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Comparing Models of Smoking Treatment in Glasgow

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RESEARCHERS

Prof Linda Bauld*
Professor of Social Policy
Department of Social and Policy Sciences, University of Bath, Bath BA2 7AY
Tel: 01225 383160 Email: l.bauld@bath.ac.uk

Prof Andy Briggs
Lindsay Chair in Health Policy and Economic Evaluation
Public Health & Health Policy, University of Glasgow, 1 Lilybank Gardens, Glasgow G12 8RZ
Tel: 0141 330 5017 Email: a.briggs@clinmed.gla.ac.uk

Kathleen Boyd
Health Economics Research Fellow
Public Health & Health Policy, University of Glasgow, 1 Lilybank Gardens, Glasgow G12 8RZ
Tel: 0141 330 2713 Email: k.boyd@clinmed.gla.ac.uk

Dr John Chesterman*
Department of Social and Policy Sciences
University of Bath, Bath BA2 7AY
Tel: 01225 383160 Email: john@fchesterman.fsnet.co.uk

Janet Ferguson*
Research Associate
Department of Social and Policy Sciences
University of Bath, Bath BA2 7AY
Tel: 01225 383160 Email: janet@jferguson.co.uk

Prof Ken Judge*
Head of the School for Health
School for Health, University of Bath, Bath BA2 7AY
Tel: 01225 384809 Email: k.f.judge@bath.ac.uk

* All members of the UK Centre for Tobacco Control Studies

KEY FINDINGS

This study examined the effectiveness and cost-effectiveness of the two main types of NHS support for smokers who want to quit in Glasgow – pharmacy-based support and group-based support. It assessed the quit rates achieved by smokers, and the relationship between quit rates and smoker and service characteristics, at two points in time – four weeks after the quit date and one year after the quit date.

Four Week (short-term) Outcomes

- The four week analysis found that the odds of success were almost double for an individual smoker attending group-based support compared with the pharmacy-based service (O.R. 1.98). This result was found after controlling for all possible smoker characteristics and form of pharmacotherapy. However, pharmacy-based services are extremely accessible to smokers and, in Glasgow at least, achieved a much higher throughput at the time of the study.
- CO-validated four week quit rates were 35.5% for group clients and 18.6% for pharmacy clients, rising to 41.3% for groups and 27.8% for pharmacy clients when self-report quitters were included.
- Both models of service in Glasgow were reaching and treating smokers from disadvantaged areas in significant numbers.
- Previous smoking behaviour also has a significant impact on the probability of a successful quit attempt. More than half the smokers accessing both services reached for their first cigarette within five minutes of waking (a key indicator of nicotine dependency).
- Those smokers who reported that they were 'extremely determined' to quit were more likely to be successful in their attempt to stop, and this pattern was found for both models of service.
- The CO-validated quit rate varied by model of service and socio-economic group. For example, smokers attending the group-based service and who were more advantaged had a quit rate of 35%, but if they were less advantaged this fell to 16%. More advantaged smokers attending the pharmacy-based service had a quit rate of 25% and the less advantaged had a quit rate of 15%.
- A larger proportion of younger people in the 16-40 age range attended the pharmacy-based service (44.5%) than attended groups (24.3%). Although the cessation rate for pharmacy-based clients increased sharply with age from 13.4% for age 16-40 to 30.7% for age 61 and over ($p < 0.0005$), the corresponding increase for group-based clients was much less and was not statistically significant ($p = 0.249$).

52 Week (long-term) Outcomes

- Overall, just 6% of pharmacy-based clients and 11% of group-based clients remained quit at one year, when all cases (CO-validated and self-report) were included.
- Only 3.6% – 64 people of the 1,785 who set a quit date – were CO-validated as non-smokers at 52 week follow-up. This rose to 7.1% (127 people) when unvalidated (self-reported) quitters were included.
- Clients who were treated in groups were still more likely to have remained abstinent at 52 weeks than those who accessed the pharmacy service.
- Amongst CO-validated quitters, age (as at four weeks) was still a highly significant predictor, increasing the probability of successful quitting by 5% for each year of age. When clients in

socio-economic groups 5 and 6 (most deprived) were considered, age increased the probability of successful quitting by a substantial 7% for each year of age.

