

Comparing Models of Smoking Treatment in Glasgow: Final report

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**Linda Bauld, Andy Briggs,
Kathleen Boyd, John Chesterman,
Janet Ferguson and Ken Judge**

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EXECUTIVE SUMMARY

This study examined the effectiveness and cost-effectiveness of the two main types of NHS support for smokers who want to quit in Glasgow. At the time of the research these models of treatment (now integrated as NHS Greater Glasgow and Clyde 'Smokefree Services') were:

- Starting Fresh, pharmacy-based one to one behavioural support with NRT for 12 weeks. Available in over 200 pharmacies across Glasgow, treating over 12,000 smokers per year.
- Smoking Concerns, community-based intensive group behavioural support available for 7 weeks, combined with NRT (collected from a Starting Fresh pharmacy) or bupropion or varenicline on GP prescription. Clients could continue receiving NRT and support from a pharmacist between weeks 8-12. At the time of the study, these groups treated around 1,700 smokers per year.

The study objectives were to determine:

- Who was accessing each model of service
- How successful each service was in helping smokers to quit at 4 and 52 weeks
- Which factors affected cessation outcomes
- What the relationship was between costs and outcomes for each model of service

An interim report from the study was published in March 2008. This outlined 4 week outcomes. Key results from this report are summarised here but are not repeated in the main body of the final report. For readers interested in examining the four week results in more detail, these are available on the GCPH website (Bauld et al, 2008).

4 Week Outcomes

- The 4 week analysis found that the odds of success were more than double for an individual smoker attending Smoking Concerns groups compared with the Starting Fresh pharmacy service (O.R. 2.42). 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 4 week quit rates for group clients were 35.5% 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 5 minutes of waking.
- 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 service 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 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 service (44.5%) than groups (24.3%). Although the cessation rate for

pharmacy 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 clients was much less and statistically insignificant ($P = 0.249$).

52 Week Outcomes

Findings at 52 weeks were consistent with those identified at 4 weeks both in terms of smoking outcome by service and in the range of client characteristics and their effect on outcome.

- Overall, just 6% of pharmacy clients and 11% of group clients remained quit at one year, when all cases (CO validated and self-report) were included.
- Only 64 people – 3.6% of the 1,785 who set a quit date – were CO validated as nonsmokers at 52 week follow-up. This rose to 7.1% (127 people) when unvalidated (self-report) 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 4 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-report quitters, clients with a socio-economic score of 5 or 6 (most deprived) were substantially less likely to quit.
- At the bivariate level, clients who reported poor health were more likely to be quitters at 52 weeks (both CO validated and self-report) among group clients, 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 4 week quitters had relapsed by 8 weeks (45.3%) as Smoking Concerns clients (23.8%).
- Two thirds of pharmacy clients (66.7%) and almost half of group clients (47.7%) relapsed in the period between 4 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 support interventions are highly cost-effective at £2500 per Quality Adjusted Life Year (QALY) and £4800 per QALY gained, respectively. Interventions with an 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 4 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 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 at 52 weeks than those reported in the interim 4 week analysis. This is due to the high relapse rates observed between 4 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.
- In comparison to each other, 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 quit attempts and successful quitting in Glasgow.

Conclusion

This study found that both forms of support available to help smokers stop in Glasgow are effective and costs effective. At the individual level, smokers are more likely to quit in the short and longer term if they access group support, after controlling for a wide range of client characteristics. This poses questions about why group support is currently the least available form of smoking treatment in the UK. 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 groups and how to expand access to group-based services.

INTRODUCTION

This report describes final results from a study comparing models of smoking treatment in Glasgow. The study is funded by the Glasgow Centre for Population Health, NHS Greater Glasgow and Clyde and NHS Health Scotland. The research builds on an earlier evaluation of local smoking cessation services (Bauld et al, 2005). The current study examines in more detail the two main elements of smoking treatment offered in Glasgow– group-based support coordinated by Smoking Concerns and the Starting Fresh pharmacy-based service. It aims to address the following research questions:

- What short (4 week) and longer term (52 week) outcomes are associated with each model of service?
- What factors (client and/or service characteristics) influence outcomes?
- What is the relationship between costs and outcomes for the two models of service?
- How effective are the services in reaching and treating clients from disadvantaged parts of the city?
- What are clients' views regarding services and what factors influence cessation outcomes from the client perspective?

The interim report (Bauld et al, 2008) outlined preliminary (4 week) results from the study. This report was followed by the preparation of two articles which were published in the journal *Addiction* in mid January 2009 (Bauld et al, 2009, Boyd and Briggs, 2009). This report describes the second stage of the study which involved collecting and analysing 52 week outcome data.

The report begins with a description of the two service models in the study. This is the same description that was included in the interim report. However, we are aware that readers who are more interested in our final results may not read the interim report and for this reason we repeat the service description here.

The Services

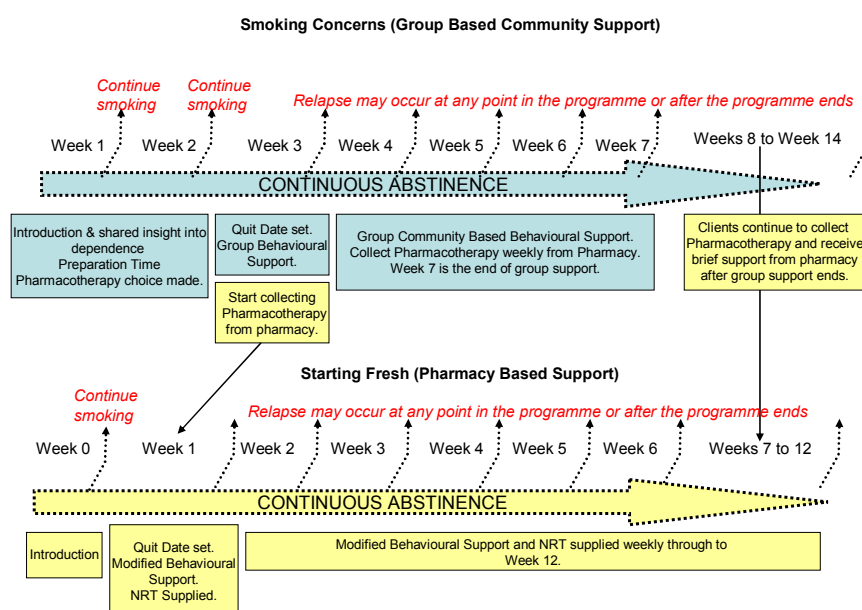
Group and pharmacy-based provision in Glasgow are two components of wider efforts to reduce smoking in the NHS Greater Glasgow and Clyde area. These wider efforts are underpinned by a local tobacco control strategy. A key part of this strategy is the development of services to encourage smoking cessation. 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 the focus of this study. The Starting Fresh scheme involves a large network of pharmacies that deliver one to one smoking cessation support. In 2008, Smoking Concerns and Starting Fresh integrated their functions to become the NHS Greater Glasgow and Clyde 'Smokefree Services'. For the purposes of this report, however, the names Smoking Concerns and Starting Fresh are used throughout.

The stop smoking groups coordinated by Smoking Concerns are delivered by Community Health Partnerships (CHPs) 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 will 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 which can be redeemed at any of the pharmacies participating in the Starting Fresh scheme. At the time of the study, the majority of Smoking Concerns 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 Starting Fresh pharmacy.

At the time of the study, there were over 200 pharmacies (90% of pharmacies within the original Glasgow Health Board area) participating in Starting Fresh, 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 Starting Fresh 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 Starting Fresh clients. The behavioural support that is provided is more than a brief intervention (NICE, 2006) but is of a much shorter duration than the more intensive group-based service. Figure 1 shows the client pathway for Smoking Concerns groups and Starting Fresh.

Figure 1: Client Pathways



The two services provide slightly different pathways through the process of smoking cessation, but do not operate in isolation from one another.

As Figure 1 shows, the starting point for the two models is slightly different. Those clients who attend Smoking Concerns groups set a quit date for the day of their week 3 attendance (weeks 1 and 2 are general registration and information provision sessions) with 4 week outcomes measured at week 7. Starting Fresh clients set a quit date for the day of their week 1 attendance, after attending an initial information session which is described as 'week 0'. Starting Fresh 4 week outcomes are measured on or around week 5. Despite these differences in sequencing, both services provide the same

starting point for the main analysis presented in this report – the starting point being the quit date.

Figure 1 also illustrates how the two models of treatment are connected. Both Smoking Concerns and Starting Fresh clients collect their pharmacotherapy from a Starting Fresh pharmacy. In addition, Starting Fresh delivers support to all abstinent clients, including those who started treatment through the Smoking Concerns Groups, from weeks 8-12. Clients do not access any formal support associated with either service beyond week 12.

The remainder of this report sets out findings from our exploration of the contribution of these two models of smoking treatment to helping smokers quit in the longer term, after one year. It is important to note here that the report outlines our 52 week results *in full*. At times the findings are fairly detailed. However we believe it is important to present our full analyses here, so that the report can be a source of reference for any briefer future articles arising from the study. The report is divided into three main sections:

- 52 week outcomes
- Economic evaluation
- Conclusions

52 WEEK OUTCOMES

This section of the report describes the longer term (one year) outcomes for clients who accessed group or pharmacy-based support to stop smoking during the study period. It begins by describing the methods used in the study, in particular in the 52 week follow up. It then goes on to describe the main findings followed by a short discussion of these findings.

Methods

This part of our study examined the proportion of service clients who were still quitters one year after their quit date, and the proportion who had this result confirmed by CO-validation. It also relates these smoking outcomes to client characteristics at the time that the quit date was set.

Data

As outlined in our interim report, detailed information was collected by both services about all smokers setting a quit date between 1st April and 31st May 2007 (Starting Fresh - SF) and between 14th March (No Smoking Day) and 31st May 2007 (Smoking Concerns - SC). These data included information about: personal details; family circumstances; smoking history and level of addiction; deprivation category and place of residence; type of services received; and smoking status at 4 weeks.

Smokers who had set a quit date during the study period, had self reported quit at 4 weeks and who had previously consented to take part in the research, were invited to take part in a 52 week follow-up. Both services were provided with extra funding to facilitate this. 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. This questionnaire covered smoking status, what else might have helped them sustain the quit or prevent relapse, and for those who had started smoking, when they relapsed and the main reason for relapse. 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, when it was combined with the descriptive information on each client collected as part of the 4-week study together with the details of treatment and status at 4 weeks on an SPSS database.

Sample

The sample of 1785 cases – 1374 (SF) and 411 (SC) - used for the 52 week analysis is identical to that used in the 4 week analysis, described in Table 1 of our interim report and in Bauld et al (2009). Out of these 1785 cases setting a quit date, 552 self-reported as abstinent at 4 weeks (excluding quit refuted by validation test).

Measures

Details of the descriptive indicators used in the analysis are shown in Table 4, which is included in the results section later in this report. These cover personal details, socio-economic circumstances (combined to form one socio-economic score), living group, smoking history and service provided, and are the same as those used in the 4-week study (Bauld et al, 2008, Bauld et al 2009).

Outcomes

As was the case at 4 weeks, 52 week outcomes were defined so as to concur as closely as possible with the Russell standard (West, 2005b). Clients were regarded as having reported sustained abstinence between their original 4-week quit date and 52 weeks if they had firstly not smoked at all (even a puff) in the previous 2 weeks and secondly had not smoked more than 5 cigarettes since the 1 month follow-up (defined as 'continuous abstinence'). They were then encouraged to attend their local Starting Fresh pharmacy for CO-validation. If clients could not be contacted they were classed as lost to follow up. No attempt was made to follow-up clients at 52 weeks who were non-quitters or lost to follow-up at 4 weeks.

