal cancer: 43.9% vs. 49.2% dead (Fig. 3). This was counterbalanced by an increase in deaths from other causes, but only in studies using obsolete techniques. The benefit is even greater in those patients who went on to have curative resections.

Post-operative radiotherapy leads to a reduction in local recurrence but no clear evidence of improved survival (Fig. 3). A randomised study showed that pre-operative radiotherapy is more effective than post-operative in improving survival and only takes one week rather than four or five, and causes less long-term morbidity.[102]

Where surgeons, working with pathologists, consistently achieve clear margins (see C.3) and therefore, low rates of local recurrence, it is not clear whether routine pre-operative radiotherapy is sufficiently beneficial to justify the costs and risks.[103] This will be investigated in a future trial (CRO7).

Radiotherapy can be highly effective in reducing symptoms (palliation) due to locally advanced rectal cancer in patients who have not previously had radiotherapy.[104]

Chemotherapy

C.7 Chemotherapy for primary colorectal cancer: The effectiveness of adjuvant chemotherapy (i.e. after surgery) was assessed in two meta-analyses. The Colorectal Cancer Collaborative Review Group pooled individual five-year survival data for 12,000 patients in 33 randomised controlled trials. This was supplemented by a meta-analysis of published data on 6,000 patients in 17 other studies.[13]

The results of 25 studies evaluating prolonged chemo-therapy using 5-fluorouracil/folinic acid (5-FU/FA) are shown in Fig. 4. This suggests that for every 100 patients with Dukes' stage C cancer treated for six months with 5-FU/FA, six deaths can be avoided (95% CI: 2% , 10%).[13] A one-week post-operative infusion of 5-FU directly into the liver may also be

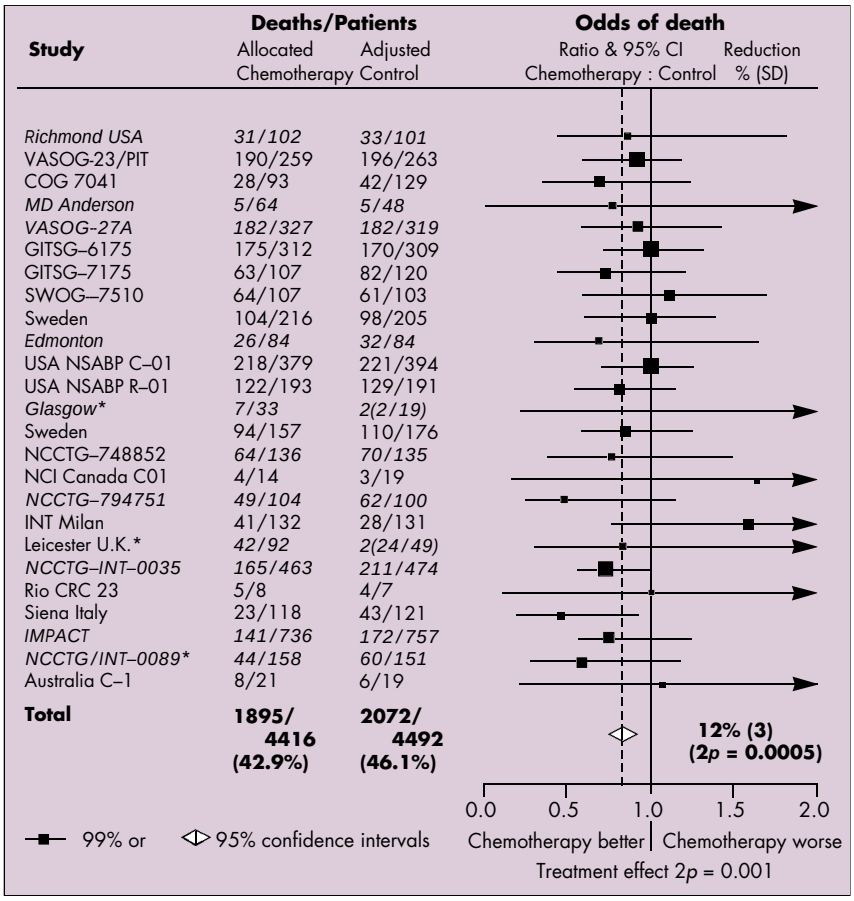


Fig. 4 Mortality in trials of prolonged (≥ 3 months) 5–Fluorouracil–based adjuvant chemotherapy regimens versus control with no chemotherapy.

