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Motivating Parents of Kids with Asthma to Quit Smoking: The Effect of the Teachable Moment and Increasing Intervention Intensity Using a Longitudinal Randomized Trial Design

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Abstract

Aims—We tested two aims: 1) The Teachable Moment (TM): whether second hand smoke exposure (SHSe) feedback motivates cessation in parents of children with asthma vs. parents of healthy children (HC) and 2) whether greater intervention intensity (Enhanced-PAM) produces greater cessation than a previously tested intervention (Precaution Adoption Model; PAM).

Design and interventions—Aim 1: Two home visits (asthma education or child wellness), and cessation induction using Motivational Interviewing and SHSe feedback. Aim 2: Post home-visits, parents with asthmatic children were randomized to PAM (n=171; 6 asthma education calls) or Enhanced-PAM (n=170; 6 asthma education/smoking cessation calls + repeat SHSe feedback).

Setting—Rhode Island USA.

Participants—Parents of asthmatic (n=341) or healthy (n=219) children who did not have to want to quit smoking to enroll.

Measurements—were given at baseline, 2, 4, 6 and 12 months. Abstinence was bioverified. Outcomes were 7-day and 30-day ppa, and SHSe (primary) and asthma morbidity (secondary).

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Clinical Trial Registration # NCT00862368

Findings—Aim 1: The TM was supported: parents of asthmatic children were more than twice as likely to achieve 30-day (OR=2.60, 95% CI = 1.22–5.54) and 7-day ppa (OR=2.26, 95% CI=1.13–4.51) at 2 months (primary endpoint) and have non-detectable levels of SHSe than HCs. Greater treatment intensity yielded stronger TM effects (OR=3.60; 95% CI= 1.72–7.55). Aim 2: Enhanced-PAM was more likely to achieve 30-day ppa at the primary endpoint, 4-months (OR=2.12, 95% CI 1.09–4.12) and improved asthma outcomes vs. PAM.

Conclusions—Smoking cessation interventions (Motivational Interviewing + biomarker feedback) appear to motivate smoking cessation more strongly among parents of asthmatic children than among parents of healthy children. Increased intervention intensity yields greater smoking cessation among parents of asthmatic children and better asthma outcomes.

Keywords

Motivational Interviewing; secondhand smoke; smoking cessation; teachable moment

Secondhand Smoke Exposure (SHSe) increases the risk for asthma (1, 2). Over 40% of children are exposed to SHSe (3). Interventions focus on SHSe reduction alone (4–8), motivating parental smoking cessation (9, 10), or both approaches (11, 12). Addressing only SHSe increases the likelihood that parents remain smokers, reduces the likelihood that SHSe reduction is sustained, and increases the risk that children will smoke (13–15). The combination of SHSe reduction and smoking cessation may be overwhelming to parents (11) and has been shown to be less effective than interventions focusing primarily on parental smoking cessation (16).

Our previous studies focused on primarily motivating cessation in parents. Parents of children with asthma who, in addition to receiving home-based asthma education, were randomized to receive the Precaution Adoption Model intervention (PAM; Motivational Interviewing to deliver feedback on child's SHSe and smokers' Carbon Monoxide level, and cessation induction strategies) or the Behavioral Action Model intervention goal setting and cessation strategies) matched on dose and intensity. We hypothesized that SHSe feedback would help parents link their smoking to their child's asthma, based on findings that parents are unlikely to spontaneously make this connection (17, 18). PAM achieved higher quit rates (19, 20) and showed promising effects on children's asthma morbidity (19, 21), but effects were not sustained (20). One goal of the present study was to test whether the outcomes achieved by PAM could be enhanced by increasing intervention dose (additional counseling calls), intervention intensity (repeat SHSe feedback), and timing the intervention in close temporal proximity to the child's asthma exacerbation to capitalize on the 'teachable moment.'

Teachable moments (TM) are naturally occurring life transitions or health events that have the potential to motivate health behavior change because of greater receptivity to health risk messages during periods of heightened health awareness (22). Prior studies have timed their interventions to coincide with the TM (23, 24), but none have dismantled the effects of their interventions from the effects of the TM. For example, in our own studies, we could not ascertain whether the effects of PAM were the result of intervention content or specific to the target population (having a child with asthma). A comparison group of parents who receive

PAM but who are not undergoing a TM (e.g., parents of healthy children) would help answer this question. Further, the PAM intervention may be especially suitable for delivery during a TM because of the focus on building motivation to quit smoking (through Motivational Interviewing) and increasing perception of risk to the child (through SHSe feedback) among smokers not actively seeking treatment or unmotivated to quit smoking.

