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A Smoking Cessation Intervention for Parents of Children Who Are Hospitalized for Respiratory Illness: The Stop Tobacco Outreach Program

Jonathan P. Winickoff, MD, MPH*‡; Valerie J. Hillis‡; Judith S. Palfrey, MD§; James M. Perrin, MD*; and Nancy A. Rigotti, MD‡

ABSTRACT. *Objective.* **Parental smoking is associated with increased rates and severity of childhood respiratory illness. No previous studies have examined child hospitalization as an opportunity for parental smoking cessation. We evaluated the feasibility of implementing a smoking cessation intervention for parents at the time of child hospitalization for respiratory illness.**

Methods. **We performed a prospective cohort study of smoking parents who had a child who was admitted to an academic children's hospital for a respiratory illness between January and April 2000. All enrollees were offered the Stop Tobacco Outreach Program, which includes an initial motivational interview, written materials, nicotine replacement therapy (NRT), telephone counseling, and fax referral to parents' primary clinician. The primary outcome was completion of all 3 counseling sessions. Two-month follow-up outcomes were quit attempts, cessation, NRT use, primary care visits, household smoking prohibition, and satisfaction.**

Results. **A total of 126 smoking parents met eligibility criteria, and 71 (56%) enrolled in the study. Of the 71, 80% completed all counseling sessions and 56% accepted free NRT at the time of enrollment. At the 2-month follow-up, of the 71 initial enrollees, 49% reported having made a quit attempt that lasted at least 24 hours, 21% reported not smoking a cigarette in the last 7 days, 27% reported having used NRT, and 38% had had a visit with their own primary clinician. The proportion of parents who reported rules prohibiting smoking in the house increased (29% vs 71%). Parental rating of the overall usefulness of the program was 4.3 ± 0.9 (1 standard deviation) on the 5-point scale 1 = not at all and 5 = a great extent.**

Conclusions. **This study demonstrates the feasibility of engaging parents in smoking cessation interventions at the time of child hospitalization for respiratory illness. Previous work done in a similar sample of parental smokers has shown extremely low ever-use rates of cessation programs. High rates of acceptance of in-hospital and telephone counseling in this study support the notion of child hospitalization as a teachable moment to address parental smoking.** *Pediatrics* **2003;111:140–145;** ***parent, smoking, tobacco, smoking cessation, respiratory illness, hospitalization.***

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ABBREVIATIONS. ETS, environmental tobacco smoke; STOP, Stop Tobacco Outreach Program; NRT, nicotine replacement therapy; PCP, primary care provider.

Children who are exposed to environmental tobacco smoke (ETS) are at increased risk for asthma, respiratory infections, and premature death.[1–3] Parents who smoke endanger themselves, put children and spouses at risk for adverse health outcomes, and increase the chance that their children will become smokers.[4,5] Parents who smoke 1 pack per day spend approximately $1500/y on cigarettes. This burden can worsen the cycle of poverty for families.[6]

Effective interventions now exist for smokers.[7] One persistent challenge has been finding appropriate and acceptable opportunities to use these interventions for parents who smoke. Previous smoking cessation studies that focused on parents in the outpatient setting have shown small but significant cessation rates compared with controls[8,9] or no effect.[10] Other studies conducted among parental smokers during the postpartum period,[11,12] among parents of children with asthma,[13–15] or in primary care settings[16] to try to reduce child exposure to ETS have shown some success with ETS reduction but not with parental cessation.

Hospitalization of adults creates an opportunity to intervene with smokers.[17–20] We hypothesized that a child's hospitalization might similarly provide an opportunity to influence parental smoking behavior. Previously, we had shown that the majority of parents said that they would be receptive to a program at the time of child hospitalization if one were available.[21] This article describes a prospective cohort study to determine the feasibility and short-term efficacy of delivering smoking cessation intervention to smoking parents in the context of a child's hospitalization for respiratory illness. We also explored whether a parent's readiness to change at baseline would predict either completion of the program or short-term tobacco abstinence. Other outcomes included smoking behavior around the child, attitude about the dangers of child ETS exposure, and parent satisfaction with the program.

