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The Pediatric Residency Training on Tobacco Project: Four Year Resident Outcome Findings

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Abstract

Objective—To evaluate the efficacy of a special program for training pediatric residents to address tobacco.

Method—In a study conducted at the New Jersey Medical School, sixteen pediatric residency-training programs in the New York/New Jersey metropolitan area were assigned randomly to either special or standard training conditions. All of the residents were invited to take part in the training. Only second and third-year residents participated in data collection activities (baseline and follow-up tobacco surveys and objective structured clinical examinations [OSCEs]). Baseline data were collected in the spring of 2001, and follow-up data were collected annually through the spring of 2005.

Special training consisted of a hybrid website/CD-ROM training program on tobacco, a seminar series, *companion intervention material*, and *clinic mobilization*. Standard training residents participated in the seminar series and utilized standard educational and self-help material

Results—The percent of residents in special training, but of not those in standard training, who provided *assistance* for modifying environmental tobacco smoke, preventing use, and helping patients and parents stop smoking increased significantly from baseline to year 4 of training, as did the percent who felt prepared to address tobacco. Performance on the OSCEs was consistent with survey outcomes, as special training residents revealed mastery of key interviewing and intervention skills.

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Conclusion—The special training program, with *Solutions for Smoking* as its centerpiece, was found to be effective for training pediatric residents to address tobacco, and it may serve as a model for other programs in the future. Ways of improving the program are discussed.

Keywords

Pediatric resident training; residency training; tobacco; environmental tobacco smoke; cigarette smoking; cessation; prevention

Introduction

Adverse health effects of environmental tobacco smoke (ETS) and tobacco use are of particular concern to pediatricians (DiFranza and Lew, 1996; American Academy of Pediatrics Committee on Substance Abuse [AAP], 2001; Samet, 2001). Twenty-seven percent of children in the United States live in a household with at least one smoker (American Legacy Foundation, 2004), and more than 5000 die each year from tobacco-related exposure (Winickoff, et al., 2005a). Children and adolescents who smoke or use other forms of tobacco face a lifetime of addiction and tobacco-related disease (Pierce and Gilpin, 1996; Heyman, 2000), and of the 322,423 American youths who became regular smokers in 2005, 103,175 will die prematurely (Markel, 2005).

While the American Academy of Pediatrics (1998; 2001; 2005) urges pediatricians to address tobacco, surveys of pediatricians (Hymowitz, 1995; Zapka, et al., 1999; Perez-Stabile, et al., 2001; Bonollo, et al., 2002; Marlarcher, et al., 2002; Tanski, et al., 2003; Kaplan, et al., 2004), residents (Kenney, et al., 1988; Hymowitz, et al., 2004), patients (Alfano, et al., 2002; Sims, et al., 2004; Hymowitz, et al., 2005a), and parents (Frankowski and Secker-Walker, 1994; Sharif, et al., 2003; Winickoff, et al., 2003a; Hymowitz, et al., 2005b) show that many pediatricians are not meeting the tobacco challenge. Like many other physicians, (e.g., Ferketich, et al., 2006), pediatricians are more likely to *ask* about tobacco use and exposure and *advise* change than to provide *assistance* for modifying behavior (cf. Collins, et al., 2007). Missed opportunities to intervene on tobacco in pediatric settings represent a gap in our nation's antismoking armamentarium (Fiore, et al., 2004).

Reasons for not addressing tobacco include lack of time and competing priorities, questions concerning reimbursement and treatment efficacy, and lack of preparation and training (Zapka, et al., 1999). The latter is consistent with calls for training medical students and residents in tobacco prevention and control (Fiore, et al., 2004). A survey of pediatric residency training directors showed that most training programs do not include tobacco in their curriculum (Hymowitz, et al., 2001a), and training directors share the same concerns about addressing tobacco as their colleagues. They also cited lack of resources and faculty with expertise on tobacco as reasons for not including tobacco in their curriculum.

The format for teaching pediatric residents about tobacco also was problematic, typically consisting of lectures and reading material, with little emphasis on small group activities and “how to” training sessions (Hymowitz, et al., 2001a). While *passive* learning approaches are appropriate for providing didactic information, *active* learning, such as modeling, role-playing, and interaction with simulated patients, is better suited for teaching skills necessary for intervention on tobacco and other health behaviors (Ockene, et al., 1988; Williams, et al., 1990; Ockene and Zapka, 2000; Humair and Cornuz, 2003).

When pediatricians and residents receive appropriate training, they become more confident in their ability to intervene on tobacco (Zapka, et al., 1999; Cabana, et al., 2004), more skillful in their approach (Lustig, et al., 2001; Hymowitz, et al., 2006), and more effective in their

impact (Hymowitz, et al., 2001b; Winickoff, et al., 2003b). In view of the need for pediatricians to play a leadership role in the anti-tobacco arena, it is important to develop and evaluate programs for training pediatric residents to address tobacco and to provide resources that may be used by programs throughout the country.

The *Pediatric Residency Training on Tobacco Project*, a 5-year (baseline plus four years of training) multi-site randomized prospective study of the effects of training pediatric residents to address tobacco (Hymowitz, et al., 2004), attempts to fill the current void by providing a distance learning tool and other resources for training residents to intervene on tobacco, demonstrating the efficacy of doing so, and serving as a model for other programs. The *Project* evaluated the efficacy of a special training program that included as its centerpiece, *Solutions for Smoking*, a hybrid CD-ROM/website program on tobacco for pediatric residents. The website provided didactic information, while CD-ROM audio-visual vignettes modeled state-of-the-art interviewing and intervention techniques. Other components of the special training program were a seminar series that included role-playing scenarios, *clinic mobilization*, and *companion intervention material*.

