



<b>Title</b>	<b>Predictors of smoking cessation among Chinese parents of young children followed up for 6 months</b>
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<b>Citation</b>	<b>Hong Kong Medical Journal, 2006, v. 12 n. 4 Suppl 2, p. S28-S31</b>
<b>Issued Date</b>	<b>2006</b>
<b>URL</b>	<b><a href="http://hdl.handle.net/10722/57363">http://hdl.handle.net/10722/57363</a></b>
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# Predictors of smoking cessation among Chinese parents of young children followed up for 6 months

## Key Messages

1. A telephone-based smoking cessation counselling programme for parents of young children achieved a significantly higher 7-day point prevalence quit rate at 6 months follow-up than the control group.
2. Proactive telephone counselling to promote smoking cessation is an effective quit strategy.

## Introduction

The health risks of both active and passive smoking are well documented.<sup>1,2</sup> Previous studies in Hong Kong and elsewhere have shown that the health of children is adversely affected by passive smoking at home.<sup>3</sup> Furthermore, children whose parents smoke are more likely to become smokers in the future. Encouraging smoking parents to quit smoking has significant public health benefits for both the parents and children. Proactive and reactive telephone counselling is effective for promoting smoking cessation treatment to a large number of smokers. Furthermore, the cost-effectiveness of telephone counselling for smoking cessation has also been established.<sup>4</sup> However, there is little evidence regarding the effectiveness of telephone-based smoking cessation interventions in Asia. Moreover, we found no studies evaluating the promotion of smoking cessation to parents of young children.

## Aims

This study explored the effectiveness of telephone counselling together with educational materials at increasing smoking quit rates in parents of young children.

## Materials and methods

We undertook a randomised controlled trial. Subjects were recruited from the list of smoking parents in the database of the '1997 Birth Cohort Study' available in the Department of Community Medicine, the University of Hong Kong. The original cohort comprised 8327 parent-infant pairs who first visited the Maternal and Child Health Centres after birth in April and May 1997 and were followed up for 18 months. The smoking history of the parents was recorded. In the present trial, parents who were documented as current smokers were recruited from August 2001 to July 2003, with follow-up completed in January 2004. To be eligible for the study, the subjects had to be daily or occasional smokers or quitters of less than 6 months, residing in Hong Kong for at least 5 days a week, and speak Cantonese. Subjects receiving other smoking cessation programmes were excluded. Of the 2311 smoking fathers or mothers approached, 1420 were eligible and the 952 who agreed to participate in the trial were randomly allocated to either the control (n=485) or intervention group (n=467). After the baseline measures, research staff opened a serially labelled opaque and sealed envelope to reveal the random assignment to intervention group or control group. Control subjects were unaware of the counselling procedures available to the intervention group.

## Intervention and follow-up

Subjects in the intervention group received four telephone-counselling sessions, smoking cessation self-help materials, and access to smoking cessation hotline counsellors. Subjects in the control group received self-help information materials by mail immediately after the initial contact and then again at 6 months. The smoking cessation-counselling nurse provided the initial contact telephone counselling session of about 20 minutes. The first counselling session included information on the health consequences of smoking, emphasised the benefits of quitting for both parents and their children, discussed the hazards of

*Hong Kong Med J* 2006;12 (Suppl 2):S28-31

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**Table 1. Smoking status using different outcome indicators among all the 952 participants at 6-month follow-up\***

Quit rates	Control No. (%)	Intervention No. (%)	Adjusted OR (CI) <sup>†</sup>
Self-reported			
7-day point prevalence (main outcome)	51 (10.5)	82 (17.6)	1.8 (1.2-2.6)
24-hour point prevalence	58 (12.0)	91 (20.0)	1.7 (1.2-2.4)
Continuous abstinence	22 (4.6)	30 (6.4)	1.4 (0.8-2.5)
Biochemically validated 7-day point prevalence quit rate			
Exhaled carbon monoxide (CO)	33 (6.8)	44 (9.4)	1.4 (0.9-2.3)
Either CO or spousal proxy <sup>‡</sup> or both	44 (9.1)	55 (11.8)	1.3 (0.8-2.0)
Urine cotinine	34 (7.0)	48 (10.3)	1.5 (1.0-2.4)
Either urine cotinine or spousal proxy or both <sup>§</sup>	44 (9.1)	59 (12.6)	1.4 (1.0-2.2)
Either CO or urine cotinine or both	34 (7.0)	49 (10.5)	1.7 (1.1-2.7)