METHODS

Sample

We drew our sample from all parents of children who had a respiratory illness and were admitted to Boston Children's Hos-

pital from January 1, 2000, to April 30, 2000. Eligible parents were current smokers who had a child admitted to the medical wards with a respiratory illness, had a telephone at home, and spoke English. We identified potentially eligible parents through daily review of the emergency department log book for the following diagnoses for admitted children: asthma, bronchiolitis, bronchopulmonary dysplasia, cystic fibrosis, pneumonia, or other respiratory illness. We also screened the parents of direct admissions to the medical wards for eligibility and possible inclusion in the study. Within the first 24 hours of hospital admission, a counselor assessed smoking status of parents by interview using the question, "Does either parent smoke cigarettes?"

Intervention

Smoking parents were offered the chance to participate in a free smoking cessation program. The intervention was designed based on pilot work showing that initial counseling in the hospital and follow-up telephone interventions would be acceptable to parents at the time of a child's hospitalization.[21] All parents who met eligibility criteria and agreed to participate received the Stop Tobacco Outreach Program (STOP) intervention. The intervention included an initial 20-minute face-to-face counseling session conducted in the hospital, provision of specialized written materials, 1 week of free nicotine replacement therapy (NRT; gum or patch), 2 follow-up telephone counseling calls, a note faxed to the parent's primary care provider (PCP), and referral to the Massachusetts Smoker's Quitline for ongoing telephone counseling.

The in-hospital counseling session included the techniques of motivational interviewing.[22] The materials provided at the initial interview session were from the STOP library. The library consists of 25 separate 1- to 2-page sheets of information designed to respond to the specific concerns raised by parents during the interview. Each parent received a maximum of 5 sheets from the library on topics that came up during the initial interview, including skills and resources needed to quit. In general, when a parent had a specific concern about smoking, a sheet addressing that concern was provided. Examples of frequently used sheets from the STOP library include "the dangers of secondhand smoke," "smoking cost calculator," "ingredients of cigarettes," and "health benefits of quitting time-line."

Two 15-minute follow-up counseling calls were completed 5 and 10 days after the initial interview by the same counselor who had provided the initial motivational interview. The purpose of these calls was to monitor the participant's progress toward quitting, to conduct an additional brief motivational interview, and to encourage the parent to continue working toward the goal of quitting. After these calls, the counselor encouraged the parent to call the Massachusetts Smoker's Quitline for ongoing counseling.[23]

A note was sent by fax to the parent's PCP. This note described the parent's enrollment in the STOP initiative and asked the provider to schedule an appointment with the parent to discuss his or her smoking. The note indicated the parent's stage of readiness to change and his or her smoking behavior and briefly described the types of messages that are important to reinforce for that stage.[24] The note also described the need to discuss prescription pharmacotherapy with the parent. Parents who lacked a PCP were assigned a doctor who had previously agreed to see study participants. This individual received the information sent to the PCP.

Measures

The primary aim of the study was to test the feasibility of enrolling parental smokers in a cessation program at the time of a child's hospitalization for respiratory illness. The primary outcome was completion of the 3 counseling sessions as assessed from the counselor's records. Secondary outcome measures assessed at 2-month follow-up were whether the parent had made a quit attempt that lasted 24 hours, tobacco abstinence for the past 7 days, smoking behavior around the child, attitudes about the dangers of child ETS exposure, and satisfaction. Baseline measures collected during the initial session before counseling also included gender, age, race, education, smoking history, degree of nicotine dependence, readiness to change, smoking behavior around child, and attitudes about the dangers of child ETS exposure. The reliability and validity of the measures used in this study to assess nicotine dependence and readiness to change are well established and have been described previously.[24,25] We used 4 questions to determine smoking behaviors around the child. The question about rules asks whether the parent has rules about nobody smoking in the house and was adapted from previously validated items used in a large cancer control trial in the United States, the Working Well Trial.[26] The 3 questions about reported ETS exposure of children also have not been validated. However, substantial agreement has been found between reported maternal recollection of ETS exposure over the past week and a biochemical indicator of passive smoking.[27] The 1-month time period for parental recall used here was also used in a large ETS reduction study to assess tobacco control practices over this longer time period.[16] We are not aware of any reliability and validity testing for questions that use a 1-month recall period. The questions to assess attitudes about parental ETS exposure were adapted from a set of questions originally used in a previous study to assess outcome and efficacy expectations around parental ETS exposure and were tested for reliability only in that context.[28]

At the 2-month follow-up, a research assistant contacted each participant by telephone and completed a scripted interview to assess secondary outcome measures. Participants were considered to be lost to follow-up after 3 failed attempts to contact the subject during a 2-week period.