For the 1785 cases setting a quit date in the study period, smoking status at 52 weeks could then be classified into the same 4 possible outcomes which applied at 4 weeks; namely 'CO-validated quitters' (classified by self-reported prolonged abstinence followed by CO validation of abstinence at 52 weeks); 'self-reported quit without validation'; 'non-quitters'; and 'lost to follow up'. This last category included clients who were classed as non-quitters or lost to follow up after 4 weeks. The percentage of validated quitters is referred to as the CO-validated quit rate.

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. Tests showing the significance of differences in rates are determined in one of three ways. When the characteristic was continuous or almost continuous, an analysis of variance was applied. When the characteristic was a dummy (two value) variable, a chi-square test with continuity correction was used. If the characteristic has three or more discrete values but was not approximately continuous, a chi-square test was applied.

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 ($p(\text{in}) < .05$). Cases from both services were included together, and a dummy predictor indicated which service a client attended. In order to simplify the models, the summary measure for socio-economic group was used in place of the items from which it is derived. The same pool of predictor variables was used as in the 4 week follow-up study (Bauld et al 2008, Bauld et al, 2009), with all client characteristics being expressed as a dummy or set of dummy variables, with the exception of age, which remained quasi-continuous but was centred by subtracting the mean age.

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 or SC cases with quit dates set in March 2007 (further details on missing data are included in the interim report). 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.

Results

Overall 52 week results are illustrated in Tables 1 and 2. In Table one, the 52 week smoking status of clients from the two services combined is tabulated against 4 week smoking status. This shows that at 4 week follow up there were 401 CO validated

quitters, but by one year this had fallen to 64 people - 3.6% of those who originally set a quit date. The 52 week quit rate rises to 7.1% (127 people) when self-reported cases not receiving a CO-validation test were included. There were 14.8% non-quitters, with a further 78.0% lost to follow-up. Also, by examining the second and 4th columns of Table 1, the proportion lost to follow-up at 52 weeks was rather bigger for 4 week unvalidated quitters (37.7%) than for 4 week CO-validated quitters (30.4%).

Table 1: Creation of long-term outcome categories from 4- and 52-week outcomes for Smoking Concerns and Starting Fresh combined

52-week status	4-week status								Total	
	CO-validated quitters		Self-report quit without validation ¹		Non-quitters ²		Lost to follow-up			
	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-report quit was refuted by a negative CO validation test were included with non-quitters.
2. Non-quitters include self-report quit refuted by CO validation test.
3. Percentages are expressed with respect to column totals.

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

Table 2: 52 week smoking outcomes by service

	Starting Fresh		Smoking Concerns	
	N	%	N	%
CO-validated quit	38	2.8	26	6.3
Self-report 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-report quit cases refuted by CO-test.
2. Includes self-report quit cases refuted by CO-test.

Relapse

Using the data in Table 1, it is possible to calculate relapse rates. Only 47 people were confirmed as CO-validated as quitters at 52 weeks from the 401 who had been assessed as quitters on this basis at 4 weeks, yielding a relapse rate overall of 88.3%. Using more detailed data not shown in the tables it is possible to show that for clients

who set a quit date with the Starting Fresh pharmacy service, the relapse rate between 4 and 52 weeks was 90.2% of CO-validated quitters at 4 weeks. For clients who set a quit date when attending Smoking Concerns groups, the relapse rate amongst CO validated 4 week quitters was 84.9%.

However, it is important to note that we were only able to obtain CO validation for around half of all 52 week self-report quit cases in this study. It may therefore be equally important to calculate relapse rates with respect to self-report quit cases as well, including those who were CO-validated. These relapse rates work out to be 80.1% in SF and 72.4% in SC, rather nearer to those found in previous research (Ferguson et al. 2005, Stapleton et al, 1998).

Smokers who had relapsed were asked to identify when they had started smoking again, and results are shown in Table 3. Only a small proportion of clients (n=191) completed the 52 week questionnaire, so responses are not necessarily representative of the study sample overall, but are nevertheless worth reporting. Amongst the clients who responded, 45.3% of SF cases had relapsed during the first 8 weeks after the quit date, while only 23.8% of SC cases had done so. Between weeks 9 and 13, the two services were comparable with 21.4% of SF cases relapsing, compared to 23.9% of SC cases. During the remainder of the year relapse rates were smaller for SF cases, with 20.1% relapsing between 14 and 26 weeks (31.3% for SC) and 13.2% relapsing between 27 weeks and 52 weeks (20.9% for SC). Thus, most relapse occurred within the first 6 months after 4 week follow-up (87% for SF and 79% for SC). Amongst those smokers who relapsed, the most frequently cited reason was stress (38.8% for SF and 30.8% for SC) followed by 'the habit was too hard to break at that point in time' (23.0% for SF and 30.8% for SC).

Table 3: Timing and reasons for relapse

Characteristic	Starting Fresh		Smoking Concerns	
	Valid values N	% of valid values	Valid values N	% of valid values
How many weeks did you go without smoking?				
2-4 weeks	35	22.0	7	10.4
5-8 weeks	37	23.3	9	13.4
9-13 weeks	34	21.4	16	23.9
14-26 weeks	32	20.1	21	31.3
27-52 weeks	21	13.2	14	20.9
Total	159	100.0	67	100.0
Main reason that made you start to smoke again				
(a) Stress	54	38.8	16	30.8
(b) Weight gain	3	2.2	4	7.7
(c) Partner still smoking	6	4.3	3	5.8
(d) I missed smoking	15	10.8	1	1.9
(e) I felt left out	4	2.9	1	1.9
(f) Habit was too hard to break at that point in time	32	23.0	16	30.8
(g) Health reasons	2	1.4	2	3.8
(h) While on holiday	2	1.4	2	3.8
(i) Lack of willpower	2	1.4	1	1.9
(j) More support required	3	2.2	2	3.8
(k) Other	16	11.5	4	7.7
Total	139	100.0	52	100.0

Client characteristics

Distributions of a selection of client characteristics are shown for each service in Tables 4a-4c, which also include a breakdown of 52 week self-report and CO-validated quit rate by each characteristic with significance tests. In examining these two bivariate relationships for each characteristic, some comparisons are made with the corresponding bivariate relationship between each characteristic and the 4 week CO-validated quit rate (Bauld et al, 2009).

Client's basic characteristics are shown in Table 4a (I-V). Findings are similar to those identified at 4 weeks. No significant associations between gender and quit rates were found. In contrast, age was significantly associated with CO validated and self-report quit rates for SF. The effect was insignificant at the 5% level for SC, though was significant at the 10% level for CO-validated quit rate ($p=.093$). More disadvantaged socio-economic groups had significantly lower CO-validated quit rates. Thus least deprived cases in socio-economic groups 1 and 2 had a CO-validated quit rate of 5.5%, compared to just 1.8% for socio-economic groups 5 and 6 ($p=.027$). For self-report quit rates the association was nearly significant ($p=.065$).

Table 4a: Frequencies of characteristics of smokers and 52 week quit rates: basic characteristics (I)

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p^1)		Valid values		52-week quit rate (%) (Significance level, p^1)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Gender								
Male	598	43.5	6.0	2.8	142	34.5	13.4	6.3
Female	776	56.5	5.7	2.7	269	65.5	10.4	6.3
Total	1374	100.0	5.8	2.8	411	100.0	11.4	6.3
			($p=.874$)	($p=1.000$)			($p=.461$)	($p=1.000$)
Age								
16 – 40	612	44.5	3.4	0.7	100	24.3	10.0	5.0
41 – 60	563	41.0	6.8	3.7	221	53.8	11.3	5.0
61 and over	199	14.5	10.6	6.5	90	21.9	13.3	11.1
Total	1374	100.0	5.8	2.8	411	100.0	11.4	6.3
			($p<.0005^2$)	($p<.0005^2$)			($p=.475^2$)	($p=.093^2$)
Male								
16 – 40	293	49.0	2.7	0.3	34	23.9	11.8	0.0
41 – 60	238	39.8	7.6	4.2	78	54.9	14.1	6.4
61 and over	67	11.2	14.9	9.0	30	21.1	13.3	13.3
Total	598	100.0	6.0	2.8	142	100.0	13.4	6.3
Female								
16 – 40	319	41.1	4.1	0.9	66	24.5	9.1	7.6
41 – 60	325	41.9	6.2	3.4	143	53.2	9.8	4.2
61 and over	132	17.0	8.3	5.3	60	22.3	13.3	10.0
Total	776	100.0	5.7	2.7	269	100.0	10.4	6.3
			($p_a<.0005^3$) ($p_b=.749^3$)	($p_a<.0005^3$) ($p_b=.859^3$)			($p_a=.527^3$) ($p_b=.744^3$)	($p_a=.041^3$) ($p_b=.222^3$)
Socio-economic group score ^{6,7}								
1,2 Least deprived	290	29.3	10.7	5.5	198	48.8	12.6	5.6
3,4	364	36.8	7.4	3.3	142	35.0	11.3	6.3
5,6 Most deprived	335	33.9	3.6	1.8	66	16.3	9.1	9.1
Total	989	100.0	7.1	3.4	406	100.0	11.6	6.4
			($p=.065^4$)	($p=.027^4$)			($p=.645^4$)	($p=.292^4$)

Table 4a (III) shows that Scottish deprivation quintile was significantly associated with both CO validated and self-report quit rates for SF. The effect was now insignificant at the 5% level for SC, though was significant at the 10% level for self-report quit rate (p=.103).

Table 4a: Frequencies of characteristics of smokers and 52 week quit rates: basic characteristics (II)

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%)		Valid values		52-week quit rate (%)	
	N	% of valid values	(Significance level, p)		N	% of valid values	(Significance level, p)	
Self-report			CO-validated	Self-report			CO-validated	
Deprivation decile								
(a) Scottish								
1 Relatively disadvantaged	566	41.2	4.6	1.9	129	31.4	9.3	7.0
2	230	16.8	5.7	3.0	58	14.1	12.1	6.9
3	129	9.4	7.0	3.9	34	8.3	5.9	0.0
4	123	9.0	2.4	0.8	34	8.3	11.8	5.9
5	78	5.7	7.7	3.9	24	5.8	8.3	0.0
6	67	4.9	7.5	4.5	23	5.6	13.0	4.4
7	40	2.9	5.0	2.5	16	3.9	0.0	0.0
8	50	3.6	6.0	4.0	34	8.3	20.6	11.8
9	51	3.7	13.7	2.0	28	6.8	21.4	10.7
10 Relatively advantaged	39	2.8	15.4	10.3	31	7.5	12.9	9.7
Total	1373	100.0	5.8	2.8	411	100.0	11.4	6.3
			(p=.003 ²)	(p=.041 ²)			(p=.103 ²)	(p=.392 ²)
(b) Glasgow								
1 Relatively disadvantaged	263	19.2	4.2	1.5	62	15.1	12.9	8.1
2	229	16.7	5.2	2.2	53	12.9	3.8	3.8
3	210	15.3	2.9	1.4	45	10.9	8.9	6.7
4	135	9.8	8.2	5.2	34	8.3	14.7	8.8
5	148	10.8	6.1	3.4	35	8.5	8.6	2.9
6	126	9.2	5.6	2.4	45	10.9	11.1	2.2
7	94	6.8	6.4	3.2	32	7.8	12.5	3.1
8	72	5.2	6.9	4.2	38	9.2	5.3	2.6
9	55	4.0	12.7	1.8	35	8.5	28.6	17.1
10 Relatively advantaged	41	3.0	14.6	9.8	32	7.8	12.5	9.4
Total	1373	100.0	5.8	2.8	411	100.0	11.4	6.3
			(p=.003 ²)	(p=.024 ²)			(p=.128 ²)	(p=.471 ²)

