Pediatrics Brief Report

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# Evaluation of academic detailing to educate clinicians regarding childhood lead poisoning prevention: a pilot study

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### Abstract

Context: Environmental exposures are associated with approximately 19% of disease globally, and exposure to neurotoxic chemicals is estimated to cost the United States \$50 billion per year. Despite calls from the Institute of Medicine to increase training for clinicians regarding environmental health since the 1990s, there is still little instruction in environmental health for clinicians. This leaves gaps in knowledge that need to be bridged through outreach and education to practicing clinicians. Academic detailing (AD) is an educational intervention associated with improved prescribing practices in healthcare professionals but has not been applied to preventive or environmental health. Childhood lead exposure is a common condition associated with lifetime increased risk of cognitive and behavioral problems. Ohio has more than 2 million homes built before 1978, making exposure to lead-based paint a significant public health

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problem; however, only 50% of high-risk children are tested for lead. Few receive health promotion information regarding lead poisoning prevention, in part because this is not a part of training for healthcare providers (HCPs).

**Objectives:** The objectives of this study were twofold: (1) implement a pilot of AD sessions on the topic of childhood lead poisoning prevention with frontline HCPs and their staff in different practice settings; and (2) evaluate the acceptability of these training sessions utilizing quantitative and qualitative methods.

**Methods:** Physicians, nurses, social workers, community health workers, and clinical office staff were recruited from clinics who care for children at high risk for lead exposure. Trainings consisting of small group AD style sessions were presented at these sites. Learning objectives included increasing knowledge regarding lead testing requirements, enabling identification of lead's impact on child development and equipping participants to provide anticipatory guidance for parents regarding lead poisoning prevention. Participants provided feedback through an anonymous questionnaire and qualitative feedback.

**Results:** There were 46 participants (12 physicians in practice/in training, 21 nursing or office staff, and 13 community health or social workers); more than 90% of the participants reported that the training achieved its learning objectives. Small-group presentations were preferred (91%); approximately 39% of participants requested an online format. Participants preferred that the presenters be either a public health or lead clinical expert, and they suggested that future activities include clinical vignettes. **Conclusions:** Academic-detailing style training shows promise in promoting childhood lead poisoning prevention for frontline HCPs.

**Keywords:** education; lead poisoning; pediatrics; public health.

Environmental exposures are associated with approximately 19% of disease globally, and exposure to neurotoxic chemicals, including lead, is estimated to cost the United

States approximately \$50 billion in 2016 [1, 2]. Despite calls from the Institute of Medicine to increase training for clinicians regarding environmental health since the 1990s, environmental health content is only being introduced slowly into the medical school curriculum [3]. Acknowledging that not all topics can be taught during medical school or residency, effective educational products to address these gaps in knowledge for practicing clinicians are needed.

Lead is a neurodevelopmental toxicant with no known threshold for its effect [4, 5]. Ohio law requires lead testing of high-risk children at ages 12 and 24 months [6], but a substantial number of children are still not being screened [7] and testing for at-risk children in the state is 50% overall (Ohio Department of Health, unpublished data). Despite the substantial societal and personal costs associated with childhood lead exposure [8, 9], there are significant gaps in knowledge of healthcare providers (HCPs) in detecting and managing this environmentally mediated illness in children [10]. Unlike in other specialties, many medical centers lack pediatric environmental health training facilities and training opportunities during residency and medical school [11]. Additionally, clinicians may not follow clinical guidelines due to: lack of familiarity, lack of awareness, lack of agreement with recommendations, lack of self-efficacy, lack of outcome expectancy, lack of motivation, and organizational constraints [12–14].

To address these barriers, the Ohio Department of Health (ODH) developed the Pediatric Lead Assessment Network Education Training (PLANET) resource in 2000 and has utilized it continuously for over 20 years. Typically, staff from the ODH presented the PLANET materials, but there were concerns that this was not acceptable to physicians and other frontline workers in clinical practice. Testing rates in the state of Ohio did not increase over that time period, so in its most recent 2017 version, a flipbook was added to be introduced in a clinic setting utilizing an "academic detailing" (AD) model [15, 16]. AD is a method of instruction in which an instructor who is considered a peer or near-peer to the learners delivers educational content in the learners' professional setting, e.g., a healthcare office or clinic [17]. Although AD has been shown to be consistent and effective in improving physician performance [18], there are limited studies examining its use in public health or environmental health [19, 20].