- Clients who were both extremely determined to quit smoking and smoked mainly for pleasure (rather than to cope) were almost three times more likely to have remained abstinent at one year.
- Amongst self-reported quitters, clients with a socio-economic score of 5 or 6 (most deprived) were substantially less likely to quit.
- At the bivariate level, clients of the group-based service who reported poor health were more likely to be quitters at 52 weeks (both CO-validated and self-reported), suggesting that poor health may be a factor motivating some clients to maintain abstinence in the longer term.
- The characteristics of Glasgow clients – in particular their levels of deprivation, their levels of addiction and possibly their age – were barriers to quitting, to a greater degree than in a similar English-based service evaluation (Ferguson et al, 2005).
- Around twice the proportion of pharmacy-based four week quitters as of group-based quitters had relapsed by eight weeks (45.3% compared with 23.8%).
- Two thirds of pharmacy-based clients (66.7%) and almost half of the group-based clients (47.7%) relapsed in the period between four and 13 weeks, when support was still available from services.
- Older smokers, more affluent smokers and those who were extremely determined to quit were all less likely to relapse, suggesting that relapse rates vary both by model of treatment and by smoker characteristics.

Economic Evaluation

- Both pharmacy-based and group-based interventions are highly cost-effective at £2,500 per Quality Adjusted Life Year (QALY) and £4,800 per QALY gained, respectively. Interventions with an Incremental Cost-Effectiveness Ratio (ICER) of less than £20,000 per QALY are generally considered to be cost-effective by the National Institute for Health and Clinical Excellence (NICE).
- The cost-effectiveness estimates for the four week, 52 week, and lifetime analyses were all based on stringent evaluation criteria, using only CO-validated quitters as the measure of outcome, using a 'no cost' comparator of self-quit attempts and discounting the future QALY gains in the lifetime analysis. Despite the stringent evaluation criteria used, both services were found to be cost-effective in each of these analyses.
- Cost per 52 week quitter results were considerably higher for both services than those reported in the interim four week analysis. This is due to the high relapse rates observed between four and 52 weeks. The cost per QALY outcomes are more meaningful than cost per quitter outcomes, as the QALY incorporates the gains in both quality and quantity of life that clients will receive from smoking cessation, better reflecting the long-term impact on health.
- The cost per QALY outcomes for both interventions compare favourably with other smoking cessation studies, many of which are lower in intensity.
- The group support service is more effective than the pharmacy service, but it also costs considerably more and therefore is less cost-effective than the pharmacy service. This is unsurprising given the highly intensive nature of group support.
- Both the pharmacy and group support services are cost-effective and co-exist to provide a comprehensive smoking cessation service across Glasgow. They offer good value for money and meet the varying needs of different smokers, providing a choice of cessation therapies in order to maximise the number of quit attempts and successful quitting in Glasgow.