Data Analysis

SAS 8.0 (SAS, Inc, Cary, NC) was used for all analyses. The primary outcome was the rate of completing the 3 counseling sessions among enrolled parents. Bivariate analyses (χ^2 and Fisher exact test) were used to compare both completion of the program and tobacco abstinence in subgroups of participants categorized by readiness to change and by demographic variables (gender, age category, race, education). For calculations of smoking cessation rates and 24-hour quit attempts, participants who were lost to follow-up were considered to be smokers who did not make a quit attempt. Rates of program component acceptance were calculated. Behavioral outcomes were compared with baseline values using a repeated measures, paired comparison test (McNemar). Means for participant attitudes about child ETS exposure were calculated at baseline and the 2-month follow-up. Scores were not normally distributed; therefore, the nonparametric Wilcoxon sign rank test was used.[29] Mean satisfaction with the program was calculated. The Boston Children's Hospital Committee on Clinical Investigation (Institutional Review Board) reviewed and approved this study.

RESULTS

A total of 126 parent smokers who met study criteria were identified and offered the program. Of these, 71 (56%) consented to the study and enrolled. Table 1 presents characteristics of the 63 children of these 71 enrolled parents. The majority of the children were younger than 5 years. Asthma and bronchiolitis accounted for 72% of the diagnoses. Approximately half had public insurance (51%). Table 2 presents characteristics of the 71 enrolled parents at baseline.

Table 3 presents acceptance of the various program components. Eighty percent of enrollees completed all 3 counseling sessions. Fewer used NRT or saw a PCP during follow-up, and only 7% called the free state quit line. Among the 27% of parents who reported use of NRT during the study, 56% had never used it before.

Baseline characteristics of smokers who were followed for 2 months ($N = 55$) were not significantly different from those who were not followed at 2 months ($N = 16$; all $P > .05$). Thirty-five parents reported having made a quit attempt that lasted 24 hours in the 2 months after enrollment. This is 49% of 71 subjects enrolled and 64% of those reached at 2 months. Fifteen parents reported 7-day abstinence at

TABLE 1. Characteristics of Hospitalized Children With Enrolled Smoking Parent

	Total N = 63 (%)
Female	27 (43)
Male	36 (57)
Age (y; mean ± 1 SD)	4.4 ± 4.5 (range 13 d to 16 y)
<1	18 (29)
1–5	22 (35)
>5	23 (36)
Admitting diagnosis*	
Asthma	25 (40)
Bronchiolitis	20 (32)
Pneumonia	10 (16)
Other†	8 (12)
Insurance status	
Public	32 (51)
Private	30 (48)
Unknown	1 (2)

SD indicates standard deviation.
* Only parents of children with a respiratory diagnosis were eligible to participate in the study.
† Respiratory distress not otherwise specified (5), cystic fibrosis (2), and bronchiectasis (1).

TABLE 2. Characteristics of Enrolled Parent Smokers at Baseline

Characteristic	Baseline N = 71 (%)
Female	54 (76)
Male	17 (24)
Age (mean ± 1 SD)	33 ± 9
18–24	16 (22)
25–35	28 (40)
>35	27 (38)
Education	
Less than high school	17 (24)
High school graduate	31 (44)
Some college or more	23 (32)
Race and ethnicity	
White	44 (62)
Black	11 (15)
Hispanic	14 (20)
Other	2 (3)
Smoking history	
Years smoked (mean ± 1 SD)	15 ± 9
Daily cigarette consumption (mean ± 1 SD)	15 ± 10
First cigarette within 30 min of awakening	31 (44)
Quit attempt in past year (24 h)	48 (68)
Previous use of NRT	23 (32)
Stage of change	
Precontemplation	15 (21)
Contemplation	10 (14)
Preparation	46 (65)
Believes own smoking is related to child's hospitalization	41 (58)

SD indicates standard deviation.

2-month follow-up (21% of all 71 enrolled parents and 27% of parents reached for 2-month follow-up).