Baseline findings underscored the need for training pediatric residents to address tobacco (Hymowitz, et al., 2004). Few residents reported receiving formal training in tobacco prevention and control, fewer felt prepared to intervene, and most *asked* about tobacco and *advised* change as opposed to providing active *assistance*. Their experience was similar to others' reported in the literature (Hymowitz, 2006). In this paper, we present year 4 outcome data from resident surveys and Objective Structured Clinical Examinations (OSCEs). Subsequent reports will include end-of-study patient and parent reports of resident tobacco intervention practices, changes made in tobacco exposure and use, and the relationship between those changes to resident intervention activities.

Methods

The methods, including recruitment and randomization of training sites, key concepts and theoretical underpinnings, experimental design, intervention, and evaluation, have been described in detail elsewhere (Hymowitz, et al., 2004). We briefly describe key features of the study below.

Subjects

All first, second, and third-year residents in each participating residency-training program (n = 2069 during the four years of training) were invited to take part in program training activities. More than 90% participated. Data collection was confined to second and third-year residents. More than 80% of eligible residents in each of two experimental conditions participated at baseline, a lesser percentage in year 2, and 92% and 71% of the residents in the special and standard training conditions, respectively, participated in year 4 data collection activities (Table 1). Reasons for the differential participation rates in year 4 are unclear. At each standard training site, the demographic profile (race/ethnicity, gender, age) of residents who did not participate in year 4 was similar to those who did.

Design

Sixteen pediatric residency-training sites in New York and New Jersey were recruited and assigned randomly (coin toss) to special or standard training conditions. One site withdrew at the onset following the tragic events of September 11th, and another withdrew at year 3. Only data for the 14 sites that completed the study (8 in special and 6 in standard training) are presented.

Aims and hypotheses

The primary aim of the study was to compare the effects of the special and standard training conditions on resident tobacco-intervention beliefs and practices, as measured by baseline and annual resident tobacco surveys and OSCEs and baseline and end-of-study surveys of patients and parents. Key outcome measures included beliefs about the importance and efficacy of tobacco intervention, preparedness to address tobacco, and intervention skills and practices for ETS management, tobacco use prevention, and cessation. It was anticipated that the percent of special training residents who believed that intervention was efficacious, felt prepared to intervene, and actively helped patients and parents modify their behavior would increase significantly from baseline. We anticipated fewer changes among standard training residents.

Special training

Solutions for Smoking served as the main teaching tool for the special training condition. The website provided didactic material on ETS, tobacco use, prevention, and cessation, as well as intervention and interviewing strategies derived from the “5 A's” model of tobacco intervention (*ask* about tobacco, *advise* change, *assess* readiness for change, *assist* behavior change, and *arrange* follow-up) (Fiore, et al., 2000), the Transtheoretical Model of Behavior Change (Prochaska and Goldstein, 1991), motivational interviewing (Miller and Rollnick, 1991), and pharmacological and behavioral approaches to smoking cessation (Hymowitz, 2005). The CD-ROM contained audiovisual vignettes that modeled clinical encounters between doctors and patients/parents.

Four one-hour seminars/year provided opportunities to introduce the project (new residents arrived each year), distribute and discuss program material, and utilize role-playing scenarios to help residents acquire interviewing and intervention skills. Faculty also utilized CD-ROM vignettes to model doctor-patient interactions. Residents were encouraged to address tobacco in patients and parents seen in continuity clinic, and additional sessions were held with clinic attending physicians, nurses, and staff.

Special training residents also received assistance with *clinic mobilization* and were provided with *companion intervention material*. *Clinic mobilization* included posters, pamphlets, and related material for clinic waiting and examining rooms, audiovisual materials on smoking and ETS for the waiting area, and stickers for marking charts of smokers. *Companion intervention material* consisted of packets of material designed for the modification of ETS in the home and elsewhere, prevention of smoking onset, and cessation of tobacco use.

Standard training

Standard training residents received background reading material, attended the seminar series, and utilized standard educational and behavior change materials to facilitate intervention with patients and parents in continuity clinic. They did not have access to *Solutions for Smoking*, *companion intervention material*, or *clinic mobilization*, and the vignettes were not shown in the seminars.

Tobacco surveys

Prior to randomization of sites to experimental conditions (baseline; spring of 2001), and annually thereafter, second and third-year residents provided informed consent and completed the resident tobacco surveys. Survey content included demographic information, beliefs about the efficacy of tobacco intervention, intervention skills and practices, and preparedness to address tobacco. The survey items required either scaling (e.g., degree of agreement with various statements) or “yes”-“no” responses (e.g., performed various intervention behaviors during the past year). Participation was voluntary, and the surveys were anonymous, ensuring

confidentiality, encouraging candor, and allaying concern that participation in the study might influence their standing in their training programs.

Objective structured clinical examinations (OSCEs)

The OSCEs were conducted at baseline and annually thereafter and served to evaluate resident interviewing and tobacco intervention skills. Trained actors served as standardized patients, and they were blinded with respect to the allocation of sites to training conditions. When the 10-minute OSCE was completed, the actor evaluated the residents on the basis of overall interviewing skills by use of a rating scale (0=poor, 1=fair, 2=good, and 3= very good) and performance of specific intervention practices by use of a checklist. Training procedures assured that each standardized patient used similar criteria for evaluating resident behavior.