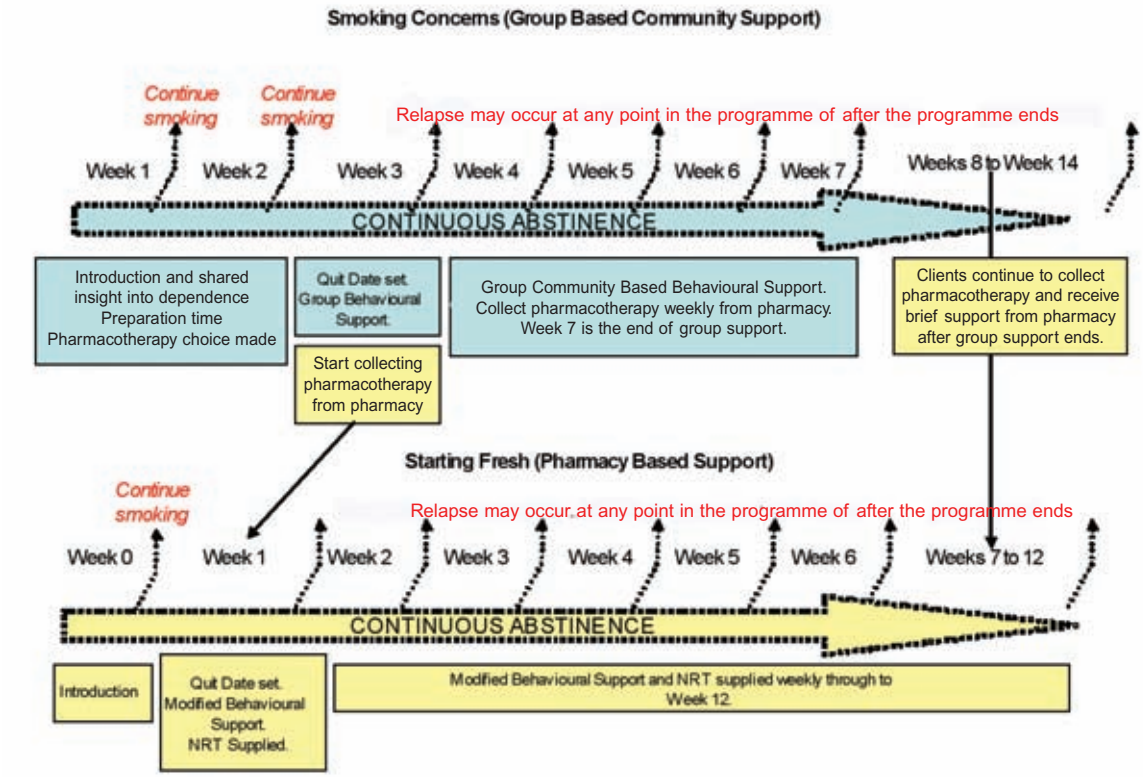
INTRODUCTION

Group and pharmacy-based provision in Glasgow are two components of wider efforts to reduce smoking in the NHS Greater Glasgow and Clyde area. These wider efforts are underpinned by a local tobacco control strategy. A key part of this strategy is the development of services to encourage smoking cessation. These services include a range of models of intervention coordinated by 'Smoking Concerns' – including a specialist service for pregnant women (the 'Breathe' service), smoking cessation in secondary care, a very small number of one-to-one interventions in a range of community settings, and the group-based service that is a focus of this study. The pharmacy-based support scheme ('Starting Fresh') involves a large network of pharmacies that deliver one-to-one smoking cessation support. In 2008, group-based support and pharmacy-based support integrated their functions to become the NHS Greater Glasgow and Clyde 'Smokefree Services'. For the purposes of this report, however, the terms group-based support and pharmacy-based support are used throughout.

The stop smoking groups coordinated by Smoking Concerns are delivered by Community Health (and Care) Partnerships across Glasgow. At the time of the study, the service treated around 1500 clients per year. The intervention is based on the 'Maudsley model' of treatment that involves seven weeks of structured behavioural support delivered to a group of smokers by a trained adviser. Behavioural support is combined with access to one of three types of smoking cessation medication (a range of nicotine replacement products, bupropion or varenicline). Advisers inform clients about the medications that are available and help the client to choose which one to use. Prescriptions for bupropion or varenicline are obtained from the client's GP whereas NRT is obtained via a voucher provided by the advisers and redeemable at any of the pharmacies participating in the pharmacy-based support scheme. At the time of the study, the majority of group-based clients were using NRT. Clients attend the group for seven weeks. After that point, if they are still abstinent, they can continue to redeem their vouchers for NRT on a week by week basis and receive some one-to-one behavioural support up to week 12 from their local participating support pharmacy.

At the time of the study, there were over 200 pharmacies (90% of pharmacies within the original Greater Glasgow Health Board area) participating in pharmacy-based support, making it the largest pharmacy-based smoking cessation service in the UK. Trained pharmacists and their assistants are treating over 12,000 smokers each year. The pharmacy-based support model involves up to twelve weeks of one-to-one support combined with the direct supply of NRT (in most cases the 16 hour Nicorette patch). At the time of the study, bupropion and varenicline were not used by pharmacy-based clients. The behavioural support that is provided is more than 'brief intervention' (NICE, 2006) but is of a much shorter duration than the intensive group-based service. Figure 1 shows the client pathway for group-based support and pharmacy-based support.

Figure 1: Client Pathways



AIMS

The study to compare the models of smoking treatment in Glasgow had four main aims:

1. To assess the short (four week) and longer term (52 week) outcomes associated with each model of service.
2. To explore what factors (client and/or service characteristics) influence outcomes.
3. To examine the relationship between costs and outcomes for the two models of service.
4. To assess how effective the services are in reaching and treating clients from disadvantaged parts of the city.

APPROACH AND METHODS

The study methods are described here, first for the effectiveness components of the study and then for the cost effectiveness component.

Data

Detailed information was collected by both services about all smokers setting a quit date between 1 April and 31 May 2007 (pharmacy-based support) and between 14 March (No Smoking Day) and 31 May 2007 (group-based support).

Smokers who had set a quit date during the study period, had self-reported quit at four weeks, and who had previously consented to take part in the research, were invited to take part in a 52 week follow-up. Clients were initially invited by letter and responded either with a freepost one page questionnaire or by telephone questionnaire, for which they were remunerated with a £5 shopping voucher. Clients who had self-reported abstinence over the year were invited to have this confirmed by CO-validation. These clients received a £10 shopping voucher to cover expenses. Clients were considered lost to follow up if they did not respond to the initial letter and/or after several telephone calls.

Data from the 52 week questionnaire material was supplied in an anonymous form to the research team, where it was combined on an SPSS database with the descriptive information on each client (collected as part of the four week study) together with the details of treatment and smoking status at four weeks.