Table 4 presents behavior and attitudes at the 2-month follow-up. Fewer parents reported smoking in the home and car at the 2-month follow-up, and more parents reported having rules prohibiting smoking in the house. Parental attitudes about the harms of passive smoke exposure in the home and in the car increased significantly. These significant improvements remained when we analyzed only those parents who continued to smoke.

In bivariate analysis, program completion did not vary by readiness to change or by gender, age, race, and education. However, 2-month tobacco abstinence did vary by the stage of readiness to change; 93% of the 15 quitters were in the preparation stage at baseline, whereas 1 quitter (7%) was in the contemplation stage (P = .02).

At the 2-month follow-up, the majority of parents (77%) thought that the program was useful "a lot" or to "a great extent," whereas another 17% thought that the program was "somewhat" useful. All participants reported that STOP should be offered to parents who smoke at the time of child hospitalization.

DISCUSSION

This study demonstrates the feasibility of implementing a smoking cessation intervention for parents of children who are hospitalized for a respiratory illness. A majority of parents enrolled in the program to address their smoking behavior, and 80% of those who enrolled completed all of the counseling sessions that were offered. Completion of the program did not vary by gender, age, race, education, or stage of change, indicating broad appeal for this approach. Fewer enrolled parents used other components of the program, such as free NRT (27%), making a primary care visit to discuss smoking (38%), or calling a free telephone counseling service (7%). Substantial rates of NRT use and PCP appointments in this study should justify inclusion in future parental cessation programs because of compelling evidence that cessation medications and PCP advice to quit have been shown independently to increase quit rates in adults.[7] A more proactive telephone counseling component might be more successful in getting parents to engage in long-term telephone counseling, which is an effective cessation aid.[7]

The program may have been successful in changing parental smoking behavior. At the 2-month follow-up, half of the parents reported having made a quit attempt that lasted at least 24 hours, and 1 in 5 reported tobacco abstinence. Participants in this study likely exceeded the background quit rate of US smokers (2%–3% per year),[30] but the absence of a control group makes it impossible to be certain that the cessation rates exceed those attainable without a program. In another study, background annual quit rates seemed to be lower for parents (2%–5%) than for smokers in the general population (5%–7%).[31] It is possible that parents with a child hospitalized for a respiratory illness would stop on their own without any intervention. This has not been our experience. The short follow-up period also argues against even a strong secular trend explaining these results. Still, the most likely possibility is that the program had the effect of increasing the likelihood of quitting.

In terms of ETS, the baseline survey results show high rates of child exposure, which have important health implications for hospitalized children with respiratory illness. A majority of parents report smoking inside the home at least some of the time. Half report smoking in the same room as their child in the past month, and one third report smoking in the car with the child present. Parental smoking in the car while the child is present has not been doc-

TABLE 3. Acceptance of Program Components (N = 71; %)

Completed all counseling sessions*	57 (80)
NRT	
Accepted NRT at time of enrollment	40 (56)
Reported use of NRT	19 (27)
PCP referral	
Parent has PCP	59 (83)
Agreed to have letter faxed to PCP	42 (71)
Actually saw PCP by 2-mo follow-up (to discuss smoking)	26 (37)
Parent has no PCP	12 (17)
Agreed to have letter faxed to assigned PCP	8 (11)
Actually saw PCP by 2-mo follow-up (to discuss smoking)	1 (1)
Reported calling the Quitline	5 (7)

* Completion defined as participation in all 3 counseling sessions.

TABLE 4. Parent Smokers' Behavior and Attitudes

	Baseline* (N = 55)	2-Month Follow-up (N = 55)	P Values†
Smoking in home and car (%)			
Ever smokes inside home	33 (60)	8 (15)	<.0001
Smoked in room with child present in the past month	25 (45)	16 (29)	.03
Smoked in car with child present in the past month	17 (31)	3 (5)	.0002
Has rules about nobody smoking in the house	16 (29)	39 (71)	<.0001
Attitudes (mean)			
How much does smoking in car affect health of children (1 = not at all, 5 = great extent)	4.01	4.84	<.0001
How important that you not smoke in same car as child (1 = not at all, 5 = great extent)	4.59	4.77	.25
How much does smoke in household affect child's health (1 = not at all, 5 = great extent)	3.67	4.82	<.0001
How important is it that you not smoke in the same room as child (1 = not at all, 5 = great extent)	4.75	4.88	.34
How much can smoking harm your own health (1 = not at all, 5 = great extent)	4.65	4.88	.004
How much can smoking harm the health of your child (1 = not at all, 5 = great extent)	4.58	4.94	.0002

