Secondhand Smoke Exposure Reduction Intervention in Chinese Households of Young Children: A Randomized Controlled Trial

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ABSTRACT

OBJECTIVE: To assess whether a theory-based, community health worker–delivered intervention for household smokers will lead to reduced secondhand smoke exposure to children in Chinese families.

METHODS: Smoking parents or caregivers who had a child aged 5 years or younger at home were randomized to the intervention group (n = 164) to receive smoking hygiene intervention or to the comparison group (n = 154). The intervention was delivered by trained community health workers. Outcomes were assessed at 2- and 6- month follow-up.

RESULTS: Of the 318 families randomized, 98 (60%) of 164 intervention group and 82 (53%) of 154 of controls completed 6-month follow-up assessment. At the 6-month follow-up, 62% of intervention and 45% of comparison group households adopted complete smoking restrictions at home ($P = .022$); total exposure (mean number of cigarettes per week ± standard deviation) from all smokers at home in the past 7 days was significantly lower among children in the intervention (3.29 ± 9.06) than the comparison (7.41 ± 14.63) group ($P = .021$); and mean urine cotinine level (ng/mL) was significantly lower in the intervention (0.030 ± .065) than the comparison (0.087 ± .027) group, $P < .001$). Participants rating of the overall usefulness of the intervention was 4.8 + 0.8 (1 standard deviation) on the 5 point scale (1 not at all and 5 = very useful).

CONCLUSIONS: The findings of this very first study in China showed that smoking hygiene intervention was effective in reducing children's exposure to secondhand smoke. These findings have implications for the development of primary health care–based secondhand smoke exposure reduction and family oriented smoking cessation interventions as China moves toward a smoke-free society.

KEYWORDS: children; Chinese; randomized controlled trial; secondhand smoke

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WHAT'S NEW

A smoking hygiene intervention trial could be feasibly delivered in the Chinese households and effective in reducing children's secondhand smoke exposure. Counselled households reported significantly greater adoption of household smoking restrictions and lower mean urine cotinine concentration in children's urine.

THE HEALTH CONSEQUENCES of exposure to secondhand smoke (SHS) are now well accepted.[1–4] Children exposed to SHS do not choose to be exposed. Children's exposure is involuntary, coming mainly from adults who smoke in the places where children live, study, and play. The World Health Organization has estimated that about 700 million, or almost half of the world's children, are exposed to SHS.[5]

With a population of 1.2 billion, China is the world's largest producer and consumer of tobacco, with over 350 million smokers.[6] The high prevalence of current smoking among men (60.2%) and an increasing rate of smoking among women (6.9%) in China[7] suggest that a large number of young children are exposed to SHS at home. In the 2002 Chinese National Survey, the prevalence of SHS exposure in nonsmokers (aged 15 or above) was 52%.[6] In the 2010 Global Adults Tobacco Survey–China, the SHS exposure prevalence to nonsmoking adults was 72.4%.[8] These high exposure rates among adults underscore the fact that the exposure prevalence could be even higher among children. This large number of exposed children,

coupled with the evidence that SHS causes illness in children, constitutes a substantial public health threat and demands urgent intervention.

Given the scope of the problem, there is a relative scarcity of randomized controlled trials reported in the literature targeting SHS exposure reduction among children. A systematic review identified 9 studies that targeted SHS exposure reduction among young children[9–13] and preschool children.[14–17] Only 2 of these studies reported significant decreases in children's exposure to SHS after counseling of parents.[14,16] A study by Wahlgren et al[18] reported reduction of SHS exposure for children who have asthma after individualized counseling to parents. However, none of these studies was carried out in a country with a growing tobacco market, thus limiting their applicability in China or other developing country setting. Also, we found no studies in the literature that specifically addressed SHS exposure reduction to children in China. Therefore, the overall aim of the study was to investigate whether SHS exposure reduction intervention for Chinese households with young children would reduce children's exposure to SHS.

METHODS

STUDY POPULATION

Smoking parents or caregivers who had children aged 5 years or younger at home were recruited through the community health centers available in the target community. Families with at least 1 smoker in the household (mother, father, or other household members) were invited to participate in the study. When >1 parent or caregiver in a family smoked, the primary caregiver was selected for study participation. Inclusion criteria were: 1) household member reports smoking 1 or more cigarettes daily for the past 30 days, 2) household smoker reports smoking a total of at least 10 cigarettes per week at home in the presence of the child, 3) smoking household member and the child live together in the same household and will live together during the entire period of the study, 4) resides in the study community, 5) able to communicate in Mandarin Chinese or local Shanghai dialect, and 6) has signed an informed consent form or given verbal consent (for those who could not read and write). Exclusion criteria were households with a breast-feeding child, as breast-feeding may confound urine cotinine analysis.[19] Although it was expected that only small number of households might have a breast-feeding child, given the low exclusive breast-feeding rates at 4 months in major cities of China (24%)[20] and in Shanghai (28%),[21] we decided to exclude breast-feeding households.

DESIGN

This was a randomized controlled trial of households in urban communities in Shanghai, China. The study protocol was approved by the institutional review boards of Boston Medical Center (IRB H-27524, November 11, 2008) and Fudan University School of Public Health (IRB 2010-01-0193, April 2, 2010). This study is registered with ClinicalTrials.gov as study NCT00995254.

RECRUITMENT

In the first step, families with a child aged 5 years or younger were identified by using health center records. Interviewers then visited each household to explain the study, assess eligibility, and invite them to participate in the study. In families with more than 1 child aged 5 years or younger, 1 child was randomly selected to participate in the study. To find eligible households, interviewers followed the sequence of residential serial numbers available in each small residential zone within the community. They continued visiting households until the required sample size was met. Upon receiving detailed information about the study, eligible selected subjects signed the consent form and completed the baseline survey. The counselor then opened a serially numbered, opaque, and sealed envelope to reveal the random assignment of each smoker to intervention or control groups. The random numbers for group assignment were generated by the project manager (not the counselors) of the project using a personal computer before subject recruitment. Participants in the intervention group received smoking hygiene intervention (SHI)[20–24]; participants in the comparison group received counseling related to child development. Participants also received health education pamphlets on smoking and SHS (intervention group) or on child development (comparison group). Counseling intervention was provided by community health workers (CHWs) who received a 3-day practicum training. Follow-up assessment was carried out at 2 months and 6 months after initial contact for both the intervention and comparison group participants. The 2-month and 6-month follow-up data were collected by interviewers who were blinded to the study conditions of the households.

INTERVENTION

SHI addressed SHS exposure reduction of children with brief advice to quit smoking. SHI practices focused on the following aspects: 1) keeping the child away from household members' and other people's smoke, 2) avoidance of smoking in the car or in closed areas near the child, 3) not taking the child into smoky environments (ie, restaurants, clubs, or karaoke), and 4) enforcing a strict no-smoking policy at home and in the car. The intervention is conceptualized on the basis of the protection motivation theory developed by Rogers.[22] The counseling approach used was patient centered, which means that the counselor engaged the households in a discussion about smoking and SHS exposure to the child in a nonthreatening manner and engaged the household members in making decisions about the counselor's recommendations.[23]

The SHI was delivered in 6 different individualized counseling sessions: initial in-person counseling (30–45 minutes), 1 week telephone counseling (~20 minutes), 2 week telephone counseling (~20 minutes), 1 month in-person counseling (15–30 minutes), 2 month telephone counseling (~20 minutes), and 4 month telephone counseling (~20 minutes). At 3 months, self-help educational material about smoking and SHS was hand-delivered or mailed to each participant. The self-help material defined