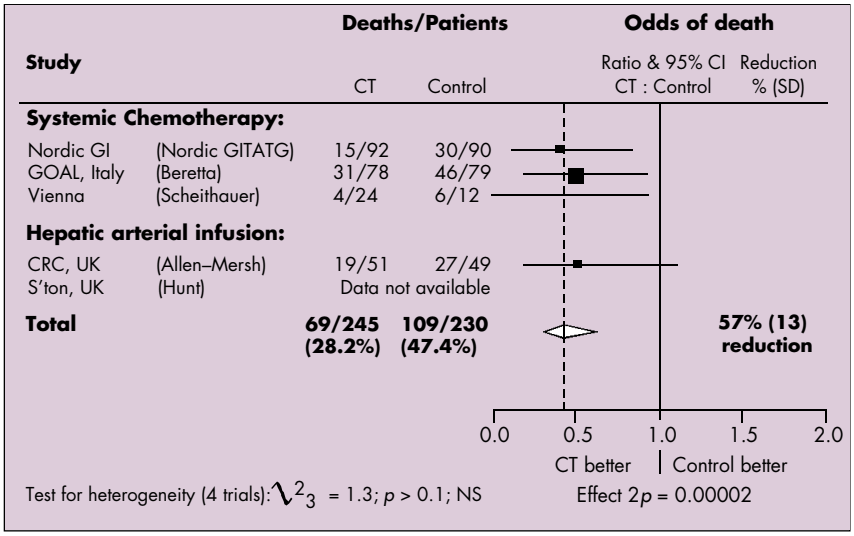


Fig. 5 Active chemotherapy (CT) versus symptom palliation only (control) in advanced colorectal cancer; six month survival.

effective.[105] It is not yet clear whether smaller potential benefits for patients with Dukes' stage B cancer outweigh the toxicity of chemotherapy; such patients should be entered into trials such as the QUASAR study.

Two economic evaluations suggest that adjuvant chemotherapy for stage C colorectal cancer, either given intraportally[106] or systemically[107] are relatively cost-effective, with a cost per discounted life year gained of around $1,000 to $2,000.

However, because of the adverse effects of adjuvant chemotherapy on quality of life, the cost of each quality adjusted life year (QALY) gained may be much greater.[108]

C.8. Chemotherapy for advanced or recurrent colorectal cancer: Five randomised trials compared chemotherapy given immediately on diagnosis of advanced or recurrent disease with chemotherapy for the palliation of symptoms. These show that early chemotherapy increases median survival (Fig. 5) and that symptom-free survival increases from a median of two months to ten months ($p < 0.001$).[109–113]

Meta-analyses of relevant randomised controlled trials suggest that: improved response rates can be achieved by supplementing 5-FU with methotrexate or folinic acid and that continuous infusion of 5-FU is more effective than bolus administration.[13] Supplemetation of 5-FU with folinic acid is more effective than the addition of methotrexate.[114] However, the gains of supplementation compared with 5-FU alone are modest and cost-effectiveness is not established.

A meta-analysis of hepatic arterial infusion[13] suggests that this is also associated with improved response rates[115–119] and possibly improved survival in patients with liver metastases.[112]

D. Follow-up

Patients who have had surgery with the intention of cure are often followed up to detect recurrences of the cancer in the hope that they will be resectable, leading to better overall survival. The nature, extent and frequency of follow-up varies widely. Tests may include: colonoscopy; laboratory analysis of carcinoembryonic antigen (CEA), liver function and faecal occult blood; and radiological investigations such as chest and colonic X-ray, liver ultrasound and

Table 2 Randomised trials of different follow-up schedules after surgery for colorectal cancer

Study country	Aims of study	Study design	Patient characteristics	Outcome Measures	Results	Comments
Lennon, 1995[129] UK Ia	To assess the value of surgical intervention for recurrent colorectal cancer based on rising carcinoembryonic antigen (CEA) levels.	RCT, 5 year follow-up. CEA monitored monthly (blind), years 1–3, 3 monthly years 4–5 after primary resection, in 1447 patients; randomised 1982–93 if CEA rose significantly. **"Aggressive" (A) group** (*n*=108): rise in CEA led to work-up prior to "second look" surgery. **"Conventional" (C) group** (*n*=108): clinician not informed of CEA rise.	All apparently disease-free at clinical examination before CEA rise observed; symptomatic patients excluded.	5 year survival; number undergoing 2nd look surgery.	Survival: Group A: 20.4% at 5 years; group C: 22%;. Survival Hazard ratio for "conventional" to "aggressive" 0.84 (95% CI: 0.62, 1.13). 62% in aggressive, 23% in conventional group had 2nd look surgery.	More detailed questioning showed some apparently disease free patients did have symptoms. Trial closed following recommendation that survival advantage for second-look surgery highly unlikely.
Ohlsson 1995[127] Sweden Ib	To compare intensive follow-up with no follow-up after curative surgery for colorectal cancer.	RCT, 5-year follow-up. 107 patients randomised 1983–6, 3 months after primary surgery & colonoscopy to remove polyps. **Intensive follow-up (FU) group** (*n*=53): frequent clinical examination for >5 years, plus colonoscopy, CT (in patients who underwent APER), lung x-ray, liver function tests, CEA & FOBT monitoring. **Control group** (*n*=54): no follow-up.	Mean age 66, 33% tumour in rectum, 66% colon. Exclusions: patients with distant metastases, also those in whom age or severe illness might preclude treatment of recurrent disease.	5-year and cancer-specific survival. Tumour recurrence. Test that first signalled recurrence.	5 year survival, 75% in FU group, 67% in controls (p>0.05); corresponding cancer-specific survival rates 78% and 71%. Tumour recurred in 33%. FU group: recurrence first signalled by symptoms in 47%, CEA in 41%. Controls: symptoms first sign of recurrence in 83%.	Authors conclude that intensive follow-up did not improve survival. However the study was too small to be conclusive.
Makela 1995[128] Finland Ib	To assess the value of intensified follow-up after curative surgery for colorectal cancer.	RCT, 5 year follow-up. 106 consecutive patients randomised after primary surgery, 1988–90. All seen in outpatient clinic 3 monthly for 2 years, then 6 monthly; FOBT & CEA tests, chest x-ray, cbc count. **Intensified follow up group** (*n*=52): yearly colonoscopy, sigmoidoscopy 3 monthly for rectal or sigmoid cancer. Liver ultrasound 6 monthly, CT scan yearly. **Conventional group** (*n*=54): barium enema yearly, rigid sigmoidoscopy 3 monthly if rectal cancer.	Mean age 66, no information on exclusions. 26% stage A, 45% stage B, 28% stage C. 29% had rectal tumours, 71% colon (including sigmoid).	Time of detection of recurrence, re-resectability & survival.	Cumulative 5 year survival 59% in intensive group, 54% in controls (p=0.5). Recurrence identified earlier in intensive group (mean 10 vs. 15 months) Endoscopy & ultrasound useful, not CT. Reresections on 22% of intensive group, 14% of conventional group. Over half asymptomatic when recurrence diagnosed.	Authors conclude that more intensive follow-up does not improve survival. However the study was too small to be conclusive.

