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An Introduction to Pharmacoeconomics

SUMMARY

-  State expenditure on medicines in Ireland under the Community Drugs Schemes was approximately €736million in 2001, a 27% increase as compared with 2000.
-  Generic prescribing is cost-effective and almost 20% of GMS items (€32.7m) have generic equivalents.
-  Pharmacoeconomics is a branch of health economics that focuses on the costs and benefits of drug therapy and provides the methodology to determine the relative cost effectiveness of treatment options.
-  Whilst cost-effectiveness data is not the only factor to be considered it provides more information for prescribers and other decision makers and will be increasingly used in drug choice.

INTRODUCTION

State expenditure on medicines in Ireland under the Community Drugs Schemes including High Tech Drug scheme payments to wholesalers was approximately €736 million in 2001, a 27% increase as compared with the year 2000⁽¹⁾. Expenditure on medicines in Ireland over the past decade [Figure 1] and the products of highest cost in the GMS scheme for 2001 are seen in Table 1. It is seen that the cost of medicines has increased over four-fold during the ten-year period. The year 2001 was the 7th consecutive year with a double-digit increase, a growth rate amongst the highest in Europe. The reasons for such growth include those of 'product mix', the prescribing of newer more expensive medications, in addition to the 'volume effect' comprising growth in the number of prescription items. Spending on drugs is an obvious target for savings, in part because it is easily identifiable. Constraints in drug expenditure could, however, lead to increased costs elsewhere such as increased hospitalisation. The focus of concern for decision makers, healthcare professionals and the public should be the value derived from drug therapy rather than drug expenditure alone. Pharmacoeconomics is that branch of health economics that focuses on the costs and benefits of drug therapy. As future issues of the NMIC Bulletin will increasingly incorporate such analysis an introduction is timely.

Fig 1: Drug Expenditure under the Community Drugs Schemes in Ireland from 1991 - 2001

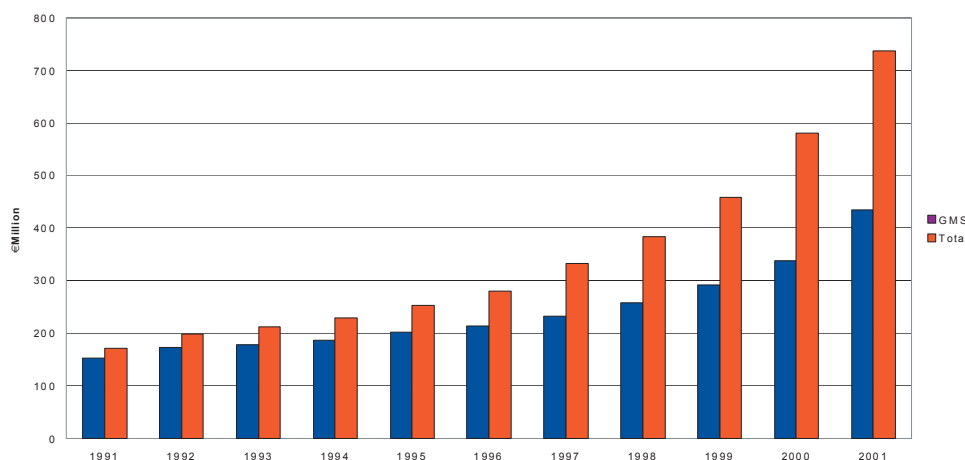


Table 1: Products of highest cost in order of their ingredient cost in the GMS scheme 2001

Drug	€ (million)
Omeprazole (Losec®)	17.3
Pravastatin (Lipostat®)	11.2
Olanzapine (Zyprexa®)	7.7
Lansoprazole (Zoton®)	6.6
Atorvastatin (Lipitor®)	6.3
Amlodipine (Istin®)	6.1
Beclomethasone (Becotide® etc)	6
Budesonide (Pulmicort® etc)	5
Paroxetine (Seroxat®)	4.8
Risperidone (Risperdal®)	4.5

Pharmacoeconomics

Economic evaluation of pharmaceutical products is increasingly used, reflecting recognition that healthcare decision makers are placing increased emphasis on value for money from healthcare interventions. The fundamental economic problem is scarcity. Economic scarcity means that choices have to be made in allocating healthcare resources. Increased expenditure in one-area frequently results in a reduction in expenditure in another; economists refer to the benefits foregone as the opportunity cost. Pharmacoeconomic evaluation provides us with the methodology to determine those treatment options, which will yield the maximum health gain per unit of currency spent. This is achieved by making explicit the opportunity cost of allocating resources to a particular treatment option.

