

# A Brief Inpatient Intervention Using a Short Video to Promote Reduction of Child Tobacco Smoke Exposure

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**OBJECTIVES:** Tobacco smoke exposure (TSE) increases the risk for respiratory-related disease and hospitalizations. The hypothesis of this study was that a brief intervention (which included a motivational video) provided to parents and caregivers during their child's hospitalization would be associated with improved knowledge and behavior changes that may reduce the child's TSE.

**METHODS:** Parents and caregivers of children hospitalized for respiratory illnesses with TSE were recruited between June and December 2012. They completed a questionnaire to determine baseline knowledge regarding the health effects of smoke exposure. The intervention included a motivational video, written smoking cessation materials, and referral to the state quitline. The questionnaire was repeated after the intervention; telephone follow-up at 1 and 3 months included knowledge questions and assessed behavior changes. Paired *t* tests were used to compare preintervention and postintervention knowledge scores.

**RESULTS:** A total of 167 parents/caregivers were enrolled. The mean preintervention knowledge score was high at 5.4 of 6, which improved for 60 parents/caregivers (36%,  $P < .001$ ) after the intervention and was sustained at follow-up. Follow-up was obtained from 123 (74%) parents/caregivers, and 90% reported behavior changes to reduce TSE. There was a 13% reported quit rate among the 99 parents/caregivers who smoked (95% confidence interval: 7–21). Other behavior changes reported included initiating home and vehicle smoking bans, discussing reduction of the child's smoke exposure, and showing the video to others. Improvement in knowledge after this brief intervention was associated with reported initiation of home and vehicle smoking bans ( $P < .01$ ).

**CONCLUSIONS:** Parents and caregivers of smoke-exposed children hospitalized for respiratory illnesses had high baseline knowledge of the effects of TSE. A brief intervention that included a motivational video was associated with reported behavior changes in parents/caretakers that decreased second- and third-hand smoke. Improvement of knowledge was associated with institution of home and vehicle smoking bans.

## ABSTRACT

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In the United States, 40.6% of children between the ages of 3 and 11 years have evidence of tobacco smoke exposure (TSE) based on serum levels of cotinine, a metabolite of nicotine.<sup>1</sup> Children are particularly vulnerable to TSE,<sup>2</sup> which is composed of both second- and third-hand smoke.<sup>3</sup> Second-hand smoke is the inhaled sidestream smoke released from a combustible tobacco product or exhaled by the smoker.<sup>2</sup> Third-hand smoke is the residual tobacco smoke contamination that remains on surfaces, in dust, and as volatile toxic compounds after the cigarette has been smoked.<sup>4</sup> TSE has been shown to cause a multitude of health issues in children, including sudden infant death syndrome, middle ear disease, lower respiratory illnesses, and asthma<sup>2</sup>; there is also recognition of a potential growing number of diseases related to TSE.<sup>5</sup> Although effective evidence-based smoking cessation interventions exist, including behavior techniques and pharmacotherapy,<sup>6,7</sup> the majority of pediatricians do not offer them to parents who smoke.<sup>8</sup> A recent interventional study among outpatient pediatric practices found that only 3.5% of parents in the nonintervention practices received any tobacco control assistance.<sup>9</sup>

Children with smoke exposure are hospitalized more frequently with respiratory illnesses,<sup>10</sup> and child hospitalization is a teachable moment to address TSE with parents and caregivers.<sup>11</sup> The aim of the present study was to improve parent/caregiver knowledge regarding the harmful effects of TSE and to encourage behaviors that reduce their child's TSE.

## METHODS

### Study Eligibility

This study was conducted at Children's of Alabama, an urban tertiary care hospital in Birmingham, Alabama. The University of Alabama at Birmingham institutional review board approved the study. Children hospitalized between July and December 2012 were eligible if they were aged <19 years, admitted with a primary respiratory diagnosis, not in an inpatient psychiatric unit or ICU, and had documentation of TSE.