Table 4a: Frequencies of characteristics of smokers and 52 week quit rates: basic characteristics (III)

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p)		Valid values		52-week quit rate (%) (Significance level, p)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Deprivation quintile								
(a) Scottish								
1 Relatively disadvantaged	796	58.0	4.9	2.3	187	45.5	10.2	7.0
2	252	18.4	4.8	2.4	68	16.5	8.8	2.9
3	145	10.6	7.6	4.1	47	11.4	10.6	2.1
4	90	6.6	5.6	3.3	50	12.2	14.0	8.0
5 Relatively advantaged	90	6.6	14.4	5.6	59	14.4	17.0	10.2
Total	1373	100.0	5.8	2.8	411	100.0	11.4	6.3
			(p=.003 ⁴)	(p=.041 ⁴)			(p=.103 ⁴)	(p=.392 ⁴)
Male								
1 Relatively disadvantaged	331	55.4	4.8	2.4	63	44.4	9.5	6.4
2	123	20.6	4.1	1.6	19	13.4	10.5	0.0
3	68	11.4	7.4	4.4	17	12.0	5.9	0.0
4	38	6.4	5.3	2.6	17	12.0	23.5	11.8
5 Relatively advantaged	37	6.2	21.6	8.1	26	18.3	23.1	11.5
Total	597	100.0	6.0	2.9	142	100.0	13.4	6.3
Female								
1 Relatively disadvantaged	465	59.9	5.0	2.2	124	46.1	10.5	7.3
2	129	16.6	5.4	3.1	49	18.2	8.2	4.1
3	77	9.9	7.8	3.9	30	11.2	13.3	3.3
4	52	6.7	5.8	3.9	33	12.3	9.1	6.1
5 Relatively advantaged	53	6.8	9.4	3.8	33	12.3	12.1	9.1
Total	776	100.0	5.7	2.7	269	100.0	10.4	6.3
			(p _a =.002 ³)	(p _a =.038 ³)			(p _a =.067 ³)	(p _a =.271 ³)
			(p _b =.099 ³)	(p _b =.518 ³)			(p _b =.057 ³)	(p _b =.141 ³)

Table 4a: Frequencies of characteristics of smokers and 52 week quit rates: basic characteristics (IV)

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p)		Valid values		52-week quit rate (%) (Significance level, p)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Deprivation quintile (b) Glasgow								
1 Relatively disadvantaged	492	35.8	4.7	1.8	115	28.0	8.7	6.1
2	345	25.1	4.9	2.9	79	19.2	11.4	7.6
3	274	20.0	5.8	2.9	80	19.5	10.0	2.5
4	166	12.1	6.6	3.6	70	17.0	8.6	2.9
5 Relatively advantaged	96	7.0	13.5	5.2	67	16.3	20.9	13.4
Total	1373	100.0	5.8 (p=.003 ⁴)	2.8 (p=.024 ⁴)	411	100.0	11.4 (p=.128 ⁴)	6.3 (p=.471 ⁴)
Male								
1 Relatively disadvantaged	198	33.2	4.6	2.5	38	26.8	7.9	5.3
2	153	25.6	4.6	2.0	25	17.6	12.0	8.0
3	135	22.6	5.2	2.2	26	18.3	7.7	0.0
4	70	11.7	7.1	4.3	26	18.3	15.4	3.9
5 Relatively advantaged	41	6.9	19.5	7.3	27	19.0	25.9	14.8
Total	597	100.0	6.0	2.9	142	100.0	13.4	6.3
Female								
1 Relatively disadvantaged	294	37.9	4.8	1.4	77	28.6	9.1	6.5
2	192	24.7	5.2	3.7	54	20.1	11.1	7.4
3	139	17.9	6.5	3.6	54	20.1	11.1	3.7
4	96	12.4	6.3	3.1	44	16.4	4.6	2.3
5 Relatively advantaged	55	7.1	9.1	3.6	40	14.9	17.5	12.5
Total	776	100.0	5.7 (p _a =.002 ³) (p _b =.162 ³)	2.7 (p _a =.026 ³) (p _b =.762 ³)	269	100.0	10.4 (p _a =.084 ³) (p _b =.106 ³)	6.3 (p _a =.324 ³) (p _b =.184 ³)

Table 4a (V) shows that employment status was again very significantly associated with both quit rates for SF. Thus, those who were permanently sick/disabled or unemployed had a CO-validated 52 week quit rate of only 1.3%, much less than the mean for all cases of 2.8%. However, the effect was again insignificant for SC. Housing status for SF was now significantly associated with both quit rates at 52 weeks, with the CO-validated 52 week quit rate for rented accommodation (2.3%) being much less than that for owner occupiers who owned outright (7.5%), the greater age of the second group being one factor associated with this difference. However, the effect for SC, although significant at 4 weeks, was now insignificant. Eligibility for free prescriptions for those aged under 60 for SF was significantly associated with the self-report quit rate but no longer with the CO-validated quit rate, which was the case at 4 weeks.

Table 4a: Frequencies of characteristics of smokers and 52 week quit rates: basic characteristics (V)

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p ¹)		Valid values		52-week quit rate (%) (Significance level, p ¹)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Age finished full-time education⁶								
15 or under	324	32.9	9.0	6.2	159	39.4	8.2	4.4
at 16	365	37.0	4.1	1.9	107	26.5	13.1	9.4
17 or over	274	27.8	9.1	2.6	133	32.9	15.0	6.8
Not yet finished	23	2.3	4.4	0.0	5	1.2	0.0	0.0
Total	986	100.0	7.1 (p=.947 ⁴)	3.5 (p=.013 ⁴)	404	100.0	11.6 (p=.067 ⁴)	6.4 (p=.381 ⁴)
Employment status								
In paid employment								
Retired	167	13.1	12.6	8.4	87	21.3	13.8	10.3
Permanently sick/disabled, unemployed								
Other	125	9.8	5.6	3.2	30	7.3	6.7	6.7
Total	1270	100.0	5.8 (p<.0005 ⁵)	2.8 (p<.0005 ⁵)	409	100.0	11.5 (p=.688 ⁵)	6.4 (p=.071 ⁵)
Housing status⁶								
Owner occupier: owned outright								
Owner occupier: buying on a mortgage	274	27.8	8.8	2.9	170	42.0	10.0	4.1
Renting	561	56.8	4.8	2.3	153	37.8	10.5	7.2
Other	19	1.9	15.8	5.3	2	0.5	0.0	0.0
Total	987	100.0	6.9 (p=.005 ²)	3.2 (p=.007 ²)	405	100.0	11.6 (p=.172 ²)	6.4 (p=.640 ²)
Eligibility for free prescriptions (cases aged under 60)								
Yes	761	66.6	3.7	1.7	127	40.3	7.9	5.5
No	382	33.4	7.3	2.6	188	59.7	12.8	4.8
Total	1143	100.0	4.9 (p=.011)	2.0 (p=.418)	315	100.0	10.8 (p=.235)	5.1 (p=.979)

Smoking behaviour

Table 4b illustrates the relationship between smoking behaviour and 52 week quit rates. Number of cigarettes smoked daily was now significantly associated with a lower self-report quit rate for SC cases, the value of 7.1% for heavier smokers (21 or over daily) being less than half that for lighter smokers (20 or under) of 14.4%. Similarly, time elapsed between waking and first cigarette was significantly associated with self-report quit rate for SC cases. Clients who smoked their first cigarette with 5 minutes of

waking had a quit rate of 7.5%, much smaller than for those who smoked their first cigarette more than 60 minutes after waking (19.1%). For SC cases, smoking mainly for pleasure led to significantly greater self-report and CO-validated quit rates than smoking mainly to cope.

For SF, determination to quit was significantly associated with both self-report and CO-validated quit rates. For example, those who were extremely determined to quit had CO-validated quit rates of 4.6%, some three times that for those who were not at all/quite determined to quit (1.5%). For SC cases, poor health in the last 12 months was significantly associated with higher self-report and CO-validated quit rates. Thus, cases in good health had a CO-validated quit rate of 2.6%, while those whose health was not good had a quit rate of 11.0%.

Table 4b: Frequencies of characteristics of smokers and 52 week quit rates: smoking history

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p)		Valid values		52-week quit rate (%) (Significance level, p)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Cigarettes smoked daily ⁶								
20 or under	591	59.9	6.8	3.2	237	58.4	14.4	6.3
21 or over	396	40.1	7.3	3.5	169	41.6	7.1	5.9
Total	987	100.0	7.0	3.3	406	100.0	11.3	6.2
			(p=.835 ⁴)	(p=.925 ⁴)			(p=.035 ⁴)	(p=1.000 ⁴)
Time elapsed between waking and first cigarette								
Within 5 minutes	799	59.2	5.8	3.1	213	53.0	7.5	5.2
6 – 60 minutes	467	34.6	5.4	1.9	168	41.8	15.5	7.7
More than 60 minutes	84	6.2	9.5	4.8	21	5.2	19.1	4.8
Total	1350	100.0	5.9	2.8	402	100.0	11.4	6.2
			(p=.324 ⁴)	(p=.950 ⁴)			(p=.008 ⁴)	(p=.493 ⁴)
How easy is it to go a whole day without smoking?								
Very/fairly easy	164	12.3	9.8	4.9	50	12.3	12.0	6.0
Fairly difficult	413	31.0	4.8	1.9	189	46.7	12.2	5.8
Very difficult	756	56.7	5.6	2.8	166	41.0	10.2	6.6
Total	1333	100.0	5.9	2.8	405	100.0	11.4	6.2
			(p=.127 ⁴)	(p=.262 ⁴)			(p=.542 ⁴)	(p=.980 ⁴)
Determination to quit ⁶								
Not at all/quite determined	199	20.2	4.0	1.5	80	19.7	15.0	10.0
Very determined	442	44.8	5.9	3.2	173	42.6	10.4	5.2
Extremely determined	346	35.1	10.1	4.6	153	37.7	11.1	5.9
Total	987	100.0	7.0	3.3	406	100.0	11.6	6.4

			(p=.004 ⁴)	(p=.047 ⁴)			(p=.416 ⁴)	(p=.362 ⁴)
Number of previous quit attempts in past year								
0	644	48.2	5.9	3.4	123	30.5	17.9	8.9
1	410	30.7	6.1	2.2	130	32.3	5.4	3.1
2 or 3	228	17.1	4.4	2.2	103	25.6	5.8	2.9
4 or more	55	4.1	9.1	1.8	47	11.7	2.3	1.5
Total	1337	100.0	5.8	2.8	403	100.0	11.4	6.2
			(p=.984 ²)	(p=.213 ²)			(p=.701 ²)	(p=.771 ²)
Do you smoke mainly for pleasure or to help you cope? ⁶								
Mainly for pleasure	308	31.7	9.4	4.6	124	30.8	18.6	11.3
About equally	453	46.6	4.6	1.8	211	52.4	8.5	4.3
Mainly to cope	211	21.7	9.5	5.7	68	16.9	8.8	4.4
Total	972	100.0	7.2	3.5	403	100.0	11.7	6.5
			(p=.730 ²)	(p=.737 ²)			(p=.016 ²)	(p=.027 ²)
Does anyone with you smoke? ⁶								
Yes	433	43.9	5.3	2.3	168	41.9	13.7	7.7
No/does not apply to me	553	56.1	8.5	4.3	233	58.1	9.9	5.2
Total	986	100.0	7.1	3.5	401	100.0	11.5	6.2
			(p=.070)	(p=.119)			(p=.305)	(p=.396)
Health in last 12 months ⁶								
Good	330	33.4	8.8	4.2	114	28.4	7.9	2.6
Fairly good	408	41.3	5.2	2.5	170	42.3	10.6	5.3
Not good	250	25.3	8.0	4.0	118	29.4	16.1	11.0
Total	988	100.0	7.1	3.4	402	100.0	11.4	6.2
			(p=.588 ²)	(p=.775 ²)			(p=.049 ²)	(p=.008 ²)

Cessation intervention

This is shown in Table 4c. Referral source was significantly associated with CO-validated cessation rate for SF cases. For example, self-referrals had lower cessation rates (2.6%) than those from GPs (3.3%) and much lower than the small number of those from practice nurses (10.0%).