Sample

Table 1 shows the study sample; 1785 smokers were included with 1374 setting a quit date with pharmacy-based support and 411 with group-based support.

Table 1: Creation of long-term outcome categories from four and 52-week outcomes for group-based support and pharmacy-based support combined

	FOUR WEEK STATUS									
	CO-validated quitters		Self-reported quit without validation[1]		Non-quitters[2]		Lost to follow-up		TOTAL	
52 WEEK STATUS	N	%[3]	N	%[3]	N	%[3]	N	%[3]	N	%[3]
CO-validated 52 week quitters	47	11.7	14	9.3	2	0.7	1	0.1	64	3.6
Self-report 52 week quit without validation[1]	48	12.0	14	9.3	1	0.4	0	0.0	63	3.5
Non-quitters at 52 weeks[2]	184	45.9	66	43.7	13	4.7	2	0.2	265	14.8
Lost to follow-up at 52 weeks	122	30.4	57	37.7	259	94.2	955	99.7	1393	78.0
TOTAL	**401**	**100.0**	**151**	**100.0**	**275**	**100.0**	**958**	**100.0**	**1785**	**100.0**

Notes:

1. Cases where self-reported quit was refuted by a negative CO-validation test were included with non-quitters.
2. Non-quitters include self-reported quit refuted by CO-validation test.
3. Percentages are expressed with respect to column totals.

Measures

Descriptive measures used in the analysis cover personal details, socio-economic circumstances (combined to form one socio-economic score), smoking history and service provided, and are the same as those used in the four week study (Bauld et al, 2008, Bauld et al, 2009).

Outcomes

The four and 52 week outcomes were defined to concur as closely as possible with the Russell Standard (West et al, 2005). Clients were regarded as having reported sustained abstinence between their original four week quit date and 52 weeks if they had firstly not smoked at all (even a puff) in the previous two weeks and secondly had not smoked more than five cigarettes since the one month follow-up (defined as 'continuous abstinence'). They were then encouraged to attend their local support pharmacy for CO-validation. If clients could not be contacted they were classed as lost to follow-up.

Methods

First, bivariate relationships between key characteristics of the sample and self-report and CO-validated quit rates are presented for each service model separately. Secondly, the relationship between CO-validated and self-report cessation rates and personal/service characteristics was investigated by means of forward stepwise logistic regression analysis ($p(in) < .05$). In order to investigate possible sources of bias, two alternative samples were used. The larger sample (N=1785) included all cases, while the smaller sample (N=1366) excluded cases with a section of the original questionnaire missing and group-based support cases with quit dates set in March 2007 (further details on missing data are included in the interim report for this study (Bauld et al, 2008)). Variables were entered in blocks. Model 1 allowed just the scheme

dummy to enter, while in Model 2 age and gender could also enter and in Model 3 socio-economic group dummies could enter as well. Model 4 allowed all remaining predictors to enter (excluding interaction terms), while in Model 5 interaction terms could enter too. The analysis was repeated entering all variables and then using backward stepwise logistic regression analysis, to see whether the models could be improved.

Economic Evaluation Methods

The study also evaluated both the annual and lifetime cost-effectiveness of the pharmacy and group-based interventions, in comparison to a baseline 'self-quit' scenario, undertaken from the perspective of the NHS. The annual cost-effectiveness model used the study data and cost information to establish the incremental cost per 52 week quitter; while a Markov Model was developed for the lifetime analysis to estimate the potential lifetime outcomes in terms of cost per QALY (Quality Adjusted Life Year) gained to account for the benefits quitters will receive in terms of extended life years and improvements in quality of life from smoking cessation.