Using the electronic medical record system, the daily patient census was reviewed for eligible patients based on age, nursing unit (not in an ICU or psychiatric unit), and primary admission diagnosis of a respiratory illness that included the following: asthma exacerbation, status asthmaticus, bronchiolitis, pneumonia, cystic fibrosis, bronchopulmonary dysplasia, wheezing, reactive airway disease, respiratory distress, difficulty breathing, and stridor. After the initial screening, the patient was eligible for study if there was nursing or physician documentation of TSE. Every patient admitted to Children's of Alabama is screened on the nursing intake form with the question "Does any caregiver who cares for your child smoke cigarettes?" and the physician history template included a question on cigarette smoke exposure in the social history. The child was considered smoke-exposed if the answer to either question was "Yes." A maximum of 2 parents/caregivers with the patient at the time of study enrollment were eligible for the study. Because our primary outcome was testing knowledge, a parent/caregiver was not required to be a current or former smoker. At enrollment, informed consent was obtained from each parent/caregiver to participate in a study to assess the educational value of a video on decreasing smoke exposure for children. The parents/caregivers were also queried regarding demographic characteristics and smoking status.

### TSE Intervention

The intervention consisted of the parent/caregiver viewing a motivational video entitled "Smoking and Kids Don't Mix," receiving written smoking cessation material, and voluntary referral to the quitline. The video "Smoking and Kids Don't Mix" (Fig 1) is 7 minutes long and was created by an internal hospital team consisting of pediatricians, nursing educators, and media experts to be a culturally sensitive, nonjudgmental smoking cessation resource for parents/caregivers. The video is based on the Health Belief Model,<sup>12,13</sup> which postulates that an individual's readiness to act is influenced by



**FIGURE 1** Still images from the "Smoking and Kids Don't Mix" video. The full video can be accessed at <http://www.youtube.com/watch?v=MT0q0JSC4j8>.

his or her belief about individual susceptibility to disease and perceptions of the barriers and benefits of avoiding disease, along with perceived self-efficacy in carrying out actions. The video reviews the adverse health effects of childhood TSE and recommends behaviors to reduce exposure, including home and vehicle smoking bans and smoking cessation.

Before the intervention, the parents/caregivers completed a self-administered knowledge assessment of 6 questions regarding the adverse effects of TSE in children. After viewing the video, the parents/caregivers completed an immediate postintervention knowledge assessment, which contained the same knowledge questions but in different order and phrasing. Child safety questions were also included on both tests. The parent/caregiver then received written materials on smoking cessation and a copy of the video to take home. The written smoking cessation materials were obtained from the Children's of Alabama Patient Health and Information Center and the American Academy of

Pediatrics Julius B. Richmond Center for Excellence. A representative sample can be found at [http://www2.aap.org/richmondcenter/pdfs/You\\_Can\\_Quit\\_Smoking.pdf](http://www2.aap.org/richmondcenter/pdfs/You_Can_Quit_Smoking.pdf). Parents/caregivers were offered on-site referral to the state quitline (1-800-QUIT-NOW), which is a nationally available free service staffed by trained smoking cessation counselors to provide information and help smokers with quitting.<sup>14</sup> No additional smoking cessation counseling was provided as part of this study, and the intervention was performed separately from the patient's routine care. Enrollment and delivery of the intervention lasted ~20 minutes, and the parent/caregivers received a \$10 gift certificate that could be redeemed at hospital eateries.

### Parent and Caregiver Follow-up

At 1 and 3 months, the parents/caregivers were contacted by telephone and queried on the same 6 knowledge-based questions as well as behavior changes they may have taken since the intervention to reduce their child's TSE. Ten attempts were made to contact each parent/caregiver at 1 and 3 months; telephone calls were made during the days of the week and time of the day that the parent/caregiver had selected at the initial enrollment as most convenient. Self-identified smokers were also queried regarding smoking behaviors, including quit attempts, smoking reduction or cessation, and

methods used to quit or reduce smoking. Smoking reduction was determined by recording the average number of cigarettes smoked per day compared with the number of cigarettes smoked per day at enrollment. Parents/caregivers who reported that they no longer smoked were asked how long it had been since they last smoked, if they had smoked in the past 7 days, and how many days in the past month they had smoked.

### Measures

The primary outcome was parent/caregiver scores on the knowledge-based assessment of the harms of childhood TSE after the intervention and knowledge retention at 1 and 3 months. The secondary outcome was parent/caregiver self-reported change in behaviors to reduce their child's exposure. The behaviors included initiation of home and vehicle smoking bans, discussing their child's TSE, and showing the video to others. Behavior changes in smokers also included smoking reduction and quit attempts. Behavior changes specifically related to third-hand smoke were also queried, including changing clothes and washing hands after smoking.

### Data Analysis

Descriptive statistics were derived for patient and parent/caregiver characteristics. Paired *t* tests were used for

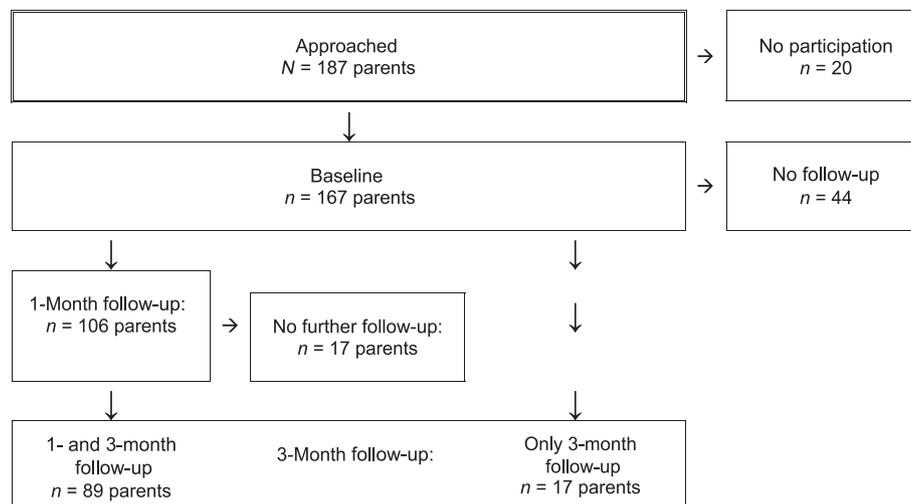
changes in the mean knowledge level for all parents/caregivers before and after the intervention. Among smokers, paired *t* tests were also used to compare changes in number of cigarettes smoked per day. The  $\chi^2$  tests were used to assess the significance of differences in parent/caregiver behavior changes according to smoking status (smokers versus nonsmokers); among smokers, differences were assessed according to reports of cessation. Analyses were performed by using SAS version 9.3 (SAS Institute, Inc, Cary, NC).

### RESULTS

Of 187 parents or caregivers approached, 167 parents/caregivers were enrolled (Fig 2). Follow-up information was obtained at 1 and 3 months from 106 parents/caregivers at each follow-up assessment (not the same 106). Eighty-nine parents/caregivers completed both the 1- and 3-month follow-ups. In total, follow-up data at 1 month, 3 months, or both were collected on 123 parents/caregivers.

### Study Sample Demographic Characteristics

The mean age of the 128 children was  $4.1 \pm 4.5$  years (range: 1 month–16 years); 33% were aged <1 year (Table 1). There were an equal number of non-Hispanic black and white children (each  $n = 59$  [46%]), with few children of other races or ethnicities.



**FIGURE 2** Flow diagram of parent and caregiver follow-up.

**TABLE 1** Baseline Child/Patient and Parent/Caregiver Demographic Information

Variable	N (Overall %) <sup>a</sup>
<b>Child/patient</b>	
Age (mean ± SD: 4.1 ± 4.5 y)	
<1 y	42 (33)
1–10 y	73 (56)
≥11 y	13 (10)
<b>Race/ethnicity</b>	
Non-Hispanic black	59 (46)
Non-Hispanic white	59 (46)
Hispanic white	3 (2)
Other	7 (6)
Male gender	73 (57)
<b>Parent/caregiver</b>	
Age (mean ± SD: 31.5 ± 10.6 y) <sup>b</sup>	
<20 y	10 (6)
20–39 y	128 (78)
≥40 y	27 (17)
<b>Relationship to hospitalized child</b>	
Mother/father	136 (81)
Grandparent	13 (8)
Other	18 (11)
Male gender <sup>b</sup>	35 (21)
<b>Baseline smoking status</b>	
Never	40 (24)
Past	28 (17)
Current	99 (59)
<b>Highest level of education</b>	
Did not complete high school	31 (19)
High school degree or GED	89 (53)
Any college	47 (28)
<b>Reported smoking bans</b>	
Home smoking ban	139 (83)
Vehicle smoking ban	127 (76)
Either home or vehicle	148 (89)
Both home and vehicle	118 (71)

GED, General Educational Development.

<sup>a</sup> Percents do not sum to 100 due to rounding.