CT scanning.[55, 120–122] However, even with follow-up as frequent as every 3 months, most recurrences are discovered as a result of symptoms reported by patients, and even those discovered by testing are rarely amenable to cure.[55, 123–126]

Three randomised controlled trials have evaluated more intensive follow-up using CEA and other tests.[127–129] Taken together, they suggest that more intensive follow-up leads to more surgery with no evidence of patient benefit (Table 2). A large cohort study also found little difference in survival.[130] A meta-analysis of data from non-randomised studies suggested a slight, but not statistically significant, survival advantage of more intensive follow-up, possibly caused by selection bias.[131]

Four studies looking at the costs and potential benefits of patient follow-up after potentially curative colorectal cancer treatment conclude that, for most patients, follow-up leads to a significant increase in costs without an increase in life expectancy.[132–135]

E. Implications

The research evidence has the following implications which include the six key recommendations identified in the COG guidance.[11] If implemented, they would make a major contribution to improving quality of care. The first of these, on patient focus, is general to all cancer sites. The evidence for this can be found in a previous bulletin (*Effective Health Care* 1996, Vol. 2 No. 6, *The Management of Primary Breast Cancer*) and in the research evidence document.[13]

- **Patient focus**
  Patients should be offered full verbal and written information about their condition and about any treatment that may be offered. This should take the individual needs of patients into account. Patients should have continuing access to a member of the core team who can offer guidance and support.

- **Multi-disciplinary teams**
The management of colorectal cancer in the UK is highly varied and sometimes poorly co-ordinated. Management by multi-disciplinary teams which work to agreed protocols is likely to facilitate improved quality and co-ordination of care. The establishment of co-ordinated teamwork may be a necessary condition for delivering services in a way that is compatible with the research evidence, and for monitoring and improving standards. These teams should include clinicians with up-to-date knowledge of diagnosis and treatment of colorectal cancer, and specialised nursing staff who can support and advise patients.

- **Endoscopy facilities**
Adequate endoscopy facilities should be provided to help ensure accurate and timely diagnosis. The quality of diagnostic procedures – particularly colonoscopy completion and complication rates – should be monitored and staff should be given additional training when necessary to improve standards. Results of diagnostic tests should be audited and further training in colonoscopy should be given when completion rates are below 85%.

- **Surgery for rectal cancer**
Surgery for rectal cancer should be concentrated in the hands of surgeons who can demonstrate good results, particularly in terms of low recurrence rates. These surgeons should monitor their performance by working closely with histopathologists.

- **Improved pathology reporting**
Pathology reporting should be sufficiently detailed to give comprehensive feedback on the adequacy of surgery, particularly for rectal cancer. Reports on surgical specimens should include data on the size, type, grade and Dukes' stage of tumour, and the involvement of lymph nodes and surgical margins. This information is important to guide treatment decisions, for routine collection of data on case-mix by cancer registries, and for monitoring long-term outcomes.

- **Adjuvant therapies**
Pre-operative radiotherapy should be available for patients with rectal cancer particularly where surgeons do not achieve low rates of local recurrence. Adjuvant chemotherapy can improve survival in some groups of patients and should be more widely available. Large scale, nationally or internationally co-ordinated randomised controlled trials should be supported in order to determine the best management of patients with colorectal cancer.

- **Follow-up**
There is insufficient evidence to justify routine intensive follow-up. A reduction in intensity of follow-up may result in considerable savings with no reduction in quality of care.

