Patient Education and Counseling 98 (2015) 1439–1445

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.elsevier.com/locate/pateducou

Patient Perception, Preference and Participation

Parental receptivity to child biomarker testing for tobacco smoke exposure: A qualitative study

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ARTICLE INFO

Article history:
Received 2 October 2014
Received in revised form 20 February 2015
Accepted 30 May 2015

Keywords:
Tobacco smoke exposure
Secondhand smoke
Biomarker testing
Parental attitudes
Qualitative methods
Thematic analysis
Parental education and counseling

ABSTRACT

Objective: Widespread tobacco smoke exposure (TSE) of children suggests that parents may be unaware of their children's exposure. Biomarkers demonstrate exposure and may motivate behavior change, but their acceptability is not well understood.
Methods: Sixty-five in-depth interviews were conducted with parents of young children, in smoking families in central Israel. Data were analyzed using thematic analysis.
Results: Consent to testing was associated with desire for information, for reassurance or to motivate change, and with concerns for long-term health, taking responsibility for one's child, and trust in research. Opposition to testing was associated with preference to avoid knowledge, reluctance to cause short-term discomfort, perceived powerlessness, and mistrust of research.

Most parents expressed willingness to allow measurement by urine (83%), hair (88%), or saliva (93%), but not blood samples (43%); and believed that test results could motivate behavior change.
Conclusions: Parents were receptive to non-invasive child biomarker testing. Biomarker information could help persuade parents who smoke that their children need protection.
Practice implications: Biomarker testing of children in smoking families is an acceptable and promising tool for education, counseling, and motivation of parents to protect their children from TSE. Additionally, biomarker testing allows objective assessment of population-level child TSE.

1. Introduction

Reduction of child exposure to tobacco smoke is an important global health challenge [1–4], and depends to a large degree on parental beliefs and practices. Worldwide, it is estimated that 40% of children are exposed to tobacco smoke in their homes [5], with most exposure caused by parental smoking. The high prevalence of exposure, combined with well-documented increased health risks [5], leads to a large and entirely preventable population burden. In 2004, 166,000 child deaths and nearly 6 million child lower respiratory infections were attributed to secondhand smoke (SHS) [5]. Exposed infants are at increased risk for sudden infant death syndrome, while exposed children have a higher risk of acute respiratory infections, lower levels of childhood lung function [1], and increased likelihood of developmental and behavioral problems [6].

Despite the broad consensus about the need to protect children from tobacco smoke (US Surgeon General [1], WHO [2], the G8 [3], Healthy Israel 2020 [4]), questions remain about how to reduce smoking *around* children, in particular in their home environment. Thus, at the individual level, an important challenge is to convey to parents the risk to their children caused by their own or family members' smoking behaviors, and to persuade them to refrain from smoking in places where children live, study, and play. Another challenge is to obtain accurate population-level data to assess the magnitude of this problem [7–9]. Monitoring exposure as a means to control population-level risk is common to many

Abbreviations: SHS, secondhand smoke; TSE, tobacco smoke exposure.

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http://dx.doi.org/10.1016/j.pec.2015.05.023
0738-3991/

public health endeavors, and has been used for other contaminants; for example, lead, allergens, pesticides [10], and mercury levels [11].

Biomarkers are measureable biological substances found in the body, which can be used for quantification of environmental exposures [12]. Biomarkers to assess child tobacco smoke exposure have the potential to persuade adults to stop smoking around children, and to measure population-level exposure. They are advantageous over parental reports, which may be compromised by social desirability bias, or parental unawareness of their child's exposure, as demonstrated by discrepancies between parental reports of exposure and objective markers [13,14]. Consequently, biomarkers are considered the gold standard for evidence of exposure [1,15]. Several biomarkers of tobacco smoke exposure (TSE) have been studied. Cotinine, found in urine, blood, hair, saliva, and nails, is most often used, due to its high sensitivity and specificity [16–19]. There are some differences between the different modalities, for example, cotinine in hair and nails reflects long-term exposure, while cotinine in saliva, serum and urine reflect short-term exposure [7]. Biomarkers can be used for individual feedback, and may persuade parents to protect their children by showing them in a convincing way that exposure, whether secondhand or thirdhand, is occurring. Research has shown that beliefs about thirdhand smoke are related to increased protective behaviors such as enforcing a 'smoke-free home' [20]. Several interventions aimed at reducing TSE of children in the home used feedback of biomarkers with varying degrees of success [21–25].

