Child Blood Lead Testing Rates in Texas

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Introduction

Estimates indicate that there are 4 million households with children who are contaminated by lead (a naturally occurring heavy metal element frequently used in industrial processes) in the United States,[1] yet testing is low—specifically in Travis county in Texas (14% testing rate).[2] Lead poisoning is concerning due to the associated health risks such as developmental problems and learning difficulties,[3] inhibited bone growth,[4] and long-term neurologic, cardiovascular, kidney, and liver impairment.[5,6] Moreover, the effects of blood lead poisoning are irreversible, which is why the Centers for Disease Control and Prevention emphasizes prevention over treatment.[7]

Young children, younger than 6 years, are at the greatest risk for blood lead contamination due to their proximity to the ground and the increased likelihood of putting foreign objects into their mouths.[8-10] Children's digestive tracts are also more permeable compared with adults, which allows for more ingested lead to pass into their bloodstream and puts them at elevated risks compared with adults.[11] Despite the health concerns associated with lead poisoning, it is estimated that nearly half a million children living in the United States between the ages of 1 and 5 years still have blood lead levels (BLLs).[9] Regardless of the seriousness and prevalence of childhood blood lead poisoning, and the fact that reducing BLLs in children aged 1 to 5 years is one of the goals mentioned in the Healthy People 2020,[13] in the state of Texas, the prevalence of elevated BLL ($\geq$5 μg/dL)[12] is at least 3% among those tested in 2016.[1] Almost 39% or nearly 3 million children living in Texas were covered by Medicaid/CHIP (Children's Health Insurance Program) in 2016,[14] and despite being eligible for blood lead screening tests up to the age of 3 years, only 39% received at least 1 blood lead test by the age of 2 years.[15]

According to the Healthy People 2020, social determinants of health (SDoH) can be important to both understanding the health problem and achieving more positive health outcomes.[16] For example, education, economic stability, neighborhood/environment, social/community, and health/health care are all SDoH that can contribute to understanding the nuances of a health issue.[16] This work focuses specifically on the social and culture within the health care component of the SDoH framework to shed light on knowledge of childhood lead screening and poisoning levels, and attitudes surrounding lead screening in the state of Texas.

The study had 4 objectives. The first objective was to assess health care professionals' knowledge about the prevalence of childhood lead poisoning in Texas. The second objective was to explore health care professionals' attitudes about blood lead poisoning, while the third objective was to assess awareness of protocols about blood lead screening and reporting. The fourth objective was to gain insight into what type(s) of communication platforms may be effective in communicating information about blood lead poisoning to health care professionals. These objectives were achieved using a combination of interviews and focus groups.

Methods

Data collected were qualitative in nature, utilizing semi-structured personal or group interviews (lasting approximately 20-30 minutes) with health care professionals including nurses, pediatricians, and the support staff. The sample consisted of 6 clinics in Travis County in Texas, of which 3 were Federally Qualified Health Clinics (FQHCs) and 3 were private practices. Efforts were made to speak with a variety of relevant staff (including medical assistants, registered nurses, and pediatric residents) as well as at least 1 pediatrician at each of the 6 locations, and

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variety of health care providers (FQHCs as well as private practices). This was in an attempt to capture a divergent knowledge base to address study objectives. Out of the 6 clinics, a total of 28 pediatricians and support staff were initially contacted with a final interview count of 27. Participants received no compensation but were offered breakfast or lunch during the interview. After obtaining informed consent, 2 trained interviewers lead participants through a series of open-ended questions and responses were captured by trained note-takers and/or audio-recording. Please see the appendix for the interview guide.

Data Analysis

Audio-recorded interviews were transcribed by 2 trained graduate research assistants. All transcriptions were read through twice and summarized by at least 2 of the authors. The data were reviewed by 2 trained individuals using an inductive process. Because the goal of this research was to improve understanding and generate hypotheses[17] rather than seek statistical significance, the findings from this study are not presented numerically. These summaries were then presented and discussed as a group with the rest of the researchers/authors, where recurring themes were extracted and ambiguities were resolved through discussion and reevaluation of the transcripts.

Ethical Approval and Informed Consent

The institutional review board (IRB) at the University of Texas at Austin determined this study to be exempt from IRB review (Protocol Number: 2018-01-0141). All the study participants were informed that their participation in the study is voluntary and their consent was obtained prior to participation in the study.

Results

Analysis revealed insight into the 4 objectives of this research. These insights are organized by research objectives and described below.

Knowledge of Lead Poisoning

Most respondents were confident about the clinical knowledge and associated effects of blood lead poisoning, and prevention strategies. However, nearly all respondents expressed that they had little or no knowledge of the state's blood lead testing and reporting protocols in Texas and were unaware of the low testing prevalence reported.