Statistical analyses

This report includes data from separate “waves” of second and third-year residents that were collected at baseline and years 2 and 4 of training. Hence, we included subjects who had at least two years of exposure to the training program and avoided overlap between subjects (second-year residents in one year become third-year residents the next). Statistical power for the randomized trial was primarily based on a two group mixed model analysis where residency site is a random effect in the model. Nominal values were used for the Type I and II error rates (i.e., 5% and 20%, respectively; two tailed). Based on 7 residency sites per group and approximately 25 residents per site, an estimated intraclass correlation of .005, and parameter estimates from an earlier study (Hymowitz, et al., 2001b), we were powered to detect a 0.35 difference on the our ordinal rating scales (e.g., beliefs about the effectiveness of pediatric intervention) and a difference of 22 percentage points between groups on dichotomous endpoints (e.g., percent trying to help a patient to quit). Given the relatively low power for cluster models compared to other designs, we also had adequate statistical power for within-groups logistic regression models.

For direct comparisons of the training conditions, statistical models were developed that accounted for the complex nature of the data. Residents were nested within residency sites and residencies served as the unit of randomization. Given that most endpoints in this study were nonGaussian, generalized linear mixed models were developed which adjusted for important resident-level factors (e.g., smoking status, gender, ethnicity) and included residency site as a random factor. Other endpoints were similarly modeled using general linear mixed models. To provide a perspective on the effects of the training program, changes within each of the two study conditions from baseline to the final year of the study were modeled. Year 2 responses are also reported for descriptive purposes. However, statistical comparisons between time-points using a subset of data collected at year 2 are reported elsewhere (Hymowitz, et al., 2006) and are therefore not included in this paper. For dichotomous endpoints, adjusted logistic regression models were conducted. For rating scales (e.g., resident attitudes), proportional odds models were developed. All within-condition analyses controlled for residents' gender, smoking status and ethnic status. Models conducted on OSCE data resulted in raw odds ratios given that resident demographics were not linked to these data for confidentiality purposes. All analyses were conducted using SAS Proc Logistic version 9.2.

Results

Demographic characteristics

Residents in each condition were similar in age and gender, with little variation over time (Table 2). The ethnic composition of residents in special training changed significantly, due largely to a decrease in the percentage of Hispanics at year 4. Approximately 6% of the residents

smoked cigarettes at baseline, while only about 3% smoked in year 4. Few residents used other forms of tobacco.

Program participation

More than 90% of the residents at each site took part in the annual seminar series. About 70% of the residents in special training reported that they reviewed *Solutions for Smoking* in year 4, an increase from year 2 (60%). More residents viewed the audio/visual vignettes (>90%) at years 2 and 4. About 60% of the residents in standard training reported reading some or all of the background material in years 2 and 4 of training.

Beliefs about pediatricians' role

At baseline and years 2 and 4, the residents gave mean ratings of 4.7 to 4.9 on a 5-point Likert scale (1=very much disagree, 5=very much agree) to the following statements: *peditricians have an important role to play in prevention of smoking onset in youths, should ask patients about tobacco use, ask parents if they smoke, encourage parents who smoke to protect young children from ETS, and help adolescents who smoke or use other forms of tobacco to quit.*

The residents were less enthusiastic about helping parents quit, neither endorsing the appropriateness of prescribing medications (ratings of 2.1-2.7) nor of arranging follow-up visits for parents (ratings of 2.9-3.5). In contrast, residents in both conditions agreed that *it is appropriate for peditricians to arrange follow-up when helping patients quit* (similar ratings of 4.3 and 4.1 for residents in each group at baseline and year 4, respectively).

Beliefs about effectiveness of intervention

The residents were skeptical about the efficacy of intervention at baseline (mean ratings ≤ 3.0), but their ratings increased significantly at year 4 (Table 3). The residents in special training rated the efficacy of each intervention significantly higher at Year 4 than residents in standard training (Table 4).

Tobacco intervention

Environmental tobacco smoke (ETS)—The majority of residents in each condition addressed ETS at baseline and continued to do so at comparable levels through year 4 (Table 5). They *asked* about ETS, informed parents/patients about the hazards of ETS, and *advised* patients/parents to create a smoke-free household and not to expose young children to ETS in the home or elsewhere. However, the percent of residents who *assisted* parents to create a smoke-free household and to protect children from ETS increased significantly for special training, but not for standard training, residents at year 4, as did the percent that felt prepared to do so (Table 5). These changes also were apparent at year 2. Residents in each condition also were significantly more likely to utilize educational and behavior change material following training. The difference in the percentages of residents in each group at year 4 who helped parents modify ETS exposure approached statistical significance (60.6% for special training vs. 41.7% for standard training; $F=4.7$, $p=.052$), while the difference in the use of material on how to modify ETS exposure was significant (58.6% for special training vs. 37.5% for standard training; $F=7.1$, $p=.021$).

