Cost Effectiveness Analysis of the Prevention of Colorectal Cancer by Aspirin and Colonoscopic Surveillance

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Context: The risk of colorectal cancer (CRC) is only prevented by the identification and the resection of the colic polyps during a colonoscopy. Two American studies showed the protective effect of aspirin in particular in addition with an endoscopic surveillance. Nevertheless this treatment is very expensive. In this context, a cost-effectiveness analysis was carried out in order to know the consequences of the reduction of endoscopic procedures related to the effectiveness of Aspirin.

Objective: To evaluate the clinical and economic advantages of a chemoprevention by aspirin and/or an endoscopic surveillance by a cost-effectiveness analysis.

4 Strategies:
1/ Without surveillance nor treatment (reference (strategy Ø))
2/ Prevention treatment by Aspirin (A): 325 mg per day
3/ Periodic surveillance without treatment (S)
4/ Periodic surveillance and prevention treatment by Aspirin (S+A)

Markov model:
- Cycle duration: 1 year
- Follow-up period: 12 years
- 6 Clinical states:
  - Healthy, Adenoma, Advanced Adenoma, Colorectal Cancer (CRC), Dead, Dead of cancer

Assumptions:
- Annual probabilities of transition (actuarial method and DEALE)
- Annual treatment cost (diagnosis + cost of CRC treatment + Aspirin)
- Protocol of follow-up in the case of strategy with surveillance (strategies S and S+A)

Efficacy:
- compliance: 82.6% go to the colonoscopy to 1 year et 78.2% to 3 years (Winawer 1993)
- sensitivity: 95% for optic colonoscopy (Pickhardt 2003)

<table>
<thead>
<tr>
<th>Compliance</th>
<th>Probability</th>
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<tr>
<td>to 3 yrs</td>
<td>90%</td>
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<tr>
<td>to 5 yrs</td>
<td>85%</td>
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<tr>
<td>to 10 yrs</td>
<td>80%</td>
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Sensitivity: adenoma (average data resulting from Rickert 1979 and Vain 1982)
- advanced adenoma (results from Betés 2003 and Stevens 2003)

<table>
<thead>
<tr>
<th>Ages brackets</th>
<th>Probability of adenoma</th>
<th>Probability of advanced adenoma</th>
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<tbody>
<tr>
<td>50-59 yrs</td>
<td>0.00151</td>
<td>0.001207</td>
</tr>
<tr>
<td>60-69 yrs</td>
<td>0.000438</td>
<td>0.006118</td>
</tr>
<tr>
<td>70-79 yrs</td>
<td>0.004386</td>
<td>0.008618</td>
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- colorectal cancer, Eide 1986
- dead of CRC in 5 years: 50% (Ladabaum 2001); mortality rate for an age (Insee 2003)

Safety:

Costs:
- Colonoscopy diagnosis (Lejeune 2003, weighted average public/private cost in 1996: 525€)
- Chemotherapy 12 weeks plan in treatment of metastatic CRC (weighted average cost of 3 protocols: 7344€, weighted median cost: 6803€)
- GHM the most frequent and prices

Methods

Cost Effectiveness Analysis:
- Criteria: incidence of CRC during 30 years for a 100 000 people cohort
- number of years of life ≥50 years for 100 000 people

Results

Sensitivity Analysis:
- Influence of the probability of developing adenomas for a person without surveillance: variation between 0.0151 and 0.0271
- Effectiveness improvement of 50% due to a regular colonoscopic surveillance

Conclusion: The chemoprevention is efficient: there is no existing process which makes possible to obtain results more effective at lower cost.

References: