ARTICLE

Provider Perspectives on Adding Biomarker Screening for Tobacco Smoke Exposure to Lead Screening at Well-Child Visits

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ABSTRACT

Introduction: Measurement of cotinine, a biomarker of tobacco smoke exposure, can accurately identify children at risk of health consequences from secondhand smoke. This study reports perspectives from pediatric health care providers on incorporating routine cotinine screening into well-child visits.

Methods: Key informant interviews (N = 28) were conducted with pediatric primary care providers: physicians, nurse practitioners, and registered nurses.

Results: Themes identified in the interviews included the following: (a) *Cotinine screening would assess children's exposure to tobacco smoke more reliably than parental report*; (b) *Addressing positive cotinine screening results might require additional resources*; (c) *Wheezing and a history of emergency department visits increased the salience of cotinine screening*; and (d) *A better understanding of the significance of specific cotinine test values would improve utility*.

Discussion: Pediatric providers see advantages of biomarker screening for tobacco smoke exposure at well-child visits, especially for children with wheezing, but have concerns about limited capacity for follow-up with parents. J Pediatr Health Care. (2016) ■, ■-■.

KEY WORDS

Cotinine, pediatric primary care, pediatric well-child visit, secondhand smoke, tobacco smoke exposure reduction

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INTRODUCTION

Health screening is a routine part of preventive pediatric practice. Common goals are to identify developmental delays, nutrition issues, or potential health hazards, which need to be addressed to prevent long-term

sequelae. The introduction of a new screening procedure requires the support of health care providers, who ultimately implement practice initiatives with their patient populations. It is therefore critical that provider perspectives are considered when considering practice changes.

Childhood tobacco smoke exposure (TSE) is associated with significant adverse health consequences. An estimated 5,000 yearly childhood deaths are a result of passive TSE (American Cancer Society, 2008). TSE exposure in infants and children is linked to lower respiratory tract and middle ear infections, asthma exacerbation, decreased birth weight, reduced brain size and alterations in brain function, and sudden infant death syndrome (Centers for Disease Control and Prevention, 2010).

Parental report suggests that approximately one quarter of children are exposed to TSE (Centers for Disease Control and Prevention, 2008), but national surveys relying on cotinine, a reliable biomarker of TSE, show that over half of children in the United States are exposed to tobacco smoke (Centers for Disease Control and Prevention, 2010). The American Academy of Pediatrics and the American Academy of Family Medicine recommend asking screening questions for TSE at all health care provider visits; however, cotinine screening is not included in current recommendations. However, the large discrepancy between parental report and estimates of TSE based on biomarker data suggest that screening questions miss many children with TSE. Parents may underreport their child's TSE for a number of reasons (e.g., to appear socially desirable, fear of consequences, or lack of awareness; Joseph et al., 2013). Improving the sensitivity of methods to identify children who have been exposed to tobacco smoke will enable providers to focus interventions on those at higher risk.

In the early 1990s, blood lead screening was successfully integrated into the 1-year well-child visit in the United States, resulting in a dramatic reduction in exposure and health consequences of lead exposure (American Academy of Pediatrics, 1998). Lead screening is now routinely performed at 1-year well-child visits, and children who have high serum lead concentrations require environmental and medical follow-up, including home remediation (American Academy of Pediatrics, 2005; Hershovitz, 2000). Lead screening programs have successfully reduced childhood lead exposure, indicating that providers can effectively incorporate routine screening of children for exposure to environmental toxins by collecting biological specimens in practice settings and can deliver necessary treatment. Considering the efficacy of lead screening for identifying lead exposure and reducing subsequent exposure as a model, in this project we considered providers' willingness to implement screening to test infants and children for TSE at well-child visits concurrently with lead screening.

Cotinine is a biomarker found in biologic fluids (e.g., urine, saliva, and blood) that can be used to quantify TSE. Cotinine is a metabolite of nicotine that is generated in the liver and released into the bloodstream, closely mirroring the dosage of nicotine absorbed from TSE (Benowitz, 1996). Studies suggest that cotinine is the most reliable marker of TSE exposure (Benowitz, 1996; Benowitz et al., 2009; Chen, Hsiao, Lee, Wang, & Chen, 2015; Jarvis & Feyerabend, 2015; Murphy, Wickham, Lindgren, Spector, & Joseph, 2013). Preliminary work indicates that cotinine can be accurately measured in dried blood spots, using approximately one drop of blood (Murphy et al., 2013). Furthermore, dried blood spots are inexpensive, and samples can be easily transported, simplifying and expanding the potential application for TSE testing in populations that are otherwise challenging to study (Murphy et al., 2013). In small children, TSE is the only source of nicotine (other than accidental ingestion), so there are no false-positive results. Cotinine has a half-life of approximately 24 hours, so test results might be negative if the child has not been recently exposed to tobacco smoke.

Systematic laboratory testing of children for cotinine, therefore, can improve identification of TSE in children and overcome the limitations of parent self-report. A pilot test of concurrent lead and cotinine screening suggests that the two screenings can be effectively combined and improve parental smoking cessation (Joseph et al., 2014). The objective of this study was to investigate practical feasibility issues regarding incorporating cotinine screening into pediatric clinical practice. The specific aim was to investigate the potential challenges this screening would present to pediatric health care providers and obtain recommendations for implementation practices to facilitate screening for TSE by blood cotinine measurement at well-child visits.

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METHODS

This work is a result of partnership between the University of Minnesota and Hennepin County Medical Center (HCMC) Pediatric Clinic. HCMC is an urban safety net teaching hospital that serves a diverse population in an area encompassing much of the inner city and first-ring suburbs of Minneapolis. HCMC Department of