References

1. Office of National Statistics. *Monitor*: Stationery Office, 1997.
2. Winawer SJ, Fletcher RH, Miller L, et al. Colorectal cancer screening: clinical guidelines and rationale. *Gastroenterology* 1997;112:594–642.
3. Irwig L, Towler B, Haas M, et al. *Should we screen for colorectal cancer?* Sydney: Department of Public Health, University of Sydney, and The Epidemiology and Health Services Evaluation Branch, NSW Department of Health, 1994.
4. Fuchs CS, Giovannucci EL, Colditz GA, et al. A prospective study of family history and the risk of colorectal cancer. *N Engl J Med* 1994;331:1669–74.
5. Hall NR, Finan PJ, Ward B, et al. Genetic susceptibility to colorectal cancer in patients under 45 years of age. *Br J Surg* 1994;81:1485–9.
6. St John DJ, McDermott FT, Hopper JL, et al. Cancer risk in relatives of patients with common colorectal cancer. *Ann Intern Med* 1993;118:785–90.
7. Dukes CE. The classification of cancer of the rectum. *J Pathol Bacteriol* 1932;35:323–32.
8. Robinson MHE, Thomas WM, Hardcastle JD, et al. Change towards earlier stage at presentation of colorectal cancer. *Br J Surg* 1993;80:1610–2.
9. Mulcahy HE. Frequency and survival statistics for colorectal cancer based on data from 777 patients derived from St Vincent's Hospital Colorectal Cancer Database, Dublin, 1997.
10. World Health Organisation IAfRoC, European Commission,. *Survival of cancer patients in Europe: the Eurocare Study.* Lyon: IARC Scientific Publications, 1995.
11. Cancer Guidance Sub–Group of the Clinical Outcomes Group. *Improving Outcomes in Colorectal Cancer: Guidance for General Practitioners and Primary Health Teams.* London: NHS Executive, Department of Health, 1997.
12. Cancer Guidance Sub–Group of the Clinical Outcomes Group. *Improving Outcomes in Colorectal Cancer: The Manual.* London: NHS Executive, Department of Health, 1997.
13. Cancer Guidance Sub–Group of the Clinical Outcomes Group. *Improving Outcomes in Colorectal Cancer: The Research Evidence.* London: NHS Executive, Department of Health, 1997.
14. Hardcastle JD, Chamberlain JO, Robinson MH, et al. Randomised controlled trial of faecal–occult blood screening for colorectal cancer. *Lancet* 1996;348:1472–7.

15. Kronborg O, Fenger C, Olsen J, et al. Randomised study of screening for colorectal cancer with faecal–occult–blood test. *Lancet* 1996;348:1467–71.

16. Mandel JS, Bond JH, Church JR, et al. Reducing mortality from colorectal cancer by screening for faecal occult blood. *N Engl J Med* 1993;328:1365–71.

17. Selby JV, Friedman GD, Quesenberry CP, et al. A case–control study of screening sigmoidoscopy and mortality from colorectal cancer. *N Engl J Med* 1992;326:653–7.

18. Newcomb PA, Norfleet RG, Storer BE, et al. Screening sigmoidoscopy and colorectal cancer mortality. *J Natl Cancer Inst* 1992;84:1572–5.

19. Dunlop M, Campbell H. Screening for people with a family history of colorectal cancer. *BMJ* 1997; 314: 1779–80.

20. Jarvinen HJ, Mecklin JP, Sistonen P. Screening reduces colorectal cancer rate in families with hereditary nonpolyposis colorectal cancer. *Gastroenterology* 1995;108:1405–11.

21. Houlston RS, Murday V, Harocopos C, et al. Screening and genetic counselling for relatives of patients with colorectal cancer in a family cancer clinic. *BMJ* 1990;301:366–8.

22. Hodgson SV, Bishop DT, Dunlop MG, et al. Suggested screening guidelines for familial colorectal cancer. *J Med Screening* 1995;2:45–51.

23. Brown ML, Kessler LG. Use of gene tests to detect hereditary predisposition to cancer: what do we know about cost–effectiveness? *Int J Cancer* 1996;69:55–7.

24. Rozen P, Ron E. A cost analysis of screening methodology for family members of colorectal cancer patients. *Am J Gastroenterol* 1989;84:1548–51.

25. Hardcastle JD, Justin TA. Screening high–risk groups for colorectal neoplasia. *Am J Gastroenterol* 1996;91:850–2.

26. Fijten GH, Starmans R, Muris JWM, et al. Predictive value of signs and symptoms for colorectal cancer in patients with rectal bleeding in general practice. *Fam Pract* 1995;12:279–86.

27. Goulston KJ, Cook I, Dent O. How important is rectal bleeding in the diagnosis of bowel cancer or polyps? *Lancet* 1986;2:261–5.

28. Helfand M, Marton KI, Zimmer–Gembeck MJ, et al. History of visible rectal bleeding in a primary care population. *JAMA* 1997;277:44–8.

29. Holliday HW, Hardcastle JD. Delay in diagnosis and treatment of symptomatic colorectal cancer. *Lancet* 1979;1:309–11.

30. Rowe–Jones DC, Aylett SO. Delay in treatment in carcinoma of colon and rectum. *Lancet* 1965;2:973–6.

31. Dixon AR, Thornton–Holmes J, Cheetham NM. General practitioners' awareness of colorectal cancer: a 10 year review. *BMJ* 1990;301:152–3.

