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Cost effectiveness of treatment for alcohol problems: findings of the randomised UK alcohol treatment trial (UKATT)

UKATT Research Team

Abstract

Objective To compare the cost effectiveness of social behaviour and network therapy (a new social treatment for alcohol problems) with that of the proved motivational enhancement therapy.

Design Cost effectiveness analysis alongside a pragmatic randomised trial.

Setting Seven treatment sites around Birmingham, Cardiff, and Leeds.

Participants 742 clients with alcohol problems; 617 (83.2%) were interviewed at 12 months and full economic data were obtained on 608 (98.5% of 617).

Main economic measures Quality adjusted life years (QALYs), costs of trial treatments, and consequences for public sector resources (health care, other alcohol treatment, social services, and criminal justice services).

Results Both therapies saved about five times as much in expenditure on health, social, and criminal justice services as they cost. Neither net savings nor cost effectiveness differed significantly between the therapies, despite the average cost of social behaviour and network therapy (£221; \$385; €320) being significantly more than that of motivational enhancement therapy (£129). If a QALY were worth £30 000, then the motivational therapy would have 58% chance of being more cost effective than the social network therapy, and social network therapy would have 42% chance of being more cost effective than the motivational therapy.

Conclusion Trial participants reported highly significant reductions in drinking and associated problems and costs. The novel social behaviour and network therapy did not differ significantly in cost effectiveness from the proved motivational enhancement therapy.

Introduction

Reviews of economic analyses of treatment for alcohol and other substance misuse have consistently found that health and other social costs decrease after treatment but have also identified methodological weaknesses.¹ Modelling of economic costs and consequences suggests that brief motivational interviewing, which includes motivational enhancement therapy, is more cost effective than many other types of treatment for alcohol problems.² A large randomised trial of alcohol treatments in the United States (the "matching alcoholism treatments to client heterogeneity" trial), generated two economic analyses on completion.^{3,4} The first study modelled the costs of treatment from data on the uptake of therapies and calculated that motivational enhancement therapy would be less costly than cognitive behavioural therapy or twelve step facilitation in non-research settings.³ The second study analysed the health records of participants and concluded that healthcare costs decreased after treatment.⁴

The UK alcohol treatment trial provided an opportunity to collect economic data alongside a large randomised trial. We designed the economic analysis to test whether social behaviour and network therapy, a new social treatment, was as cost effective in improving quality of life as motivational enhancement therapy, a treatment of proved effectiveness. We compared the treatment costs, consequences for public sector resources, and health outcomes of the two therapies.

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This is an abridged version; the full version is on bmj.com

Methods

The UK alcohol treatment trial is described elsewhere⁵ and summarised in the accompanying paper.⁶ Social behaviour and network therapy, comprising up to eight 50 minute sessions, helps clients to build social networks to support change in their drinking and associated behaviours. Motivational enhancement therapy, comprising up to three 50 minute sessions, combines counselling in the motivational style with objective individual feedback from earlier assessment.

We carried out our trial in seven UK sites around Birmingham, Cardiff, and Leeds. We trained 72 therapists in social behaviour and network therapy or motivational enhancement therapy. To achieve accreditation the therapists had to show competence through video recordings and complete the supervised treatment of at least two clients in the motivational group or one client in the social network group. Fifty two therapists achieved accreditation. We recruited 742 clients with alcohol problems of all ages above 16 and all social groups.

We interviewed 617 (83.2%) clients at 12 months, of whom 608 (98.5%) yielded data for economic analysis. We valued all economic costs and consequences in pounds sterling at 2000-1 prices. Discounting was not necessary as we measured costs and consequences occurring within a year of recruiting clients.

Measurement of treatment costs

We measured the time trainers and therapists spent in training and supervision, and their use of space and materials. We valued their time from their individual salaries, employers' costs, and overheads.⁷ We spread the total cost for training in each therapy over the corresponding number of sessions delivered for the UK alcohol treatment trial.

We measured the time therapists spent in delivering treatment from forms completed after each session, and we valued this time in the same way as the

training costs. We measured the space and other resources therapists used and valued these using local costs. To calculate the cost of treatment we multiplied session length in minutes by the cost per minute of the individual therapist and other resources. We derived the cost of treating each individual by summing over sessions.

