Cost-effectiveness analysis of addiction treatment: paradoxes of multiple outcomes
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Standard versus enhanced (e.g. case management and added social services) drug treatment was examined. The substance abuse treatment (SAT) programmes were publicly supported. All programmes used primarily 12-step group counselling aimed at abstinence through the provision of 2 to 3 hours of group sessions per week. A 4- to 6-week length of stay comprised a complete programme. The enhancements included a clinical case manager (social worker) assigned to each of the selected programmes and funds made available to provide pre-contracted social support services outside of the treatment facility. The clinical case manager was available to assess the social service needs of the clients and to help make connections to the needed services offered in the community. The pre-contracted services included health care, employment, education, parenting, nutrition and housing services.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients (drug users) participating in SAT programmes.

Setting
The setting was the community and primary care. The study was conducted in Philadelphia, USA.

Dates to which data relate
The effectiveness and resource use data were gathered from 1993 to 1997. The price year was not reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out on a sub-sample of patients who were included in the clinical study.

Study sample
The clinical study had been published already (McLellan et al. 1998 and 1999, see 'Other Publications of Related Interest' below for bibliographic details), thus limited information on sample size and design was reported. A sample of 431 patients participating into nine SAT programmes was enrolled. There were 88 patients in the standard care group and 343 patients in the enhanced care group. Six of the programmes received enhanced care and three programmes
received standard care. The authors stated that approximately 80% of those eligible entered the study. The mean age was around 35 years and 60% of the sample comprised men. The average level of education completed was 12 years.

**Study design**
This was a quasi-experimental study that was carried out in inner city North and West Philadelphia. The patients were allocated to treatment groups depending on the centres where the programmes were delivered. The average length of stay in the programme was approximately 22 days and the length of follow-up was 6 months. Thus, the patients were followed for almost 7 months. No information on the loss to follow-up was reported. No blinding was performed.

**Analysis of effectiveness**
It appears that all the patients included in the initial sample were considered for the effectiveness analysis. The outcome measures used were the seven components of the Addiction Severity Index (ASI):

- drug and alcohol use (number of different drugs used in the last 30 days; number of days reported using a drug across all drugs; dollars spent on illicit drugs in the last 30 days; days out of the last 30 days suffering from drug-related problems; dollars spent on alcohol in the last 30 days; days out of the last 30 days suffering from alcohol-related problems);
- family (days out of the last 30 days suffering from serious family conflict);
- social relationships (days out of the last 30 days suffering from serious conflict with others);
- medical problems (days out of the last 30 days with medical problems);
- psychiatric symptoms (days out of the last 30 days with psychiatric problems);
- employment (dollars earned from employment during last 30 days; days out of the last 30 days with paid employment); and
- illegal activities (days out of the last 30 days engaged in illegal activities; dollars earned from illegal activities during last 30 days).

For outcomes that reflect "days of problems", a negative value or a decrease in the problem frequency represented an improvement. In contrast, for employment, a positive value represented an improvement. The analysis considered the changes from baseline to the last 30 days of follow-up. The correlation across outcome measures was also investigated. The outcome measures were not comparable at baseline given the different characteristics of patients in the standard and enhanced groups. Thus, in assessing the effectiveness results, the relative improvement of enhanced care over standard care was estimated.

**Effectiveness results**
The correlation analysis showed that the outcome measures within the drug domain were almost all positively and significantly correlated with each other. In contrast, improvements in drug measures were insignificantly correlated with employment outcomes; they were positively and significantly correlated with changes in crime, but the correlation was relatively low for most measures of drug use. Family, social and psychiatric problems were generally significantly related to drug measures and were of the expected sign, but the magnitude of the correlation was relatively low. Thus, drug use could not be a sufficient predictor of changes in the other outcomes.

The incremental changes outcome measures for standard care over no intervention and for enhanced care over standard care were, respectively:

-0.06 and -0.57 for the number of different drugs used in the last 30 days (difference 0.51; statistically significant at the 99% level of confidence);
-1.23 and -4.23 for the number of days reported using a drug across all drugs (difference 3; statistically significant at the 99% level of confidence);

-9.19 and -95.27 for the dollars spent on illicit drugs in the last 30 days (difference 86.08; statistically significant at the 99% level of confidence);

-1.63 and -5.75 for days out of the last 30 days suffering from drug-related problems (difference 4.12; statistically significant at the 99% level of confidence);

-2.02 and -17.14 for the dollars spent on alcohol in the last 30 days (difference 15.11; statistically significant at the 90% level of confidence);

-1.71 and -4.10 for days out of the last 30 days suffering from alcohol-related problems (difference 2.40; statistically significant at the 90% level of confidence);

-0.27 and -0.18 for days out of the last 30 days suffering from serious family conflict (difference -0.09; not significant);

-0.25 and -0.66 for days out of the last 30 days suffering from serious conflict with others (difference 0.41; not significant);

-1.93 and -1.31 for days out of the last 30 days with medical problems (difference -0.62; not significant);

-1.47 and -2.77 for days out of the last 30 days with psychiatric problems (difference 1.30; not significant);

142.68 and 111.45 for the dollars earned from employment during last 30 days (difference -31.23; not significant);

5.05 and 3.48 for days out of the last 30 days with paid employment (difference -1.57; not significant);

0.01 and 1.06 for days out of the last 30 days engaged in illegal activities (difference -1.05; not significant); and

1.02 and -8.71 for the dollars earned from illegal activities during last 30 days (difference 9.74; not significant).

**Clinical conclusions**

The effectiveness analysis showed that the enhanced programme led to improvements in all measures of alcohol and drug use in comparison with standard care. However, no significant improvements in measures of social relations, psychological problems and money from crime were observed. In other domains such as family problems, medical problems, employment income, days employed and crime, standard care was associated with improvements in comparison with no intervention and better outcomes than enhanced care.