Results from type of pharmacotherapy suggest some possible interesting trends, though these were statistically insignificant. Although treatment with bupropion was associated with lower CO-validated quit rates at 4 weeks ($p=.510$), it resulted in higher 52 week quit rates of 15.4% self-report ($p=.991$) and 7.7% CO-validated ($p=1.000$), compared to the mean of 11.4% (self-report) and 6.3% (CO-validated). Treatment with varenicline had been associated with a slightly bigger CO-validated quit rate at 4 weeks. At 52 weeks this association was greater for both the self-report quit rate of 16.4% ($p=.314$) and the CO-validated quit rate of 9.1% ($p=.544$), compared again with means of 11.4% (self-report) and 6.3% (CO-validated).

Table 4c: Frequencies of characteristics of smokers and 52 week quit rates: cessation intervention

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p)		Valid values		52-week quit rate (%) (Significance level, p ¹)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Referral source ⁶								
Self referral	733	74.1	6.4	2.6	148	39.2	10.8	5.4
GP	150	15.2	6.0	3.3	116	30.7	12.1	7.8
Practice nurse	20	2.0	10.0	10.0	34	9.0	11.8	5.9
Other	86	8.7	14.0	9.3	80	21.2	12.5	6.3
Total	989	100.0	7.1 (p=.066 ⁵)	3.4 (p=.004 ⁵)	378	100.0	11.6 (p=.981 ⁵)	6.4 (p=.891 ⁵)
Type of pharmacotherapy								
NRT only	1374	100.0	5.8	2.8	343	83.5	10.5 (p=.256)	5.8 (p=.513)
Bupropion ⁸					13	3.2	15.4 (p=.991)	7.7 (p=1.000)
Varenicline ⁹					55	13.4	16.4 (p=.314)	9.1 (p=.544)
Total	1374	100.0	5.8	2.8	411	100.0	11.4	6.3

Notes on Tables 4a-4c:

1. Significance level, p, refers to a chi square test with continuity correction unless otherwise stated.
2. Significance level, p, refers to a one-way analysis of variance on the (quasi-)continuous variable.
3. Significance levels p_a, p_b, refer to a two-way analysis of variance broken down by 52 week quit rate and gender.
4. Significance level, p, refers to a one-way analysis of variance on the (quasi-)continuous variable before it was categorised/collapsed.
5. Significance level, p, refers to a chi square test.
6. This characteristic was asked about on the additional questionnaire, of which 385 were missing (Starting Fresh) and 5 were missing (Smoking Concerns).
7. Socio-economic group is a summary measure based on whether education finished by 16, single parent, rented housing, unemployed or permanently sick/disabled, whether eligible for free prescriptions and aged under 60, lowest Scottish deprivation decile: range 1 (least deprived) to 6 (most deprived).
8. The 13 Smoking Concerns cases receiving bupropion include 2 cases who subsequently changed to NRT.
9. The 55 Smoking Concerns cases receiving varenicline include 2 cases who subsequently changed to NRT and 2 cases who started with NRT and changed to varenicline.

How 52 week quitters differ from 4 week quitters

We also examined in what ways the 52 week CO-validated and self-report quitters differed from 4 week self-report quitters, combining pharmacy and group cases. This analysis was undertaken in part to help us understand what types of clients engaged with CO validation at one year, given our relative lack of success in incentivizing clients to return to their pharmacy to have their smoking status confirmed. Distributions of a few key client characteristics are shown in Table 5.

Table 5: Comparing 52 week quitters with 4 week self-report quitters

	Sample selected						Inter-sample significance (p) levels of difference between	
	Original 4 week self-report quit (including CO-validated)		52 week quit Self-report (including CO-validated)		CO-validated only		52 week self-report quit & 52 week non-quitters ¹	52 week CO-validated quit & 52 week non-CO-validated quitters ¹
	N	% of valid values	N	% of valid values	N	% of valid values		
Age								
16 – 40	168	30.4	31	24.4	9	14.1		
41 – 60	260	47.1	63	49.6	32	50.0		
61 & over	124	22.5	33	26.0	23	35.9		
Total	552	100.0	127	100.0	64	100.0	.005	<.0005
Scottish deprivation quintile								
1 Relatively disadvantaged								
2	266	48.3	58	45.7	31	48.4		
3	99	18.0	18	14.2	8	12.5		
4	70	12.7	16	12.6	7	10.9		
5 Relatively advantaged	50	9.1	12	9.4	7	10.9		
66	12.0	23	18.1	11	17.2			
Total	551	100.0	127	100.0	64	100.0	.067	.262
SEG score								
1,2 least deprived								
200	42.6	56	47.9	27	45.0			
3,4								
179	38.2	43	36.8	21	35.0			
5,6 most deprived								
90	19.2	18	15.4	12	20.0			
Total	469	100.0	117	100.0	60	100.0	.075	.818
Lives with spouse/partner								
Yes								
253	54.4	71	61.2	36	60.0			
No								
212	45.6	45	38.8	24	40.0			
Total	465	100.0	116	100.0	60	100.0	.100	.405
Health in last 12 months								
Good								
168	35.8	38	32.8	17	28.8			
Fairly good								
183	39.0	39	33.6	19	32.2			
Not good								
118	25.2	39	33.6	23	39.0			
Total	469	100.0	116	100.0	59	100.0	.080	.031

Notes: 1. The 2 samples are from the sample of 4 week self-report & CO-validated quitters.

The last 2 columns of Table 5 show significance levels of group differences when the 4 week self-report and CO-validated cases are selected: firstly all self-report 52 week quitters (including CO-validated) are compared with all 52 week non-quitters (including lost to follow-up); secondly all 52 week CO-validated quitters are compared with all 52 week non-CO-validated quitters (including non-quitters and lost to follow-up).

Although there are no appreciable group differences in gender, age effects are highly significant. 52 week self-report quitters are an older group than 4 week self-report quitters: the proportion aged 16-40 dropped from 30.4% (second column of figures) to 24.4% (4th column of figures), while the proportion aged 61 and over increased from 22.5% to 26.0% ($p=.005$). Moreover, 52 week CO-validated quitters are a much older group than these 4 week self-report quitters: the proportion aged 16-40 dropped from 30.4% (second column of figures) to 14.1% (sixth column of figures), while the proportion aged 61 and over increased from 22.5% to 35.9% ($p<.0005$). Scottish deprivation quintile values indicated that 52 week self-report quitters were more advantaged than 4 week self-report quitters, though the result was not quite significant at the 5% level ($p=.067$). There was some suggestion from socio-economic group score that self-report 52 week quitters were less deprived than self-report 4 week quitters. On reaching 52 weeks, the proportion of cases scoring 1 or 2 (least deprived) rose from 42.6% to 47.9% while that for cases scoring 5 or 6 (most deprived) fell from 19.2% to 15.4%, though the effect was not quite significant at the 5% level ($p=.075$).

The proportion living with a spouse or partner increased from only 54.4% for 4 week self-report quitters to 61.2% for 52 week self-report quitters, though the result was only significant at the 10% level. Self-report 52 week quitters appeared to be in poorer health than self-report 4 week quitters. The proportion for which health in the last 12 months was good fell from 35.8% to 32.8%, while that for which it was not good rose from 25.2% to 33.6%, though this effect was not quite significant at the 5% level ($p=.080$). However, CO-validated 52 week quitters were in significantly poorer health than self-report 4 week quitters. The proportion for which health in the last 12 months was good fell from 35.8% to 28.8%, while that for which it was not good rose from 25.2% to 39.0% ($p=.031$).

Client views at 52 weeks

Table 6 provides frequency distributions for the questions asked of all clients surveyed at 52 week follow-up, with breakdowns of self-report and CO-validated 52 week quit rates. As noted above, only a small proportion of 4 week quitters completed a 52 week questionnaire so responses are not necessarily representative of all clients at 52 weeks.

Clients were asked whether there was anything which might have helped them more to remain a non-smoker. For those who received support to quit from Starting Fresh, the greatest proportion of clients (21.2%) indicated the need for more product support. These clients had much lower self-report quit rates (5.0%) than the remainder (18.8%), this result being almost significant at the 5% level ($p=.061$). The next most frequent response for SF clients (18.0%) was the need for more advice about how to deal with stress. These clients had much lower self-report quit rates (2.9%) than the rest (18.7%), this result being statistically significant ($p=.043$). The third most frequent response for SF clients (13.8%) was the need for more advice about how to deal with cravings.

For those clients who received support to quit from Smoking Concerns groups, the most common response (37.9%) was for more sessions. The next most frequent response (20.7%) was for more advice about how to deal with stress. In addition, 18.4% of SC clients pointed to the need for access to the quit smoking adviser after the course of treatment ended, at times of particular need, and 17.2% of group clients pointed to a need for more product support.

Table 6: Client views at 52 weeks and 52 week quit rates

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p ¹)		Valid values		52-week quit rate (%) (Significance level, p ¹)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Have you smoked at all (even a puff) in the last 2 weeks?								
No	83	30.6	88.0	44.6	48	39.3	93.8	54.2
Yes	188	69.4	3.7	0.5	74	60.7	2.7	0.0
Total	271	100.0	29.5	14.0	122	100.0	38.5	21.3
			(p<.0005)	(p<.0005)			(p<.0005)	(p<.0005)
Have you smoked at all since the 1 month follow up?								
No not a puff	64	23.7	100.0	56.3	44	36.1	100.0	59.1
Yes 1-5 cigarettes in total	17	6.3	94.1	11.8	3	2.5	100.0	0.0
More than 5 cigarettes in total	189	70.0	0.0	0.0	75	61.5	0.0	0.0
Total	270	100.0	29.6	14.1	122	100.0	38.5	21.3
			(p<.0005 ²)	(p<.0005 ²)			(p<.0005 ²)	(p<.0005 ²)
Is there anything that you think might have helped you more to remain a non-smoker?								
(a) More sessions								
Y	18	9.5	11.1	5.6	33	37.9	15.2	12.1
N	171	90.5	16.4	11.7	54	62.1	33.3	25.9
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=.809)	(p=.693)			(p=.106)	(p=.204)
(b) More advice about how to deal with cravings								
Y	26	13.8	15.4	7.7	10	11.5	10.0	0.0
N	163	86.2	16.0	11.7	77	88.5	28.6	23.4
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=1.000)	(p=.794)			(p=.383)	(p<.193)

Table 6: Client views at 52 weeks and 52 week quit rates, continued.