Measurement of public sector resource use

We devised a questionnaire to measure, both at baseline and at 12 months, clients' use over the previous six months of health care, alcohol treatment outside our trial, social services, and the criminal justice system. We chose a period of six months so as to capture important but infrequent events within clients' recall. We estimated the unit costs of the 40 items covered by the questionnaire as long run marginal opportunity costs. Table 1 lists the more expensive resources, together with their average use, unit costs, and sources (see also table A on bmj.com).

Measurement of health outcomes

To permit comparison with other economic evaluations, we assessed health outcomes through quality adjusted life years (QALYs).⁹⁻¹⁰ We asked participants to complete the EQ-5D questionnaire at baseline and at three and 12 months.¹¹ We estimated how many QALYs participants had experienced during their year in the UK alcohol treatment trial by using UK population norms to value their health states¹² and linear interpolation¹³ to calculate areas under the QALY curves. To impute missing final health states for a few respondents we carried forward their previous states.

Economic and statistical analysis

To improve estimates of QALYs we adjusted for differences in baseline measurements. Under specified assumptions analysis of covariance yields more precise estimates than analysis of changes between baseline and follow-up.¹⁴ As the economic data collected in the

Table 1 Costs of public sector resources before and after randomisation by allocated treatment. Values are average numbers (SD) of units consumed unless stated otherwise

Resource	Unit	Cost (£) per unit	Six months before randomisation		Six months before follow-up	
			Motivational group (n=347)	Social network group (n=261)	Motivational group (n=347)	Social network group (n=261)
General health care ⁷						
Hospital inpatient	Night	242	2.69 (6.85)	2.93 (6.68)	2.14 (10.46)	2.05 (8.89)
Hospital day patient	Visit	77	0.04 (0.20)	0.02 (0.16)	0.03 (0.17)	0.03 (0.16)
Hospital outpatient	Appointment	74	0.31 (0.70)	0.37 (0.76)	0.47 (1.18)	0.39 (0.98)
Hospital accident and emergency department	Visit	61	0.55 (0.83)	0.50 (0.81)	0.28 (0.61)	0.33 (0.71)
General practitioner visit:						
Home	Home visit	59	0.12 (0.45)	0.15 (0.46)	0.12 (0.65)	0.12 (0.98)
Surgery	Consultation	19	4.05 (4.46)	3.75 (4.16)	3.11 (3.42)	3.84 (4.22)
Prescriptions	Prescription	19	11.61 (18.00)	12.39 (17.90)	11.65 (19.80)	11.68 (21.90)
Community psychiatric nurse	Home visit	27	0.61 (2.42)	0.96 (3.35)	0.32 (1.08)	0.48 (1.69)
Specialist alcohol treatment						
Detoxification in primary care ¹	Episode	350	0.16 (0.71)	0.18 (0.66)	0.06 (0.47)	0.04 (0.39)
Alcohol agency:						
Rehabilitation ⁷	Night	89	0.32 (4.17)	0.24 (2.28)	0.13 (0.97)	0.10 (0.98)
Consultation*	Appointment	28	1.83 (2.56)	1.85 (2.37)	1.03 (9.90)	1.33 (7.61)
Social services ⁷	Contact	7	1.51 (3.66)	1.84 (6.16)	1.12 (4.71)	1.06 (3.43)
Criminal justice ⁸						
Court attendance:						
Crown court	Appearance	8824	0.017 (0.13)	0.027 (0.16)	0.020 (0.14)	0.011 (0.11)
Magistrates court attendance	Appearance	564	0.21 (0.76)	0.28 (0.79)	0.17 (1.02)	0.16 (0.74)

*Estimated from data in UK alcohol treatment trial (excluding training costs).

