Weekly versus basic smoking cessation support in primary care: a randomised controlled trial

Paul Aveyard, Karen Brown, Cas Saunders, Avril Alexander, Elaine Johnstone, Marcus R Munafò, Mike Murphy

Background: There is insufficient and conflicting evidence about whether more intensive behavioural support is more effective than basic behavioural support for smoking cessation and whether primary care nurses can deliver effective behavioural support.

Methods: A randomised controlled trial was performed in 26 UK general practices. 925 smokers of ≥10 cigarettes per day were randomly allocated to basic or weekly support. All participants were seen before quitting, telephoned around quit day, and seen 1 and 4 weeks after the initial appointment (basic support). Participants receiving weekly support had an additional telephone call at 10 days and 3 weeks after the initial appointment and an additional visit at 2 weeks to motivate adherence to nicotine replacement and renew quit attempts. 15 mg/16 h nicotine patches were given to all participants. The outcome was assessed by intention to treat analyses of the percentage confirmed sustained abstinence at 4, 12, 26 and 52 weeks after quit day.

Results: Of the 469 and 456 participants in the basic and weekly arms, the numbers (%) who quit and the percentage difference were 105 (22.4%) vs 102 (22.4%), 0.1% (95% CI 0.6% to 1.6%) at 4 weeks, 66 (14.1%) vs 52 (11.4%), −2.6% (95% CI 0.6% to 7.7%) at 12 weeks, 50 (10.7%) vs 40 (8.8%), −1.9% (95% CI 0.7% to 7.0%) at 26 weeks and 36 (7.7%) vs 30 (6.6%), −1.1% (95% CI 0.4% to 2.3%) at 52 weeks.

Conclusions: The absolute quit rates achieved are those expected from nicotine replacement alone, implying that neither basic nor weekly support were effective. Primary care smoking cessation treatment should provide pharmacotherapy with sufficient support only to ensure it is used appropriately, and those in need of support should be referred to specialists.
of medication. In practice, three visits are usual and, if satisfactory appointments cannot be made, the support is delivered by telephone. With the addition of a telephone call around quit day, this comprised the basic support intervention. In this trial, weekly support supplemented basic support with an additional visit at 14 days and additional calls at 10 and 21 days.

The protocol did not specify the nature of the support offered as this was a trial designed to test NHS practice and protocols and hence fidelity checks were left to the NHS stop smoking services. In NHS practice, telephone support is given as an alternative to a face-to-face consultation and there was no intended difference in the content of visits and calls. Unique to weekly support, because the additional contacts took place later into the quit attempt, a participant whose quit attempt was failing was encouraged to set a new quit date. At nurse visit 1 (NV1), all participants were given and instructed in the use of a 15 mg nicotine patch to be worn for 16 h/day for 8 weeks (NV1), all participants were given and instructed in the use of a nicotine patch to be worn for 16 h/day for 8 weeks (NV1), all participants were given and instructed in the use of a nicotine patch to be worn for 16 h/day for 8 weeks (NV1), all participants were given and instructed in the use of a nicotine patch to be worn for 16 h/day for 8 weeks (NV1), all participants were given and instructed in the use of a nicotine patch to be worn for 16 h/day for 8 weeks (NV1), all participants were given and instructed in the use of a nicotine patch to be worn for 16 h/day for 8 weeks (NV1), all participants were given and instructed in the use of a nicotine patch to be worn for 16 h/day for 8 weeks (NV1)

![Figure 1](https://example.com/figure1.png)

**Figure 1** Timing of behavioural support in the basic and weekly support arms.

The primary outcomes were confirmed sustained abstinence at 1, 4, 12 and 26 weeks from quit day. Sustained abstinence was defined as self-reported total abstinence from NV2 providing NV2 was undertaken 14 or fewer days from quit day. At each visit the exhaled carbon monoxide (CO) level was measured. Participants were telephoned at 12 weeks (TC4), 6 months (TC5) and 1 year (TC6) from quit day to assess smoking status and those claiming abstinence for at least 7 days were asked to return a salivary sample for cotinine concentration measurement. Confirmation of abstinence was defined as an exhaled CO level of <10 parts per million (ppm) or salivary cotinine concentration of <15 ng/ml on each occasion. Participants who were withdrawn (which was commonly due to reverting to smoking) or who were lost to follow-up (unless they moved to an untraceable address or had died) were counted as smokers, as is standard.

