Can we calculate the cost of haematological side effects of systemic therapy?

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BACKGROUND

Systemic treatments for cancer are increasingly expensive. However, some costs may be offset by changes in the resources required to manage side effects.

Haematological side effects are common with traditional chemotherapy, but are less frequent with newer biological agents. To assess if these differences influence overall cost it is necessary to first identify the resources used to manage haematological side effects, and their related unit costs.

The aim of this review was to identify the resources used to manage common haematological side effects of systemic therapy and to assess the feasibility of estimating the cost of these resources in the Australian setting.

METHODS

A systematic review of the clinical and economic literature was undertaken in August and September 2009, as presented in the diagram below. The quality of the methodology of included studies was assessed using the 12 question 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 haematological 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, adverse events, and cost, followed by hand searches of reference lists

4506
excluded based on title/abstract

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

479
full text articles for assessment

438
excluded based on full text

41
eligible articles included in review
(22 model based, 19 research based)

RESULTS

Forty-one eligible articles were identified for inclusion in the review, and are summarised in Table 1. The studies were generally of moderate quality, with an average score on the Graves checklist of 7 out of 12 (range 2 to 11). Figure 1 shows the percentage of modelling and research studies which addressed each of the 12 criteria satisfactorily.

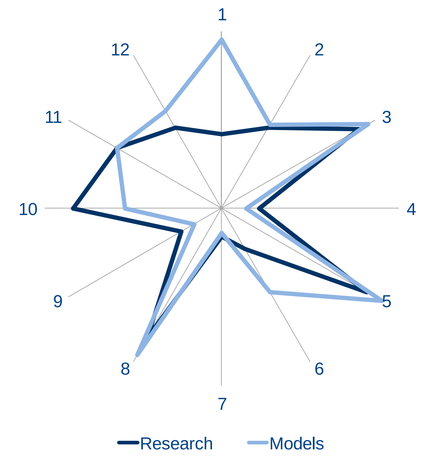
Table 2 shows the most common resources considered by studies in the review. The methods used to measure the quantities and value the resources consumed were highly variable (see Figure 2). These disparate methods contributed to highly divergent estimates of costs which were unable to be meaningfully compared (data not shown).

Approximately one-third of anaemia studies assessed erythropoietin, either in comparison to transfusion, or in head to head studies. Thirty-seven percent of neutropenia studies assessed the addition of G-CSFs to standard treatment. The inclusion of these newer treatments may have biased estimates of resource and cost.

Table 1: Summary of studies included in the review

Cancer	Anaemia studies (n=22)	Neutropenia studies (n=32)	Thrombocytopenia studies (n=13)
Breast	6	8	2
Any / multiple	4	4	1
Colon / rectal	4	7	0
Ovarian	3	7	6
Lung	4	5	3
Head and neck	1	1	0
Pancreatic	0	0	1
Industry involvement			
Yes	15	20	8
No	7	12	5
Study type			
Research	10	18	8
Modelling	12	14	5
Economic analysis			
Cost effectiveness / consequence	16	13	6
Total cost	8	4	2
Cost minimisation	4	4	4
Cost utility	3	3	0
Cost of illness	0	0	0
Cost benefit	1	0	0

Figure 1: Quality assessment of studies in the review



Graves Quality Assessment Key:

General costing issues:
1. Perspective of the cost analysis stated
2. Perspective of the cost analysis justified
3. Included cost data satisfied the stated perspective
4. Distinction between long and short run costs made

Quantities of resources:
5. Methods for estimating variable costs
6. Methods for estimating semi-fixed costs
7. Methods for estimating fixed costs

Value of resources:
8. Methods to estimate prices given
9. Data other than 3rd party used

Reporting of data:
10. Data collection year reported
11. Base cost year reported
12. Adjustments for costs incurred in different time periods

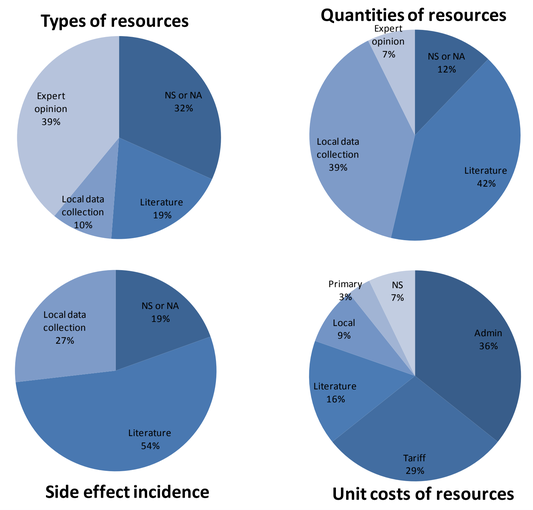
Each arm of the star represents a question on the Graves checklist, with the centre of the star meaning no studies addressed that criteria satisfactorily and the point of the star meaning 100% of studies answered that criteria satisfactorily.

Table 2: Resources included by studies in the review

Resources	Anaemia studies (%)	Neutropenia studies (%)	Thrombocytopenia studies (%)
	n=22	n=32	n=13
Medication	64	78	54
Hospitalisation	45	41	31
Travel time	55	16	54
Visit by doctor while an inpatient	18	22	38
Outpatient visit	41	3	38
Transfusion	5	16	23
Lab test	14	6	8
Diagnostic test	0	9	8
Building costs	0	9	8
Phone calls	0	9	8
Nurse time	0	6	8
Carer time	0	6	8
Staff	0	3	8
Paid carer costs	5	3	0
Patient time	0	3	0
Dose delay	0	0	0

Figure 2: Sources of data used to cost haematological side effects

To determine the cost of haematological side effects, it is necessary to identify the incidence of each side effect and the resources used to manage them, and to measure the quantities and value in monetary terms of the resources used. The charts below show the proportion of studies which used various data sources as input for calculations of haematological side effect costs.



RESULTS continued

As no benchmark approach was recommended in the literature for the identification, measurement and valuation of resources in order to estimate the costs of side effects, general principles of best practice modelling techniques will be followed in developing Australian estimates of costs related to the side effects of systemic therapy.

In the Australian setting, the availability of data will influence what can be used to develop cost estimates, which in turn affects the general modelling approach taken. While a top down approach will result in estimates which can be generalised across multiple sites, a bottom up approach would allow for local variations in practices and costs to be taken into account by local decision makers.

Data	Top down approach	Bottom up approach
Resources to manage side effect	Clinical guidelines	Patterns of care data, eg EMCaP
Side effect incidence	Clinical trials data	Patterns of care data, eg EMCaP
Quantity of resources used	Clinical guidelines	Patterns of care data, eg EMCaP
Unit costs of resources	Reimbursement data, eg MBS/ PBS	Not available - use top down approach

CONCLUSIONS

Having ascertained appropriate methods to identify the resources involved in managing common haematological side effects, and options for data sources to use in measuring and valuing these resources, it is now feasible to estimate the costs of managing these side effects in the Australian setting. The EMCaP Project provides an ideal and unique opportunity to develop Australian specific costs of chemotherapy using a bottom up approach.

For further information and references

For further information, or for the full list of studies included in the review, please contact:
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ACKNOWLEDGEMENTS

Funding for this review was provided by the Centre for Health Economics Research and Evaluation, University of Technology, Sydney, through a PhD scholarship within an NHMRC Health Services Research Grant (Application ID 455366).

The authors would like to acknowledge the contribution of Liz Chinchen to searching for and retrieving the articles for this review.