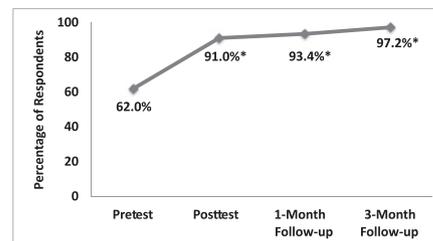
<sup>b</sup> Data missing on age and gender for 2 parent/caregivers.

At baseline, smoking was not allowed in the home of 83% of the children, not allowed in vehicles for 76%, and not allowed in both homes or vehicles for 66%. The mean age of parents/caregivers was 31.5 ± 10.6 years (range: 18–66 years); 81% were parents. Overall, 28% of parents/caregivers had more than a high school education, 24% had never smoked, and 59% were current smokers. There were no differences in any of the aforementioned demographic

characteristics or baseline smoking status between parents/caregivers for whom there was follow-up data and those without follow-up data.

### Knowledge

The 6 knowledge questions were queried preintervention and postintervention and at the 1- and 3-month follow-ups (Fig 3). The number of parents/caregivers and percent with correct answers for each question at



**FIGURE 3** Parents/caregivers with perfect scores on knowledge assessment. \*All improvements over pretest findings were significant ( $P < .01$ ).

baseline before watching the video are presented in Table 2.<sup>2,15–19</sup>

The mean number of correct responses from the 6 questions at baseline was 5.4 ± 0.9, which improved to 5.9 ± 0.3 immediately postintervention ( $P < .01$ ) (Fig 3). Those for whom follow-up data were available had essentially the same preintervention and immediate postintervention improvement as did those for whom no follow-up information was available. The improved knowledge was maintained at 1 and 3 months. Neither demographic characteristics nor baseline smoking status was associated with improvement in knowledge score.

### Behavior Changes Applicable to Nonsmokers and Smokers

The majority of smoking and nonsmoking parents/caregivers reported behavior changes that could lead to reduction in the child's TSE (Table 3). Washing hands after smoking or encouraging others to do so and discussing reducing their child's TSE were reported by 90% and 88%, respectively. More than one-half (55%) reported showing the video to other caregivers; this number was higher among nonsmokers than among smokers (65% vs 48%;  $P = .05$ ). Improvement in knowledge after the intervention was associated with initiation of a smoking ban in either the house or the car ( $P < .01$ ).

### Smoking Cessation and Reduction in Amount Smoked

Of the 71 parents/caregivers who smoked at baseline for whom we had follow-up data, 13 reported smoking cessation at last follow-up (Table 4). Cessation was defined

**TABLE 2** Number (%) of Parents/Caregivers With Correct Answers for Each Question at Baseline Before Watching the Video

Answer	No. (%)
Second-hand smoke increases the risk for asthma <sup>15</sup>	164 (99)
Third-hand smoke is [not] safe for children <sup>2</sup>	160 (96)
Second-hand smoke causes health problems for children <sup>2</sup>	159 (96)
Infants with second-hand smoke exposure have a higher risk for SIDS <sup>2</sup>	147 (89)
Second-hand smoke increases the risk for ear infections <sup>2</sup>	148 (89)
Children with smoking parents are more likely to smoke <sup>16–19</sup>	132 (80)

SIDS, sudden infant death syndrome.

as quitting for at least 7 days before completing the questionnaire. Assuming smokers who were lost to follow-up continued smoking, there was a 13% (95% confidence interval: 7–21) cessation rate among parents/caregivers who smoked at baseline and 18% (95% confidence interval: 10–29) among those with follow-up data available. On average, smokers who quit had reported smoking fewer cigarettes per day at baseline than smokers who did not quit (7.5 vs 12.7 cigarettes per day;  $P = .02$ ). Of the 13 smokers who reported quitting, 8 (61%) reported cutting down gradually rather than stopping suddenly. The number of weeks since the last cigarette for these 13 smokers ranged from 3 to 13 weeks (mean  $\pm$  SD: 10  $\pm$  5.3 weeks).

The only demographic characteristic associated with quitting was race; non-Hispanic black subjects had a higher quit rate than did other races (32% vs 9%;  $P = .02$ ). The most common method or tool used was the quitline, which was used by 34% of smokers; use was higher among those who quit than those who did not

(62% [8 of 13] vs 28% [16 of 58];  $P = .02$ ). Nicotine replacement therapy was the next most common method used, with 23% of parents/caregivers who smoked using this option. Neither the use of nicotine replacement therapy nor any other method (except the quitline) differed between smokers who quit and those who did not. Neither achieved knowledge level nor improvement in knowledge was associated with reported smoking cessation or significant reduction in amount smoked among smokers who did not quit.