We also studied NRT use. At the first telephone call (quit day), participants were asked whether they were using NRT and, at NV4, it was also recorded whether the second 4-week pack of patches was dispensed. At every other contact up to NV4 the side effects of NRT were recorded or left blank in cases not on NRT. To be classed as using NRT a person had to have contacted the nurse during the relevant period and be recorded as using NRT at every contact during that period. People who switched to non-trial supplied NRT were counted as using NRT. These data record whether NRT was being used in general and not the degree of adherence.

Based on two similar trials, we anticipated that 35–40% of the smokers would maintain abstinence for 1 week, 25% for 1 month, 15% for 3 months and 8% for 6 months. The recruitment target was reduced to 900 because of difficulties. This provided more than 80% power to exclude a 1.5-fold increase in quit rate up to 3 months and 52% power at 6 months.

A random number sequence and sealed numbered envelopes were generated by a statistician at the Cancer Research UK Medical Statistics Group, Oxford. Nurses opened the envelopes in sequence following eligibility assessment and consent. Participants attending together, such as husbands and wives, were allocated to the same arm. In some cases the envelopes were opened slightly out of sequence, which was inadvertent and not due to dislike of the allocation. The trial statistician was informed and was unconcerned. Participants and nurses were necessarily not blind to allocation although research staff making follow-up telephone calls at 3, 6 and 12 months were.

In the analysis we compared the proportion of smokers who quit in each arm, calculating risk differences and ORs and 95% CIs using standard formulae. Logistic regression was used to examine for effect modification.

**RESULTS**

Nine hundred and twenty-five smokers were recruited between July 2002 and March 2005. Although only cigarette smokers were eligible, seven cigar smokers and two pipe smokers were recruited and retained. Likewise, 13 participants who reported smoking <10 cigarettes per day were enrolled although all reported ≥10 to the nurse assessing eligibility. Mean nicotine dependence scores were similar to those of comparable studies and these and other key confounders were balanced (table 1).

The number of participants asked by their GPs to participate and who declined and the number of ineligible participants were not recorded. In two practices where we knew the number of smokers invited by letter, 11% and 13% were recruited. Five people were recruited but excluded from the analysis, three because they entered the study twice (their second entry was excluded) and two because the randomisation envelope was

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**Table 1** Baseline characteristics of trial participants

<table>
<thead>
<tr>
<th></th>
<th>Basic (n = 469)</th>
<th>Weekly (n = 456)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women, n (%)</td>
<td>247 (52.7)</td>
<td>229 (50.2)</td>
</tr>
<tr>
<td>Age (years)*</td>
<td>42.9 (11.9)</td>
<td>44.3 (11.7)</td>
</tr>
<tr>
<td>Ethnic background, n [%]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>431 (98.0)</td>
<td>423 (97.2)</td>
</tr>
<tr>
<td>Oriental</td>
<td>0 (0.0)</td>
<td>0 (0.9)</td>
</tr>
<tr>
<td>Indian, Pakistani, Bangladeshi</td>
<td>7 (1.4)</td>
<td>8 (1.8)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (0.5)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Has partner</td>
<td>301 (74.1)</td>
<td>293 (71.5)</td>
</tr>
<tr>
<td>Live with smoker</td>
<td>202 (48.1)</td>
<td>189 (44.4)</td>
</tr>
<tr>
<td>Weekly units of alcohol†</td>
<td>8 (19)</td>
<td>6 (1.5)</td>
</tr>
<tr>
<td>Daily cigarette consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–9</td>
<td>7 (1.6)</td>
<td>6 (1.4)</td>
</tr>
<tr>
<td>10</td>
<td>22 (5.1)</td>
<td>27 (6.4)</td>
</tr>
<tr>
<td>11–20</td>
<td>221 (50.9)</td>
<td>222 (52.5)</td>
</tr>
<tr>
<td>21–30</td>
<td>146 (33.4)</td>
<td>122 (28.8)</td>
</tr>
<tr>
<td>&gt;30</td>
<td>38 (8.8)</td>
<td>46 (10.9)</td>
</tr>
<tr>
<td>FTND*</td>
<td>5.1 (2.2)</td>
<td>5.1 (2.1)</td>
</tr>
<tr>
<td>Baseline CO (ppm)*</td>
<td>22.6 (10.4)</td>
<td>23.3 (10.0)</td>
</tr>
<tr>
<td>Baseline plasma cotinine concentration (ng/ml)*</td>
<td>284 (126)</td>
<td>280 (120)</td>
</tr>
<tr>
<td>Longest duration of past quit attempt (days)†</td>
<td>28 (177)</td>
<td>21 (178)</td>
</tr>
<tr>
<td>Age started smoking*</td>
<td>16.5 (3.6)</td>
<td>16.3 (3.6)</td>
</tr>
<tr>
<td>Smoking product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufactured cigarette</td>
<td>379 (80.8)</td>
<td>360 (78.9)</td>
</tr>
<tr>
<td>Roll up cigarette</td>
<td>86 (18.3)</td>
<td>91 (20.0)</td>
</tr>
<tr>
<td>Cigar</td>
<td>4 (0.9)</td>
<td>3 (0.7)</td>
</tr>
<tr>
<td>Pipe</td>
<td>0 (0.0)</td>
<td>2 (0.4)</td>
</tr>
</tbody>
</table>