Despite the potential utility of biomarkers for both behavior-change interventions and monitoring, the topic of parental receptivity to child biomarker testing to assess TSE has received little attention in the research literature. Just two previous studies were found on this topic [26,27]. One study addressed the willingness of Latino parents to allow hair sampling of their children, and found that over 90% of them were willing to provide child hair samples [26]. A nationally-representative study conducted in the US [27] found that the majority of both smoking and non-smoking parents were willing to have their children tested for TSE. However, these studies addressed only one biomarker, and neither performed an in-depth qualitative investigation of parental attitudes.

This study aimed to explore in-depth the beliefs, attitudes, concerns and preferences about child biomarker testing among parents in whose families smoking occurs, as they relate to behavior change associated with protecting children from TSE.

2. Methods

2.1. Sampling and recruitment

The study was conducted in Israel, where smoking rates during the period 2010–2012 among Israeli adults were 20.6% (Jewish men: 23.7%, Jewish women: 15.9%, Arab men: 43.8%, Arab women: 6.7%) [28]. Though smoking in many indoor public places has been banned in Israel for several decades [29,30], nearly 70% of Israelis were regularly exposed to tobacco smoke in 2010 [31].

Recruitment of parents for this study began in the Meuhedet Health Care Services organization, the third largest of the four Israeli health fund organizations, which provide subsidized healthcare as part of the national healthcare system. We used a purposive sampling approach to select clinics in different geographical areas to ensure the recruitment of participants from various socio-economic, demographic and religious groups [32].

Potential participants were initially recruited by primary care clinic staff who were familiar with members of the community and trusted by them. Posters and flyers advertising for potential participants were placed in the clinics; the clinic staff recruited members visiting the clinics for well-child or other services. In order to enlist a wider group of parents, parents from two Meuhedet well-baby clinics were approached as well, and additional parents were recruited using the 'snowball' method. Interested parents were contacted by research assistants who described the study. Inclusion criteria were parents in families in which at least one parent smoked, and with a child below the age of 3 years. This was later expanded to children up to age 7 to increase recruitment.

We received names of 123 individuals who had expressed an interest in the project, of whom 65 (52.8%) were interviewed. The remainder were either unreachable ($n = 9$), unavailable ($n = 30$), did not wish to participate ($n = 10$), quit smoking ($n = 2$), did not meet the inclusion criteria ($n = 1$), did not agree to have the interview recorded ($n = 1$), or did not participate for unknown reasons ($n = 5$). Signed informed consent was obtained from all participants and a gift certificate worth about $30 was given to compensate them for their time.

2.2. Interviewing process

Interviews were conducted between September 2011 and August 2012, by three interviewers (SR, AB, IR); all were trained by a medical sociologist (ET). Interviews in religious neighborhoods were conducted by same-sex interviewers. The majority of interviews were held in health clinics (70%), and some took place in participants' homes or at their workplace. Interviews lasted from 35 to 131 min (mean: 62.9, STD: 18.7) and were audio-recorded and transcribed. Field notes were taken.

2.3. Research tool and interview guide

Aiming for a phenomenological exploration of participants' experiences and the meanings they attributed to them, we used semi-structured interviews with open-ended questions [33]. Interview Guides (for smokers and spouses of smokers, and for secular and religious participants) were developed based on previous work (Personal communication, Elizabeth Gonzales, Project KISS 2009; Personal communication, Robyn Keske, 2012, Project: Breathe Free for Kids; Personal communication, Deborah Ritchie, 2012, Project: REFRESH).

Respondents were asked to describe their daily routine and smoking habits, including previous quit attempts, and to discuss smoking restrictions in their home or car and around their children. Respondents were then asked what they knew about secondhand and thirdhand smoke and their risks. Questions regarding current strategies to protect their children followed. The last part of the interview focused on respondents' views about possible interventions, including questions regarding biomarker testing for child exposure, with parents asked which tests would be acceptable, and why. The biomarker tests referred to included analysis of children's hair, urine, saliva, blood and fingernails for nicotine/cotinine, and environmental measures for home exposure assessment. Each of these methods was briefly explained. Parental responses regarding which biomarker methods they would find acceptable were categorized according to consent and opposition to each type.

2.4. Analysis

2.4.1. Qualitative analysis

Data were transcribed and transcripts were checked for accuracy. Thematic analysis was performed (ET) and then reviewed and refined (VM, NG), with themes derived from the data, according to the process described by Braun and Clarke