**Measure of benefits used in the economic analysis**

The summary benefit measures used were the same domains of ASI as those estimated in the clinical analysis.

**Direct costs**

Discounting was not relevant since the costs were incurred during a short timeframe. The unit costs were not presented separately from the quantities of resources used. The economic analysis considered only treatment costs. These included personnel, supplies and materials, contracted services, buildings and facilities, equipment and miscellaneous items. The cost/resource boundary of the third-party payer appears to have been used. The treatment costs were estimated using the Drug Abuse Treatment Cost Analysis Program, which was administered separately in each of 2 years to three enhanced care programmes. The costs of the standard care programme were estimated using estimates for enhanced care and subtracting the costs of the enhancements. The cost of no intervention was zero. The resource use data were derived from the sub-sample of patients included in the clinical study. The price year was not reported.
Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not considered in the economic evaluation.

Currency
US dollars ($).

Sensitivity analysis
A one-way sensitivity analysis was carried out on the key cost item, the incremental cost of enhanced care over standard care. Thus, two alternative (higher) values were used in the sensitivity analysis.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The incremental cost of standard care over no intervention was $200. The incremental cost of enhanced care over standard care was $18 (alternative estimates $36 and $72).

Synthesis of costs and benefits
Incremental cost-effectiveness ratios were calculated to combine the incremental costs with the incremental benefit measures considered in the analysis.

The incremental costs per incremental benefit with standard care over no intervention and with enhanced care over standard care were, respectively:

- $3,508.8 and $35.4 for the number of different drugs used in the last 30 days (preferred option: enhanced care);
- $163 and $6 for the number of days reported using a drug across all drugs (preferred option: enhanced care);
- $21.8 and 0.2 for the dollars spent on illicit drugs in the last 30 days (preferred option: enhanced care);
- $123.1 and $4.4 for days out of the last 30 days suffering from drug-related problems (preferred option: enhanced care);
- $98.9 and $1.2 for the dollars spent on alcohol in the last 30 days (preferred option: enhanced care);
- $117.3 and $7.5 for days out of the last 30 days suffering from alcohol-related problems (preferred option: enhanced care);
- $732.6 and 'not assessed' for days out of the last 30 days suffering from serious family conflict (enhanced care was dominated; preferred option: standard care);
- $800 and $44 for days out of the last 30 days suffering from serious conflict with others (preferred option: enhanced care);
- $103.5 and 'not assessed' for days out of the last 30 days with medical problems (enhanced care was dominated; preferred option: standard care);
$136.4 and $13.8 for days out of the last 30 days with psychiatric problems (preferred option: enhanced care);

$1.4 and 'not assessed' for the dollars earned from employment during last 30 days (enhanced care was dominated; preferred option: standard care);

$39.6 and 'not assessed' for days out of the last 30 days with paid employment (enhanced care was dominated; preferred option: standard care);

'not assessed' for either intervention for days out of the last 30 days engaged in illegal activities (preferred option: standard care); and

'not assessed' and $1.8 for the dollars earned from illegal activities during last 30 days (preferred option: enhanced care).

The results did not change when higher costs of enhanced care were used.

Authors' conclusions
The use of alternative measures and domains of outcomes for substance abuse treatment (SAT) programmes produced conflicting results as to which treatment should be selected on the grounds of cost-effectiveness. The analysis showed that use of the drug use outcome alone could be misleading. In addition, policy makers might be interested in other outcomes such as reduced crime and reduced reliance on welfare.

CRD COMMENTARY - Selection of comparators
The selection of the comparators was appropriate as standard care was compared with no intervention, while enhanced care was compared with standard care. Limited information on the characteristics of the intervention was provided. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a non-randomised study. The fact that the study groups were not comparable at baseline could have introduced some selection bias, which might have affected the results of the study. However, the authors considered the relative improvement of enhanced over standard care to partially overcome this issue. The authors noted some limitations of their study, such as the lack of randomisation, the use of patient self-report data, the lack of baseline comparability between the groups, the relatively small sample size, the lack of a no-treatment arm, and the availability of data only at two time points (baseline and final assessment). Furthermore, no details on the loss to follow-up were reported. These issues tend to limit the internal validity of the analysis.

Validity of estimate of measure of benefit
The authors discussed the choice of the multiple benefit measures, which represented the key aim of the study. Thus, no aggregated benefit measure was used to show the contrasting results achieved from the use of multiple outcomes. All measures were specific to the intervention considered in the study, thus they are not comparable with the benefits of other health care interventions.

Validity of estimate of costs
The perspective of the study appears to have been that of the service provider. Only treatment costs were considered. The authors noted that the lack of precise cost estimates represented a limitation of the cost analysis. The unit costs were not presented separately from the quantities of resources used and a detailed breakdown of the cost items was not reported. Similarly, the price year was not given. Thus, it is difficult to replicate the analysis and to reflate the results in other settings and time periods. The cost estimates were treated deterministically and only variations of the incremental cost of enhanced care were investigated in the sensitivity analysis.
Other issues
The authors did not compare their findings with those from other studies. They also did not address explicitly the issue of the generalisability of the study results to other settings. Limited sensitivity analyses were carried out. The authors stressed some limitations of their analysis, but stressed that the analysis focused on the methodological conclusions of the study rather than on the use of high-quality economic and clinical data.

Implications of the study
The study results highlighted the problems associated with interventions with multiple outcome measures. The authors stated that further research should be aimed at advancing methods to overcome the issues of multiple outcomes. It was also stated that the use of the cost-benefit approach may be preferable for some interventions.

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Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
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