## DISCUSSION

In our study using a brief intervention with a motivational video, the majority of parents/caregivers reported behavior changes after the hospitalization to reduce their child's smoke exposure. Surprisingly, the baseline level of knowledge regarding the harms of TSE was high despite most parents/caregivers having a high school education or less. Improvement in knowledge after the intervention was associated with the institution of home and vehicle smoking bans, although not with

smoking cessation or other behaviors. Smoking bans have been shown to decrease child TSE and can be an important step in the process of decreasing a child's TSE.<sup>20–22</sup>

Completely eliminating a child's TSE, however, requires smoking cessation. There was a self-reported 13% quit rate among smokers in this study, with an average time of 9.9 weeks since last cigarette use among quitters with follow-up data. In comparison, the yearly adult baseline quit rate is 6% in the general population.<sup>23</sup> In a recent meta-analysis of 18 parental smoking cessation studies in various pediatric health care settings, there was a pooled quit rate of 23%.<sup>24</sup> In contrast to our study, the majority of the trials reviewed used intensive resources with at least 3 or more counseling sessions, whereas our study used only a brief intervention. Smoking parents/caregivers in our study (including those who did not report cessation) also reported a decrease of an average of 11 cigarettes per day. In addition to the decreased smoke exposure for the child, a decrease in cigarettes per day is associated with an increase in the odds of cessation.<sup>25</sup>

Although nonsmoking parents and caregivers cannot directly eliminate their child's TSE, they can be advocates for their child to decrease TSE. Behavior changes reported by both nonsmoking and smoking parents/caregivers after the intervention included discussing the child's smoke exposure with others, showing others the video after discharge from the hospital, and washing hands and changing clothes after smoking or encouraging others to do this (for nonsmokers). Along with institution of

**TABLE 3** Parent/Caregiver Behavior Changes, Overall and According to Baseline Smoking Status

Behavior Changes After Intervention	All ( $N = 123$ )	Smokers ( $n = 71$ )	Nonsmokers ( $n = 52$ )	$P^a$
Showed the video to other caregivers	55% (68/123)	48% (34/71)	65% (34/52)	.05
Discussed reduction of child's TSE with other caregivers	89% (109/123)	86% (61/71)	92% (48/52)	.27
Washed hands after smoking or encouraged others to do so	90% (111/123)	94% (67/71)	85% (44/52)	.07
Changed clothes after smoking or encouraged others to do so	54% (67/123)	55% (39/71)	54% (28/52)	.91
Initiated home smoking ban (if did not already have one)	82% (18/22)	78% (11/14)	87% (7/8)	.60
Initiated vehicle smoking ban (if did not already have one)	68% (19/28)	67% (12/18)	70% (7/10)	.86
Baseline smokers who self-reported smoking cessation	NA	18% (13/71)	NA	NA

Among those parents/caregivers with follow-up data, the most recent (longest) follow-up was used if they had both a 1- and 3-month follow-up (see Fig 1). NA, not applicable.

<sup>a</sup> From  $\chi^2$  for differences between smokers and nonsmokers.

**TABLE 4** Parent/Caregiver Characteristics According to Smoking Cessation Among Baseline Smokers (*N* = 71)

Characteristic	Quit			<i>P</i> <sup>a</sup>
	All ( <i>N</i> = 71)	Yes ( <i>n</i> = 13)	No ( <i>n</i> = 58)	
Child's age, y <sup>b</sup>	4.4 ± 5.1	4.7 ± 4.8	4.3 ± 5.1	.81
Caregiver demographics				
Parental (relation)	58 (82%)	12 (92%)	46 (79%)	.27
Caregiver's age, y <sup>b</sup>	32 ± 11.2	31 ± 10.5	32 ± 11.4	.85
Non-Hispanic black	28 (39%)	9 (69%)	19 (33%)	.02
Less than high school education	19 (26%)	1 (8%)	18 (31%)	.09
Female gender	50 (70%)	9 (69%)	41 (71%)	.92
Smoking behaviors				
Previous smoking ban in house or car	63 (89%)	11 (85%)	52 (90%)	.60
Quit for at least 1 day	14 (20%)	2 (15%)	12 (21%)	.07
Mean number of cigarettes/d <sup>b</sup>				
At baseline	11.7 ± 7.5	7.5 ± 7.2	12.7 ± 7.3	.02
At follow-up	5.9 ± 4.3	0	7.3 ± 3.5	<.0001
Change since baseline	11.1 ± 8.9	10.3 ± 8.4	11.2 ± 9.1	.88
Methods used				
Nicotine replacement therapy	16 (23%)	4 (31%)	12 (21%)	.43
Quitline	24 (34%)	8 (62%)	16 (28%)	.02
Web sites	9 (13%)	2 (15%)	7 (12%)	.75
In-person counseling	7 (10%)	2 (15%)	5 (9%)	.46
Prayer	9 (13%)	3 (23%)	6 (10%)	.21