Most prior studies include only smokers who are motivated to quit smoking. Because nearly 30% of smokers are not motivated to quit (25), studies that exclude them may suffer from recruitment biases (16). In our prior studies, smokers did not have to want to quit smoking to enroll; they simply needed to be willing to discuss their smoking during pediatric asthma care (19, 20). This resulted in > 40% of our samples not motivated to quit smoking upon study entry. Thus, we utilized asthma education as a 'foot in the door' to discuss the risks of smoking on their child's asthma and on their own health.

The current study also enrolled all smokers, regardless of motivation to quit smoking. We hypothesized that providing an intervention to parents after a TM (e.g., child's acute asthma exacerbation) would motivate smoking cessation and SHSe reduction to a greater extent than those not experiencing a TM (i.e., parents of healthy children). We also hypothesized that, among the parents of children with asthma, that an intervention that added telephone counseling and repeated SHSe feedback (Enhanced-PAM) would outperform our previously tested intervention (PAM) in terms of greater cessation, lower SHSe, and improved asthma morbidity. We hypothesized that Enhanced-PAM would achieve the best outcomes in both aims.

Methods

Participants

Parents of children with asthma were recruited from Emergency Departments and urgent care. Parents of healthy children (HCs) were recruited from the community. Participants were recruited in Rhode Island, USA and were eligible if they: 1) were primary caregivers ≥18 years old (i.e., person who spends the most time with the child, ≥ 4 hours per week), 2) have a child 3–17 years old, 3) smoked ≥ 3 cigarettes/day for the past year and ≥100 cigarettes in their lifetime, 3) were not pregnant or planning pregnancy, 4) spoke English, 5) had a telephone, and 6) were not currently in smoking cessation treatment. Parents who had children with other pulmonary disease (e.g., cystic fibrosis) were excluded.

HCs had children with no asthma diagnosis or other chronic respiratory (e.g., cystic fibrosis) or cardiac (e.g., congenital heart disease) condition, and no past year hospitalizations for serious acute respiratory illness. Children with >4 ARI episodes or chronic or persistent ARI (e.g. chronic allergic rhino-sinusitis or chronic otitis media) were excluded; those with outpatient treatment for sub-acute respiratory illness (ARI) were not excluded.

Prospective participants were told that they would be required to accept health education visits in their home (asthma for parents of children with asthma or child wellness for HCs) and discuss their smoking (although they did not have to want to quit). If they decided to quit, they were offered 8 weeks of nicotine patches at no cost. The study was conducted

from 2007–2013 and received ethical approval from The Miriam Hospital's Human Subjects Review Board.

Procedure

All participants received: 1) two, 1-hour educational home visits (asthma if their child had asthma or wellness if HC) and smoking cessation induction counseling, 2) nicotine patches if medically eligible and ready to quit within 30 days, and 3) six, 15-minute calls for four months after the home visits. Randomization of asthma participants to PAM or PAM-Enhanced occurred after the second home visit (Figure 1).

Home Visits (for Aim 1; Teachable Moment)—Parents of children with asthma received NIH guideline-based asthma education (26). HCs received child wellness counseling (nutrition, physical activity, managing stress, child development, and safety). All participants received identical smoking cessation induction counseling using Motivational Interviewing (27), which included communication strategies (e.g., open-ended questions, reflections, evocation, autonomy promotion) and motivational techniques (costs/benefits of quitting, elicit-provide-elicit, typical day, barriers/facilitators of motivation and confidence, resolving ambivalence, and values clarification (28)(29, 30). Verbal and graphical feedback was provided regarding their 1) Carbon Monoxide level, associated symptoms, and how quitting could attenuate disease risk and symptoms and 2) child's SHSe based on objective measurements obtained by passive dosimetry: "Your child breathed in as much smoke as if s(he) smoked 'X' number of cigarettes last week." Feedback on SHSe in their home versus non-smokers' homes was also provided. The risks of smoking on their child's asthma and how risks could be attenuated by quitting smoking/SHSe reduction was discussed.

Randomization and Telephone Counseling (for Aim 2; Intervention Intensity)—After the home visits, parents of children with asthma were randomized by a data manager to PAM or Enhanced-PAM using an urn randomization procedure (31, 32), which generated the code to create the allocation sequence; condition was conveyed to counselors via Microsoft Access and could not be accessed by staff.

Both PAM and Enhanced-PAM received six, 15–20 minute calls regarding asthma symptoms and management, for four months after the home visits. Enhanced-PAM additionally received smoking cessation (Motivational Interviewing; evocation of change talk; building readiness/confidence for change, values clarification) and a second round of SHSe feedback (to compare their child's current levels SHSe with those obtained during the home visits). HC's received six, 15–20 minute counseling calls focused on child wellness for four months after the home visits; smoking cessation was not discussed. The number, duration, and timing of follow-up phone calls were identical for all groups.