*Mean (SD).
†Median (IQR).

FTND, Fagerstrom test for nicotine dependence; CO, carbon monoxide. All values are percentages of the available data unless indicated otherwise.

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FTND, Fagerstrom test for nicotine dependence; CO, carbon monoxide. All values are percentages of the available data unless indicated otherwise.

*Mean (SD).
†Median (IQR).
not opened and they were not allocated to either arm. There were 431 months of recruitment, meaning that, on average, nurses provided support for 2.1 patients per month.

The most popular quit day was 1 day after the initial visit, with two-thirds setting quit days within 4 days of the initial visit. Fifty-eight (12.4%) basic and 49 (10.7%) weekly arm participants did not make a quit attempt. There was some contamination with a few participants in the basic intervention arm making additional visits or calls, but insufficient to alter the results (fig 2). Only 53% (TC2), 68% (NV3) and 42% (TC3) of participants allocated to the additional support received it, but these were 68%, 95% and 67% of those participants whose

**Table 2** Use of NRT at various times after quit day in those whose quit attempt was continuing at the relevant time and who had a contact in the relevant period

<table>
<thead>
<tr>
<th></th>
<th>Basic</th>
<th>Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using n (%)</td>
<td>Not using n (%)</td>
</tr>
<tr>
<td>Days 1–14</td>
<td>335 (97.7)</td>
<td>8 (2.3)</td>
</tr>
<tr>
<td>Days 15–35</td>
<td>227 (90.4)</td>
<td>23 (9.2)</td>
</tr>
<tr>
<td>Issued for final 4 weeks</td>
<td>243 (89.0)</td>
<td>18 (6.6)</td>
</tr>
</tbody>
</table>

![Trial flow diagram. NV, nurse visit; TC, telephone call.](figure2.png)

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quit attempts were continuing at these times. One effect of weekly contacts might have been to motivate NRT use or manage side effects resulting in improved concordance. However, rates of use of NRT were high and did not differ between arms (table 2).

The timing of the support offered differed from the protocol and between participants, with only 63 participants (13.4%) in the basic arm and 35 (7.7%) in the weekly arm making all the contacts at the times specified (±4 days). There was also evidence of a slightly significant variation between practices, with the interquartile range for the median days between quit day and NV2 by practice being 2 days (Kruskal Wallis $\chi^2 = 38.4$, df = 24, $p = 0.032$; table S1 available online only at http://thorax.bmj.com/supplemental).

At 1 week, confirmed sustained abstinence was higher for those in the weekly contact arm with a risk difference of 11.6% (95% CI 5.4% to 17.8%) as observed in other studies (table S2 available online at http://thorax.bmj.com/supplemental). One explanation could be that GP referred patients (as is normal in smoking cessation services) were more motivated than those recruited by GP letter. There was little evidence to support this, with 26.4% of those recruited by GPs exhibiting confirmed sustained abstinence at 4 weeks and 22.1% in those responding to invitation letters ($\chi^2 = 0.50$, df = 1, $p = 0.50$).

Eleven participants (2.3%) in the basic arm and 49 (10.7%) in the weekly arm set renewed quit dates. However, only one person (weekly contact) sustained continued abstinence for 6 months or more.

The length of previously achieved smoking abstinence predicted success, as did nicotine dependence (FTND) scores, as observed in other studies (table S2 available online at http://thorax.bmj.com/supplemental). However, there was no evidence that those who were least likely to succeed because of high dependence or short previous quit attempts were more likely to benefit from the weekly support over basic support.