52 week model

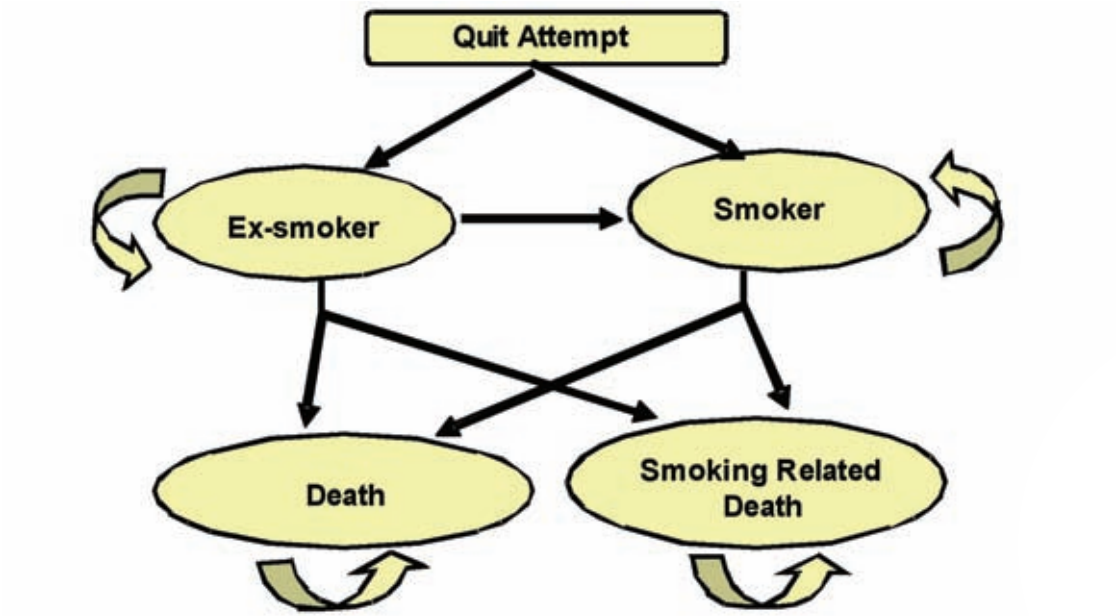
The cost per quitter analysis was based on a simple decision tree model involving three alternative quit options: NHS support via the group-based service, NHS support via the pharmacy-based service, or a 'no-service' control option of a self-quit attempt. The effectiveness outcomes and cost information from the study were combined with secondary information on effectiveness of self-quit attempts to determine the incremental cost per 52 week quitter for each service.

Lifetime model

A Markov Model was developed using the 52 week quitter results from the study along with secondary information to model the lifetime effects of quitting for each intervention in terms of QALYs. Figure 2 illustrates the Markov Model process.

Figure 2:

Markov Model: Lifetime model for smokers who undertake a quit attempt



There are four main Markov states in this model: Ex-smoker, Smoker, Death and Smoking Related Death. The direction of the arrows indicates possible transitions between these states. From the initial 'Quit Attempt' clients who are successful will become ex-smokers, and from this state they can either remain an ex-smoker, relapse to become a smoker again, die from non-smoking related causes or die a smoking related death. Those who are unsuccessful in their quit attempt move into the smoker state and it is assumed that no further quit attempts are undertaken, so there is no transition from the smoker state to the ex-smoker state. Time dependency was also built into the model, reflecting the risk of relapse limited to eight years post-quit, and the risk of a smoking related death for an ex-smoker limited to 12 years post-quit. Probabilities, which are derived from the study evidence and secondary sources, are applied to all possible transitions reflecting the appropriate risks, while costs are applied to the quit attempt undertaken and any relevant states and utility estimates are applied to the respective states to reflect the quality of life in that state. The model life-span was set at 75 years, incorporating the full lifetime of all participants, with each cycle of the model representing one year. The baseline model generated three cohorts of smokers: the first cohort utilised the pharmacy-based service, the second the group-based service, while the third cohort undertook a self-quit attempt without any cost incurred by the NHS. Therefore all three cohorts had different costs and different probabilities of success in quitting, based on the 52 week study results.

FINDINGS

Findings are presented for the effectiveness analysis and the cost effectiveness analysis in turn.

52 week outcomes

Table 2 illustrates 52 week outcomes for each service separately. This shows that quit rates are higher amongst smokers who attended the group-based service rather than the pharmacy-based service. Thus, the CO-validated quit rate of 6.3% for group-based clients compares with just 2.8% for pharmacy-based clients and the combined CO-validated and self-reported unvalidated quit rate of 11.4% for group-based compares with just 5.9% for pharmacy-based clients.

Table 2: 52 week smoking outcomes by service

	Pharmacy-based support		Group-based support	
	N	%	N	%
CO-validated quit	38	2.8	26	6.3
Self-reported quit without CO-validation[1]	42	3.1	21	5.1
Smoker[2]	190	13.8	75	18.2
Lost to follow-up	1104	80.3	289	70.3
Total	**1374**	**100.0**	**411**	**100.0**

Notes:
1. Excludes self-reported quit cases refuted by CO-test
2. Includes self-reported quit cases refuted by CO-test

Multivariate analysis provides a useful way of examining the relationship between one or more risk factors (e.g. age, socio-economic group score etc) and an outcome such as CO-validated and unvalidated self-report smoking status. This analysis involved statistical modelling using logistic regression to estimate the probabilities of CO-validated quit (Table 3) and CO-validated and unvalidated self-reported quit rates combined (Table 4).