Table 2 Costs of public sector resources at 2000-1 prices by allocated treatment. Values are mean (SD) costs of alcohol problems unless stated otherwise

Public sector resource costs	Motivational group (n=347)	Social network group (n=261)	Difference (95% CI)†
Six months before randomisation:			
Health care	1121 (1953)	1192 (1829)	71 (-219 to 389)
Criminal justice	519 (1524)	685 (1823)	166 (-104 to 466)
Other alcohol treatment	502 (1456)	621 (1071)	119 (-103 to 299)
Social care	50 (133)	87 (303)	37 (3 to 84)*
Total	2192 (3409)	2585 (3224)	393 (-118 to 918)
Six months before follow-up:			
Health care	900 (2693)	912 (2330)	13 (-419 to 379)
Criminal justice	351 (1851)	301 (1241)	-50 (-315 to 181)
Other alcohol treatment	186 (806)	290 (1037)	104 (-31 to 271)
Social care	34 (107)	63 (208)	29 (3 to 58)*
Total	1469 (3466)	1565 (3171)	96 (-435 to 602)
Reduction in public sector resources: 6 months before randomisation versus 6 months before follow-up			
Cost of specialist alcohol treatment within trial	129 (58)	221 (178)	92 (69 to 113)**
Net reduction in public sector resource costs minus cost of trial treatments	593 (4114)	798 (3817)	206 (-454 to 818)

*Statistically significant difference between treatments at 5% level

†Confidence interval corrected for bias.

**Statistically significant difference between treatments at 0.1% level

UK alcohol treatment trial may violate several of these assumptions, however, it is acceptable and prudent to analyse changes between baseline and follow-up.¹⁵

As the economic data were skewed, we used bootstrapping to obtain more reliable confidence intervals.¹⁶ We drew 1000 artificial bootstrapped samples, each containing 608 observations drawn randomly with replacement from the actual sample of 608 participants with complete economic data. This enabled us to derive bootstrapped confidence intervals for key statistics. We then divided the net cost of therapy by the QALYs gained to yield the average cost per QALY, otherwise known as the incremental cost effectiveness ratio. We estimated the sampling distribution of this ratio from the 1000 bootstrapped samples and derived cost effectiveness acceptability curves. These curves plot the resulting probability that one therapy is better than the other against the maximum that decision makers might pay for an additional QALY.¹⁶

Sensitivity analyses

To test whether differences in treatment costs between the treatments depended on our assumptions, we undertook three distinct sensitivity analyses. We spread training costs over all 736 treatment sessions (16 sessions a week for 46 weeks) that a typical therapist might deliver in a year, rather than just the sessions therapists delivered within the UK alcohol treatment trial. We replaced the salaries of all 52 therapists in the UK alcohol treatment trial by the lower quartile of their annual salaries and then the higher quartile. To test the effect of compliance with treatment we replaced the number of sessions attended for one treatment by the 10th centile of its distribution and the other by the 90th centile of its distribution, and vice versa.

Results

The 347 clients in the motivational group reported mean EQ-5D scores (health utilities) of 0.616 [standard deviation (SD) 0.299] at baseline, 0.684 (SD 0.293) at

three months, and 0.671 (SD 0.311) at 12 months. The corresponding values for the 261 clients in the social network group were 0.589 (SD 0.298), 0.648 (SD 0.314), and 0.626 (SD 0.324). After adjusting for the baseline differences, we estimated that social network group achieved 0.0113 fewer QALYs than the motivational group, but this was not significant (bias corrected 95% confidence interval 0.0532 fewer to 0.0235 more).

Treatment costs and resource savings

The average treatment cost of social behaviour and network therapy (£221) was significantly greater than that of motivational enhancement therapy (£129; table 2). Three sensitivity analyses confirm the significantly higher cost of the social network therapy (see bmj.com).

In the six months before randomisation, 590 (97.0%) of 608 participants had used health care and 572 (94.1%) had been in contact with services for alcohol problems, but only 286 (47.0%) had used social services and only 128 (21.1%) had had any contact with criminal justice. In the six months before follow-up all these percentages fell: 517 (85.0%) used health care, only 164 (27.0%) contacted alcohol treatment services, 170 (28.0%) used social services, and 61 (10.0%) had any contact with criminal justice. Both treatments resulted in substantial and similar savings in public sector resources—namely, about five times as much as they cost (table 2). Combining treatment costs with these savings suggests that social behaviour and network therapy achieved a mean net public sector saving of £206 per client more than motivational enhancement therapy, but the difference was not significant (95% confidence interval -£454 to £818).