Treatment Fidelity

We followed best practice guidelines for treatment fidelity (33). Trainers were licensed Clinical Psychologists, one certified in Motivational Interviewing and the other in Asthma Education. Counselors had graduate-level degrees and were trained using didactics, role-plays, and video. Skill acquisition was determined by intervention delivery with pilot

participants. Counselors were guided by a written treatment protocol, sessions were audiotaped, and a random 20% were reviewed weekly with counselors. Sessions were coded using the Motivational Interviewing Treatment Integrity coding system (version 3.1.1) by three coders (blind to condition and outcomes) who completed 40 hours of training (e.g., coding standardized transcripts).

Primary Outcome Measures

Participants received $20.00 per completed questionnaire given at baseline and 2, 4, 6 and 12 months by staff who were blind to treatment condition.

Smoking Status. Expired air carbon monoxide testing (Bedfont, Carbon Monoxide Ecolyzer) was used to bioverify self-reported abstinence (≤ 9 parts per million (ppm) = abstinence) at all follow-ups; readings > 9ppm were recoded as 'smoking' (6–18 participants at each time point; no significant differences by group). We defined 'continuous abstinence' as self-report of no smoking since the previous contact; 'seven-day point prevalence abstinence' (7-day ppa) as no smoking in the past 7 days, and '30-day point prevalence abstinence' (30-day ppa) as no smoking in the past 30 days (34); the latter two measures were our primary outcomes. The Fagerstrom Test for Nicotine Dependence (35) measured nicotine dependence.

Second Hand Smoke Exposure (SHSe) Second Hand Smoke Exposure (SHSe) was objectively measured with two passive nicotine monitors (dosimetry) placed for one week during each of the two measurement periods (baseline and after call 5), one in the room in which the child spent the most time and one worn by the child. The monitors use nicotine as a tracer for ambient SHSe, accurately detect nicotine (36–38) and were analyzed by gas chromatography. The limit of detection is 0.005 μg per sample, or 0.02 μg /m3 for weekly samples. Blank filters were collected throughout the study; all were < 0.005 μg (limit of detection). SHSe outcomes were calculated as a dichotomous variable (Non-detectable <.02 μg/m3 vs. detectable >= .02 μg/m3). To generate 'cigarette equivalents" used in the SHSe feedback, the nicotine concentration of the child sampler was used together with the normal breathing rates of children, the side-stream emissions of nicotine, and the ratio of side-stream to mainstream emissions of N-nitrosodimethylamine (NDMA), a potent carcinogen, to calculate the equivalent number of cigarettes that one would have to smoke to have the same intake of NDMA as the passive exposure experienced by the child that week: cigarette equivalents = [nicotine] * volume air breathed * SS(NDMA)/MS(NDMA) / SS(nicotine) (39). Participants received $10.00 for returning the monitors in good condition.

Parent-reported SHSe was assessed by structured interview designed to evoke reliable memory-based reports of smoking during the past 7 days (40, 41). Questions assess the total, average, least, and greatest number of cigarettes smoked in the home, car, and away from home, by both the participant and others. Point estimates of the typical smoking rate (by participants and household members) and boundary estimates (average, least and greatest amount of cigarettes smoked during one week) were computed. Higher scores indicate greater SHSe.

Secondary Outcome Measures

Asthma Morbidity was assessed by the number of asthma-related hospitalizations, school days missed due to asthma, and days with asthma symptoms, in addition to the Asthma Functional Morbidity Scale (alpha = .72; (42, 43)).

Program Satisfaction was assessed with three items (scored on a 1 – 5 scale, not at all to very much) regarding the helpfulness of the counselors and program satisfaction.

Analytic Plan

Analyses used SAS 9.3. Analysis of variance (ANOVA) and chi-squares assessed baseline differences. Previous trial data was used to power the study. We estimated that we needed 145 participants per arm to detect ≥ 10 percentage point difference between groups for Aim 1, and ≥13 percentage point difference between groups for Aim 2. Therefore, this study was sufficiently powered. Intent to treat was used for cessation outcomes and analyzed with GEE (with robust standard errors). Final models adjusted for child and parent age, cigarettes/day and motivation to quit. We compared the results assuming missing=smoking to results using multiple imputation for missing smoking outcomes using variables at prior assessments (smoking status, motivation, asthma morbidity) and baseline (cigarettes/day and education) as predictors of missingness. There were no significant differences between models, so missing=smoking analyses are reported. We examined differences in SHSe using longitudinal mixed effect modeling and likelihood estimation adjusting for baseline SHSe, number household smokers, household ban, and parent and child age. Log transformed results did not significantly differ from untransformed results, so the latter are presented. We controlled for season due to possible effects on asthma, but it was removed because it did not add to model fit or impact estimates. Logistic regression estimated the effects of group on the probability of non-detectable levels of objective SHSe at follow-up (<.02). Mixed effects models with random intercepts assessed between group differences over time in asthma morbidity. Longitudinal models (GEEs for binary outcomes and mixed effects models for continuous outcomes) assessed between group differences in the probability of hospitalization for asthma, missing ≥ least one day of school for asthma and number of symptoms.