* This column represents the baseline responses of those parents who were followed at 2 months.
† McNemar repeated measures, paired comparison test used for **"Smoking in home and car."** Wilcoxon sign rank test used for **"Attitudes"** because scores were not normally distributed and small sample size prohibited parametric comparison.

umented previously and may represent a particularly intense ETS exposure. Secondhand smoke exposure of children was a common concern for parents and so was often covered during 1 or more of the counseling sessions. At follow-up, parents reported significantly less ETS exposure of their children and a more than doubling in the number of parents who have rules prohibiting smoking in the house. Farkas et al[32] showed a strong association between presence of household smoking prohibitions and lower adolescent smoking rates, irrespective of parental smoking status. Significant attitude change also occurred in terms of the harms associated with smoking in the car and house. Ceiling effects might explain lack of change for parental attitudes about their own smoking in the house and car when children are present.

This is the first study to provide NRT to smoking parents in a pediatric setting. We reported no adverse events related to using this approach. We received no complaints from PCPs about distribution of this over-the-counter medication to their patients without previous physician consent.

This hospital-based approach may represent a "teachable moment" for parental smokers. More than one third of the parents who were offered the program were in the preparation stage, a higher rate than found in the general smoking population (20%).[33] Several reasons might explain higher parental motivation in this setting. First, the child's hospitalization focuses on the child's health. Our baseline data show that most parents believe that their smoking is bad for their child's health. Second, the child's respiratory illness may make parents worry more about how smoking may harm their child. Baseline data show that 58% believe that their smoking is related to this particular child illness. Third, numerous active and passive messages discourage smoking in the hospital environment, including signs that prohibit smoking in the hospital; an outside designated smoking area that is far away from the hospital wards; and a hospital environment free from ash trays, cigarette butts, and other cues to smoke. Last, almost all parents believe that pediatricians should offer smoking cessation programs to parents in the context of a child's hospitalization. Parents may perceive that addressing smoking is a normal part of the care that the child receives in the hospital. Establishing a clear expectation in the form of this normative belief may enhance intention to change behavior.[34]

This research extends previous work on ETS reduction in the outpatient setting.[8–10,15,35–39] Hovell et al[13] and Emmons et al[16] showed cotinine-confirmed reduction of ETS exposure after mothers were given

in-person and telephone counseling after recruitment from a clinic setting. Others have tried to intervene with new mothers to effect ETS reductions after childbirth with mixed results.[11,40] To date, no published studies demonstrate sustained smoking cessation arising from brief pediatric office interventions,[42] although none have used recommended strategies of both pharmacotherapy and counseling.[7] No previous studies have evaluated the feasibility of implementing a smoking cessation intervention for parents during a child's hospitalization.

In addition to the lack of a control group, this study has other limitations. First, we assessed smoking status by self-report. Self-reported quit rates are accurate in some studies but may not be reliable in situations in which study subjects received substantial interventions.[41] The interview format may have increased the likelihood of socially desirable answers. However, the majority of parents admitted to smoking inside the home, which indicates an opportunity to give socially undesirable answers. This large tertiary care hospital is not representative of all hospitals that care for children, although the low levels of parent education, the racial diversity, and levels of parental nicotine dependence are comparable to other studies.[13,37]

This study demonstrates the feasibility of engaging parents in smoking cessation interventions at the time of child hospitalization for respiratory illness. Previous work done in a similar sample of parental smokers has shown extremely low ever-use rates of cessation programs.[21] High rates of acceptance of in-hospital and telephone counseling support the notion of child hospitalization as a teachable moment to address parental smoking.

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RETINOPATHY OF PREMATURITY (ROP) AND THE DIGITAL FUNDUS CAMERA

"The recent development of contact wide-field digital retinal imaging (eg, RetCam 120) has opened up new opportunities for ROP service. . . captured images, from poorly, fragile infants, requiring urgent assessment, may be transmitted electronically via the Internet and stored on central servers where they are available for local assessment and through telemedicine also to remote expert opinion at any time."

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A Smoking Cessation Intervention for Parents of Children Who Are Hospitalized for Respiratory Illness: The Stop Tobacco Outreach Program
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