32. Goodman D, Irvin TT. Delay in the diagnosis and prognosis of carcinoma of the right colon. *Br J Surg* 1993;80:1327–9.

33. Stubbs RS, Long MG. Symptom duration and pathologic staging of colorectal cancer. *J Surg Oncol* 1986;12:127–30.

34. MacAdam DB. A study in general practice of the symptoms and delay patterns in the diagnosis of gastrointestinal cancer. *J R Coll General Practitioners* 1979;29:723–9.

35. Crosland A, Jones R. Rectal bleeding: prevalence and consultation behaviour. *BMJ* 1995;311:486–8.

36. Jones RVH, Dudgeon TA. Time between presentation and treatment of six common cancers: a study in Devon. *Br J Gen Pract* 1992;42:419–22.

37. Ratcliffe R, Kiff RS, Kingston RD, et al. Early diagnosis in colorectal cancer. Still no benefit? *J R Coll Surg Edinb* 1989;34:152–5.

38. Robinson E, Mohilever J, Zidan J, et al. Colorectal cancer: incidence delay in diagnosis and stage of disease. *Eur J Cancer Clin Oncol* 1986;22:157–61.

39. Clarke PJ, Dehn TCB, Kettlewell MGW. Changing patterns of colorectal cancer in a regional teaching hospital. *Ann R Coll Surg Engl* 1992;74:291–3.

40. Spratt JS. *Neoplasms of the Colon, Rectum and Anus.* Philadelphia: WB Saunders Company, 1984: 247–8.

41. Rex DK, Weddle RA, Lehman GA, et al. Flexible sigmoidoscopy plus air contrast barium enema versus colonoscopy for suspected lower gastrointestinal bleeding. *Gastroenterology* 1990;98:855–61.

42. Kewenter J, Brevinge H, Engaras B, et al. The yield of flexible sigmoidoscopy and double–contrast barium enema in the diagnosis of neoplasms in the large bowel in patients with a positive hemoccult test. *Endoscopy* 1995;27:159–63.

43. Walker AR, Whynes DK, Chamberlain JO, et al. The hospital costs of diagnostic procedures for colorectal cancer. *J Clin Epidem* 1991;44:907–14.

44. Raymond JM, Tissot B, Dartigues JF, et al. Qualite des coloscopies realisees en pratique courante dans la region Aquitaine. *Gastroenterol Clin Biol* 1994;18:310–6.

45. Arblaster MJ, Collopy BT, Elliot PR, et al. Colonoscopy in a private hospital: continuous quality improvements in practice. *Australian Clini Rev* 1992;12:71–6.

46. Church JM. Complete colonoscopy: how often? and if not, why not? *Am J Gastroenterol* 1994;89:556–60.

47. Parry BR, Goh HS. Quality control in colonoscopy: a Singapore perspective. *Int J Colorectal Dis* 1993;8:139–41.

48. Cass OW, Freeman ML, Peine CJ, et al. Objective evaluation of endoscopy skills during training. *Ann Intern Med* 1993;118:40–4.

49. Hawes R, Lehman GA, Hast J, et al. Training resident physicians in fiberoptic sigmoidoscopy: how many supervised examinations are required to achieve competence. *Am J Med* 1986;80:465–70.

50. Maule WF. Screening for colorectal cancer by nurse endoscopists. *N Engl J* Med 1994;330:183–7.

51. Stevenson G. Radiology in the detection and prevention of colorectal cancer. *Eur J Cancer* 1995;31:1121–6.

52. Collier BD, Foley WD. Current imaging strategies for colorectal cancer. *J Nucl Med* 1993;34:537–40.

53. Malone DE, McGrath FP. Optimizing the detection of colorectal liver metastases within the Canadian health care system. *Can Assoc Radiol J* 1993;44:5–13.

54. Zerhouni EA, Rutter C, Hamilton SR, et al. CT and MR imaging in the staging of colorectal carcinoma: report of the Radiology Diagnostic Oncology Group II. *Radiology* 1996;200:443–51.

55. Wessex Colorectal Cancer Audit. *Progress Report.* Winchester: Institute of Public Health Medicine, 1996.

56. Mountney L, Sanderson H, Harris J. Colorectal cancer. In: Stevens A, Raftery J, editors. *Health Care Needs Assessment.* Oxford: Radcliffe, 1994.

57. Yorkshire Cancer Registry. Unpublished data, 1996.

58. Phillips RKS, Hittinger R, Blesovksy L, et al. Local recurrence following 'curative' surgery for large bowel cancer: I. The overall picture. *Br J Surg* 1984;71:12–6.

59. Rice N, Eastwood A, Sheldon T, et al. *Risk factors associated with survival from colorectal cancer,* mimeo, University of York.

60. McArdle CS, Hole D. Impact of variability among surgeons on postoperative morbidity and mortality and ultimate survival. *BMJ* 1991;302:1501–5.

61. Riedl ST, Wiebelt H, Bergmann U, et al. Postoperative morbidity and mortality in colon carcinoma. Results of the German mulitcenter study of the Study Group Colorectal Carcinoma (SGCRC). *Der Chirurg* 1995;66:597–606.