\* Results are based on intention-to-treat: parents who did not complete the intervention (withdrew/could not be contacted) were considered smokers; those whose status could not be validated were also considered smokers

<sup>†</sup> OR denotes odds ratio, and CI 95% confidence interval; adjusted for unmatched variables (age distribution, number of years smoked, alcohol dependency, and marital status) between intervention and control group

<sup>‡</sup> Self-reported cessation was validated by exhaled CO or spousal proxy; cut-off levels for the CO concentration:  $\leq 8$  ppm=non-current smoker;  $\geq 9$  ppm=current smoker; for spousal proxy, the husband or wife was asked to report their spouse's smoking status in a separate interview

<sup>§</sup> Self-reported cessation was validated by a urine cotinine test (using NicAlert test) or spousal proxy; in the NicAlert test, urine cotinine at level 2 or below (30-100 ng/mL) indicates 'non-smoker'; level 3 or above (100-200 ng/mL) indicates 'smoker'

second-hand smoking, and encouraged the smokers to quit smoking. Stage-matched smoking cessation reading materials were used as self-help materials in the study. A hotline number was available to all the participants in the intervention group.

Follow-up assessment and relapse prevention counselling was carried out at 1, 3, and 6 months after the first contact for the intervention group and at 6 months after the first contact for the control group. All follow-up counselling lasted less than 15 minutes per call.

### Questionnaire

A structured questionnaire modified from the questionnaire used by the Hong Kong Smoking Cessation Health Centre was used. The baseline questionnaire included demographic information, smoking and quitting history, detailed information on the smoker's and their children's health, marital relationships, and alcohol use. The follow-up questionnaire also included reasons for quitting smoking and asked about withdrawal symptoms.

### Main outcome measures

The main outcome at 6-month post-intervention was the self-reported 7-day point prevalence smoking cessation rate. Other 6-month outcome measures included: (a) 24-hour point prevalence quit rate, (b) continuous quit rate, (c) reduction rate, and (d) number of quitting attempts. All analyses were on an intention-to-treat basis.

## Results

### Baseline characteristics of the participants in the randomised controlled trial

Most of the subjects were fathers (84.3%), married (97.7%), currently employed (86.4%), daily smokers (92.4%), and educated at the secondary school level or above (81%). Most subjects (84.3%) had a monthly household income of HK\$10 000 or above. The mean number of cigarettes smoked

per day was 14.5 (standard deviation [SD], 8.9) and the average number of years the subjects had smoked was 19.8 (SD, 7.3). There were no significant differences between the groups except for age distribution, number of years smoked, alcohol dependency level, and marital relationships.

### Quitting outcome

Table 1 shows the various quitting outcomes at the 6-month follow-up. Based on an intention-to-treat analysis, the intervention group had a significantly greater 7-day point prevalence quit rate. The absolute risk reduction was 7.1% (95% confidence interval [CI], 2.70-11.50%). The number needed to treat to get one additional smoker to quit was 14 (9-37). Both the crude and adjusted odds ratio (OR) of quitting was 1.8 (95% CI, 1.2-2.6).

For secondary outcomes, the 24-hour point prevalence quit rate was also significantly greater in the intervention group, but there was no significant difference in the continuous quit rates. The biochemically (either urine cotinine, or exhaled carbon monoxide, or both) validated quit rates were significantly greater in the intervention group (10.5%; 49/467) than the control group (7.0%; 34/485) [ $P < 0.05$ ]. The absolute risk reduction was 3.5% (0.60-7.09%) and number needed to treat was 29 (14-167).

Parents in both the intervention and control group significantly reduced (50%) in their average cigarette consumption, ceased smoking for at least a 24-hour period during the past 6 months, implemented complete restriction of smoking at home, improved levels of restriction at home, and improved readiness to quit smoking.