Prevention—Most residents in each condition reported that they *tried to prevent a young person from starting smoking (or using other forms of tobacco), talked with youth about the dangers of smoking (or using other forms of tobacco), and assessed risk factors for smoking (or other tobacco use) onset*, with little difference between groups or from baseline through year 4 (Table 6). The most prevalent form of assistance was *discussing peer pressure* (Table 6). Fewer residents addressed tobacco advertising or engaged in role-playing, although the

increase from baseline for the latter was statistically significant for special training. Special training residents also revealed a significant increase in *provide material on smoking (tobacco use) prevention*, although the absolute magnitude of endorsement (35.5%) was modest. The percentage of special training residents that indicated that they felt *prepared* or *very prepared* to encourage a young person not to start smoking (or using other forms of tobacco) increased significantly from baseline (51.4%) to year 4 of training (75.2%), and the increase also was apparent at year 2 (80%) (Table 6). For standard training residents, the changes from baseline were not significant.

Cessation—Most residents in each condition *asked* patients and parents about smoking and *advised* cessation, with little or no difference between conditions or from baseline to year 4 (Table 7) (very few patients or parents reported using other forms of tobacco). The percentage of residents in special training, but not of those in standard training, who indicated that they tried to *assist* patients and parents to stop smoking increased significantly from baseline to year 4, and the increase also was apparent at year 2 (Tables 7 and 8). The percentages of special training residents who reported providing educational literature, using self-help quit smoking brochures, encouraging quit dates, and encouraging use of nicotine replacement therapy (NRT) also increased. For standard training residents, only the percent that used self-help quit smoking material increased significantly at year 4 (Table 7).

The percent of special training residents who reported feeling *prepared* or *very prepared* to help patients quit smoking (or use other forms of tobacco) also increased significantly at year 4 (Table 8), and the difference between special and standard training conditions at year 4 was statistically significant (72.6% for special training vs. 45.7% for standard training; $F=8.3$; $p=.014$). The percent of residents in either group who felt *prepared* or *very prepared* to help parents quit did not increase significantly (Table 8).

Objective structured clinical examinations (OSCEs)

Performance on the OSCEs was quite strong for residents in each experimental condition at baseline, as well as years 2 and 4 of training. At each time point, virtually all of the residents took advantage of the clinical opportunity to address ETS and asked about exposure to second hand smoke. Close to 90% asked about household rules on smoking and the number of smokers in the house, 70% asked about previous attempts to limit smoking in the house and elsewhere, and 80% asked about obstacles to creating a smoke-free household. They enquired about ETS in a manner that was respectful and courteous and demonstrated genuine concern and empathy. Residents in special training were significantly more likely than those in standard training at year 4 to use open-ended questions to engage the parent in a discussion about ETS (ratings of 2.04 and 1.76 for special and standard training residents, respectively; $F=21.3$; $p<.005$).

Almost all residents advised the parent to eliminate ETS from the home at year 4, and they related ETS to the child's presenting symptoms. The percentages did not differ significantly from those who participated in the OSCEs at baseline and year 2 of training. The percentage of residents in each condition who assessed the parent's knowledge of the health effects of ETS, engaged the parent in creating an action plan, and arranged follow-up exceeded 90% at each time period.

The percent of special training residents, but not of those in standard training, who assessed readiness for change (80.2%, 87.7%, and 96.6% at baseline, year 2, and year 4, respectively; $OR=6.91$; 95% $CI=2.50-19.12$; $p<.001$) and used take home materials to assist the parent (30.4%, 64.3%, and 78.6% at baseline, year 2, and year 4, respectively; $OR=8.30$; 95% $CI=4.65-14.83$; $p<.001$) increased significantly at year 4. Special training residents were more likely than standard training residents at year 4 to utilize a stage-dependent intervention (92.4% vs. 69.1%; $F=4.78$; $p=.049$), utilize *decision balance* (84.1% vs. 38.1%; $F=5.90$; $p=.0318$), ask

the parent to select a *start date* (25.5% vs. 4.1%; $F = 4.98$; $p = .045$), and discuss the control of ETS in other settings (24.1% vs. 6.2%; $F = 6.99$; $p = .021$). The percent of special and standard training residents endorsing these items did not differ at baseline.

Discussion

The design of the multi-site study was conservative, and agreement between data collected for separate waves of residents at years 2 and 4, as well as between qualitative OSCEs and quantitative surveys, enhanced the confidence one may place in the findings. Residency-training sites served as the unit of analysis, and residents were included in the statistical models regardless of whether they received the treatment (e.g., reviewed *Solutions for Smoking*, attended the seminar series, utilized *companion intervention material*, etc.). Despite this, the efficacy of the special training program was demonstrated.

The percentage of special training residents who reported providing *assistance* for modifying tobacco use and exposure increased significantly from baseline to year 4 of training, as did the percent who felt prepared to intervene. In view of the frequently reported failure of pediatricians and other physicians to go beyond *asking* and *advising* to providing *assistance* for behavior change (Pbert, et al., 2003; Ferketich, et al., 2006), these findings are noteworthy. Increases in the percentages of special training residents who believed in the efficacy of treatment and who felt prepared to actively intervene also are important. They are associated with the likelihood of intervening on tobacco in clinical practice (Cabana, Rand, et al., 2004).

Performance on the OSCEs was consistent with the survey findings. Residents in both training conditions displayed skill and acumen in taking advantage of a clinical opportunity to enquire about ETS, reviewing household rules, and asking about attempts to limit smoking in the home and elsewhere. However, significantly more residents in special training used open-ended questions, assessed readiness for change, used stage-dependent interventions, and asked parents who were ready to make changes to select a *start date*. These findings suggest that special training residents gained a working knowledge of motivational interviewing and behavioral intervention.