Cost utility analysis

Combining the net savings from social behaviour and network therapy with the net health utility gains it achieved yields an incremental cost effectiveness ratio which is the ratio of two negative but non-significant quantities. To summarise this double negative, motivational enhancement therapy has an incremental cost effectiveness ratio of £18 230 relative to the social network therapy.

Bootstrapping generated 233 samples where social network therapy was more effective in generating QALYs and less costly in net public sector resources than motivational therapy, 193 where social behaviour therapy was more costly and less effective than the motivational therapy, 514 where the social network therapy was less costly but less effective than the motivational therapy, and 60 where the social network therapy was more effective but more costly than the motivational therapy. Thus 19% of bootstrapped samples unequivocally favoured motivational enhancement therapy whereas 23% unequivocally favoured social behaviour and network therapy—a difference of only 4%.

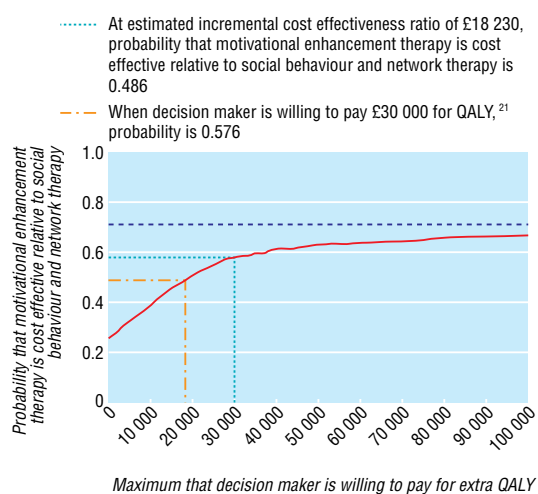
Plotting the resulting probability that the motivational therapy is more cost effective than the social network therapy against the maximum that decision makers might pay for a QALY, shows that the two therapies were similarly cost effective (figure). When this threshold is small, the social network therapy seems preferable to the motivational therapy. For example, when a QALY is worth nothing to decision makers, the social network therapy would be preferable

to the motivational therapy in 747 (74.7%) of the 1000 samples (514 where the health gain from motivational therapy then has no value, plus 233 where social behaviour therapy dominates). As the threshold increases, motivational therapy becomes more attractive because the possible health gains from motivational therapy are more highly valued than the possible cost savings from the social network therapy. When a QALY is worth £100 000 to decision makers, the motivational therapy is preferable to the social network therapy in 662 (66.2%) of the 1000 samples. Between these two points, if decision makers value an additional QALY at £30 000 (a value consistent with previous recommendations made by the National Institute for Clinical Excellence in the United Kingdom),¹⁷ then motivational enhancement therapy has a 57.6% probability of being more cost effective than social behaviour and network therapy.

Discussion

In the accompanying clinical paper on the UK alcohol treatment trial, we concluded that social behaviour and network therapy was as effective as the proven motivational enhancement therapy.⁶ Participants reported highly significant improvements in drinking and associated problems, and in mental health. Our economic analysis alongside the UK alcohol treatment trial found no evidence of differences in net cost. Although the direct cost of the social network therapy was £92 per client more than that of the motivational therapy, net savings in public sector resources did not differ significantly between the two therapies—both saved about five times as much as they cost.

In the first prospective cost effectiveness analysis in alcohol research we have estimated health gains and clients' use of 40 different public services. Nevertheless we did not include loss of productivity or measure the full social costs of either alcohol related violence or the effects of alcohol problems on family or friends. There was some evidence that using either therapy increased time in employment. If we had not avoided adding gains in productivity to gains in quality of life within economic analysis, however, we would have counted



Cost effectiveness acceptability curve for motivational enhancement therapy relative to social behaviour and network therapy

What is already known on this topic

Studies suggest that psychosocial treatment for alcohol problems is cost effective, yet many have methodological weaknesses

What this study adds

Social behaviour and network therapy did not differ significantly in cost effectiveness from motivational enhancement therapy

