Acknowledgement/Funder:
The research described in this article was funded by the Department of Health in England under the Policy Research Unit in Economic Evaluation of Health and Care Intervention (EERPUs) based at the University of Sheffield and University of York. The sponsors had no involvement in the analysis or interpretation of the data or findings presented here. We would like to thank our clinicians: Dr Richard Adams, Dr Hazim Ahmed, Mr Steven Brown, Dr Charlotte Coles, Professor Chris Nutting, Dr Melanie Powell, Dr Teresa Guerrero-Urbano and Ms Lynda Wyld.

**Objective:** To examine the empirical evidence, variation in methods and quality of cost-effectiveness research on surgical interventions for breast, colorectal, and prostate cancer.

**Methods:** A systematic search of seven databases including MEDLINE, EMBASE and NHSEED, research registers, the NICE website and conference proceedings was conducted in April 2012. The essential, preferred and NICE specific requirements for economic evaluation submissions were used to assess the study quality.

**Results:** The 17 (breast=3, colorectal=7, prostate=7) studies covered a broad range of settings (9 European; 8 non-European) and six were published over 10 years ago (Figure 1). Figure 2 shows that the populations, interventions and comparators were generally well defined. Very few studies were informed by literature reviews and few used synthesised clinical evidence. The interventions had potential differential effects on recurrence and mortality rates, but some studies used relatively short time horizons. While less than a third characterised all uncertainty with a probabilistic sensitivity analysis, one-way sensitivity analyses were reported in all studies. Eight studies incorporated patients' health-related quality of life data, but only four studies used social tariff values.

**Conclusion:** There is a dearth of recent robust evidence describing the cost-effectiveness of surgical interventions in these indications. Many of the recent publications did not satisfy essential methods requirements such as using clinical evidence informed by a systematic review and synthesis. There is an urgent need to increase economic evaluations of these technologies, given the ratio of potential benefit and harm and the associated volume of resources.

**Figure 1:** Flow diagram for study inclusion

**Figure 2:** Quality of included studies compared to the NICE reference case

<table>
<thead>
<tr>
<th>(Essential requirements)</th>
<th>Breast cancer</th>
<th>Colorectal cancer</th>
<th>Prostate cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient group/indication clearly defined</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Comparators clearly defined</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Effectiveness evidence based on a systematic review</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Appropriate time horizon</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>HRQoL data reported directly by patients &amp;/or carers</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Probabilistic sensitivity analysis used to quantify uncertainty</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Relevant one-way sensitivity analyses</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Preferred requirements**

- Cost-effectiveness analysis using QALYs
- NL preference data valuation by representative sample of the public

**UK/NICE specific requirements**

- Discount rate, 3.5%
- Comparators used in the NHS
- UK Setting
- UK NHS and personal social services costs
- Cost/QALY < NICE threshold value* = €20,000

<table>
<thead>
<tr>
<th>Citations identified by searches</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papers screened by title/abstract</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Full papers retrieved for detailed inspection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*One additional study was included which was published after the searches were conducted.

---

**Citations**

- Breast Cancer: N=1154
- Colorectal Cancer: N=3226
- Prostate Cancer: N=1078

---

**Potential studies to be included in the review**

- Breast Cancer: N=3
- Colorectal Cancer: N=7
- Prostate Cancer: N=21

---

**Excluded – publication errors**

- Breast Cancer: N=2
- Colorectal Cancer: N=1
- Prostate Cancer: N=5

---

**Excluded – no intervention**

- Breast Cancer: N=2
- Colorectal Cancer: N=2
- Prostate Cancer: N=1

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**Excluded – no publication**

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- Prostate Cancer: N=1

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**Excluded – no effect**

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- Prostate Cancer: N=1

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**Excluded – no cost**

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- Colorectal Cancer: N=1
- Prostate Cancer: N=1

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**Excluded – no benefit**

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- Colorectal Cancer: N=1
- Prostate Cancer: N=1

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