While the data underscore the efficacy of the special training program and the importance of preparing future doctors to address tobacco, there is room for improvement. For training purposes, we would have liked to see all of the special training residents offer *assistance* for the management of ETS, prevention, and cessation. Similarly, our use of “yes”-“no” responses to questions about intervention behaviors failed to provide insight into the frequency in which residents intervened on tobacco. While the training program stressed the importance of addressing tobacco in all patients and parents at each and every visit, there is little question that the exigencies of busy clinic settings compromised this goal. The absolute percent of residents that used role-playing to develop resistance skills in youths, encouraged quit dates, and scheduled follow-up support at year 4 also left much to be desired.

At baseline, residents were reluctant to prescribe medications or offer follow-up to parents, and their attitudes did not change during the course of the study. These findings are consistent with recent surveys of parents (Winickoff, et al., 2005) and pediatricians (Collins, et al., 2007). In view of the importance of helping parents quit smoking and the growing role of medication in that process, the propriety of prescribing medications and following parents in clinical settings merits the attention of pediatric policy makers, practitioners, and training directors.

Access to adolescents in continuity clinic also proved problematic. Their attendance was sparse, and opportunities for intervention and follow-up were limited. While some residents rotated through separate adolescent clinics, rotations typically were brief (one month) and not

conducive to long-term intervention and follow-up. The limited access to older adolescents, along with reluctance to use medications with parents, may explain, in part, the modest percentages of residents who reported *assisting* cessation in patients/parents at year 4 (Table 7). In order to increase access to adolescent smokers, it is advisable to consider additional venues, such as emergency rooms, inpatient units, and community settings.

Resident participation left much to be desired. A number of special training residents failed to review *Solutions for Smoking*, although most attended seminars and viewed the audio-visual vignettes. The vignettes could be viewed relatively quickly, while the website was more time consuming. The need to insert and enable external CDs also may have proved cumbersome. *Solutions for Smoking* can be made user-friendlier by incorporating the vignettes directly onto the web and by using animation and “talking heads” to minimize viewing time. It also is likely that resident participation would be greater if the program were a mandatory component of the residency-training curriculum.

Participation of residents in data collection activities also fell short of 100%, raising the question of whether beliefs and practices of residents who did not participate differed from those who did. Our impression is they did not, although the differential participation rates for residents in standard and special training at year 4 remain unexplained. Staff returned to sites on numerous occasions, and it was apparent that the overwhelming majority of residents who were unavailable were genuinely preoccupied with emergency situations, assigned to distant clinics, ill, post-call, on vacation or maternity leave, etc. In the future, the use of web-based questionnaires may enable investigators to *capture* residents who otherwise are unavailable.

Conclusion

Year 4 survey and OSCE data document the positive impact of the special training program. Special training residents revealed statistically significant changes in active *assistance* and preparedness for the management of ETS, prevention of smoking onset, and tobacco use cessation. They demonstrated an increased understanding of concepts derived from motivational interviewing and utilized state-of-the-art approaches to modifying tobacco use and exposure. These findings support the efficacy of the special training program and suggest that *Solutions for Smoking* and other features of the program may serve as valuable resources to other pediatric residency training programs. In view of the fact that physician intervention on tobacco is a cost-effective approach to disease prevention and control (Fiore, et al., 2004), one may argue that formal training in tobacco use prevention and cessation, as well as the management of ETS, should be a mandatory requirement for all pediatric residents.

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Resident data collection participation rates at baseline (2001), year 2 (2003), and year 4 (2005) of the New Jersey Medical School
Pediatric Residency Training on Tobacco Project

Table 1

	Special Training		%	Standard Training		%
	n in program	n participated		n in program	participated	
Baseline	170	142	84	155	137	88
Year 2	164	122	74	146	98	67
Year 4	160	147	92	141	100	71

Table 2
Demographic characteristics of residents who participated in the New Jersey Medical School Pediatric Residency Training on Tobacco
Project: baseline (2001) and year 4 (2005) comparisons

Standard Training Condition				
	Baseline N=135	Year 2 N=95	Year 4 N=99	p values
Resident Age Mean (SD)	32.6 (5.1)	34.6 (5.9)	33.7 (5.7)	0.13
% Female	64.4	54.3	59.3	.444
Ethnicity				
White, non-hispanic	32.6	35.8	27.3	0.07
Black	22.2	16.8	15.2	
Hispanic	5.2	9.5	15.2	
Hispanic Black	3.7	1.1	1.0	
Asian	27.4	30.5	30.3	
Other	8.9	6.3	11.1	
Cigarette use status				
Never	75.0	78.4	78.2	0.56
Former	19.1	20.6	18.8	
Current	5.9	1.0	3.0	
Pipe/Cigar use status				
Never	92.9	80.6	92.9	0.13
Former	7.1	17.3	7.1	
Current	0.0	2.0	0.0	
Snuff/Chew use status				
Never	97.8	100.0	95.9	0.32
Former	1.5	0.0	4.1	
Current	0.7	0.0	0.0	
Special Training Condition				
	Baseline N=140	Year 2 N=118	Year 4 N=136	p value
Resident Age Mean (SD)	32.0 (4.7)	32.2 (4.0)	32.3 (5.1)	0.63
% Female	69.5	62.1	69.1	0.95
Ethnicity				
White, non-hispanic	41.4	41.5	29.9	0.008
Black	5.7	6.8	8.3	
Hispanic	17.1	2.5	7.6	
Hispanic Black	0.0	0.0	1.4	
Asian	27.1	37.3	42.4	
Other	8.6	11.9	10.4	
Cigarette use status				
Never	73.9	76.0	77.3	0.37
Former	19.7	19.8	19.9	
Current	6.3	4.1	2.8	