Results

Participants (n=560) smoked an average of 15 cigarettes/day, had a mean nicotine dependence score of 4.53 (SD=2.35), 40% were not ready to quit, 18% never tried to quit, 46% lived with another smoker, and 55% had a household smoking ban. Over half were raising children on their own, most reported low household income, and 30% had < high school education (Table 1). The children (mean age = 6.18 years, SD=5.02) had mild to moderate asthma functional impairment. See Figure 1 for study flow.

There were no significant baseline demographic differences between Enhanced-PAM and PAM, but there were differences between these groups and HC (Table 1). Rates of Carbon Monoxide bioverification were high (2 months: 92.9%; 4 months: 95.9%; 6 months: 98.7%; 12 months: 85.6%) and > 98% of the dosimeters were analyzed. There were no significant

group differences on counseling call completion (Call 1: 96.6%; Call 2: 88.2%, Call 3: 79.9%, Call 4: 71.7%, Call 5: 78.1%, Call 6: 80.4%), assessment completion (2 month: 87.9%; 4 month: 84.7%; 6 month: 86.3%; 12 month: 85.2%), or percent who reported nicotine patch use since study entry (2 months: 56.8%; 4 months: 58.8%; 6 months: 57.2%; 12 months: 55.0%).

Motivational Interviewing Adherence

Sixty audiotapes were coded, 20 randomly chosen from each group. Coders had good reliability (Global Spirit, ICC = .61 and Empathy, ICC = .67; Reflection to Question Ratio ICC = .87, Percent Open Ended Questions ICC = .75, Percent Adherent ICC = .64) with one exception (Percent Complex Reflections ICC = .38). For the counselors, the average ratings of Spirit (3.63/5), Empathy (3.65/5), and Percent Complex Reflections (M=.45) exceeded proficiency thresholds. Several indicators approached proficiency (Reflection to Question Ratio = .91, Proficiency = 1; Percent Open Ended Questions = .49, Proficiency = .50) except one (Percent Adherent = .71, proficiency = .90). There were no significant group differences on Motivational Interviewing indicators.

Teachable Moment Analyses

Smoking cessation (Table 2)—We hypothesized that parents of asthmatic children who were randomized to PAM would achieve greater 30- and 7 day ppa than HC at our primary outcome point for the TM hypothesis (2-months follow-up). We compared PAM with HC because both received the same number and type of contacts, varying only on whether or not their child had asthma. PAM was more than twice as likely to achieve 30-day ppa (12.9%) than HC (5.0%) (OR=2.60, 95% CI = 1.22–5.54; Table 2) and were also more than twice as likely to achieve 7 day ppa (14.6%) than HC (6.39%; OR=2.26, 95% CI: 1.13–4.51).

While the above comparison is the most direct test of the TM (the groups varied only on whether or not the child had asthma), we wanted to examine differences between Enhanced PAM and HC to determine the effect of receiving a greater dose of treatment *and* having a child with asthma. Enhanced-PAM was more than twice as likely to achieve 7 day PPA (OR=2.88, 95% CI=1.45–5.69) and more than three times as likely to achieve 30-day ppa (OR=3.60; 95% CI= 1.72–7.55) than HCs at the primary outcome point, after covariate adjustment. In addition, Enhanced-PAM was and over five times as likely to be continuously abstinent (OR=5.58, 95% CI = 2.08–14.96) than HCs at the primary outcome point.

Self-reported SHSe—After covariate adjustment, PAM had significant reductions over time on one SHSe variable, while HC had reductions on four out of the five SHSe variables, with a significant group × time interaction (Table 3). Enhanced-PAM showed significant within-group decreases in SHSe over time on all five variables and HC showed significant within group decreases in SHSe over time on four of the five variables. There was a group × time effect, such that Enhanced-PAM showed greater decreases in SHSe over time vs. HC for three of the five SHSe variables (Table 3).

Objective SHSe—At baseline, 95.1% of the home monitors (93.6% of PAM and 96.4% of HC) and 94.3% of the child monitors (92.3% of PAM and 95.9% of HC) had detectable

levels of SHSe with no significant group differences. At follow-up, there were significant group differences in detectable levels of SHSe in the home monitors (PAM 92.1% vs. HC 97.2%, χ^2 (df=1)=4.39, p=.04) but not the child monitors (PAM 91.4% vs. HC 95.6%). After adjusting for covariates, there were significant between-group differences in the home monitors, which parallel unadjusted effects (OR=0.68, 95% CI: .25–0.93).