62. Hermanek P, Wiebelt H, Staimmer D, et al. Prognostic factors of rectum carcinoma – experience of the German multicentre study SGCRC. *Tumori* 1995;81:60–4.

63. Adam IJ, Mohamdee MO, Martin IG, et al. Role of circumferential margin involvement in the local recurrence of rectal cancer. *Lancet* 1994;344:707–11.

64. Ng IOL, Luk ISC, Yuen ST, et al. Surgical lateral clearance in resected rectal carcinomas. A multivariate analysis of clinicopathological features. *Cancer* 1993;71:1972–6.

65. Quirke P. Limitations of existing systems of staging for rectal cancer: the forgotten margin. In: Soreide, editor. *Rectal Cancer Research*: Springer–Verlag, 1997:63–81.

66. Bull AD, Biffin AHB, Mella J, et al. *Colorectal cancer pathology reporting: a regional audit.* Cardiff: University Wales College of Medicine, 1996.

67. Arbman G, Nilsson E, Hallbook O, et al. Local recurrence following total mesorectal excision for rectal cancer. *Br J Surg* 1996;83:375–9.

68. MacFarlane JK, Ryall RDH, Heald RJ. Mesorectal excision for rectal cancer. *Lancet* 1993;341:457–60.

69. Sprangers MAG, Taal BG, Aaronson NK, et al. Quality of life in colorectal cancer: stoma vs nonstoma patients. *Dis Colon Rectum* 1995;38:361–9.

70. Allum WH, Slaney G, McConkey CC, et al. Cancer of the colon and rectum in the West Midlands, 1957–1981. *Br J Surg* 1994;81:1060–3.

71. Hall C, Rowley S, Neoptolemos JP. Anastomosis or stoma for low rectal cancer? *Postgrad Med J* 1989;65:144–9.

72. Waldron RP, Donovan IA, Drumm J, et al. Emergency presentation and mortality from colorectal cancer in the elderly. *Br J Surg* 1986;73:214–6.

73. Anderson JH, Hole D, McArdle CS. Elective versus emergency surgery for patients with colorectal cancer. *Br J Surg* 1992;79:706–9.

74. Gordon NLM, Dawson AA, Bennett B, et al. Outcome in colorectal adenocarcinoma: two seven–year studies of a population. *BMJ* 1993;307:707–10.

75. Runkel NS, Schlag P, Schwarz V, et al. Outcome after emergency surgery for cancer of the large intestine. *Br J Surg* 1991;78:183–8.

76. Sagar PM, Hartley MN, MacFie J, et al. Comparison of individual surgeon's performance. *Dis Colon Rectum* 1996; 39:654–8.

77. Hakama M, Karjalainen S, Hakulinen T. Outcome–based equity in the treatment of colon cancer patients in Finland. *Int J Tech Assess in Health Care* 1989;5:619–30.

78. Flood AB, Scott WR, Ewy W. Does Practice Make Perfect? Part I: The relation between hospital volume and outcomes for selected diagnostic categories. *Medical Care* 1984;22:98–114.

79. Kelly JV, Hellinger FJ. Physician and hospital factors associated with mortality of surgical patients. *Medical Care* 1986;24:785–800.

80. Burns LR, Wholey DR. The effects of patient, hospital, and physician characteristics on length of stay and mortality. *Medical Care* 1991;29:251–71.

81. The Consultant Surgeons and Pathologists of the Lothian and Borders Health Borders. Lothian and Borders large bowel cancer project: immediate outcome after surgery. *Br J Surg* 1995;82:888–90.

82. Darby CR, Berry AR, Mortensen N. Management variability in surgery for colorectal emergencies. *Br J Surg* 1992;79:206–10.

83. Swedish Rectal Cancer Group. Improved survival with pre–operative radiotherapy in resectable rectal cancer. *N Engl J Med* 1997;336:980–7.

84. Stockholm Rectal Cancer Study Group. Preoperative short–term radiation therapy in operable rectal carcinoma: a prospective randomised trial. *Cancer* 1990;66:49–55.

85. Goldberg PA, Nicholls RJ, Porter NH, et al. Long–term results of a randomised trial of short–course low–dose adjuvant preoperative radiotherapy for rectal cancer: reduction in local treatment failure. *Eur J Cancer* 1994;30A:1602–6.

86. Marsh P, James R, Schofield LPF, et al. Adjuvant pre–operative Radiotherapy for locally advanced rectal carcinoma: results of a prospective randomised trial. *Dis Colon Rectum* 1994;37:1205–14.

87. Medical Research Council Rectal Cancer Working Party. Randomised trial of sugery alone versus radio-therapy followed by surgery for potentially operable locally advanced rectal cancer. *Lancet* 1996;348:1605–10.

88. Gerard A, Buyse M, Nordinger B, et al. Preoperative radiotherapy as adjuvant treatment in rectal cancer: final results of a randomised study of the European Organisation for Research and Treatment of Cancer (EORTC). *Ann Surg* 1988;208:606–14.