Standard Training Condition

	Baseline N=135	Year 2 N=95	Year 4 N=99	p values
Pipe/Cigar use status				
Never	85.1	84.0	85.0	0.81
Former	13.5	13.4	14.3	
Current	1.4	1.7	0.7	
Snuff/Chew use status				
Never	96.5	100.0\	98.6	0.40
Former	2.8	0.0	1.4	
Current	0.7	0.0	0.0	

Table 3

Proportional odds models analyses of beliefs about the effectiveness of pediatric intervention on tobacco: baseline (2001) vs. year 4 (2005) comparisons for residents participating in the New Jersey Medical School Residency Training on Tobacco Project.

Standard Training Condition					
	Baseline M (SD) N=137	Year 2 M (SD) N=98	Year 4 M (SD) N=100	OR 95% CI	p value
Effective interventions for preventing smoking onset are available for use in pediatric offices/clinics.	3.0 (1.2)	3.1 (1.0)	3.3 (1.0)	1.61 0.98-2.64	0.06
Effective interventions for modifying ETS in the home and elsewhere are available for use in pediatric offices/clinics.	3.0 (1.1)	3.2 (0.9)	3.2 (1.0)	1.48 0.91-2.42	0.12
Effective interventions for modifying adolescent cigarette smoking are available for use in pediatric offices/clinics	3.0 (1.1)	3.2 (1.0)	3.3 (1.1)	1.64 1.00-2.67	0.05
Effective interventions for modifying adolescent use of smokeless tobacco are available for use in pediatric offices/clinics.	2.8 (1.1)	2.9 (1.1)	3.0 (1.1)	1.42 0.87-2.32	0.16
Effective interventions for modifying adult cigarette smoking and other forms of tobacco are available for use in pediatric offices/clinics.	2.6 (1.2)	2.8 (1.1)	3.1 (1.2)	2.19 1.33-3.59	0.002
Special Training Condition					
	Baseline M (SD) N=142	Year 2 M (SD) N=122	Year 4 M (SD) N=146	OR 95% CI	p value
Effective interventions for preventing smoking onset are available for use in pediatric offices/clinics.	2.9 (1.1)	3.5 (1.0)	3.7 (1.1)	4.03 2.51-6.47	<0.001
Effective interventions for modifying ETS in the home and elsewhere are available for use in pediatric offices/clinics.	3.0 (1.0)	3.5 (1.0)	3.6 (1.1)	3.46 2.17-5.54	<0.001
Effective interventions for modifying adolescent cigarette smoking are available for use in pediatric offices/clinics	2.9 (1.1)	3.4 (1.0)	3.7 (1.1)	4.12 2.55-6.60	<0.001
Effective interventions for modifying adolescent use of smokeless tobacco are available for use in pediatric offices/clinics.	2.7 (1.1)	3.1 (1.1)	3.4 (1.2)	3.05 1.92-4.84	<0.001
Effective interventions for modifying adult cigarette smoking and other forms of tobacco are available for use in pediatric offices/clinics.	2.6 (1.1)	3.1 (1.1)	3.5 (1.2)	4.04 2.51-6.50	<0.001

Note: Models control for gender, current smoking status, and ethnic status
Response scale ranged from "1", very much disagree, to "5", very much agree

Adjusted mixed models analyses of beliefs about the effectiveness of pediatric intervention on tobacco: standard vs. special training comparisons at year 4 (2005) for residents who participated in the New Jersey Medical School *Pediatric Residency Training on Tobacco Project*

	Standard M (SD) N=100	Special M (SD) N=146	F -test P value
Effective interventions for preventing smoking onset are available for use in pediatric offices/clinics.	3.3 (1.0)	3.7 (1.1)	9.6 0.002
Effective interventions for modifying ETS in the home and elsewhere are available for use in pediatric offices/clinics.	3.2 (1.0)	3.6 (1.1)	8.1 0.005
Effective interventions for modifying adolescent cigarette smoking are available for use in pediatric offices/clinics	3.3 (1.1)	3.7 (1.1)	7.9 0.005
Effective interventions for modifying adolescent use of smokeless tobacco are available for use in pediatric offices/clinics.	3.0 (1.1)	3.4 (1.2)	6.4 0.01
Effective interventions for modifying adult cigarette smoking and other forms of tobacco are available for use in pediatric offices/clinics.	3.1 (1.2)	3.5 (1.2)	4.0 0.04

Note: Models control for gender, current smoking status, and ethnic status
Response scale ranged from "1", very much disagree to "5", very much agree

Adjusted generalized linear mixed models analyses of resident intervention for management of ETS: baseline (2001) vs. year 4 (2005) comparisons of residents who participated in the New Jersey Medical School *Pediatric Residency Training on Tobacco Project*