### DISCUSSION

There was no benefit from an additional visit and two additional supportive telephone calls, which was the difference between basic and weekly support. Rates of use of NRT were uniformly high and additional quit attempts failed swiftly in 59/60 cases. Although an ideal pattern of smoking cessation support was recommended, few patients adhered to it.

This study had 50% more participants than all three previous trials combined in the Cochrane review of intensity of behavioural support. However, the evidence is compatible with a small but worthwhile advantage. At 6 months, using the confidence intervals as bounds, the sustained abstinence rate could be 2% higher in absolute terms with moderate support. The marginal cost of this additional support (30 min of nurse time) could be no more than £30, making this intervention highly cost effective (a maximum of £1500 per additional 6-month quitter or around £750 per life year saved). No single trial could exclude cost effective benefits of additional behavioural support in smoking cessation. Adding these results to the two trials contrasting moderate versus low intensity support, the combined OR is 0.71 (95% CI 0.47 to 1.07).

The sustained abstinence rates at 4 and 52 weeks were half those achieved by NHS stop smoking services studied in the national evaluation and similar to those achieved by NRT supplied with no behavioural support. Two explanations are possible. The first is that some inherent characteristic of NHS patients in Oxfordshire and Buckinghamshire makes them less likely to stop than the services in the national evaluation (North Cumbria and Nottingham). However, given that Oxfordshire and Buckinghamshire are more affluent and that affluence is related to success in stopping, this seems unlikely. The

### Table 3  Confirmed sustained abstinence†

<table>
<thead>
<tr>
<th></th>
<th>Basic* (n = 469)</th>
<th>Weekly* (n = 456)</th>
<th>Risk difference (95% CI)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>148 (31.6)</td>
<td>196 (43.0)</td>
<td>11.6 (5.4 to 17.8)</td>
<td>1.65 (1.26 to 2.16)</td>
</tr>
<tr>
<td>4 weeks</td>
<td>105 (22.4)</td>
<td>102 (22.4)</td>
<td>0.1 (–5.3 to 5.5)</td>
<td>1.00 (0.74 to 1.37)</td>
</tr>
<tr>
<td>12 weeks‡</td>
<td>66 (14.1)</td>
<td>52 (11.4)</td>
<td>–2.6 (–6.9 to 1.7)</td>
<td>0.79 (0.54 to 1.17)</td>
</tr>
<tr>
<td>26 weeks‡</td>
<td>50 (10.7)</td>
<td>40 (8.8)</td>
<td>–1.9 (–5.7 to 2.0)</td>
<td>0.81 (0.52 to 1.26)</td>
</tr>
<tr>
<td>52 weeks‡</td>
<td>36 (7.7)</td>
<td>30 (6.6)</td>
<td>–1.1 (–4.4 to 2.3)</td>
<td>0.85 (0.51 to 1.41)</td>
</tr>
</tbody>
</table>

*Values presented as n (%).
†Allows a grace period of smoking before visit 2 providing visit 2 took place within 14 days of quit day.
‡No participants were taking nicotine replacement therapy at any of these follow-up points.
second explanation is that treatment was more effective. In Cumbria and Nottingham it was given on a true weekly schedule by NHS advisors working directly for the stop smoking service to their protocol. In Oxfordshire and Buckinghamshire we reported great variation in practice and only 1 in 13 assigned weekly support received it as intended. The sustained abstinence rate at 1 year is not quite double that which would be expected from smokers stopping without any assistance (4%) whereas, with effective behavioural support and medication, it should be 3–4 times higher—about 15% observed in the national evaluation. Given NRT is effective with only minimal support1 2 and NRT was used by nearly all participants, we conclude that the behavioural support offered by primary care nurses was only minimally effective. Perhaps this was because the throughput was low (2.1 patients per month) or because practice appointment systems make weekly contact difficult.

The quit rate in this study was similar to that in the only other study of primary care NHS stop smoking services (table S3 available online at http://thorax.bmj.com/supplemental).