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p ¹)		Valid values		52-week quit rate (%) (Significance level, p ¹)	
	N	% of valid values	Self- report	CO- validated	N	% of valid values	Self- report	CO- validated
Is there anything that you think might have helped you more to remain a non-smoker? (continued)								
(c) More advice about how to deal with stress								
Y	34	18.0	2.9	2.9	18	20.7	11.1	5.6
N	155	82.0	18.7	12.9	69	79.3	30.4	24.6
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=.043)	(p=.170)			(p=.175)	(p=.146)
(d) More support from family and/or friends								
Y	21	11.1	23.8	23.8	10	11.5	20.0	20.0
N	168	88.9	14.9	9.5	77	88.5	27.3	20.8
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=.460)	(p=.111)			(p=.913)	(p=1.000)
(e) Access to your quit smoking adviser after the course of treatment ended, at times of particular need								
Y	16	8.5	6.3	6.3	16	18.4	12.5	6.3
N	173	91.5	16.8	11.6	71	81.6	29.6	23.9
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=.457)	(p=.817)			(p=.278)	(p=.216)
(f) More product support (NRT, Zyban or Champix)								
Y	40	21.2	5.0	5.0	15	17.2	26.7	20.0
N	149	78.8	18.8	12.8	72	82.8	26.4	20.8
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=.061)	(p=.271)			(p=1.000)	(p=1.000)

Table 6: Client views at 52 weeks and 52 week quit rates, continued.

Characteristic	Starting Fresh				Smoking Concerns			
	Valid values		52-week quit rate (%) (Significance level, p ¹)		Valid values		52-week quit rate (%) (Significance level, p ¹)	
	N	% of valid values	Self-report	CO-validated	N	% of valid values	Self-report	CO-validated
Is there anything that you think might have helped you more to remain a non-smoker? (continued)								
(g) Easier access to services								
Y	16	8.5	18.8	6.3	11	12.6	27.3	27.3
N	173	91.5	15.6	11.6	76	87.4	26.3	19.7
Total	189	100.0	15.9	11.1	87	100.0	16.4	20.7
			(p=1.000)	(p=.817)			(p=1.000)	(p=.858)
(h) None of the above								
Y	88	46.6	19.3	13.6	25	28.7	48.0	44.0
N	101	53.4	12.9	8.9	62	71.3	17.7	11.3
Total	189	100.0	15.9	11.1	87	100.0	26.4	20.7
			(p=.312)	(p=.424)			(p=.009)	(p=.002)

Notes on Table 4:

1. Significance level, p, refers to a chi square test with continuity correction unless otherwise stated.
2. Significance level, p, refers to a one-way analysis of variance on the (quasi)-continuous variable.

Multivariate analyses

The client and service characteristics illustrated in Table 4 and employed in the 4-week follow-up paper (Bauld et al, 2009) were used as a predictor pool in the subsequent 52-week multivariate analyses.

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 modeling using logistic regression to estimate the probabilities of CO-validated (Table 7) and CO validated and unvalidated self-report combined (Table 8) quit rates.

This analysis focused on the smaller sample in the study (n=1366), so excluding those with missing questionnaires. Models were built up in 5 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 7 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

statistically not 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.

In Table 8 for 52 week self-report 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-report 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 7 and 8.

Table 7: Modelling 52 week CO-validated quit rate

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

Notes:

1. Significance of change in -2 log likelihood.

2. Age was centred by subtracting the mean Age (46).

Table 8: Modelling 52 week self-report quit rate

	B	N=1366 Sig ¹	Odds Ratio
Model 1: just scheme dummy allowed to enter			
Whether service offered by Smoking Concerns	0.576	.005	1.779
Model 2: also age and gender allowed to enter			
Whether service offered by Smoking Concerns	0.446	.032	1.563
Age (years) ²	0.027	<.0005	1.028
Model 3: also socio-economic group dummies allowed to enter			
Whether service offered by Smoking Concerns	0.387	.063	1.473
Age (years) ²	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)			
Whether service offered by Smoking Concerns	0.397	.059	1.488
Age (years) ²	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 Smoking Concerns	0.410	.052	1.506
Age (years) ²	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. Significance of change in -2 log likelihood.
2. Age was centred by subtracting the mean Age (46).

52 Week Outcomes: Discussion

Findings from this analysis of (one year) smoking cessation outcomes for clients who used NHS stop smoking services in Glasgow are in many ways disappointing. This disappointment arises for two main reasons. The first is the very low quit rates that we have found. We found that just 64 people – 3.6% of the 1,785 who set a quit date – were CO validated as nonsmokers at 52 week follow-up. This rises to 7.1% (127 people) when unvalidated (self-report) quitters are included. This means that only a very small proportion of adults who accessed smoking cessation services in the spring of 2007 in Glasgow remained non smokers one year later. The second disappointment relates to the relatively low level of CO validation we achieved in this study, which is

unfortunate from a research perspective. We discuss both these issues later in this section of the report.

On the other hand, our findings at 52 weeks are at least consistent with those identified in our earlier report. As we found at 4 weeks, clients who were treated in groups were more likely to quit than those who accessed the pharmacy service. A range of client characteristics affect quit rates, as we also found at 4 weeks. We consider these issues first, and then compare our results with our previous work in England, and discuss when and why clients relapsed. Finally we discuss some of the limitations of our work.

Outcomes

Overall, just 6% of Starting Fresh clients and 11% of Smoking Concerns clients remained quit at one year, when all cases (CO validated and self-report) were included. Clients who attended groups had higher quit rates at 52 weeks than those who went to their local pharmacy for help to stop smoking. Amongst smokers who had their quit status CO-validated, results from our modeling show that this difference between service models was significant at the 10% level ($p=.097$). Overall, group clients who were CO validated were 60% more likely to quit than pharmacy clients.

When all those who stated they quit (self-report and CO validated) are included, group clients once again had higher quit rates than pharmacy clients. After controlling for all possible client and service characteristics, group clients had significantly higher quit rates at the 10% level ($p=.052$).

Client characteristics

At one year we also found that a similar range of client characteristics were associated with quitting to those identified at 4 weeks. Amongst CO validated quitters, age was a highly significant predictor, increasing the probability of successful quitting by 5% for each year of age. Attitude to smoking was also important: 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 quit.

Amongst self-report quitters, clients with a socio-economic score of 5 or 6 (most deprived) were substantially less likely to quit. Age now contributed to the probability of quitting in two ways. Age by itself increased the probability of successful quitting by 2% for each year of age. However, when clients in socio-economic groups 5 and 6 are considered, age increases the probability of successful quitting by a substantial 7% for each year of age. What this means, in effect, is that 52 week self-report quit rates are particularly low for the most deprived, younger clients.

An interesting pattern also arises in our results with the health of clients – although this pattern was only apparent at the bivariate level. Clients who reported poor health were more likely to be quitters at 52 weeks (both CO validated and self-report) among Smoking Concerns clients (Table 4b). When clients from both services are considered together (Table 5) CO validated 52 week quitters were in significantly poorer health than self-report quitters at four weeks. What this may suggest is that poor health is a factor motivating some clients to maintain abstinence in the longer term.

Comparisons with previous research

Findings from this study can be compared with our 2004 research, which examined 52 week outcomes for clients who accessed NHS stop smoking services in Nottingham and in North Cumbria. In the English study, quit rates were higher than those found in Glasgow – 14.6% of clients were CO-validated as quitters at 52 weeks (compared with 2.8% for SF and 6.3% for SC, just 3.6% overall) rising to 17.7% when self-report cases were included (compared with 5.9% for SF and 11.4% for SC, just 7.1% overall).

Why were outcomes so much poorer in Glasgow, particularly for pharmacy clients? There are at least two possible explanations. The first is that the support received was not as effective. In Nottingham and North Cumbria, most clients received one to one support in primary care (usually from a practice nurse) plus NRT. This type of support was more intensive than that delivered in pharmacies in Glasgow. Some clients in the English study received group support plus NRT, similar to that in Glasgow. Yet both the 4 and 52 week outcomes for SC clients in Glasgow were poorer than those found in the English study. The second explanation is that 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 the English study.

It would be possible to explore this issue further by combining the English and Scottish datasets and conducting further statistical modeling. However this was beyond the scope of this current study.

Relapse

Clients who responded to our 52 week follow-up questionnaire were asked when they relapsed and why. One of the most striking findings to emerge from this part of our analysis is the rapid rate of relapse, particularly for pharmacy clients. First, around twice the proportion of Starting Fresh 4 week quitters had relapsed by 8 weeks (45.3%) as Smoking Concerns clients (23.8%). A small proportion of SC clients received bupropion and varenicline (16.6%) and did have slightly higher 52 week quit rates, but not enough to explain this difference in relapse. Is it possible that group clients were offered better coping strategies to maintain their quit attempt for longer, or is this difference due (as postulated above) to client characteristics such as the slightly more deprived, younger profile of SF clients?

Our results also show that two thirds of pharmacy clients (66.7%) and almost half of group clients (47.7%) relapsed in the period between 4 and 13 weeks, when support was still available from services, most notably from their local pharmacist where medication and advice could be accessed up to week 13. While it is likely that a range of factors contributed to these rates of relapse, it may be possible that more could be done to encourage clients to keep attending throughout their treatment course.

When the reasons for relapse are explored, over one third of clients stated that stress was the main reason they went back to smoking. One in four pointed to the fact that the habit was just too hard to break at that particular point in time. When asked what might have helped them remain abstinent, one client in five cited more support with using their stop smoking medication, a similar proportion asked for more advice about how to deal with stress, and around one in eight asked for more advice about how to deal with cravings. For those who attended Smoking Concerns groups, one in three clients stated that they would have liked to have had access to a stop smoking adviser after the course of treatment ended, or at times of particular need (one in five).

Limitations

This study has a number of limitations. Some of these relate to our research design – an observational study that cannot draw direct comparisons between the two service models – which have been described in some detail in our recent articles on our 4 week results (Bauld et al, 2009; Boyd and Briggs, 2009). However at 52 week follow-up we are faced with an additional limitation which is the relatively low level of CO validation we achieved. The Russell Standard stipulates that biochemical validation is required to reliably assess smoking outcomes, as smokers may not always be truthful regarding their smoking status. The Russell standard states that biochemical validation (West et al, 2005b, pg 301):

... is required at least at the final follow-up and expired air carbon monoxide (CO) is the preferred method of detecting recent smoking. At the final follow-up, subjects who report being abstinent but for whom biochemical verification is not available are counted as having smoked.

We therefore attempted in this study to verify the smoking status of research participants. As outlined in our methods section, we did this by incentivising clients to return to their local pharmacy to be CO monitored. We assumed that those clients who responded to our questionnaire by post or telephone (and received a £5 voucher for doing so) and who were truly abstinent would be motivated to have their smoking status validated by the addition of a further £10 for their time and trouble. However, we were only able to obtain CO validation for around half of our sample (SF: 47%, SC: 55%). This contrasts to the 85% 52 week CO validation rate we achieved in our English study in 2004, where we used a similar approach, including incentives.

It is worth asking therefore why we were unable to encourage more clients to return for CO validation in Glasgow in 2008. Some of the explanation may lie with the characteristics of clients in this study – we found, for example, that those who were CO validated were more likely to be older and to be female – suggesting that for younger and possibly male clients in particular, £10 may not have been enough to encourage them to take time away from their daily activities to go back to their pharmacy. Could the reluctance to return for CO monitoring also have something to do with the intensity or form of treatment received – we found that Smoking Concerns clients were more likely to be CO validated at 52 weeks.