Comparison between Enhanced-PAM vs. PAM

Smoking cessation outcomes (Table 2)—At the primary endpoint (4 months), Enhanced-PAM were more than twice as likely to achieve 30-day ppa vs. PAM (OR=2.12; 95% CI 1.09–4.12).

Self-reported SHSe—Longitudinal mixed effects models revealed that Enhanced-PAM achieved significant reductions of SHSe over time, across all five SHSe variables, after covariate adjustment (Table 3). PAM showed significant SHSe reduction over time on only one SHSe variable. The Group × Time interaction was not significant.

Objective SHSe—At baseline, 93.8% of home monitors (Enhanced-PAM=94.1%, PAM= 93.6%) and 92.3% of child monitors (Enhanced-PAM=92.3%; PAM=92.3%) had detectable levels of SHSe with no significant between group differences. At follow-up, there were no significant between group differences in detectable levels of SHSe in either the home (Enhanced-PAM=88.8% vs. PAM=92.1%) or child monitors (Enhanced-PAM=89.5% vs. PAM=91.4%).

Secondary Outcomes: Asthma Morbidity—At 6 months, Enhanced-PAM had an 81% lower odds of a child asthma hospitalization vs. PAM (OR=0.19, 95% CI: .04–.89). The odds of missed school due to asthma was lower for Enhanced-PAM vs. PAM at 2 months (OR=.52, 95% CI: .26–1.00), 4 months (OR=.48, 95% CI: .24–.95) and 6 month follow-ups (OR=.48, 95% CI: .24–.98). The odds of at least one day with asthma symptoms was lower among Enhanced-PAM vs PAM (OR=.61, 95% CI: .39–.96) at the 6 month follow-up. There were no significant between-group differences in changes in asthma functional morbidity, with both groups decreasing over time (b=−0.07, SE=.004, p<.01).

Program Satisfaction—The percent who gave ratings of ≥4 were: 75.4% (helpfulness of speaking with the counselor about smoking) and 85.0% (how helpful program would be to other parents), with no significant group differences. In terms of satisfaction with care provided by the counselor, 88.6% give ratings ≥4, with the PAM reporting less satisfaction than HC (83.1% vs. 92,1%, χ2(1)=6.45, p=0.01).

Discussion

Despite a reduction in overall smoking prevalence, parental smoking and pediatric SHSe remain high, particularly among minority and low income families with children with asthma (44). The first aim of our study was to assess whether providing an intervention after a TM (e.g., child's acute asthma exacerbation) motivates parental smoking cessation and SHSe reduction more than one provided to parents of children who did not experience a TM. This hypothesis was supported; the intervention provided to the parents of children with

asthma who were randomized to PAM was more than twice as likely to produce 30-and 7-day ppa vs. the same treatment provided to the parents of healthy children. Stronger effects were found among parents of children with asthma who were randomized to receive a more intense intervention (Enhanced-PAM). Our previous studies have shown that SHSe feedback results in higher quit rates, but it was unclear if the effect was due to the intervention, or linked to the fact that the intervention was presented during a TM. Our results suggest that SHSe feedback is potentiated within the context of a TM, resulting in greater cessation. To our knowledge, no previous studies have tested the prospective effect of the TM on smoking cessation.

Our second aim was to test whether the effectiveness of two in-home counseling visits that included SHSe feedback (PAM) could be improved with the addition of six counseling calls and repeated SHSe feedback (Enhanced-PAM). Enhanced PAM achieved significantly greater cessation at the primary outcome point vs. PAM. Although Enhanced PAM achieved greater cessation rates than PAM at subsequent time points, differences were not significant. It is interesting that the two groups were not significantly different before Enhanced-PAM received the extra feedback (2 months) and that the effect of the feedback was not sustained beyond the four-months. This could be because PAM was a strong contact control in that they did receive one round of SHSe feedback and their phone calls were not a ‘sham’ (i.e., focused on asthma education). The PAM calls could have continued to raise awareness of the effect of smoking on asthma even though smoking was not discussed. We did not feel that it would be ethical to have a ‘sham’ condition given that children with asthma were enrolled in the study because they had a recent asthma exacerbation necessitating urgent care. Therefore, we believed that ‘minimal’ treatment would involve continued asthma education.

Feedback on SHSe has been shown to be effective in other studies (10, 19, 46), but to our knowledge, ours is the first to provide repeated SHSe feedback to allow for affirmation for those who have made changes and a motivational “boost” for those who have not. Enhanced-PAM also showed significant reductions in SHSe and in asthma health care utilization and school attendance vs. PAM, but not on a measure of asthma functional morbidity. Future research should investigate ways of increasing the sustainability of the TM effect and identifying its mechanisms. Our results also underscore the need to develop novel interventions to motivate cessation in parents of healthy children, including strategies to increase parental risk perception. Indeed, one study has shown that parents are more than four times likely to quit smoking if they believe that quitting will benefit their children’s health (18). Ongoing research using multi-level designs to eliminate SHSe show promise (47, 48).