Randomisation eliminates selection bias and balanced confounders in this trial. However, information bias may have played a role. The assessment of smoking status during the first 4 weeks was not identical, with more assessments in the weekly support arm. This biased the OR in favour of weekly support for the 1-week quit rates considerably and the 4-week quit rates slightly because NV4 took place a median of 4 days earlier at 26 days in the basic support arm. This would not bias the assessment of abstinence subsequently. The results could be biased against weekly support if individuals were less likely to report lapses occurring more than a week before their visit because lapses were forgotten or not salient. In the basic arm the median time between NV2 and NV4 was 21 days whereas, with effective behavioural support and medication, it would probably not be provided in primary care. Finally, attempting to set a quit date soon after the original unsuccessful one is unproductive. Halting that quit attempt and returning to the stop smoking services later would be preferable.

We do not believe, however, that the results imply that basic support would be as effective as the usual 1 h weekly session group treatment provided in specialist clinics. The effectiveness of behavioural interventions in smoking cessation depends upon context, exemplified by buddying. Buddying links the fortunes of two quitters so they feel responsible for each other’s success. In primary care where there is no link between quitters, buddying had an OR of 2.6 (p<0.05) for 4-week continuous abstinence,24 but the same intervention in group based programmes produced an OR of 1.16 (95% CI 0.76 to 1.78) for the same outcome.25 This difference in effectiveness may reflect the higher commitment felt in group programmes without buddying that would be undermined by fewer visits. This might explain the higher quit rates achieved by specialist group programmes than primary care based support in this trial or weekly one-to-one support provided by specialists.15 16

Primary care professionals have a key role in providing support for smoking cessation and reaching public health goals, but these trial results emphasise that this role is providing medication and sufficient support to ensure it is taken appropriately. Primary care smoking cessation services should reach broadly rather than give in-depth support.

ACKNOWLEDGEMENTS

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Additional data are given in the tables in the online supplement available at http://thorax.bmj.com/supplemental.

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Mike Murphy, Childhood Cancer Research Group, University of Oxford, Oxford, UK

This study was funded by a programme grant from Cancer Research UK (trial registration ISRCTN 05689186). United Pharmaceuticals supplied the nicotine patches for the study free to be given without charge to the participants.

Competing interests: PA has received free nicotine replacement products from Novartis and nortriptyline from King Pharmaceuticals for distribution to trial participants; personal income for advice to Xenova, a biotechnology company investigating a nicotine vaccine; small gifts and had meals paid for by drug companies, including those producing medications for smoking cessation; and travel grants to attend conferences from the National Institute of Health and Clinical Excellence recommends that patients choose their preferred form of NRT. However, other forms of NRT require good technique to use properly and perhaps a trial of additional contacts using these other forms of NRT may show a greater benefit of the additional contacts. In support of this, table S3 in the online supplement (available at http://thorax.bmj.com/supplemental) shows that both Fagerstrom and Raw23 found modest advantages of more frequent contact early in the quit attempt when participants used nicotine gum. This should push primary care prescribers towards the patch. The ineffectiveness of behavioural support given by primary care nurses implies that stop smoking services...
Commission, The American Institutes for Research, the National Audit Office and G-Nostics Ltd. EJ has received consultancy income from the European Network for Smoking Prevention and has provided scientific consultancy services through the University of Oxford ISOS Innovation to the National Audit Office and G-Nostics Ltd. The Childhood Cancer Research Group and the Cancer Research UK General Practice Research Group have received unrestricted educational grants, research project grants and consultancy fees from Ciba Geigy/Novartis, Glaxo Smith Kline, Pharmacia/Pfizer, Ares-Serono, Sanofi-Synthelabo, Third Wave Technologies, Astra-Zeneca and G-Nostics.

A longer version of this paper can be obtained by emailing Paul Aveyard.

The protocol was designed and written by Mike Murphy, Marcus Munafó, Robert Walton, Mike Bradburn, Ed Peile and Mark Drury. The clinical protocol was designed by Mark Drury, Karen Brown and Mike Murphy. Karen Brown and Cas Saunders recruited and trained the practice nurses. Karen Brown, Cas Saunders and Avril Alexander monitored the practice nurses. Kate Hey provided organisational and computing support. Viv Crombie and Victoria Johansen provided administrative support. Elaine Johnstone, Katherine Elliott and Dominic Sweeney processed the samples. The cotinine concentrations were measured by ABS Labs Ltd, Oxford. Karen Brown, Mark Drury and Paul Aveyard monitored the study. Mike Bradburn, Louise Linsell and Sharon Love provided statistical support. Paul Aveyard cleaned and analysed the data and wrote the first draft of the study. All authors commented and revised the draft and it was agreed by all authors. Paul Aveyard acts as the guarantor of the study.

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REFERENCES

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