Methods of economic evaluation

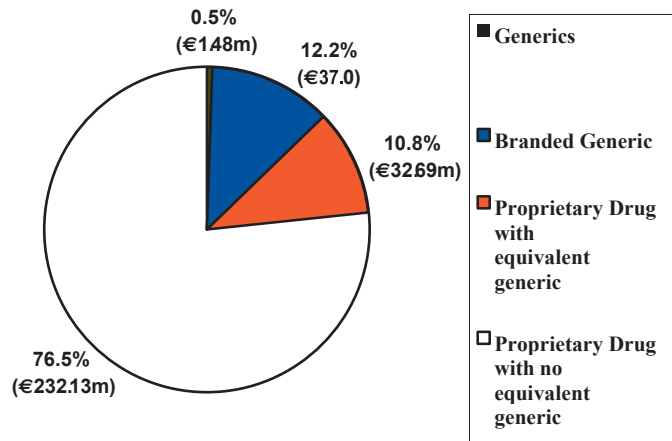
All methods of pharmacoeconomic evaluation share the common feature of comparing inputs (cost) with outcomes (benefits) resulting from drug intervention^[2]. The cost of drug therapy relates not only to the price of the drug but also includes direct and indirect costs. Direct costs include costs of staff and capital. Indirect costs might include loss of earnings, loss of productivity and cost of travel to hospital. Many of these costs are difficult to measure, as are intangible costs for pain or other distress a patient might suffer. As costs are expressed in monetary terms the difference between economic evaluations resides in the measurement of benefits. Such benefits may be measured in natural units such as years of life saved following lipid lowering or antiretroviral therapy. Benefits may also be measured in terms of utility units such as quality of life. This combines assessment of physical activity such as degree of mobility and psychosocial outcomes such as anxiety and ability to cope. The Quality Adjusted Life Year (QALY) is a measure of health outcome which includes quality and quantity of life. The four pharmacoeconomic evaluations frequently used include cost minimisation analysis (CMA), cost effectiveness analysis (CEA), cost utility analysis (CUA) and cost benefit analysis (CBA)^[3].

Cost minimisation analysis

This method of analysis can be used when the treatments being evaluated have similar health outcomes. The comparison is limited to analysing the costs. An example of the cost minimisation approach is seen when selecting the proton pump inhibitor of choice. Expenditure on the proton pump inhibitors (PPIs) exceeded €50 million in 2001, approximately 10% of total drugs costs under the GMS and Drugs Payment Schemes. A review by the UK's National Institute for Clinical Excellence (NICE) concluded that the efficacy of individual PPIs did not differ significantly, and the choice of agent should be based on licensed indication and cost^[4]. Based on current Irish pricing and in accordance with NICE guidance, rabeprazole (Pariet®) would enhance cost-effectiveness of treatment for gastro-oesophageal reflux disease and treatment of peptic ulcer disease. Lansoprazole (Zoton®) could be considered the agent of choice for maintenance therapy for peptic ulcer disease, and NSAID-induced ulceration. For the eradication of H-pylori infection both rabeprazole (Pariet®) and esomeprazole (Nexium®) should optimise cost-effectiveness.^[5]

Generic prescribing is widely recognised as a means of optimising cost-effectiveness. Generic substitution may be considered another example of a cost minimisation strategy. Licensing regulations guarantee that generic preparations are “essentially similar” to proprietary products i.e. therapeutically bioequivalent. 18% of items prescribed on the GMS in 2001 (€32.7 million i.e. 10.8% of GMS expenditure) were proprietary preparations for which a generic equivalent was available (Figure 2)^[5]. The top 30 drugs of highest cost to the GMS scheme accounted for approximately 50% of expenditure in 2001. Analysis of the top 30 drugs indicates eleven medications, which have a generic equivalent. Substitution of the generic product could result in annual savings in the region of €5.65 million. A similar analysis of the Drug Payments Scheme suggests potential savings in the region of €2 million^[5]. Although the cost minimisation approach is easily understood it cannot be used to assess drug therapies with different outcomes.

Figure 2: Percentage ingredient cost of medicines reimbursed under the GMS Scheme from December 2000 to November 2001



Cost-effectiveness analysis (CEA)

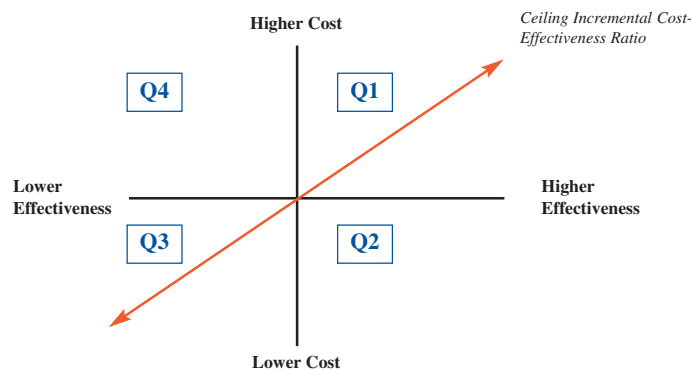
If two or more drug therapies have the same treatment objective but different degrees of efficacy then cost-effectiveness analysis may be performed. When comparing therapies the important question for resource allocation is how much additional benefit is achieved for the additional cost incurred. It is essential therefore to calculate the incremental cost-effectiveness of one therapy (A) over the other (B) this is expressed as the incremental cost-effectiveness ratio (Table 2).