One limitation of our study is the inclusion of some components that might not be feasible for routine clinical care (e.g., feedback on SHSe). However, portable methods are currently under development (49). Another limitation is that the half-life of Carbon Monoxide is 4–6 hours, so that 7-and 30-day ppa cannot be verified beyond that time frame.

Despite these limitations, our study is unique in 1) using Motivational Interviewing to motivate smoking cessation among parents who are not necessarily motivated to quit and

have a child with asthma, 2) using Motivational Interviewing to provide repeated SHSe feedback, and 3) conducting prospective assessments of the effect of providing an intervention during a TM. We were able to reach a large population of smokers who were not motivated to quit because our study employed a 'foot in the door' approach (e,g, providing families with asthma education or child wellness and integrating smoking cessation into these educational approaches). Our population had a high prevalence of risk factors that are typically associated with difficulty quitting smoking (e.g. low education, low income, single mothers). Despite these factors, we achieved quit rates that were two-five-fold times greater than spontaneous quit rates (45). Our results show that Motivational Interviewing for smoking cessation can be delivered during asthma education to increase smoking cessation, that this integrated intervention reduces SHSe and asthma care utilization, and that these effects may be potentiated by the TM.

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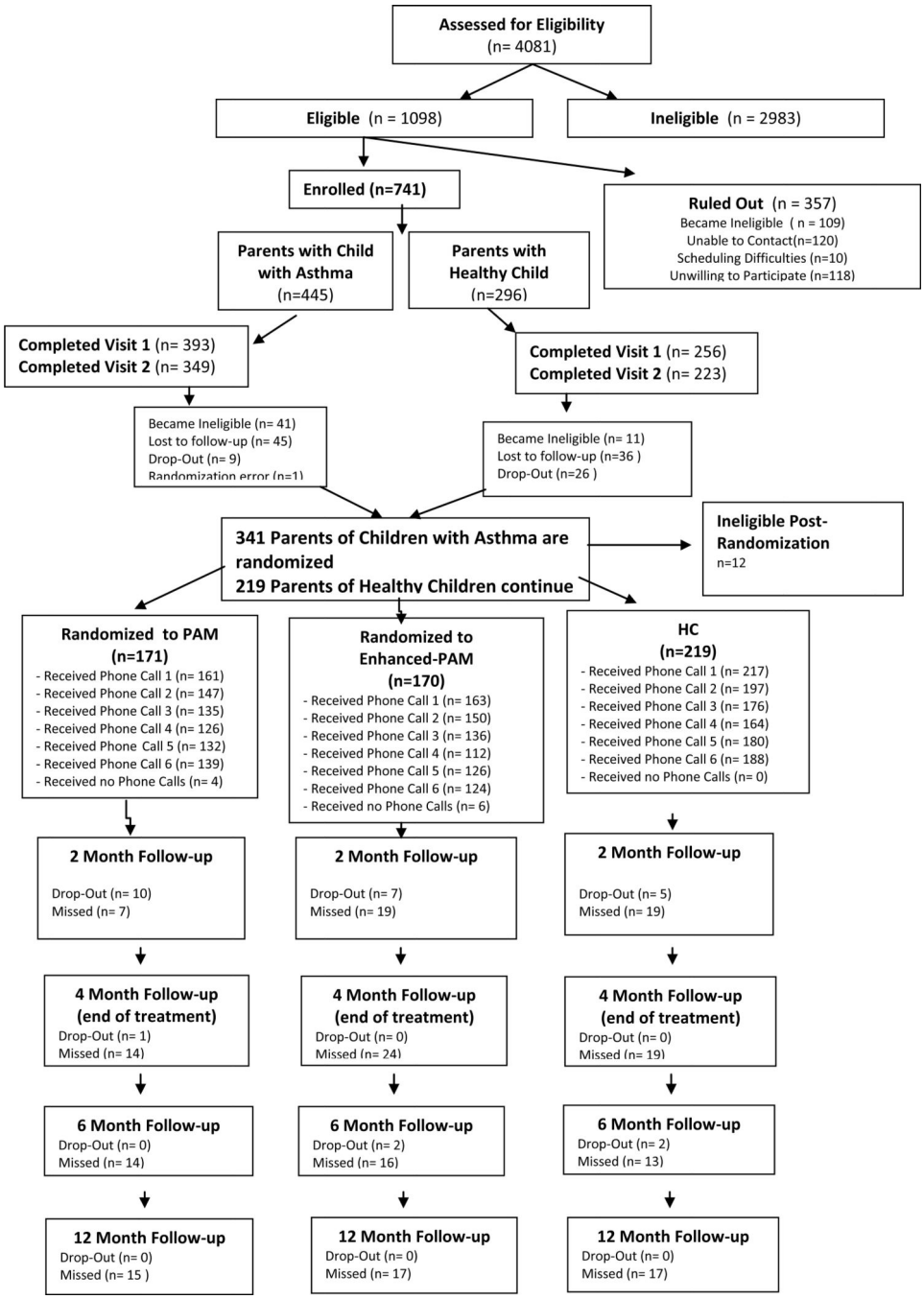