Because of the lower than expected CO validation rates, we also need to ask to what extent the self-report quit rates found in this study are a reliable measure of the smoking status of our study participants. From a research perspective, particularly if we follow the Russell standard, we should assume that the CO validated rates are the most accurate information we have on smoking status. However, when validation rates are low, they may not be. The SRNT Subcommittee on Biochemical Verification has considered this issue in relation to clinical trials conducted in different types of settings (SRNT, 2002). They differentiate between ‘clinic-based’ and ‘population-based’ studies. While we cannot draw a direct comparison between these categories and our study, as our research could be described as clinic based (ie it commenced with smokers being treated in NHS setting), but it was not a trial, and it has some similarities with a population-based study. The SRNT argues that biochemical validation should always be possible in a clinic-based study. However, for population-based trials they state (SRNT, 2002, pg 154):

The population-based trial is characterized by a much larger sample size- usually 1000+ - often recruited through healthcare settings or worksites ... The goal of the population-based study is to produce a sample that is representative of a defined population. Biochemical validation could produce a selection bias unrelated to smoking status. The primary outcome variables are the same as in the clinic-based trial but biochemical verification is not generally used. Follow-up periods tend to be longer ... Missing data rates tend to be somewhat higher – perhaps more like 30% than 20% at the end of follow-up – and may well differ between groups, particularly if one group received more active and time-consuming interventions. The higher missing data rates may also reflect the somewhat longer follow-up rates. They may also be related to baseline variables such as number of cigarettes smoked, education or gender.

It is possible that factors relating both to the design of this study and the client population may explain our limited success with CO validation. What this means is that in interpreting our results and in our future dissemination of results, it will be important to continue to consider both self-report and CO validated outcomes.

ECONOMIC EVALUATION

Cost-effectiveness analysis (CEA) is a form of economic analysis where both the costs and effects of two or more health interventions are compared, and the results report the incremental difference between the alternatives under consideration. The cost-effectiveness analysis undertaken in this study evaluates both the annual and longer term outcomes from the Starting Fresh (pharmacy) and Smoking Concerns (group) interventions, in comparison to a baseline 'self-quit' scenario. The 52 week model is concerned with the cost per quitter outcome, using the follow-up study data and cost information to establish the cost per 52 week quitter; while the longer term analysis extrapolates these results in combination with existing literature to model the potential lifetime outcomes in terms of cost per QALY (Quality Adjusted Life Year) gained. This outcome measure accounts for the long term gains quitters will receive in terms of extended life years and improvements in quality of life from smoking cessation.

Methods

The cost-effectiveness analysis is based on a simple model in which there are three alternative options for someone deciding to quit smoking: NHS support via the Smoking Concerns service (SC), NHS support via the Starting Fresh service (SF), or a 'no-service' control option of a self-quit attempt. The decision tree illustrated in figure 1 depicts the alternative pathways in this model. Smokers who decide to quit using the Starting Fresh and Smoking Concerns services complete an introductory period whereby a quit date is set and it is only after this date that the quit attempt is undertaken. Clients who drop out of either service prior to setting a quit date are considered to have withdrawn from the program, while those who leave after this date are considered to have relapsed, including those clients who were lost to follow-up. The study collated data on 4 week, 12 week and 52 week follow-up, while estimates for the self-quit control option were informed via secondary literature.

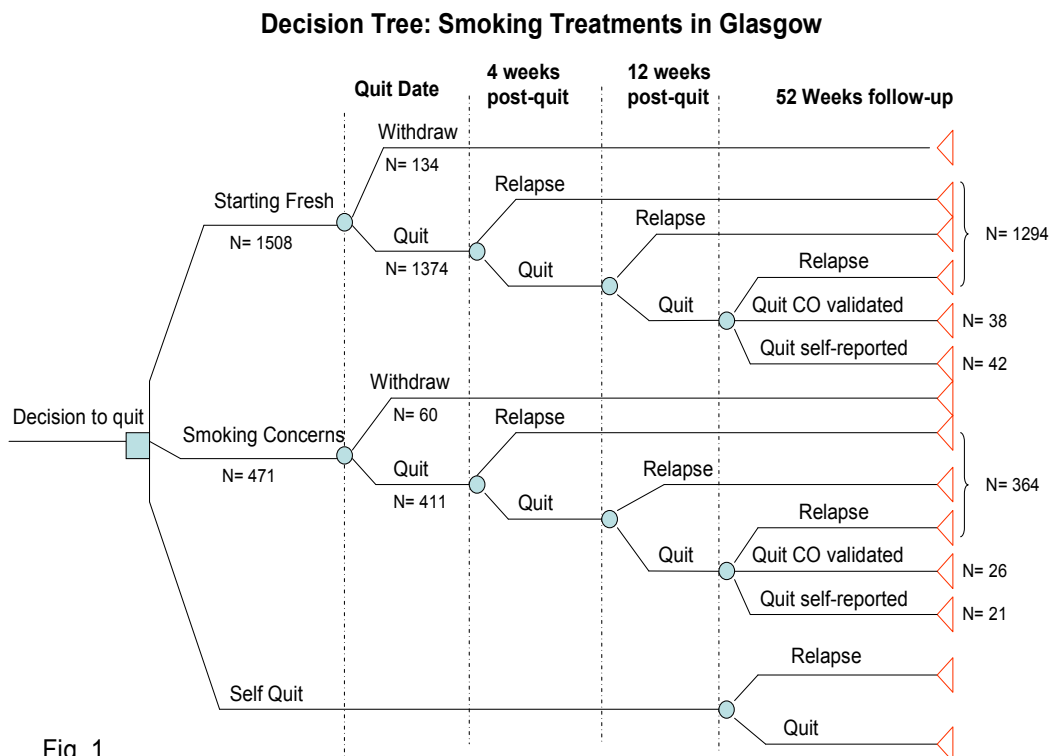


Fig. 1

52 week model

The 52 week model was based on this decision tree, applying a cost to each of the smoking interventions along with the numbers of clients to establish the probability of quitting with each intervention, and an estimate for the self-quit scenario. The 52 week outcomes distinguish between carbon monoxide (CO) validated quitters and self-reported quitters, as self-reported quits are often considered a less reliable outcome due to uncertainty regarding reporting bias (West, 2005a).

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. The model life-span was set at 75 years, incorporating the full lifetime of all participants, and each cycle of the model is equivalent to 1 year. The baseline model generated three cohorts of smokers; the first cohort utilised the Starting Fresh service to undertake their quit attempt, the second using the Smoking Concerns service, with the third cohort as a control, which did not utilise any NHS smoking cessation service, but instead undertook a self-quit attempt. Therefore all three cohorts had different probabilities of success in quitting, based on the study 52 week results. Figure 2 below illustrates the Markov process in this model.

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

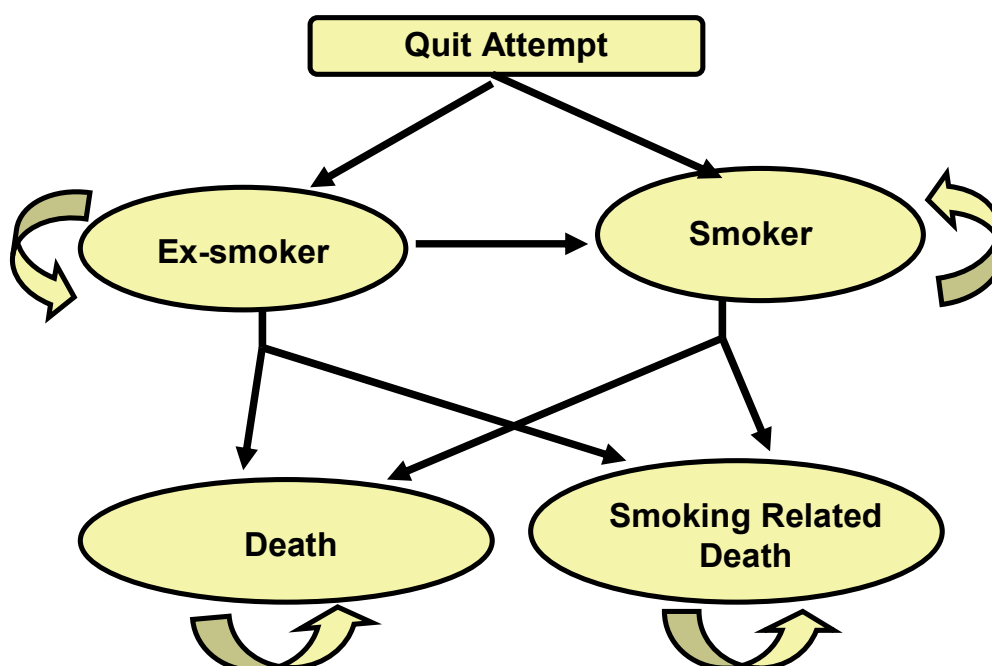


Fig. 2

This model consists of four main Markov states that can be moved into after undertaking a quit attempt: Ex-smoker, Smoker, Death and Smoking Related Death. The direction of the arrows indicates possible transitions between these states, for example, ex-smokers who were successful in the quit attempt can still relapse later in life to become smokers again, however it is assumed that no further quit attempts are undertaken, so there is no transition from the smoker state to the quit attempt or ex-smoker states. From the initial 'Quit Attempt' state, smokers 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 from a smoking related death. Clients in the smoking state remain here until they die from either a smoking or non-smoking related death. Death and smoking related death are absorbing states which can not be left.

Probabilities are applied to all possible transitions reflecting the appropriate risks. Table 9 details the parameters used in the baseline model.

Table 9: Baseline parameters for lifetime model

Parameters	Value
Age	45 years
Probability of CO validated quit success	
Self-quit attempt	0.015
Starting Fresh	0.025
Smoking Concerns	0.055
Cost of cessation attempt	
Self-quit	£0.00
Starting Fresh	£79.23
Smoking Concerns	£368.38
Discount rate	
Outcomes	3.50%
Costs	not applicable
Utility/ Quality of life	
Smokers	0.8
Ex-smokers	0.87
Long-term Relapse Rate	
Years 1-2	0.24
Years 3-4	0.10
Years 5-8	0.02
Years 9+	0.00

The risk of death is based on 2004 age and sex related Scottish mortality rates excluding smoking attributable deaths (General Register Office for Scotland, 2007; Peto, et al. 2006), while the risk of a smoking related death is based on 2004 age and sex related Scottish smoking attributable mortality rates (General Register Office for Scotland, 2007; Peto, et al. 2006). Time dependency was also built into the model, so that the risk of relapse from the ex-smoker to smoker state is time dependent for up to eight years (Yudkin, et al. 2003; Gilpin, et al. 1997; Godfrey, et al. 2005). The transition probability is spread across the years and once an ex-smoker has remained in this state for eight years it is assumed that they are no longer susceptible to relapse. The risk of an ex-smoker dying from a smoking related death is also time dependent. It is considered that twelve years post-quit an ex-smoker is no longer susceptible to a smoking related death, therefore accounting for the benefits and increased life expectancy gained from quitting smoking.

Each state is also assigned a utility as a quality of life estimate between 1 and 0; a utility of 1 reflecting perfect health and 0 being death. Ex-smokers are assigned a greater utility than smokers, accounting for the health and quality of life improvements gained from smoking cessation (Kind, et al. 1999; Tengs & Wallace, 2000). The resulting QALY's were discounted at a rate of 3.5%¹ (NICE, 2004).

¹ Discounting reduces the present value of future benefits, because benefits received now are valued higher than in the future. People prefer to receive benefits sooner rather than later.