89. Dahl O, Horn A, Morild I, et al. Low dose preoperative radiation postpones recurrences in operable rectal cancer: results of a randomised multicentre trial in Western Norway. *Cancer* 1990;66:2286–94.

90. Niebel W, Schulz U, Ried M, et al. Five year results of a prospective randomised study: experience with combined radiotherapy and surgery for primary rectal carcinoma. *Recent Results in Cancer Res* 1988;110: 111–3.

91. MRC Working Party – Second Report. The evaluation of low dose preoperative X–ray therapy in the management of operable rectal cancer. *Br J Surg* 1984;71:21–5.

92. Sause WT, Martz KL, Noyes D, et al. RTOG 81–15 ECOG 83–23 evaluation of pre–operative radiation therapy in operable rectal carcinoma. *Int J Rad Oncol Biol Phys* 1990;19:179.

93. Rider WD, Palmer JA, Mahoney LJ, et al. Pre–operative irradiation in operable cancer of the rectum. Report of the Toronto trial. *Can J Surg* 1977;20:335–8.

94. Reis Neto JA, Quichi FA, Reis JA. A comparison of non–operative vs preoperative radiotherapy in rectal carcinoma: a 10 year randomised trial. *Dis Colon Rectum* 1989;32:702–10.

95. Thomas PRM, Lindblad AS. Adjuvant postoperative radiotherapy and chemotherapy in rectal carcinoma: a review of the Gastrointestinal Tumour. Study Group experience. *Radiother Oncol* 1988;13:245–52.

96. Buyse M, Zeleniuch–Jacquotte A, Chalmers TC. Adjuvant therapy of colorectal cancer. Why we still don't know. *JAMA* 1988;259:3571–8.

97. Treurniet–Donker AD, Van Putten WLJ, Wereldsma JCJ, et al. Postoperative radiation therapy for rectal cancer: an interim analysis of a prospective multicentre trial in The Netherlands. *Cancer* 1991;67:2042–8.

98. Balslev I, Pedersen M, Teglbjaerg PS, et al. Postoperative radiotherapy in Dukes' B and C carcinoma of the rectum and rectosigmoid: a randomised multicentre study. *Cancer* 1986;58:22–8.

99. Marneghan H, Gray BN, de Zwart J, et al. Adjuvant post–operative radiotherapy in rectal cancer: results from the ANZ bowel cancer trial (Protocol 8202). *Australas Radiol* 1991;35:61–5.

100. Mansour E, Lefkopoulou M, Johnson R, et al. A comparison of post–operative chemotherapy, radiotherapy or combination therapy in potentially curable rectal carcinoma: an ECOG study EST 4276. In the proceedings of the American Society of Clinical Oncology, 1991.

101. Fisher N, Wolmark N, Richette H, et al. Post–operative adjuvant chemotherapy or radiation therapy for rectal cancer: results from the NSABP Protocol R–01. *J Natl Cancer Inst* 1988;80:21–9.

102. Frykholm GJ, Glimelius B, Pahlman L. Pre–operative or post–operative irradiation in adenocarcinoma of the rectum: final treatment results of a randomised trial and an evaluation of late secondary effects. *Dis Colon Rectum* 1993;36:564–72.

103. Kim NK, Senagore AJ, Luchiefeld MA, et al. Adjuvant radiation therapy in resectable rectal cancer: should local recurrence rates affect the decision? *Am Surg* 1997;63:579–85.

104. Swedish Council on Technology Assessment in Health Care. Radiotherapy for cancer. Volume 2: a critical review of the literature. *Acta Oncol* 1996;35:64–9.

105. Liver Infusion Meta–analysis Group. Portal vein chemotherapy for colorectal cancer: a meta–analysis of 4000 patients in 10 studies. *J Natl Cancer Inst* 1997;89:497–505.

106. Messori A, Bonistalli L, Costantini M, et al. Cost effectiveness of adjuvant intraportal chemotherapy in patients with colorectal cancer. *J Clin Gastroenterol* 1996;23:269–74.

107. Brown ML, Nayfield SG, Shibley LM. Adjuvant therapy for stage III colon cancer: economic returns to research and cost–effectiveness of treatment. *J Natl Cancer Inst* 1994;86:424–30.

108. Smith RD, Hall J, Gurney H, et al. A cost–utility approach to the use of 5–fluorouracil and levamisole as adjuvant chemotherapy for Dukes' C colonic carcinoma. *Med J Aust* 1993;158:319–22.

109. Nordic Gastrointestinal Tumour Adjuvant Therapy Group. Expectancy or primary chemotherapy in patients with advanced asymptomatic colorectal cancer: a randomised trial. *J Clin Oncol* 1992;10:904–11.

110. Beretta G, Bollina R, Labianca R, et al. A controlled trial of supportive care (SC) versus SC plus 5–fluorouracil/folinic acid (Ff) for advanced metastatic gastric carcinomas (AMGC), in the elderly patient. In the proceedings of the American Society of Clinical Oncology, 1994.

111. Scheithauer W, Rosen H, Gabriela–Verena K, et al. Randomised comparison of combination chemotherapy plus supportive care alone in patients with metastatic colorectal cancer. *BMJ* 1993;306:752–5.