This analysis focused on the smaller sample in the study (n=1366), excluding those with missing questionnaires. Models were built up in five stages (Models 1 to 5). Only terms for which the significance of the change in –2 log likelihood was less than 5% were normally allowed to enter. Examining Table 3 for 52 week CO-validated quit, Model 1 shows that the service dummy enters with an odds ratio of 1.995. After introducing age in Model 2, this odds ratio drops to 1.636. When in Model 4 all remaining predictors apart from interaction terms are allowed to enter, two new predictors enter the model, 'smokes mainly for pleasure', which is significant at the 5% level (p=.008) and Scottish deprivation quintiles 3-5 (less deprived) (p=.061). On allowing all interaction terms to enter in Model 5, the odds ratio is 1.599 but is not statistically significant at the 5% level (p=.097). An interaction term between 'extremely determined to quit smoking' and 'smoked mainly for pleasure' enters. This interaction term implies that clients who are 'extremely determined to quit smoking' and 'smoke mainly for pleasure' are more likely to be CO-validated 52 week quitters.

Table 3: Modelling 52 week CO-validated quit rate

	N=1366		
	ß[1]	Sig[2]	Odds Ratio
Model 1: *just scheme dummy allowed to enter*			
Whether service offered by group-based support	0.691	.013	1.995
Model 2: *also age and gender allowed to enter*			
Whether service offered by group-based support	0.492	.078	1.636
Age (years)[3]	0.047	<.0005	1.048
Model 3: *also socio-economic group dummies allowed to enter*			
Whether service offered by group-based support	0.492	.078	1.636
Age (years)[3]	0.047	<.0005	1.048
Model 4: *also all remaining predictors allowed to enter (excluding interaction terms)*[3]			
Whether service offered by group-based support	0.459	.105	1.582
Age (years)[3]	0.047	<.0005	1.048
Scottish deprivation quintiles 3 – 5 (low deprivation)	0.533	.061	1.704
'Smokes mainly for pleasure'	0.731	.008	2.077
Model 5: *also interaction terms allowed to enter*[3]			
Whether service offered by group-based support	0.469	.097	1.599
Age (years)[3]	0.049	<.0005	1.050
Scottish deprivation quintiles 3 – 5 (low deprivation)	0.566	.047	1.761
('Extremely determined to quit smoking') x ('Smokes mainly for pleasure')	1.054	.003	2.868

Notes:
1. ß coefficient from regression analysis
2. Significance of change in –2 log likelihood
3. Age was centred by subtracting the mean Age (46)

In Table 4 for 52 week self-reported (unvalidated) quit, the models show some different features from those for CO-validated quit, though in most respects are quite similar. 'Socio-economic group score of 5 or 6' enters Models 3 to 5. Also an additional interaction term, 'Age x (Socio-economic group score of 5 or 6) enters Model 5. In other words, the age effect on self-reported quit rate is biggest for cases in greatest socio-economic need. Model 5 also shows that the service dummy is not quite significant at the 5% level.

Entering all variables followed by stepwise regression failed to improve upon any of the initial models in Tables 3 and 4.

Table 4: Modelling 52 week self-reported quit rate

	N=1366		
	ß[1]	Sig[2]	Odds Ratio
Model 1: *just scheme dummy allowed to enter*			
Whether service offered by group-based support	0.576	.005	1.779
Model 2: *also age and gender allowed to enter*			
Whether service offered by group-based support	0.446	.032	1.563
Age (years)[3]	0.027	<.0005	1.028
Model 3: *also socio-economic group dummies allowed to enter*			
Whether service offered by group-based support	0.387	.063	1.473
Age (years)[3]	0.023	.001	1.024
Socio-economic group score of 5 or 6 (highest deprivation)	-0.617	.017	0.539
Model 4: *also all remaining predictors allowed to enter (excluding interaction terms)*[3]			
Whether service offered by group-based support	0.397	.059	1.488
Age (years)[3]	0.025	.001	1.025
Socio-economic group score of 5 or 6 (highest deprivation)	-0.602	.021	0.548
'Extremely determined to quit smoking'	0.504	.013	1.655
'Smokes mainly for pleasure'	0.629	.002	1.876
Model 5: *also interaction terms allowed to enter*			
Whether service offered by group-based support	0.410	.052	1.506
Age (years)[3]	0.018	.023	1.018
Socio-economic group score of 5 or 6 (highest deprivation)	-0.730	.008	0.482
Age x (Socio-economic group score of 5 or 6)	0.068	.006	1.071
('Extremely determined to quit smoking') x ('Smokes mainly for pleasure')	1.083	<.0005	2.953

Notes:
1. ß coefficient from regression analysis
2. Significance of change in –2 log likelihood
3. Age was centred by subtracting the mean Age (46)

Economic Evaluation

Table 5 shows the average cost per participant for smokers accessing pharmacy-based support or group-based support. The cost per participant used in the cost-effectiveness analysis is £79.23 for pharmacy-based clients and £368.38 for group-based clients. The baseline analysis in both the 52 week and lifetime models assumes self-quit attempts do not incur a cost to the NHS.