The only costs incurred in the baseline model are those dependent on the type of quit attempt undertaken, and therefore as costs are only incurred in the first year there is no need to discount. It is debatable as to whether the cost to the NHS of smoking related diseases, for example through future medical expenses, should be included in a cost-effectiveness analysis of smoking cessation interventions (Woolacott, et al. 2002; Akehurst & Piercy, 1994). Some studies have found little difference between the future medical costs incurred by smokers and non-smokers (Fiscella, & Franks, 1996) while others find that smokers do incur substantially higher medical costs than both ex-smokers and non-smokers (Hurley & Matthews, 2007; Rasmussen, et al. 2005). Including an extra cost burden for smoking related deaths in the model would make each intervention appear more cost-effective against the self-quit comparator, as there will be more smoking related deaths under a self-quit attempt, and future costs of smoking related diseases will be much higher than the cost of either Starting Fresh or Smoking Concerns. Therefore the baseline analysis only considers the direct costs of the interventions, providing a more conservative cost-effectiveness estimate, while the sensitivity analysis does incorporate a cost of smoking related diseases (discounted at 3.5%) to reflect the longer term financial benefits of the interventions to the NHS.

Sources of data

52 week data from the study were combined with information from published literature to inform both the annual and lifetime analyses. A systematic literature review was undertaken to establish the nature of cost-effectiveness models previously used and their outcomes in analyses of smoking cessation interventions.

The main study analysis based quit rates on the quit-date sample in compliance with the Russell Standards (West, 2005b); however, a slightly different approach is required for the economic analysis. Both the Starting Fresh and Smoking Concerns services commence with 'introductory' weeks prior to the quit date which incur costs to NHS Greater Glasgow and Clyde (NHSGGC). The cost-effectiveness analysis must incorporate these costs and therefore cost and probability calculations are based on the initial sample for each intervention. These alternative samples are illustrated in the decision tree in figure 1.

Costs

The cost effectiveness analysis is undertaken from the NHS perspective, and therefore the relevant costs are those directly incurred by NHSGGC for the two interventions Starting Fresh and Smoking Concerns. Cost and price information was obtained from the British National Formulary (BNF 55), Personal Social Services Research Unit (PSSRU) (Curtis, 2007) and NHSGGC for the resources used in the interventions, price year 2007. Patient data on resource use was collected at weekly intervals throughout the study. For the control scenario, self-quit attempts, the baseline analysis assumed no direct advice or help from the NHS, and therefore no costs are incurred.

The costs for each intervention are attributed to four main areas: nicotine replacement therapy (NRT), professional time, the materials used and overheads. Table 10 below presents a summary description of the costs incurred by the two services.

Table 10: Cost summary details Starting Fresh & Smoking Concerns

Cost Area	Specifics	Service Use	Description
NRT	Nicorette 16 hour patch	Both services	First line NRT option prescribed for the majority of patients in both services. Cost £9.98 per quitter per week, for a maximum of 12 weeks. The total cost of NRT for each service is dependent on the total number of participants using the service and number of quitters each week.
Professional Time	Pharmacy fees	Both services	Pharmacy fees are paid for every four weeks of patient participation and the fee rate is dependent on quit stage. SF maximum total payment per patient £30, SC maximum total payment per patient £15. The total cost is dependent on the number of participants using the service and the duration of quit attempts.
	Facilitator fees	Smoking Concerns (group) only	Group facilitators paid an hourly fee of £15. The seven week group duration incurs 17hrs of facilitator time, or 34hrs for groups run by two facilitators.
Overheads	Advertisement	Both services	Flyers & posters for both services. This cost is incorporated with other NHSGGC smoking cessation advertising, so an annual sum of £150 is attributed to each service reflecting their proportion of costs.
	Room hire	Smoking Concerns (group) only	A cost of £50 per group session has been assigned to reflect the opportunity cost of venue hire for groups which are normally held in 'free' Health Centres. The room hire cost for SF is incorporated in the Pharmacy fee.
	Project officers	Both services	Both services incur salary costs for project management. This reflects the full and part time costs for employees who manage, organise and run the services. Salary 'on costs' are also incorporated.
	Service operators	Both services	SF only incurs costs for pharmacy advisers who are paid on an hourly rate, while SC incurs the much larger salary costs for a cessation adviser and for coordinators for each of the nine community health care partnerships (CHPs) in NHSGGC. The CHPs are responsible for delivering the Smoking Concerns service for NHSGGC.
	Refresh Training	Both services	Biannual refresh training is provided by the project officers. SF incurs the cost of venue hire and pharmacists and pharmacy assistants are reimbursed for a full day lost from work. SC provides the training in-house and don't reimburse facilitators for their time. An opportunity cost of £100 reflects the use of venue and materials used for SC training.
Materials	CO monitors	Both services	£132 per carbon monoxide (CO) monitor. Annual SF cost attributes one monitor per pharmacy (n=270), while in SC monitors can be shared within each of the nine CHPs so an average of 45 monitors are required annually.
	Maintenance of CO monitors	Both services	Each service incurs an annual cost of £500 for maintenance & miscellaneous costs for CO

			monitoring.
	Booklets	Both services	Booklets are distributed to all NHS smoking cessation services. Attribute £100 each service to represent their annual share of this cost.
	Refreshments	Group (SC) only	Refreshments are only provided in the SC service. An annual cost of £100 is incurred.

NRT

The cost of NRT is based on the first line product offered by NHSGGC which is Nicorette 16hr patches. At the time of study 95% of Starting Fresh patients received this form of NRT and therefore costs have been calculated based on the weekly price of this for all patients receiving NRT. In the Smoking Concerns intervention 20% of clients received two forms of NRT simultaneously and this additional cost was also incorporated. NRT provision is abstinence contingent and therefore the total cost of NRT for each intervention is dependent on the number of weeks each patient participates (remains a quitter). 16% of SC clients received alternative smoking cessation medication (Varenicline or Bupropion) which was collected from their GP as opposed to the pharmacy. The cost of this alternative nicotine medication was incorporated, however, these clients do not incur the pharmacy fees during or after their attendance at Smoking Concerns, and therefore there is no overall cost increase.

Professional Time

Professional time reflects the cost of pharmacist and group facilitator's time incurred directly through providing the services. NHSGGC pay the pharmacy a fee per client attendance per week as reimbursement for their time and use of their premises. The fee is dependent on which intervention the patient belongs to and the duration of their quit attempt. In Starting Fresh a fee of £5 is paid for patients who participate for week zero only and thereafter do not set a quit date. The pharmacy will receive a maximum of £30 per patient for those who complete the full thirteen week duration and for Smoking Concerns the pharmacy will receive a maximum of £15, again for those patients who complete the full 14 week duration².

The Smoking Concerns intervention also involves seven weekly behavioural support sessions per group. Facilitators are paid an hourly rate for their time involved in preparing for and running groups. Groups run by two facilitators are more expensive than those run jointly by a facilitator and a cessation coordinator, as the coordinator is paid a salary rather than an hourly fee. Salary costs for coordinators are included as an overhead cost in this analysis, as running group support sessions is only one aspect of their role.

Overheads

The annual overhead costs include salaries, venue costs, advertising and biannual refresh training. The Starting Fresh intervention consists of two salary costs, and the cost of ten pharmacy advisers working 4hrs a week on an hourly rate throughout the year. The venue cost for the pharmacy premises is incorporated in the pharmacist 'professional time' fee. The Smoking Concerns intervention consist of numerous salary costs; for a smoking cessation adviser, health promotion officers, smoking cessation coordinators for each of the nine CHPs and the administration salaries. An additional

² Since time of study the Pharmacy fee arrangement for provision of smoking cessation services across NHSGGC have changed, however the cost-effectiveness analyses based costs on the structure in place at the time of study.

'on-cost' of 21% of salary costs to the employer (NHS) is incurred, representing the cost of superannuation and national insurance fees. The venue cost for Smoking Concerns is minimal as most group sessions are held in health centres where there is no charge to the NHS for their use; however, an opportunity cost has been attributed to reflect the cost of an alternative use of the venue.

Both interventions provide biannual 'refresh' training, given by the services' project officers. Starting Fresh incurs the costs of external venue hire and the pharmacists and pharmacy assistants are reimbursed for their time. Smoking Concerns facilitators also receive training, but their time is not reimbursed and as the training takes place in-house, an opportunity cost has been assigned to reflect the cost of venue and resource use. Both Starting Fresh and Smoking Concerns interventions are advertised simultaneously under NHS Greater Glasgow smoking cessation advertising. The annual cost includes production of fliers and posters for both interventions and therefore an annual sum has been attributed to each.

Materials

The materials used include carbon monoxide (CO) monitors, handouts, stationery and refreshments. CO monitors are not only used to validate self-reported quitting throughout both interventions, but are also considered to be a motivational tool. Each of the 270 participating pharmacies is provided with a CO monitor while the numbers required for group support sessions varies between the nine CHPs. Annual maintenance and miscellaneous costs are also incurred for CO monitors and a set cost has been applied to both interventions. The handouts provided include the Starting Fresh flier (which was incurred as an advertising cost in the previous section) along with the "How to stop smoking" booklet and the "Fresh Start" quitters diary. The quitter's diary is an additional material used in both interventions which is provided to NHS Greater Glasgow by Nicorette. The "How to stop smoking" booklet is distributed to all NHS Glasgow Smoking cessation services, and therefore a set cost has been attributed to both interventions to reflect the cost of this material. Refreshments are not provided in the pharmacy service, but an annual 'refreshments' sum is attributed to Smoking Concerns.

Results

52 week model

The baseline characteristics of the study population were discussed in the previous section of this report, where it was also noted that the 52 week study outcomes (number of CO validated quitters) were lower than expected for both services.

Outcomes

The main study outcomes for each service are displayed in Table 11, detailing both the initial and quit-date samples. Self-reported and CO validated quitters are listed separately, while all participants who left the cessation service, or are lost to follow up are considered to have relapsed, including those who withdrew prior to setting a quit date.

Table 11: 52 week study outcomes

<u>Smoking Status</u>	<u>Starting Fresh</u> N	%	<u>Smoking Concerns</u> N	%
Initial Sample	1508	100	471	100
'No quit date' relapses	134	8.9	60	12.7
Quit-date sample	1374	100	411	100
CO validated quitters	38	2.8	26	6.3
Self-reported quitters	42	3	21	5.1
Relapsers	379	27.6	145	35.3
Lost to follow-up = relapsers	915	66.6	219	53.3
Quit date total	1374	100	411	100
<i>Outcomes and percentages calculated from the initial sample</i>				
Quitters - CO validated	38	2.5	26	5.5
- Self reported	42	2.8	21	4.5
Relapsers	379	25	145	30.8
Lost to follow-up/ Relapsers (quit-date sample relapses + 'no quit-date' relapses)	1049	70	279	59.2
Initial Total	1508	100	471	100

The results relevant to the cost-effectiveness analysis are those based on the initial sample of participants with quitters incorporating only those who were CO validated at 52 weeks post-quit (SF, n = 38 and SC, n = 26). This is in compliance with the Russell Standard recommendations (West, 2005b). By excluding the self-reported quits (SF, n = 42 and SC, n = 21) in calculating the probability of quitting for the analysis, the study results become more rigorous, and of a higher publishable quality in line with the Russell Standards, however, this impacts negatively on the outcomes with the interventions becoming less effective, which in turn will negatively affect the cost-effective outcome providing a more conservative CEA estimate.

The interim study economic analysis (Bauld et al, 2008) was based on the 4 week follow-up results which were later published in the Journal Addiction (Boyd & Briggs, 2009) including an extension of the 4 week results to predict annual cost per quitter outcomes. Using previously published evidence (Ferguson, et al. 2005; Stapleton,

1998) a 75% relapse rate was used to predict relapses between 4 and 52 weeks. However, the 52 week study outcomes as detailed in Table 4 below suggest an 85% relapse rate from the 4 week follow up for both services³. As discussed in the earlier sections of this report, the relapse rates between 4 and 52 weeks from the study are higher than expected. The results present CO validated quit rates of 2.5% and 5.5% for Starting Fresh and Smoking concerns respectively, however, if self-reported quits were also incorporated, these quit rates would increase to 5.3% & 10% respectively.

