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Evaluating the Efficacy Validation of a Screening Kit for Detecting Lead Hazards

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Introduction

Many states don't assess environmental lead dangers until a child who has been exposed to lead has been found. The fact that only a tiny number of kids are tested for lead and that children with elevated blood lead levels may experience irreparable developmental harm make this passive strategy problematic. A novel lead screening kit was developed in order to shift this paradigm. In this investigation, we validated the accuracy of the kit in comparison to established techniques. 45 participants utilised the kit to gather three samples each of dust, dirt, and paint from their residences [1].

The ageing housing stock in the United States, which is made worse by out-of-date rules and laws, is largely to blame for childhood lead exposure. For instance, the New York City Housing Authority and the National Guard have both lately come under scrutiny for their slowness and disdain for lead testing requirements and public housing rules. The Centres for Disease Control and Prevention estimate that lead-based paint is present in 83% (24 million) of all residences constructed before 1978, putting at least 4 million young children under the age of five at danger of exposure. Leaded petrol wastes contribute to the lead and dust burden in the soil and could be the main source of lead exposure in big cities.

A commercial DIY lead test kit can be purchased as an alternative to hiring a professional. The EPA established new kit requirements on September 1, 2010, requiring test kits to meet both a positive and negative response criterion sensitivity of 95% and a specificity of 90% for paint. The EPA currently states that no commercially available test kit meets these criteria; however, the EPA recognises three test kits that meet the requirements established prior to September 1, 2010, which require a negative response criterion [2].

Given the magnitude of the legacy lead problem in our community and across the country, new methods for assisting families in primary lead poisoning prevention are required. As previously stated, current methods for testing homes are labour intensive, costly, and limited. This kit is a screening tool, which is the first step in identifying a lead hazard in the home. It was intended to be quick, inexpensive and scalable. Furthermore, the development of this kit was not motivated by a commercial interest or the desire to replicate HUD and EPA testing, but rather by the desire to create a screening tool to supplement ongoing state and federal lead risk reduction efforts.

Participants for this double-blind study were recruited in Saint Joseph County, Indiana, USA. Community organisations, medical practises, and word of mouth were the primary sources of recruitment. Community organisations distributed a variety of recruitment materials such as postcards and flyers. Investigators contacted medical practises directly, and practises that believed this project would benefit their patients aided in recruitment. Seminars about the study were also given on campus and posted on the university website. Participants contacted the study team as the study progressed after hearing about the screening testing process from previous participants [3].

Description

In order to check participants' houses for lead exposure concerns and to watch how to utilise a “citizen science” lead screening kit, residences in St. Joseph County, Indiana, USA were visited in the months of June, July, and August. No oral instructions were given to residents other than to follow the written directions in the sample kit, which came with written instructions. After participants collected each sample, the research team watched and carried out in-situ testing at the sample site. Three soil samples, two paint samples, and three composite dust samples are all included in the kit. Before using the kit, the tape, bags, paper, and plastic components were all XRF-analyzed to make sure the lead levels were below the XRF's detection limit [4].

Third, the kit has the potential to significantly improve child lead poisoning prevention and reach. Saint Joseph County has nearly 68,000 homes built before 1978. Given the labor-intensive nature of the SJCHD's risk assessment (approximately 6 person hours are required per home to collect samples and write reports), testing all homes for environmental lead hazards would require 408,000 h, or more than 200 person-years. Given these constraints and shrinking health-care budgets, we arrive at the current situation, in which the vast majority of homes remain untested. Another option would be to distribute these screening kits directly to residents, which would involve families in the process of testing their homes. Trained analysts would still conduct the analysis [5].

The majority of penetrometers are made up of a metal probe with a conical tip attached to a cylindrical shaft. The probe diameter ranges from about 0.1 mm for a small needle penetrometer to more than 10 mm for a large field penetrometer, but it is usually around 1 mm, which is comparable to the diameter of many crop roots such as maize or peas. A relieved shaft with a diameter smaller than the cone basis is frequently used to reduce friction and adhesion between the soil and the shaft.

Conclusion

With the use of the Lead Screening Kit, we may be able to identify environmental lead and so prevent exposure. Parents can start and take part in the primary prevention of lead poisoning with the help of the kit. After decades of relying on a child's high blood lead level to detect environmental lead, the kit provides a more compassionate, proactive, and efficient way to discover lead dangers before children are exposed.

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Conflict of Interest

There is no conflict of interest by author.

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