Table 5: Average cost per participant

	Pharmacy-based support	Group-based support
Cost area	Cost per participant	Cost per participant
NRT	£46.50	£53.84
Professional time	£18.53	£27.02
Overheads	£6.39	£282.96
Materials	£3.02	£4.43
Annual training	£4.79	£0.13
TOTAL	**£79.23**	**£368.38**

Table 5 also shows the constituent parts of the cost per participant for each service model. First-line NRT costs the NHS £9.98 per week per client, regardless of the service, and therefore the average cost per participant depends on the duration of use of NRT. The slightly higher cost for NRT attributed to group-based support in Table 5 reflects the longer duration of average quit attempt than for pharmacy-based clients. The average pharmacy fee cost also depends on duration of quit, but it is expected that group-based support incurs a higher average cost than pharmacy-based support due to the additional cost of facilitator fees. The overheads, materials and refresher training costs are fixed annual sums, so average costs were based on the number of annual participants for each service at the time of study. These have not altered from the interim analysis (Bauld et al, 2008). The overhead costs for group-based support are considerably greater than those incurred by pharmacy-based support, due to the much greater volume of salary-related costs incurred in this service, and the lower numbers of clients.

Cost-effectiveness analysis

Based on this study cost and outcome data, the cost per participant, probabilities of quitting and incremental cost-effectiveness ratios (ICERs) are detailed in Table 6.

Table 6: 52 week model results

ICERs for pharmacy-based support & group-based support			
Intervention	**Cost per participant**	**Probability of quit**	**Incremental cost per 52 week quitter**
Self-quit	**£ -**	**0.015**	
Pharmacy-based support	**£79.23**	**0.025**	**£7,768**
Group-based support	**£368.38**	**0.055**	**£9,163**

Table 6 shows that the group-based support intervention has the greatest probability of achieving 52 week CO-validated quitters; however, it also has the greatest cost per participant. This is mainly attributable to the higher overhead costs involved with group-based support. As group-based support and pharmacy-based support attract different types and populations of smokers, the cost-effectiveness analysis compares each intervention incrementally to the baseline self-quit scenario, rather than directly with each other. Both pharmacy-based support and group-based support are more expensive and more effective than the self-quit scenario. The incremental cost per quitter results show that in comparison to the 'self-quit' option, the pharmacy-based support service provides an additional 52 week CO-validated quitter at a cost of £7,768, while the group-based support service produces an additional quitter at a cost of £9,163 compared with a self-quit attempt.

The two ICERs (Incremental Cost-Effectiveness Ratios) reported here can still be considered cost-effective; however, they are considerably higher than expected and much greater than those reported in the four week interim analysis (Bauld et al, 2008); due to the substantial drop in probabilities of quitting with both services, but relative consistency in costs. They are also higher than the 52 week estimates (Boyd & Briggs, 2009). Those estimates were based on a 75% relapse rate from four week results and predicted ICERs of £5,678 for pharmacy-based support and £6,987 for group-based support. The higher, less cost-effective results presented in Table 6 are due to the lower effectiveness of the actual 52 week outcomes, however it should be noted that the effectiveness of the comparator, self-quit attempts, was also lowered in line with this, but the ICER for each service is still approx £2,000 per quitter higher than predicted.

The results show that the cost-effectiveness of these two services is dependent on the probability of quitting. Marginal improvements in success rates will have substantial effects on cost-effectiveness ratios. When the self-reported quit rates are also incorporated into the analysis (as many cost-effectiveness analyses currently do, despite the Russell Standard recommendations (West et al, 2005)) the incremental cost-effectiveness ratios for both services improve substantially, as shown in Table 7. If the self-reported quitters are incorporated, then the probabilities of quitting increase to 0.05 and 0.1 respectively for pharmacy-based support and group-based support, and the ICERs fall respectively to £2,082 and £4,345[1] indicating a substantial improvement and making both services extremely cost-effective.