Table 5

Standard Training Condition					
	Baseline % Yes N=134	Year 2 % Yes N=97	Year 4 % Yes N=96	OR 95% CI	p value
During the year, did you speak to a patient/parent about ETS?	97.0 N=134	100.0 N=97	96.0 N=96	0.69 0.17-2.88	0.61
For those responding "YES" to the previous question...					
Did you inform patient/parent about the hazards of ETS?	95.5	96.9	95.8	0.95 0.25-3.56	0.94
Did you provide patient/parent with material on the hazards of ETS?	21.2	37.1	36.5	2.12 1.12-4.03	0.02
Did you advise patient/parent in creating a "Smoke Free Household"?	94.7	88.7	89.6	0.44 0.16-1.22	0.11
Did you assist patient/parent in creating a "Smoke Free Household"?	44.7	41.2	46.9	1.10 0.63-1.94	0.74
Did you advise patient/parent not to expose young children to ETS in the home or elsewhere?	92.4	91.8	85.4	0.48 0.20-1.15	0.10
Did you assist patient/parent in modifying ETS exposure in the home or elsewhere?	42.4	45.4	41.7	0.93 0.52-1.64	0.79
Did you provide patient/parent with material on how to modify ETS exposure in the home or elsewhere?	21.2	38.1	37.5	2.03 1.01-3.87	0.03
How prepared did you feel talking to patients/parents about ETS? % Responding Prepared or Very Prepared	57.8	60.0	53.8	0.98 0.55-1.74	0.94
Special Training Condition					
	Baseline N=140	Year 2 N=122	Year 4 N=144	OR 95% CI	p value
During the year, did you speak to a patient/parent about ETS?	92.1 N=133	92.6 N=113	97.2 N=138	2.59 0.66-10.12	0.17
For those responding "YES" to the previous question...					
Did you inform patient/parent about the hazards of ETS?	97.0	97.3	96.5	0.80 0.21-3.09	0.75
Did you provide patient/parent with material on the hazards of ETS?	14.3	68.5	54.9	8.93 4.66-17.10	<0.001
Did you advise patient/parent in creating a "Smoke Free Household"?	87.2	92.9	87.3	0.97 0.46-2.03	0.93
Did you assist patient/parent in creating a "Smoke Free Household"?	36.8	54.5	51.4	1.81 1.08-3.04	0.02
Did you advise patient/parent not to expose young children to ETS in the home or elsewhere?	88.7	92.9	89.4	1.05 0.45-2.47	0.91
Did you assist patient/parent in modifying ETS exposure in the home or elsewhere?	39.1	60.0	60.6	2.27 1.36-3.79	0.002
Did you provide patient/parent with material on how to modify ETS exposure in the home or elsewhere?	12.0	61.6	58.6	12.09 6.04-24.19	<0.001
How prepared did you feel talking to patients/parents about ETS? % Responding Prepared or Very Prepared	51.9	71.4	71.3	2.65 1.55-4.52	<0.001

Note: Models control for gender, current smoking status, and ethnic status
Response scale for preparedness consisted of very unprepared, unprepared, prepared, very prepared

Adjusted generalized linear mixed models analysis of resident interventions for tobacco use prevention: Baseline (2001) vs. year 4 (2004) comparisons for residents who participated in the New Jersey Medical School *Pediatric Residency Training on Tobacco Project*

Table 6

Standard Training Condition		Baseline % Yes N=132	Year 2 % Yes N= 93 N= 72	Year 4 % Yes N=142	OR 95% CI	p value
During past the year, did you try to prevent a young person from starting smoking (or using other forms of tobacco)?		78.8	77.4	76.8	0.88 0.46-1.67	0.69
<i>If you answered yes to the previous question, did you...</i>						
Assess risk factors for smoking (or other tobacco use) onset		84.9	77.8	75.9	0.58 0.27-1.28	0.18
Talk with the youth about the dangers of smoking (or using other forms of tobacco)		96.2	98.6	83.5	0.23 0.07-0.74	0.01
Address the issue of tobacco advertising		38.7	36.1	49.4	1.58 0.83-2.98	0.16
Discuss peer pressure		91.5	90.3	74.7	0.34 0.14-0.81	0.02
Provide material on smoking (tobacco use) prevention		18.9	26.4	27.8	1.35 0.63-2.92	0.44
Engage in role playing to encourage acquisition of resistance skills		16.0	19.4	22.8	1.21 0.54-2.73	0.64
How prepared did you feel to encourage a young person not to start smoking? % Responding Prepared or Very Prepared		58.1	71.3	60.5	1.40 0.72-2.73	0.31
Special Training Condition		Baseline N= 142	Year 2 N= 121	Year 4 N=142	OR 95% CI	p value
During past the year, did you try to prevent a young person from starting smoking (or using other forms of tobacco)?		74.6	76.9	81.8	1.59 0.86-2.95	0.14
<i>If you answered yes to the previous question, did you...</i>						
Assess risk factors for smoking (or other tobacco use) onset		N=107 74.8	N=80 80.4	N=80 79.0	1.14 1.59-2.21	0.69
Talk with the youth about the dangers of smoking (or using other forms of tobacco)		94.4	97.8	86.3	0.49 0.18-1.32	0.16
Address the issue of tobacco advertising		31.8	42.9	27.4	0.76 0.42-1.40	0.38
Discuss peer pressure		85.0	86.5	79.0	0.71 0.35-1.44	0.34
Provide material on smoking (tobacco use) prevention		8.4	49.4	35.5	6.92 2.89-16.53	<0.001
Engage in role playing to encourage acquisition of resistance skills		14.0	30.1	21.8	2.31 1.04-5.16	0.04
How prepared did you feel to encourage a young person not to start smoking? % Responding Prepared or Very Prepared		51.4	80.0	75.2	3.21 1.76-5.86	<0.001

Note: Models control for gender, current smoking status, and ethnic status

Response scale for preparedness consisted of very unprepared, unprepared, prepared, very prepared