Figure 1.
Patient Flow

Table 1

Demographics and Smoking History by Study Group

	ENHANCED-PAM(n=170) M(SD) or %	PAM(n=171) M(SD) or %	HC(n=219) M(SD) or %	All(N=560) M(SD) or %
Child Age (yrs) *,2,3	4.88 (4.47)	5.42(4.59)	7.79(5.33)	6.18(5.02)
Parent Age (yrs) *,2,3	34.16(9.94)	34.02(9.77)	37.37(9.94)	35.37(1.00)
% Female	78.24%	81.29%	85.84%	82.14%
% Partnered	44.71%	35.67%	34.70%	38.04%
% Employed	40.59%	45.03%	33.33%	39.11%
% < high school education	33.53%	30.41%	27.85%	30.36%
Income (<25k per year)	71.8%	70.4%	72.5%	71.6%
White, Non-Hispanic	54.12%	46.20%	55.71%	52.32%
African American, Non-Hispanic	20.00%	29.24%	22.83%	23.93%
Hispanic/Latino	15.48%	16.57%	13.76%	15.14%
Other	10.40%	7.99%	7.70%	8.61%
Cigarettes/day *,3	15.59(13.00)	13.37(8.15)	15.74(8.12)	14.99(9.91)
% Ready to Quit in 30 days	61.18%	60.23%	58.90%	60.22%
Never tried to Quit (%)	20.59%	18.71%	15.07%	17.86%
Years Smoked *,3	18.00(10.16)	16.91(9.32)	19.89(9.85)	18.41(9.85)
# 24hr Quit Attempts	2.94(3.04) Median=2	4.96(13.51) Median=2	3.76(7.92) Median=2	3.88(9.13) Median=2
Fagerstrom Test for Nicotine Dependence *,2,3	4.41(2.36)	3.91(2.31)	5.10(2.25)	4.53(2.35)
% Household Smoking Ban *2,3	61.76%	64.91%	42.20%	55.10%
Asthma Morbidity Score	1.41(0.90)	1.52(0.98)	N/A	1.47(0.94)
% Households with >=1 additional smoker	54.71%	45.03%	48.17%	46.11%

*p<.05 for between-group difference. Means (standard deviations) are presented unless noted otherwise. Between-group differences refer to null hypothesis that group1=group2=group3.

1p<.05 for difference between Enhanced-PAM and PAM

2p<.05 for difference between Enhanced-PAM and Healthy

3p<.05 for difference between PAM and Healthy

Table 2

Smoking Cessation Outcomes Using Intent to Treat Analyses (n=560)[1]

	ENHANCED-PAM	PAM	HC	ENHANCED-PAM vs. HC (Adjusted Effects-Odds Ratio (95% CI))	ENHANCED-PAM vs. PAM (Adjusted Effects- Odds Ratio (95% CI))	PAM vs. HC (Adjusted Effects- Odds Ratio (95% CI))
7 day ppa						
2-Month *b,c						
4-Month	18.24%	14.62%	6.39%	2.88(1.45–5.69) *	1.27(0.71–2.29)	2.26(1.13–4.51) *
6-Month	15.88%	10.53%	8.22%	1.85(0.96–3.57)	1.71(0.88–3.33)	1.08(0.53–2.21)
12-Month	13.53%	9.94%	7.76%	1.64(0.83–3.24)	1.53(0.76–3.05)	1.07(0.52–2.22)
	14.71%	13.45%	12.79%	1.03(0.56–1.90)	1.09(0.58–2.04)	0.95(0.52–1.74)
30 day ppa						
2-Month *b,c	17.65%	12.87%	5.02%	3.60(1.72–7.55) *	1.39(0.75–2.56)	2.60(1.22–5.54) *
4-Month *a,b	18.24%	9.94%	6.85%	2.70(1.38–5.29) *	2.12(1.09–4.12) *	1.28(0.60–2.71)
6-Month	14.12%	12.87%	7.31%	1.85(0.93–3.70)	1.06(0.56–2.02)	1.74(0.88–3.46)
12-Month *b	19.41%	13.45%	10.50%	1.83(1.00–3.34) *	1.48(0.81–2.70)	1.23(0.65–2.33)
Cts Abstinence						
2-Month *b,c	12.94%	7.02%	2.28%	5.58(2.08–14.96) *	1.93(0.90–4.14)	2.90(1.01–8.33) *
4-Month *b	14.12%	8.77%	5.48%	2.490(1.18–5.23) *	1.784(0.86–3.68)	1.40(0.62–3.14)
6-Month *b,c	12.35%	12.28%	5.48%	2.13(1.00–4.55) *	0.94(0.48–1.84)	2.26(1.08–4.73) *
12-Month	13.53%	9.36%	7.76%	1.63(0.82–3.25)	1.45(0.71–2.93)	1.13(0.55–2.32)
7 day self-report						
2-Month *b	20.59%	16.37%	10.05%	2.04(1.12–3.71) *	1.25(0.721–2.201)	1.63(0.89–2.98)
4-Month *b	19.41%	12.87%	8.68%	2.23(1.18–4.20) *	1.66(0.90–3.06)	1.34(0.68–2.63)
6-Month *b,c	17.06%	15.79%	8.68%	1.90(1.00–3.63) *	1.09(0.60–1.98)	1.74(0.92–3.31)
12-Month	20.00%	15.20%	13.70%	1.38(0.78–2.44)	1.39(0.78–2.50)	1.00(0.55–1.79)

