The cost of chemotherapy side effects: Recommendations for local modelling and economic evaluation.

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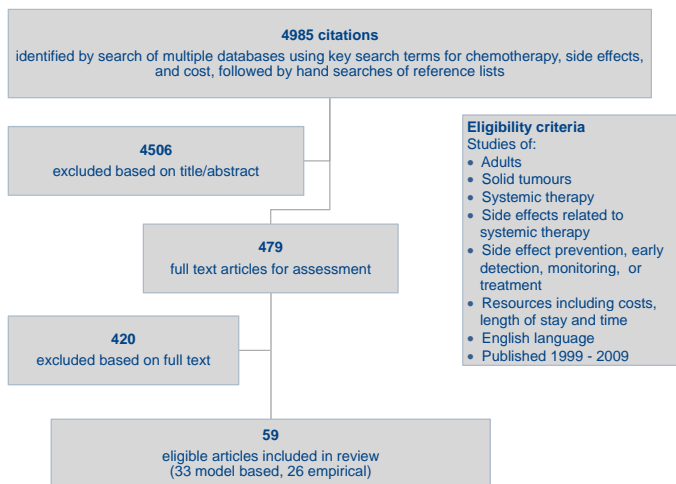
Background

Many new systemic treatments for cancer are expensive. However, some costs may be offset by changes in the profile of side effects associated with these new treatments compared to traditional chemotherapies. Estimating the costs of side effects would allow overall chemotherapy costs to be accurately calculated.

The aim of this literature review was to identify a benchmark approach to the estimation of costs for chemotherapy side effects.

Methods

A systematic review of the clinical and economic literature was undertaken in September 2009, as presented below. The methodological quality of studies was assessed using the checklist developed by Graves (*Graves et al, Health Economics, 2002.11(8):735-9*).

Results were combined using descriptive techniques to identify the resources involved in managing chemotherapy side effects, and to assess the methods used to estimate the cost of these resources.

4985 citations
identified by search of multiple databases using key search terms for chemotherapy, side effects, and cost, followed by hand searches of reference lists

4506
excluded based on title/abstract

479
full text articles for assessment

Eligibility criteria
Studies of:
- Adults
- Solid tumours
- Systemic therapy
- Side effects related to systemic therapy
- Side effect prevention, early detection, monitoring, or treatment
- Resources including costs, length of stay and time
- English language
- Published 1999 - 2009

420
excluded based on full text

59
eligible articles included in review
(33 model based, 26 empirical)

Results

The 59 eligible articles identified were divided into model based analysis and empirical studies. In general all studies were of moderate quality, with a mean score on the Graves checklist of 7 out of 12 (range 2 to 11).

The ten most common side effects were neutropenia, anaemia, diarrhea, nausea and vomiting, thrombocytopenia, oral inflammation, cardiac toxicities, infection, pulmonary toxicities and fractures.

The table below shows the characteristics of the studies included in the review:

	Modelling studies (n=33)	Empirical studies (n=26)
Cancer		
Breast	15	5
Any / multiple	7	7
Colon / rectal	3	8
Ovarian	4	3
Lung	2	3
Head and neck	1	0
Pancreatic	1	0
Economic analysis		
Cost effectiveness / consequence	26	6
Total cost	2	11
Cost minimisation	3	4
Cost utility	2	1
Cost of illness	0	2
Cost benefit	0	2
Model type		
Decision analysis	10	n/a
Markov model	14	n/a
Other models	9	n/a
Costs included		
Direct	26	19
Indirect	0	1
Direct & indirect	7	6

Results continued

The perspectives and methods for estimating quantities and value of resources consumed were highly variable. A clear benchmark approach to the economic analysis of chemotherapy side effects was not evident in the literature.

General methodological recommendations to guide the development of reliable, valid and transparent estimates of the costs of chemotherapy side effects, based on best practice modelling techniques were developed.

Recommendations

Side effects

1. The most common, distressing and costly side effects such as neutropenia, anaemia, diarrhea, nausea and vomiting and cardiac toxicities should be prioritised.
2. Side effects included should be clearly defined and graded using international standard grading protocols (CTCAE v4.0).

Resources

3. The most commonly used and cost intensive resources should be included. The literature suggests that these are medication, hospitalisation, outpatient visits, transfusions, lab tests and other diagnostic tests.

Chemotherapy

4. The management of side effects should be considered to be independent of the chemotherapy causing the side effect.

Perspective

5. The health care system perspective should be prioritised, however a wider perspective may be considered in future analysis.

Inputs

6. A standardised tool for quality assessment of studies should be used and the implications of any flaws in design or analysis considered.
7. The requirements for internal and external validity of data, and data availability, will influence model development.
8. Consider the implications of including industry sponsored studies.

Outputs

9. Consider the purpose of outputs for the end user as a decision maker and tailor outcome measures accordingly.

Model

10. Given the clinical features of chemotherapy side effects a decision tree model is appropriate.
11. Best practice modelling guidelines (such as ISPOR) should be followed.

Conclusions

These recommendations provide a framework for developing cost estimates for specific side effects. This framework will be implemented for the side effects neutropenia, anaemia, diarrhea, nausea and vomiting and cardiac toxicities in the first instance.

The Economic Modelling of Cancer Protocols Project will then be able to incorporate these estimates of side effect costs into broader economic evaluations of alternative chemotherapy protocols.

For more information and reference list

For further information, or the reference list for the review, please contact:
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