Attitudes About Blood Lead Testing

When asked why pediatricians may not test their patients for lead poisoning, all participants responded with a similar list of reasons, including lack of time, lack of perceived severity of the problem, not being up-to-date on recommendations, and the burden of high number of vaccinations, especially at the 12-month check-up, which discourage parents from consenting to test infants. Related to the first point, one health care provider (also a parent) reported in this portion of the interview that their physician had initially declined their request to test their child. The provider described having to push the physician to test and indicated that they only insisted because it was a prerequisite for a federal aid program. On being probed why participants thought why some pediatricians were not routinely testing, participants responded one reason could be related to extra work and/or lack of efficiency to daily work flow.

Awareness of Testing Protocols

Among participants working in FQHCs, there was a strong consensus around the belief that federally mandated guidelines for testing, including using the risk identification questionnaire and ordering testing for all Medicaid patients at 12 and 24 months are being adequately followed. Providers suggested that it may be that the parents are at fault by not following through with procedures, particularly when the testing laboratory is off-site (and thus inconvenient).

Communication Insights

Health care providers suggested the best platforms to communicate information about blood lead testing included medical journals, medical associations, and professional list serves. A large portion of participants also indicated they were also reachable through social media (ie, Facebook or Twitter). Suggestions for parental educational strategies included focusing on popular parenting blogs, churches, educational programming at clinics, and daycares, as well as more traditional informational media such as fliers, posters, and billboards.

Discussion

The purpose of the current study was to explore the low testing rates in Texas by examining health care professionals' knowledge, attitudes, and awareness about blood lead testing in Texas. Our work extends prior work that examined barriers to testing by examining knowledge about the prevalence of blood poisoning, attitudes about blood lead screening, and awareness of testing and reporting protocols.[18] Additionally, this work sought to identify current gaps in communication between health care providers and public health professionals regarding childhood lead testing. Findings were

guided by the SDoH framework[16] and indicated a general lack of knowledge regarding the low testing rates and/or prevalence of blood lead poisoning among children in Texas. Findings thus indicate a need to target health care professionals' attitudes and cultural beliefs about the seriousness of childhood lead poisoning, in order to mitigate the problem of childhood lead poisoning in the United States. Similar to prior work,[18] our research uncovered a common attitude among health care providers that lead poisoning no longer poses a significant public health risk to most children—particularly based on their zip code. Nonetheless, all of the interviewees reported that they understood the serious physical and developmental health problems associated with blood lead poisoning. Our data indicate that health care professionals view lead as a serious problem, but believe that it has been eradicated for most US populations, which highlights gaps in health education and knowledge of health care providers regarding the prevalence of lead poisoning in Texas.

Findings also revealed that health care providers are open to receiving up-to-date information about the latest research in a variety of ways such as via on-site presentations, advertising, and academic journals. A majority of our providers also indicated that they use social media to stay informed. They follow influential users on apps such as Twitter and Facebook, indicating that these sources are often a convenient and timely way to stay up-to-date. This finding indicates that less formal channels and community influencers may also be a viable way to disseminate information quickly and conveniently. Blood lead poisoning educational programs and future research should consider using these strategies and network mapping to determine whether this could be an effective method for message distribution.

When asked about how to reach parents about blood lead health information, physicians appeared less confident and offered more diverse and unique responses, with little overlap between respondents. The lack of overlap may indicate that physicians have not really considered how to reach parents outside of the purview of their own influence. This is an important insight, as parent engagement is an influential component of lead testing. The findings of this study suggest that strategies such as offering educational materials to parents or ensuring that a health care provider converses with parents about lead poisoning may be important.

Conclusion

Future communication with health care professionals providing information regarding the multitude of health risks associated with blood lead poisoning among children (including the fact that no amount of lead in a child's blood is safe), as well as emphasizing the importance of preventive action, is necessary. Our research reveals that education should be the first step to any campaign aimed at improving testing and reporting of childhood BLLs. It is encouraging to note that although providers may not be aware of the issue, they are open to receiving the information and very receptive to discussing the issue of childhood blood lead testing in Central Texas.

Appendix

Study Objectives and Interview Questions Asked.

Objective	Corresponding interview questions
Childhood lead screening knowledge and attitudes	1. Do you routinely screen your patients for blood lead poisoning? If so, can you explain this process? If not, can you explain why you do not? 2. What do you think are the implications of not testing? Do you think these long-term effects are known by most health care providers? (Implications are slow brain development, etc) 3. What is your understanding of the blood lead screening questionnaire and what it tells you that you are supposed to do with it? a. Do you see any value in doing the test if the screener/lead questionnaire is negative? What are your thoughts on this? b. Do you screen at 24 months? Other age? 4. Data suggests that a lot of pediatricians don't test for blood lead poisoning. Why do you think this is the case?
Awareness	1. A lot of health care providers are unaware that lead poisoning in Texas is still an issue (and consider something of the distant pass). Have you heard much about blood lead poisoning still being an issue?
Communication strategies and gaps in communication	1. We are interested in trying to increase the number of blood lead poisoning tests that are done in the state of TX. What type of messaging strategy do you think would be effective in persuading pediatricians to routinely test for lead poisoning? 2. Is there any concern about reaction of parents when testing?

Author Contributions

KP: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
DA: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
CJL: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
BL: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.
AK: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

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