Both therapy groups reported substantially reduced drinking and associated problems and achieved large savings in the costs of health and social care and of criminal justice

benefits twice.⁹ In summary the UK alcohol treatment trial reinforces the finding that treatment for alcohol problems leads to net savings.^{18 19}

In the United Kingdom the National Institute for Clinical Excellence seems to value an additional quality adjusted life year (QALY) between £20 000¹⁰ and £30 000.¹⁷ Even if the value of a QALY were £30 000, motivational enhancement therapy would have 58% chance of being more cost effective than social behaviour and network therapy. Participants allocated at random to the reference group received motivational enhancement therapy, a treatment of proved effectiveness. Therefore the combination of a large sample size and the lack of significant differences lead to positive conclusions about the value of both of these treatments for alcohol problems.

In short we found evidence that social behaviour and network therapy is as effective as motivational enhancement therapy, and that both are cost effective. Thus commissioners of treatment for alcohol problems are free to choose either or both treatments on the basis of local circumstances, notably the availability of therapists of each type in statutory and non-statutory services. Although both treatments give value for money, both need trained therapists. We found that training is feasible and cheap. Hence there is now strong evidence about the effectiveness and cost effectiveness of two complementary treatments for alcohol problems.

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Self reported stress and risk of breast cancer: prospective cohort study

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Abstract

Objective To assess the relation between self reported intensity and frequency of stress and first time incidence of primary breast cancer.

Design Prospective cohort study with 18 years of follow-up.

Setting Copenhagen City heart study, Denmark.

Participants The 6689 women participating in the Copenhagen City heart study were asked about their perceived level of stress at baseline in 1981-3. These women were followed until 1999 in the Danish nationwide cancer registry, with <0.1% loss to follow-up.

Main outcome measure First time incidence of primary breast cancer.

Results During follow-up 251 women were diagnosed with breast cancer. After adjustment for confounders, women with high levels of stress had a hazard ratio of 0.60 (95% confidence interval 0.37 to 0.97) for breast cancer compared with women with low levels of stress. Furthermore, for each increase in stress level on a six point stress scale an 8% lower risk of primary breast cancer was found (hazard ratio 0.92, 0.85 to 0.99). This association seemed to be stable over time and was particularly pronounced in women receiving hormone therapy.

Conclusion High endogenous concentrations of oestrogen are a known risk factor for breast cancer, and impairment of oestrogen synthesis induced by chronic stress may explain a lower incidence of breast cancer in women with high stress. Impairment of normal body function should not, however, be considered a healthy response, and the cumulative health consequences of stress may be disadvantageous.

Introduction

Breast cancer is a hormone dependent disease with a clear positive relation to high endogenous concentra-

tions of oestrogen.¹ The risk of breast cancer associated with the acute stress of major life events has been assessed in several studies,²⁻⁵ but less attention has been given to the effect of perceived daily stress.⁶⁻⁸ Prolonged low key stress of everyday life results in a persistent activation of stress hormones, which may impair oestrogen synthesis,⁹ and may thereby be related to a lower risk of breast cancer. Everyday stress may also indirectly affect the risk of breast cancer through changes in health related behaviour. This study explores the impact of everyday stress on the long term risk of first time incidence of primary breast cancer among 6689 women prospectively followed up for 18 years.

Methods

Study population—The Copenhagen City heart study is a longitudinal study initiated in 1976. An age stratified random sample of 19 698 Danish men and women were invited to participate. In 1981-3, 7018 women from the study were examined, and baseline measures of stress were taken. We excluded women with breast cancer before baseline or lacking information on stress or other covariates, leaving 6689 women. Twenty six women were lost to follow-up. A detailed description of the Copenhagen City heart study has previously been published.¹⁰

Everyday stress—The study participants were asked about their level of stress in terms of intensity and frequency. The measure was questionnaire based, and stress was exemplified as the sensation of tension, nervousness, impatience, anxiety, or sleeplessness. We categorised stress scores into low, medium, and high.

Covariates—We controlled for the following potential confounders: current oral contraceptive use, hormone therapy, menopause at baseline, body mass

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