Table 2: Incremental Cost Effectiveness Ratio

Incremental Cost Effectiveness Ratio = (ICER)	$\frac{\text{Cost A} - \text{Cost B}}{\text{Effect A} - \text{Effect B}}$
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Frequently the results of such an evaluation i.e. incremental cost effectiveness ratios are demonstrated on the cost-effectiveness plane (Figure 3). Interventions with higher effectiveness and lower cost (quadrant 2) are said to dominate and can easily be accepted, whereas those with lower effectiveness and higher cost (quadrant 4) are rejected. In developing nations, decision makers may occasionally be forced to consider interventions in quadrant 3, i.e. lower cost and lower effectiveness. In wealthy industrialised countries, new interventions frequently fall into quadrant 1 i.e. higher effectiveness but at greater cost. An example of cost-effectiveness analysis is seen in a recent study from the National Centre for Pharmacoeconomics. Using economic modelling techniques and Irish cost data the incremental cost-effectiveness ratio (ICER) for adding carvedilol therapy to standard of care in patients with severe chronic heart failure was €1560 per life year gained (LYG). Sensitivity analysis demonstrated an ICER range of €1560/LYG to €7322/LYG under a variety of assumptions. This indicates that carvedilol therapy for patients with severe chronic heart failure is highly cost-effective in the Irish healthcare setting^[6].

Figure 3: The Cost-effectiveness Plane



Cost utility analysis (CUA)

This form of analysis enables the effects of treatment on patient quality of life and survival to be considered together by converting both into a common unit of measure. The outcome measure most commonly used is the quality adjusted life year (QALY). Interventions with a cost per QALY in the region of €50,000 would be considered cost-effective whilst those less than €20,000 per QALY would be considered highly cost-effective e.g. statins for secondary prevention of coronary heart disease in Ireland are highly cost-effective with ICERs in the range €1,172 - €3,900 per QALY^[7].

Cost benefit analysis (CBA)

In this approach both the costs and benefits of the drug therapy are measured in monetary terms. Cost benefit analysis enables comparison of expenditure within the health sector and with expenditure in other sectors e.g. education or transport. Few cost benefit studies have been published which may be due to ethical objections in placing a monetary value on health and human life. However, monetary values for health are used for example, in estimating compensation for injury or death.

Analysis and reporting of pharmacoeconomic evaluations

Perspective

When reporting economic evaluations it is important to consider the viewpoint of the relevant decision makers. The same evaluation may need to be communicated in different ways in order to meet the needs of governmental decisions makers and individual prescribers. A societal perspective would include both direct costs such as drug prices, hospitalisation etc. and indirect costs such as lost productivity and pain. However a primary healthcare provider perspective might focus on direct medical costs only including costs of drug therapy, laboratory monitoring and GP consultations. As the aim of economic analysis is to make the best use of resources, the societal perspective i.e. the policy maker viewpoint is considered most appropriate however a healthcare manager with a fixed budget may consider added drug costs a greater priority.

Discounting

In comparing different healthcare interventions, the investment of healthcare resources may occur over a different timescale to that of the benefits obtained e.g. if we compare preventative therapies such as statins with curative ones such as thrombolysis. Normally we prefer to receive benefits earlier but incur costs later. In order to reflect this positive rate of time preference, future costs and consequences in economic evaluations are often discounted to present values by an annual rate of approximately 5%.

Sensitivity analysis

The choice of discount rate is just one of the uncertainties in economic evaluation. Others arise from a lack of precision in the estimates of costs and benefits. Sensitivity analysis, the approach used to deal with these uncertainties, involves alteration in key parameters or assumptions in an attempt to determine their impact on the economic evaluation. The efficacy of an intervention in a controlled clinical trial setting may overestimate the effectiveness in routine clinical practice. If the cost-effectiveness of lipid lowering therapy is based on a 25% reduction in coronary event rates over a given time period, would cost-effectiveness be maintained if the reduction in event rate was 15%? Therefore sensitivity analysis is essential to demonstrate the impact of critical assumptions in any economic evaluation^[8].

CONCLUSION

In the context of limited healthcare budgets pharmacoeconomic considerations can greatly facilitate optimum use of limited resources. Some form of pharmacoeconomic evaluation is currently being considered in the United Kingdom, Netherlands, Italy, Portugal, Greece, Norway, Sweden and Finland. In Ireland, pharmacoeconomic evaluation is currently not a prerequisite to reimbursement of new technologies. It is clear that pharmaceutical expenditure in Ireland will continue to grow, approaching €1billion within the next 1 to 2 years, should current trends continue. Failure to link drug reimbursement in Ireland with a demonstration of cost-effectiveness may limit our ability to ensure value for money from the ever-increasing drugs bill. It is important to appreciate that the role of pharmacoeconomics is to provide the decision maker with additional information to that which is already available i.e. data on drug efficacy, toxicity and safety. From an individual prescriber perspective, pharmacoeconomic evaluation of new therapies makes explicit the cost savings associated with avoiding or delaying disease progression or disease complications and facilitates identification and prioritisation of the most cost-effective interventions.

This bulletin was produced in collaboration with National Centre for Pharmacoeconomics in Ireland (www.ncpe@stjames.ie)

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