<sup>a</sup> From  $\chi^2$  or *t* test (means) for differences based on whether quit.

<sup>b</sup> Mean ± SD.

smoking bans, washing hands and changing clothes specifically target childhood third-hand smoke exposure, which is increasingly being recognized as a health hazard.<sup>26–29</sup>

The present study targeted parents/caregivers during a “teachable moment”; that is, the hospitalization of a child.<sup>30</sup> The teachable moment has been the focus of several pediatric inpatient interventions for parents/caregivers to reduce childhood TSE.<sup>11,31–33</sup> Two of these studies used intensive counseling (defined as lasting ≥30 minutes) and found nonstatistically significant decreased cigarette use among smokers.<sup>31,32</sup> A third study with a prospective cohort design found decreased smoking rates and increased home smoking bans after the intensive smoking cessation intervention.<sup>11</sup> The fourth study was a randomized trial of an intervention that included brief counseling by a pediatric hospitalist trained in tobacco counseling; this study had an 18% overall self-reported quit rate at 2 months, with no statistical

difference between the intervention and the control groups.<sup>33</sup>

Smoking cessation counseling including videos has been used in previous studies with mixed results,<sup>34–37</sup> including interventions with videos targeted to parents of children with TSE.<sup>38,39</sup> Huang et al<sup>38</sup> targeted nonsmoking women and mothers of infants in Taiwan during routine care in a controlled study and found that women who received targeted videos in addition to written materials and supportive tools exhibited improved knowledge and self-efficacy regarding decreasing TSE for their child. The study by Huang et al did not evaluate the behaviors of the nonsmoking women or smokers. Streja et al<sup>39</sup> reported on an intervention for low-income minority families of children with asthma who were randomized to receive an intervention that included a video, workbook, and minimal counseling versus a brochure. This intervention, which was limited by a high attrition rate, did not result in significant

differences in child biochemical confirmation of nicotine exposure, parental report of child second-hand smoke exposure, or number of cigarettes smoked.

An important limitation of the present study is that we did not have a control group and were thus unable to assess whether the associations of improved knowledge and behavior changes were related solely to the child being hospitalized for a respiratory illness. A previous small study in the inpatient setting, however, did not find that the smoking cessation rate in the control population differed from the expected baseline quit rate.<sup>32</sup> Another limitation of our study is that the behaviors were self-reported, and parents/caregivers may be providing only socially acceptable answers. This outcome seems unlikely because preintervention behaviors were also based on self-report. In addition, selection bias could have been introduced if only parents and caregivers who were interested in learning and changing behaviors to reduce smoke exposure participated. Due to universal screening of patients for TSE and the enrollment rate of 89%, we feel this possibility is unlikely, however. In addition, there were no demographic differences or differences in improvement in knowledge preintervention and immediately postintervention between those parents/caregivers with follow-up and those without such data.

Resources and access to tobacco counselors or tobacco cessation-trained pediatricians may not be feasible at every institution for smoking cessation counseling. Thus, the motivational video used in our study could be a tool to target parents/caregivers, particularly when paired with brief physician advice and other resources such as the quitline. The components of the intervention are easily available to providers and are of no cost to the participant. Providing any smoking cessation intervention for parents/caregivers with smoke-exposed children, regardless of how limited, is preferable to performing no intervention.

## CONCLUSIONS

Parents and caregivers of smoke-exposed children hospitalized for respiratory illnesses had high baseline knowledge of the harms of

TSE. A brief intervention that included a motivational video was associated with reported behavior changes that decrease second- and third-hand smoke. Improvement of knowledge was associated with institution of home and vehicle smoking bans.

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