Clinical utility and cost-effectiveness of routine preoperative computed tomography scanning in patients with colon cancer

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The study examined routine preoperative computed tomography (CT) scanning of the abdomen and pelvis in patients with colon cancer. The patients were scanned at 5-mm intervals from the diaphragm to the pubic symphysis. The scans were interpreted as positive for hepatic metastases if they showed one or more low-attenuation or rim-enhancing solid masses.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with colon cancer.

Setting
The setting was tertiary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness and resource use data were gathered from November 1, 1997 to May 31, 2003. The price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was performed retrospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were not reported. Of the 140 consecutive patients who had been evaluated and treated for colon cancer at the authors’ institution, 130 patients received preoperative CT scans of the abdomen and pelvis per protocol and were included in the current study. There were 126 men and 4 women. The mean age was 67 years. No patient appears to have been excluded from the study sample.
Study design
This was a diagnostic study that was carried out at a single centre, the Veteran Affairs Puget Sound Healthcare System (VAPSHCS), Seattle (WA), USA. The impact of CT scanning was assessed by reviewing the medical records of patients identified at the authors' institution. The length of follow-up was unclear. No patient was lost to the follow-up assessment. No blinding of the outcome assessment was performed.

Analysis of effectiveness
All of the patients were included in the analysis of effectiveness. The clinical outcomes were CT scan findings, the accuracy of CT scanning, and the results of CT-directed clinical management.

Effectiveness results
The use of a preoperative scan showed a number of clinical characteristics previously unknown to the surgeon. The preoperative scan showed clinically significant local extension of the disease in 9% of the cases. In addition, metastatic disease was shown in 15% of the patients, vascular abnormalities were diagnosed in 10% of patients, and synchronous malignancies were diagnosed in 4% of the patients. Additional pathologies were shown in 13% of the patients.

The preoperative CT scan missed metastatic disease in 6 cases.

The sensitivity of the preoperative scan for liver metastases was 90%, the specificity was 99%, the positive predictive value was 95%, and the negative predictive value was 99%.

The sensitivity of the preoperative scan for all metastases was 75%, the specificity was 99%, the positive predictive value was 95%, and the negative predictive value was 95%.

The preoperative scan directly aided operative planning in 43 cases (33%) and definitely altered treatment in 21 cases (16%).

Clinical conclusions
The effectiveness analysis showed that the use of CT scanning aided operative planning and altered the treatment received in a fraction of patients with colon cancer.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was performed.

Direct costs
The cost analysis was undertaken from the perspective of the third-party payer. The study focused on the cost-savings provided by the preoperative information derived from CT scanning. The costs of CT scanning involved three main components: nursing, the surgeon, and cleaning of the operating room. The costs of hospital stay were included in the calculation of the total costs. The cost of the surgical procedure and the cost of postoperative care represented cost-savings. These were derived by avoiding surgical procedures in patients who would have had an operation without the benefit of the preoperative CT scan. The total cost of CT scans was subtracted from this estimate to determine the net cost (or savings) to the institution of routine preoperative CT scanning. The unit costs were not presented separately from the quantities of resources used. Resource use was estimated from the medical records of patients included in the effectiveness analysis from 1997 to 2003. The costs were derived from the Decision Support System, the institutional accounting system at VAPSHCS. The price year was not stated. Discounting was not relevant, because the costs per patient were incurred during a short timeframe, and was not carried out.

Statistical analysis of costs
The costs were treated deterministically.

**Indirect Costs**
The indirect costs were not considered in the economic analysis.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were not performed.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The total cost of a CT scan for all 130 patients was $28,602. The total cost-savings associated with the use of the CT scan would have been $24,017 over 6 years.

**Synthesis of costs and benefits**
A synthesis of costs and benefits was not relevant since a cost-consequences analysis was carried out.

**Authors' conclusions**
The preoperative use of computed tomography (CT) scanning of the abdomen and pelvis in patients with colon cancer provided important treatment information in a third of the patients, changed management in a smaller sub-set, and reduced the use of hospital resources because the savings achieved by averting non-therapeutic operations and postoperative hospitalisation offset the cost of routine CT scanning. The authors stated that, owing to the results of the current study, preoperative CT scan was included as a component of the clinical pathway for all patients with colon cancer at their institution.

**CRD COMMENTARY - Selection of comparators**
The selection of the comparators was appropriate as they reflected treatment patterns at the authors' institution. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness analysis came from a diagnostic study. The patients were evaluated using the standard approach, and then the impact of CT scanning was retrospectively assessed. Thus, hypothetically, the same sample of patients received both interventions. In addition, a sample of consecutive patients was identified over a long timeframe, which should limit the potential impact of bias and confounding factors. Since the evidence came from a single centre the study sample might not be representative of the patient population. In fact, caution is required when extrapolating the results of the analysis to other institutions. Limited information on the length of follow-up was provided.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).
Validity of estimate of costs
The included costs were consistent with the perspective adopted in the study. The unit costs were not presented separately from the quantities of resources used, and a breakdown of the cost items was not reported. This limits the possibility of replicating the analysis in other settings. The source of the data was provided. The costs were specific to the authors’ institution and might not be generalisable to other centres, owing to the peculiarities of VA institutions. The costs were estimated over a period of 6 years. However, the price year was not reported, which makes reflation exercises in other time periods difficult. No statistical analyses of the costs were performed to account for the potential impact of variability in the data.

Other issues
The authors noted that other studies had shown the utility of preoperative CT scanning to depend on disease stage as well as the type of patients. Some studies supported the use of routine CT scans, while other studies concluded that CT scans should be used selectively. In terms of the issue of the generalisability of the study results, the authors noted that the analysis focused on the VA accounting system, which might be different from other health service providers. The study referred to patients with colon cancer and this was reflected in the authors’ conclusions.

Implications of the study
The study supported the routine use of CT scans for the preoperative workup of patients with colon cancer. The authors stated that the cost-effectiveness of the practice of routine CT scanning for patients with colon cancer should be further investigated in future studies.

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Other publications of related interest


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MeSH
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