Table 12: 4 - 52 week relapse rates

	<u>Starting Fresh</u> N		<u>Smoking Concerns</u> N	
		%		%
Initial Sample	1508	100	471	100
4 week CO validated quitters	255	17%	146	31%
52 week CO validated quitters	38	2.5%	26	5.5%
Relapse Rate 4 – 52 weeks CO validated	85%		82%	

The study outcomes reveal that clients who use the Starting Fresh service have a 0.025 probability of quitting at 52 weeks while clients in the Smoking Concerns service have a 0.055 probability of quitting, based on the initial sample and CO validated quitters. Annual estimates for UK background cessation rates vary throughout the smoking cessation literature (Woolacott, et al. 2002; West, 2006), however, many UK studies have tended to use between 1-2.5%. In line with this the interim study analysis applied a conservative 4 week success rate of 10% assuming the large majority of self-quit attempts fail in the first few weeks. The interim analysis results were later published in the Journal Addiction (Boyd & Briggs, 2009) with an extension of the 4 week results to predict annual cost/quitter results. Using previously published evidence (Ferguson, et al., 2005; Stapleton, 1998) a 75% relapse rate was applied to all three interventions, however, these 52 week outcomes indicate a relapse rate closer to 85% than 75% for both Starting fresh and Smoking Concerns, between the 4 and 52 week follow-up. Therefore for this 52 week analysis, an 85% relapse rate has been applied to the 4 week self-quit estimate of 10%, rather than the 75% used in the interim analysis, resulting in a 0.015 probability of quitting with a self-quit attempt. This allows for consistency between the comparators and provides a more realistic estimate.

Costs

A breakdown of the average cost per participant in the study is detailed in Table 13 below.

³ The relapse rates between 4 and 52 weeks discussed in the earlier sections of this report were based on the 'quit-date' sample, however, the relapse rates presented in Table 12 here, are based on the initial sample numbers, in line with the economic approach adopted.

Table 13: Average Cost per participant

Cost Area	Starting Fresh Cost per participant	Smoking Concerns Cost per participant
<i>NRT</i>	£46.50	£53.84
<i>Professional Time</i>	£18.53	£27.02
<i>Overheads</i>	£6.39	£282.96
<i>Materials</i>	£3.02	£4.43
<i>Annual Training</i>	£4.79	£0.13
TOTAL	£79.23	£368.38

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 Smoking Concerns in Table 13 reflects the longer duration of average quit attempt than the average Starting Fresh client. The average pharmacy fee cost also depends on duration of quit, but it is expected that SC incurs a higher average cost than SF due to the additional cost of facilitator fees. The overheads, materials and refresh 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. The overhead costs for Smoking Concerns are considerably greater than those incurred by Starting Fresh, due to the much greater volume of salary-related costs incurred in this service, and the relatively lower numbers of clients.

The cost per participant used in the cost-effectiveness analysis is £79.23 for Starting Fresh clients and £368.38 for Smoking Concerns clients. The baseline analysis in both the 52 week and lifetime models assumes self-quit attempts do not incur a cost to the NHS.

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 14.

Table 14: 52 week model results

ICERs for Starting Fresh & Smoking Concerns			
Intervention	Cost per participant	Probability of quit	Incremental cost per 52-week quitter
Self-quit	£ -	0.015	
Starting Fresh	£ 79.23	0.025	£ 7,768
Smoking concerns	£ 368.38	0.055	£ 9,163

Table 14 shows that the Smoking Concerns 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 significantly higher overhead costs involved with Smoking Concerns. As Smoking Concerns and Starting Fresh 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 Starting Fresh and Smoking Concerns 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 Starting Fresh service provides an additional 52 week CO validated quitter at a cost of £7768, while the Smoking Concerns service produces an additional quitter at a cost of £9163 compared with a 'self-quit' attempt.

The two ICERs reported here can still be considered cost-effective; however, they are considerably higher than expected and much greater than those reported in the 4 week interim analysis (Bauld et al, 2008); due to the substantial drop in probabilities of quitting with both services, and relative consistency in costs. They are also higher than the 52 week estimates which were published in the Journal Addiction (Boyd & Briggs, 2009). Those estimates were based on a 75% relapse rate from 4 week results and predicted ICERs of £5678 for Starting Fresh and £6987 for Smoking Concerns. The higher, less cost-effective results presented in Table 14 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 £2000 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 lowering the cost-effectiveness ratios. When the self-reported quit rates are also incorporated to the analysis (as many cost-effectiveness analyses currently do, despite the Russell Standard recommendations) the incremental cost-effectiveness ratios for both services improve substantially, shown in Table 15. If the self-reported quitters are incorporated, then the probabilities of quitting increase to 0.05 and 0.1 respectively for Starting Fresh and Smoking Concerns, and the ICERs fall respectively to £2082 and £4345⁴ indicating a substantial improvement and making both services extremely cost-effective.

Table 15: 52 week results, CO validated and self-reported quitters

ICERs for Starting Fresh & Smoking Concerns			
Intervention	Cost per participant	Probability of quit	Incremental cost per 52-week quitter
Self-quit	£ -	0.015	
Starting Fresh	£ 79.23	0.053	£ 2,082
Smoking concerns	£ 368.38	0.100	£ 4,345

It should be noted that the baseline cost per quitter ICERs in Table 14 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 across various health care interventions that have also used QALY's as an outcome measure.

⁴ This is based on the self-quit comparator probability of 0.015 (an 85% relapse rate from the 4 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 4 week success estimate of 10%) then the ICERs still fall substantially to £2824 Starting Fresh and £4925 Smoking Concerns).

Lifetime model

The baseline lifetime model was calculated for both males and females aged 45 years old, based on the costs and CO validated quit rates from the 52 week analysis. Table 16 presents the results of this analysis detailing the costs, discounted QALYs, and the incremental cost per discounted QALY gained for each service in comparison to self-quit attempts.

Table 16: Lifetime model baseline results

Intervention	<u>Males</u>		<u>Females</u>	
	Cost	QALYs	Cost	QALYs
Self-Quit	£0.00	14.10	£0.00	15.17
Starting Fresh	£79.23	14.13	£79.23	15.20
Smoking Concerns	£368.38	14.18	£368.38	15.25
<u>ICERs</u>				
Starting Fresh	£2,619	per QALY	£2,583	per QALY
Smoking Concerns	£4,871	per QALY	£4,803	per QALY

The incremental cost per QALY results show that in comparison to a 'self-quit' attempt, the Starting Fresh service provides an additional QALY at a cost of £2583 for females and £2619 for males, while the Smoking Concerns service produces an additional QALY at a cost of £4803 for females and £4817 for males compared with a 'self-quit' attempt. The incremental cost-effectiveness ratios (ICERs) reported here are lower than the cost per quitter ICERs reported in the 52 week model. This is because the Markov model incorporates the gains in quality and quantity of life that clients will receive from smoking cessation, making it a more realistic portrayal of the longer term outcomes. These results show that both the Starting Fresh and Smoking Concerns services offered by NHSGGC are cost-effective.

The lifetime model developed in this analysis was based on stringent criteria, such as using only the CO validated success probabilities, discounting the future QALY gains, and applying no cost to the self-quit comparator. If the QALY benefits are left undiscounted in the model both services become even more cost-effective with Starting Fresh incurring an ICER of £1080 for females and £1150 for males, and Smoking Concerns £2000 for females and £2100 for males. Incorporating a cost to the NHS for self-quit attempts also lowers the incremental cost per QALY in both models, with Starting Fresh incurring approx £400 per QALY for both females and males and Smoking Concerns £3900 for both females and males, in comparison to self-quit attempts. If the Russell Standard criteria were dropped and self-reported quits were included in the analysis, both services become more effective and the incremental cost per QALY gained falls to approx £1200 for Starting Fresh females and males, and £2650 Smoking Concerns females and males.

The baseline lifetime model only incorporated the direct cost of the smoking cessation interventions, excluding the future cost of smoking related diseases to the NHS. To assess the cost-effectiveness of each intervention when these smoking related lifetime costs are taken in to account, the approach adopted by Akehurst & Piercy (1994) was used; which incorporates the cost of IHD (Ischemic Heart Disease) and lung cancer (account for approximately 60% of smoking related diseases) to the NHS. Adjusting for inflation between 1994 and 2007, a cost of £27'120 per smoking attributable death was entered into the lifetime model and discounted at a rate of 3.5%. Incorporating this additional cost to the NHS of future smoking related deaths resulted in both interventions becoming a dominant strategy over self-quit attempts. Starting Fresh became cost saving at £24,000 per QALY saved and Smoking Concerns saving the NHS £21'500 per QALY. Accounting for the potential cost savings to the NHS, through avoided smoking related diseases later in life, makes both Starting Fresh and Smoking Concerns extremely cost-effective as they both dominate the alternative of self-quit attempts. Smoking Concerns also becomes a dominant strategy when compared directly against Starting Fresh using this analysis, again, because of the cost attributable to smoking related deaths. There are less smoking attributable deaths with the more effective group intervention (Smoking Concerns), and therefore the intervention costs less while providing additional QALY's.

The baseline ICERs reported in Table 14 are comparable with other published smoking cessation cost per QALY outcomes (Fiscella & Franks, 1996; Song, et al. 2002, Lowin, 1996; Akehurst & Piercy, 1994), and are very cost-effective in comparison to other health care interventions, such as hip replacements or coronary artery bypass grafts (Parrott & Godfrey, 2004).

When comparing the cost-effectiveness of smoking cessation interventions against one another, it has previously been found that more intensive interventions have greater effectiveness, but due to their nature they also have higher costs, and in some cases have been found to be less cost-effective than lower intensity interventions (Parrott & Godfrey, 2004), although still representing good value for money. The cost per QALY results from the lifetime model indicate that both Starting Fresh and Smoking Concerns compare favourably with other smoking cessation interventions many of which are lower in intensity, however, in comparison to each other it is apparent that Smoking Concerns has a higher incremental cost-effectiveness ratio than Starting Fresh. This is not surprising considering the nature of Smoking Concerns, which is an intensive group based service. It would be inappropriate to assume that the pharmacy service is a better use of funding than group services, based on the lower incremental cost per QALY alone. Rather, the results from the lifetime model indicate that these two cost-effective services 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 smoking cessation attempts and quits in Glasgow.

This cost-effectiveness analysis provides valuable additional information on the cost-effectiveness of medium and highly intensive smoking cessation services such as Starting Fresh and Smoking Concerns.

CONCLUSION

This report has outlined findings from the final element of the 'comparing models of smoking treatment in Glasgow' study. This involved examining the effectiveness and cost-effectiveness of group and pharmacy-based interventions at 52 weeks. This study found that both forms of support available to help smokers stop in Glasgow are effective and costs effective. At the individual level, smokers are more likely to quit in the short and longer term if they access group support, 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 and are even more cost-effective than group support.

These results have implications for the development and evaluation of services to support smokers to stop in the UK and further afield. They provide further evidence that intensive group support is a highly effective and cost-effective form of smoking treatment, which poses questions about why this form of intervention is not available to smokers in some other parts of the country. Our findings also suggest that pharmacy-based interventions, while resulting in lower quit rates, have a number of advantages in terms of accessibility and affordability. These results should assist commissioners and public health professionals to consider what service mix is appropriate to support smokers to stop in their area. Our findings suggests that both types of intervention have a valuable role to play in cessation, but the challenge for the future is to determine what can be done to bring the success rates of pharmacy services up to those of groups and how to expand access to group-based services.

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