Logistic regression analyses of resident interventions for tobacco use cessation: baseline (2001) vs. year 4 (2005) Comparisons for residents who participated in the New Jersey Medical School *Pediatric Residency Training on Tobacco Project*

Standard Training Condition					
	Baseline % Yes N=137	Year 2 % Yes N=97	Year 4 % Yes N=100	OR 95% CI	p value
During the course of your clinical contact with patients/parents, do you... Ask patients/parents if they smoke or use other forms of tobacco	96.4	92.8	93.9	0.55 0.16-1.90	0.35
Advise patients/parents who smoke or use other forms of tobacco to quit	85.4	82.5	87.9	1.18 0.54-2.58	0.67
Counsel patients/parents who want to quit smoking or using other forms of tobacco	46.0	46.4	47.5	0.98 0.57-1.71	0.95
Assist patients/parents to stop smoking or using other forms of tobacco	38.0	46.4	47.5	1.41 0.80-2.49	0.23
Provide smoking and health (other tobacco use and health) literature and related materials to patients/parents who smoke or use other forms of tobacco	19.7	29.9	32.3	1.65 0.87-3.12	0.13
Provide self help pamphlets and related material to patients/parents who want to quit smoking or using other forms of tobacco	12.4	28.9	27.3	2.40 1.15-5.03	0.02
Encourage patients/parents who want to quit to select a quit date	31.4	39.2	39.4	1.49 0.83-2.66	0.18
Encourage use of nicotine replacement therapy (gum, patch, nasal spray, inhaler) by patients/parents who want to quit smoking or using other forms of tobacco	43.1	44.3	42.4	0.95 0.55-1.66	0.86
Provide follow-up support for patients/parents who are trying to stop smoking or using other forms of tobacco	22.6	24.7	28.3	1.20 0.64-2.24	0.56
Special Training Condition					
	Baseline % Yes N=143	Year 2 % Yes N=121	Year 4 % Yes N=144	OR 95% CI	p value
During the course of your clinical contact with patients/parents, do you... Ask patients/parents if they smoke or use other forms of tobacco	98.6	90.1	95.9	0.34 0.07-1.74	0.18
Advise patients/parents who smoke or use other forms of tobacco to quit	88.1	86.7	90.4	1.25 0.56-2.81	0.59
Counsel patients/parents who want to quit smoking or using other forms of tobacco	38.5	61.4	55.2	2.25 1.41-3.89	0.001
Assist patients/parents to stop smoking or using other forms of tobacco	28.0	49.6	41.1	1.92 1.13-3.27	0.02
Provide smoking and health (other tobacco use and health) literature and related materials to patients/parents who smoke or use other forms of tobacco	7.7	58.6	52.7	12.83 6.08-27.09	<0.001
Provide self help pamphlets and related material to patients/parents who want to quit smoking or using other forms of tobacco	7.0	53.8	45.9	11.13 5.04-24.55	<0.001
Encourage patients/parents who want to quit to select a quit date	35.7	49.6	45.9	1.70 1.02-2.81	0.04
Encourage use of nicotine replacement therapy (gum, patch, nasal spray, inhaler) by patients/parents who want to quit smoking or using other forms of tobacco	43.4	56.0	55.2	1.72 1.04-2.84	0.03
Provide follow-up support for patients/parents who are trying to stop smoking or using other forms of tobacco	21.7	42.0	30.8	1.56 0.88-2.78	0.13

Note: Models control for gender, current smoking status, and ethnic status
Response scale for preparedness consisted of very unprepared, unprepared, prepared, very prepared

Logistic regression analyses of resident preparedness for cessation intervention: baseline (2001) vs. year 4 (2005) Comparisons for residents who participated in the New Jersey Medical School *Pediatric Residency Training on Tobacco Project*

Table 8

	Baseline % Yes	Year 2 % Yes	Year 4 % Yes	OR 95% CI	p value
Standard Training Condition					
During the past year, did you try to help a PATIENT stop smoking?	58.5 N=135	67.7 N=96	67.0 N=100	1.58 0.90-2.79	0.11
How prepared did you feel helping a PATIENT stop smoking? % Responding Prepared/Very Prepared	54.2 N=83	59.1 N=71	45.7 N=64	0.78 0.39-1.57	0.49
During the past year, did you try to help a PARENT stop smoking?	47.4 N=137	62.5 N=96	55.0 N=100	1.26 0.73-2.18	0.40
How prepared did you feel helping a PARENT stop smoking? % Responding Prepared/Very Prepared	58.8 N=68	53.8 N=67	56.3 N=70	0.97 0.45-2.10	0.94
Special Training Condition					
During the past year, did you try to help a PATIENT stop smoking?	44.8 N=143	59.0 N=122	61.2 N=147	2.08 1.25-3.45	0.005
How prepared did you feel to help a PATIENT stop smoking?	50.8 N=65	69.2 N=81	72.6 N=104	2.09 1.03-4.42	0.04
During the past year, did you try to help a PARENT stop smoking?	42.0 N=143	61.2 N=121	66.0 N=147	2.54 1.52-4.23	<0.001
How prepared did you feel to help a PARENT stop smoking?	55.1 N=69	61.9 N=84	67.3 N=95	1.83 0.94-3.58	0.08

Note: Models control for gender, current smoking status, and ethnic status

Response scale for preparedness consisted of very unprepared, unprepared, prepared, very prepared