[1] This is based on the self-quit comparator probability of 0.015 (an 85% relapse rate from the four week success estimate of 10%). If the probability of 52 week self-quit success is also increased to 0.025 (using the 75% relapse rate from the four week success estimate of 10%) then the ICERs still fall substantially to £2,824 for pharmacy-based support and £4925 for group-based support.

Table 7: 52 week results, CO-validated and self-reported quitters

ICERs for pharmacy-based support & group-based support			
Intervention	**Cost per participant**	**Probability of quit**	**Incremental cost per 52 week quitter**
Self-quit	**£ -**	**0.015**	
Pharmacy-based support	**£79.23**	**0.025**	**£2,082**
Group-based support	**£368.38**	**0.055**	**£4,345**

It should be noted that the baseline cost per quitter ICERs in Table 7 are also likely to be at the upper limit, due to the conservative approach adopted throughout; however it is likely that the lifetime model will present more meaningful outcomes, which can not only be compared with other smoking cessation interventions, but also across various healthcare interventions that have also used QALYs as an outcome measure.

LIMITATIONS

This study faced a number of limitations. Firstly, it was an observational study that cannot draw direct comparisons between the two service models (Bauld et al, 2009, Boyd and Briggs, 2009). Given that both services are publicly available and a previous evaluation provided some information on service outcomes, conducting a trial was not possible. It is therefore important that readers understand that the issue of selection bias should be kept in mind when considering our results.

Secondly, at 52 weeks the level of CO-validation was relatively low. The Russell Standard (West et al, 2005) stipulates that biochemical validation is required to reliably assess smoking outcomes, as smokers may not always be truthful regarding their smoking status. We attempted this by incentivising clients to return to their local pharmacy for CO-validation. We assumed that those clients who responded to our questionnaire and who were truly abstinent would be motivated to have their smoking status validated given a £10 incentive. However, CO-validation could only be obtained for around half of our sample (pharmacy-based service – 47%, group-based service – 55%). This contrasts with the 82% 52 week CO-validation rate achieved in our English study in 2004 (Ferguson et al, 2005) where we used a similar approach, including incentives. We have therefore reported both self-reported and CO-validated outcomes here, and both should be considered when interpreting our results.

CONCLUSION

This study found that both forms of support available to help smokers stop in Glasgow are effective and cost-effective. At the individual level, smokers are more likely to quit in the short and longer term if they access group support. This finding stands after controlling for a wide range of client characteristics. However, pharmacy-based services are extremely accessible to smokers and, in Glasgow at least, achieve a much higher throughput. This suggests that both types of intervention have a valuable role to play in cessation, but that further work is needed to determine what can be done to bring the success rates of pharmacy services up to those of group services and how to expand access to group-based services.

REFERENCES

Bauld, L, Chesterman, J, Ferguson, J, & Judge, K. A comparison of the effectiveness of group-based and pharmacy led smoking cessation treatment in Glasgow. *Addiction*. 2009; **104**:308-316.

Boyd, KA & Briggs, AH. Cost-effectiveness of pharmacy and group behavioural support smoking cessation services in Glasgow. *Addiction*. 2009; **104**:317-325.

Bauld, L, Briggs, AH, Boyd, K, Chesterman, J, Ferguson, J, Judge, K, & Wilson, M. *Comparing Models of Smoking Treatment in Glasgow: Interim Report. 2008. Glasgow Centre for Population Health, Glasgow*. http://www.gcph.co.uk/index2.php?option=com_docman&task=doc_view&gid=336&Itemid=71

Ferguson, J, Bauld, L, Chesterman, J & Judge, K. The English smoking treatment services: one-year outcomes. *Addiction*. 2005; **100**(2):59-69.

National Institute for Clinical Excellence. *Public Health Intervention Guidance – Brief interventions and referral for smoking cessation in primary care and other settings.* 2006. NICE, London.

West, R, Hajek, P, Stead, L, & Stapleton, J. Outcome criteria in smoking cessation trials: proposal for a common standard. *Addiction*. 2005; **100**:299-303.

West, R. *Assessing smoking cessation performance in NHS Stop Smoking Services: The Russell Standard (Clinical)*. 2005. Smoking Cessation Service Research Network. http://www.scsrn.org/clinical_tools.html

CONTACTS

Professor Linda Bauld
Professor of Social Policy
Department of Social and Policy Sciences
University of Bath
Bath BA2 7AY

Tel: 01225 383160

Email: l.bauld@bath.ac.uk

Prof Carol Tannahill
Director
Glasgow Centre for Population Health
1st Floor, House 6
94 Elmbank Street
Glasgow G2 4DL

Tel: 0141 287 6959

Email: carol.tannahill@drs.glasgow.gov.uk

Web: www.gcph.co.uk