Outcomes are bioverified unless otherwise noted. OR's and 95% CI's are from adjusted models (adjusted for child and parent age, cigarettes/day and motivation to quit),

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* indicates p<.05.

[a] ENHANCED-PAM vs PAM significant, p<.05;

[b] ENHANCED-PAM vs HC significant, p<.05;

[c] PAM vs HC significant, p<.05

Table 3

Unadjusted Self Report SHS across Time and Conditions and Adjusted Time Effects

	ENHANCED-PAM	PAM	HC	ENHANCED-PAM	PAM	HC
Exposure from caregiver to child from home & car						
Baseline *b,c	13.42(28.01)	9.68(22.84)	24.47(36.27)	−0.88,	−0.39,	−1.36,
4 month *b,c	3.18(10.57)	1.80(5.49)	12.20(34.99)	SE=.18,	SE=.18,	SE=.15,
6 month *b,c	3.54(12.48)	4.78(14.16)	9.05(20.58)	p<.001	p=.03	p<.01
12 month *b,c	3.48(10.95)	3.68(12.53)	7.99(19.46)			
Exposure from people (excluding caregiver)						
Baseline	15.06(60.80)	7.31(16.79)	13.64 (29.45)	−0.75,	−0.25,	-.23,
4 month *a,c	7.82(22.11)	3.30(8.65)	10.59(27.41)	SE=0.37,	SE=0.37,	SE=.30,
6 month	12.56(100.06)	5.94(19.52)	10.87(34.92)	p=.05	p=.50	p=0.46
12 month *c	5.84(15.51)	4.06(16.59)	10.59(30.24)			
Exposure from caregiver and other people in all places						
Baseline *c	28.48(79.38)	16.99(31.90)	38.12(55.141)	−1.62,	−0.67,	−1.59,
4 month *a,b,c	11.00(27.53)	5.10(10.93)	22.80(49.64)	SE=.45,	SE=.45,	SE=.37,
6 month	16.10(104.66)	10.73(29.49)	19.92(44.11)	p<.001	p=.13	p<.001
12 month *b,c	9.32(23.94)	7.74(25.71)	18.58(42.63)			
Exposure ‘in home’ from caregiver and others						
Baseline *a,b,c	16.94(46.56)	8.55(25.95)	26.60(45.60)	−0.97,	−0.22,	−1.11,
4 month *a,b,c	6.41(22.85)	1.70(6.27)	16.34(44.65)	SE=.28,	SE=.28,	SE=.23,
6 month	8.77(54.23)	6.59(23.17)	11.10(26.96)	p<.001	p=.43	p<.001
12 month *b,c	5.74(20.46)	5.01(19.86)	13.34(34.02)			
Exposure ‘in home’ from caregiver						
Baseline *b,c	10.46(25.52)	6.53(20.83)	19.55(32.40)	−0.69,	−0.25,	−1.09,
4 month *b,c	1.91(7.82)	1.08(4.72)	9.40(32.09)	SE=.16,	SE=.16,	SE=.13,

	ENHANCED-PAM	PAM	HC	ENHANCED-PAM	PAM	HC
6 month *b	2.63(10.62)	4.26(13.75)	7.09(17.22)	p<.001	p=.12	p<.001
12 month *b,c	2.83(10.00)	2.86(11.11)	6.44(16.71)			

*p<.05 for between-group unadjusted differences;

*a*Enhanced-PAM vs PAM P<.05;

*b*ENHANCED-PAM vs HC p<.05;

*c*PAM vs HC p<.05

Adjusted for baseline SHSe, number household smokers, household ban, and parent and child age