### Factors associated with successful quitting

The strongest predictors for successful quitting were, being in the action stage at baseline (OR=6.4; 95% CI, 2.0-20.1) and not smoking in the past month (OR=9.6; 95% CI,

**Table 2. Summary of logistic regression model (forward stepwise) to predict successful quitting at 6 month follow-up based on the self-reported 7-day point prevalence\***

Independent variables	Adjusted OR (CI) <sup>†</sup>	P value
Group		
Control group	1	
Intervention group	2.6 (1.6-4.0)	<0.001
Stage of quitting at baseline		
Pre-contemplation stage	1	
Contemplation stage	0.8 (0.4-1.3)	0.32
Preparation stage	0.9 (0.3-2.4)	0.84
Action stage	6.4 (2.0-20.1)	<0.01
Daily cigarette consumption in the past month		
No consumption	9.6 (1.6-58.7)	<0.05
≤10	5.0 (1.5-17.4)	<0.01
11-20	3.0 (0.9-10.5)	0.08
≥21	1	
Child's morning cough		
Frequent morning cough in the past 3 months	4.8 (1.1-20.8)	<0.05
No morning cough	1	
Perceived confidence in quitting		
More confidence in quitting	2.3 (1.4-3.5)	<0.001
Less confidence in quitting	1	

\* Results are based on intention-to-treat: parents who did not complete the intervention (withdrew /could not be contacted) were considered as smokers; up to 5.6% of data were missing for some variables

<sup>†</sup> OR denotes odds ratio, and CI 95% confidence interval; adjusted for unmatched variables (age distribution, number of years smoked, alcohol dependency, and marital status) between intervention and control group at baseline and all the significant variables in the bivariate analysis

1.6-58.7) [Table 2]. Other independent predictors were being randomised to the intervention group, smoking 10 or fewer cigarettes in the past month, perceived confidence in successful quitting, and child's morning cough over the previous 3 months.

## Discussion

This study confirmed earlier studies<sup>5,6</sup> showing that proactive telephone counselling is effective in promoting smoking cessation among parents of young children. The self-reported smoking quit rate of 17.6% was biochemically validated (urine cotinine, or exhaled carbon monoxide, or both) and higher than the reported quit rates of proactive telephone counselling (11.4-14.8%) reported elsewhere.<sup>7</sup> However, the overall point prevalence quit rate of 14% in our study was lower than that found by others<sup>8</sup> providing reactive telephone counselling (20%), as these callers are usually more motivated and call to seek help. Interventions based on proactive calls encounter a more heterogeneous group of smokers with some smokers not prepared to quit or who are less motivated to quit.

Our OR of 1.8 (95% CI, 1.2-2.6) for self-reported quit rates and 1.7 (95% CI, 1.1-2.7) for biochemically validated quit rates are consistent with the aggregate OR (1.56; 95% CI, 1.38-1.77) reported in the meta-analysis of 13 randomised proactive telephone interventions.<sup>9</sup> In another review, proactive telephone counselling as a means of intervention was associated with an estimated OR for quitting of 1.2 (95% CI, 1.1-1.6).<sup>7</sup>

We found five independent predictors of quitting similar to those identified among Chinese clients attending a smoking cessation clinic.<sup>10</sup>

## Limitations

This study has several limitations. First, not all eligible people contacted agreed to participate in the counselling programme thus increasing the risk of participation bias, although once subjects enrolled, the dropout rate and loss to follow-up was relatively low. Second, we tried to limit our counselling to fit the planned timetable (20-30 minutes for the initial counselling and 10-15 minutes for the follow-up). A longer counselling session and more frequent contact may have strengthened the effect of the intervention. However, a more intensive intervention would be resource consuming and might not be practicable. Third, the intervention was given at a time when parents may have been worried about the negative effect of smoking on their child's health and be more likely to follow the counsellor's advice on quitting. Therefore, generalisation of findings from this study to other population groups should be done with caution. Finally, the quit rates reported are based on the follow-up at 6 months. It is not certain what proportion will continue not smoking over a longer period.

## Conclusions

Proactive telephone counselling has been shown to be a useful strategy for promoting smoking cessation to parents of young children. This trial is the first in Hong Kong and Asia to report proactive telephone-based smoking cessation counselling targeting a group who should be more reactive. About 70% of the parents were pre-contemplators and only 5% were in the action stage. As the action stage is the strongest predictor for quitting, a comprehensive tobacco control programme is needed in the community to move more smokers into the action stage, so that individual proactive counselling can have a greater impact.

## Acknowledgements

This study was supported by the Health Care and Promotion Fund (#212918). We thank Dr LM Ho, Department of Community Medicine, The University of Hong Kong, for his support during the statistical analysis and all those parents who participated in the study.

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