112. Allen–Mersh TG, Earlam S, Fordy C, et al. Quality of life and survival with continuous hepatic–artery floxuridine infusion for colorectal liver metastases. *Lancet* 1994;344:1255–60.

113. Hunt TM, Flowerdrew ADS, Birch SJ, et al. Prospective randomised controlled trial of hepatic arterial embolisation of infusion chemotherapy with 5–fluorouracil and degradable starch microspheres for colorectal liver metastases. *Br J Surg* 1990;77:779–82.

114. Poon MA, O'Connell MJ, Wieand HS, et al. Biochemical modulation of fluorouracil with leucovorin: confirmatory evidence of improved therapeutic efficacy in advanced colorectal cancer. *J Clin Oncol* 1991;9:1967–72.

115. Hohn DC, Stagg RJ, Friedman MA, et al. A randomised trial of continuous intravenous versus hepatic intraarterial floxuridine in patients with colorectal cancer metastatic to the liver: the Nothern California Oncology Group trial. *J Clin Oncol* 1989;7:1646–54.

116. Kemeny N, Daly J, Reichman B, et al. Intrahepatic or systemic infusion of fluorodeoxyuridine in patients with liver metastases from colorectal carcinoma: a randomised trial. *Ann Intern Med* 1987;107:459–65.

117. Martin JK, O'Connell MJ, Wieand HS, et al. Intra–arterial floxuridine vs systemic fluorouracil for hepatic metastases from colorectal cancer: a randomised trial. *Arch Surg* 1990;125:1022–7.

118. Kemeny MM, Goldberg D, Beatty JD, et al. Results of a prospective randomised trial of continuous regional chemotherapy and hepatic resection as treatment of hepatic metastases from colorectal cancer. *Cancer* 1986;57:492–8.

119. Chang AE, Schneider PD, Sugarbaker PH, et al. A prospective randomised trial of regional versus systemic continuous 5–fluorodeoxyuridine chemotherapy in the treatment of colorectal liver metastases. *Ann Surg* 1987;206:685–93.

120. Mella J, Datta SN, Biffin A, et al. *Surgeons' follow–up practice after resection of colorectal cancer.* London: Royal College of Surgeons of England, 1996.

121. Foster ME, Hill J, Leaper DJ. Follow–up after colorectal cancer – current practice in Wales and southwest England. *Int J Colorectal Dis* 1987;2:118–9.

122. Vernava AM, Longo WE, Virgo KS, et al. Current follow–up strategies after resection of colon cancer: results of a survey of ASCRS. *Dis Colon Rectum* 1994;37:573–83.

123. Pugliese V, Aste H, Saccomanno S, et al. Outcome of follow–up programs in patients previously resected for colorectal cancer. *Tumori* 1984;70:203–8.

124. Hulton NR, Hargreaves AW. Is long–term follow–up of all colorectal cancer necessary? *J R Coll Surg Edinb* 1989;34:21–4.

125. Cochrane JPS, Williams HT, Gaber RG, et al. Value of outpatient follow–up after curative surgery for carcinoma of the large bowel. *BMJ* 1980:593–5.

126. Tornqvist A, Ekelund G, Leandoer L. The value of intensive follow–up after curative resection for colorectal carcinoma. *Br J Surg* 1982;69:725–8.

127. Ohlsson B, Breland U, Ekberg H, et al. Follow–up after curative surgery for colorectal carcinoma. Randomised comparison with no follow–up. *Dis Colon Rectum* 1995;38:619–26.

128. Makela JT, Laitinen SO, Kairaluoma MI. Five–year follow–up after radical surgery for colorectal cancer. Results of a prospective randomised trial. *Arch Surg* 1995;130:1062–7.

129. Lennon T, Houghton J, Northover J. What is the value of clinical follow–up for colorectal cancer patients? The experience of the CRC/NIH CEA second–look trial. In the proceedings of the Nottingham International Colorectal Cancer Symposium, Nottingham 1995.

130. Moertel CG, Fleming TR, MacDonald JS, et al. An evaluation of the carcinoembryonic antigen (CEA) test for monitoring patients with resected colon cancer. *JAMA* 1993;270:943–7.

131. Bruinvels DJ, Stiggelbout AM, Kievet J, et al. Follow–up of patients with colorectal cancer: a meta–analysis. *Ann Surg* 1994;219:174–82.

132. Audisio RA, Setti–Carraro P, Segala M, et al. Follow–up in colorectal cancer patients: a cost–benefit analysis. *Ann Surg Oncol* 1996;3:349–57.

133. Virgo KS, Vernava AM, Longo WE, et al. Cost of patient follow–up after potentially curative colorectal cancer treatment. *JAMA* 1995;273:1837–41.

134. Kievit J, Bruinvels DJ. Detection of recurrence after surgery for colorectal cancer. *Eur J Cancer* 1995;31A:1222–5.

135. Edelman MJ, Meyers FJ, Siegel D. The utility of follow–up testing after curative cancer therapy: a critical review and economic analysis. *J Gen Intern Med* 1997;12:318–31.

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