To evaluate and improve the PLANET content and delivery method for clinicians in practice to promote children's health, the ODH collaborated with the Pediatric Environmental Health Specialty Unit (PEHSU) at Cincinnati Children's Hospital Medical Center (Children's) and the University of Cincinnati (UC) to introduce updated

PLANET materials in AD sessions. The objectives of this study were to assess the acceptability and feasibility of the PLANET program content utilizing participant feedback, as well as AD as a training method regarding environmental health for frontline practitioners. This study did not assess change in local testing rates as a result of the PLANET training.

# **Methods**

An experienced presenter and physician from the PEHSU, first author NN, facilitated the sessions utilizing materials developed by the ODH. We utilized a mixed methods approach to evaluate the PLANET materials and the AD method of delivery. Groups of HCPs received the PLANET small group presentation in an AD style [15] utilizing the PLANET flipbook. Each session lasted close to 1 h, and each participant had a flipbook in front of them to follow along with the facilitator. Several copies of the flipbook were also left behind as resources for each setting. The learning objectives for the session were: (1) to be aware of Ohio lead testing guidelines; (2) to identify the negative effects of lead poisoning on child development; and (3) to understand how to educate parents on preventing lead poisoning.

The participants in the sessions were a convenience sample of practicing physicians, residents/trainees, nurses, medical assistants, office staff drawn from community primary care clinics (university-owned family medicine clinic, Federally Qualified Health Center family medicine clinic, private primary care pediatric clinic) as well as Cincinnati Children's Community Health Workers and Social Workers. Because lead testing and follow-up for children is seen as a team activity, a broad variety of healthcare personnel was recruited for this study. As appropriate for the time of day, either breakfast or lunch was provided. The UC Institutional Review Board (IRB) determined that this educational evaluation did not meet the criteria for research involving human subjects.

The participants provided quantitative and qualitative feedback regarding flipbook sessions. The quantitative feedback was collected via a survey questionnaire: three Likert-style questions (five levels ranging from 1 "Strongly Disagree" to 5 "Strongly Agree") regarding achievement of learning objectives; five multiple-choice questions regarding the PLANET training; one question to identify the type of health worker (physician, nurse, etc.); and one optional question asking for email address in case they want to follow up with a separate conversation (Appendix A). Multiple answers were allowed for the questions regarding how the training should be offered (Large group, Small group, Online, Other) and who should offer the training (ODH Staff, Anyone who has already received the training, Physicians with lead specialty training, Professors within a classroom setting, Other). Therefore, the totals for these questions may be larger than the number of participants. The qualitative feedback consisted of a brief focus group discussion or question-and-answer session immediately following the PLANET presentation as well as four open-ended questions regarding content, delivery, and reflection on the PLANET training from the survey questionnaire.

Quantitative data from the Likert-style questions on the feedback questionnaire were summarized with descriptive statistics. Statistical analysis was conducted in Microsoft Excel utilizing the Data Analysis Add-In (Microsoft Corporation, Redmond, WA). Qualitative data were analyzed utilizing an interpretive phenomenological approach; data were analyzed for themes to distill the key facets of the educational experiences provided by PLANET [21]. Because there were relatively small numbers of participants in some of the subgroups, results were analyzed in aggregate.

# Results

## Quantitative results

The flipbook activity was presented at four different locations with a total of 46 participants: resident (n=1), medical student (n=1), attending physician (n=10), nurse (n=9), medical assistant (n=7), community health worker (n=11), social worker (n=2), or office staff (n=5) (Table 1). There were three partially completed questionnaires out of a total of 44 questionnaires submitted; the partially completed questionnaires were included in the dataset. On a Likert-style scale of 1=strongly disagree to 5=strongly agree, participants either somewhat or strongly agreed that the training made them aware of the Ohio lead testing guidelines (95.3%), prepared them to identify the negative effects of lead poisoning on children (93.2%), and helped to educate parents on preventing lead poisoning (93.0%). Overall, the participants agreed that the flipbook presentation achieved its learning objectives with a mean score of at least 4.6 for those questions (Table 2).

When asked about how the PLANET training should be offered, 40 responses indicated that it should be offered through small-group in-person activities, such as the flipbook approach. The lecture format was endorsed by 20 participants, and 17 preferred an online format; however, the PLANET training does not currently exist in an online format. When asked who should present the PLANET training, responses suggested a preference that the presenter be an expert in childhood lead poisoning prevention with the lead specialty physician and the ODH staff receiving 13 responses positive each (Figure 1). Attending physicians equally endorsed this option as well.

### Qualitative results

Participants provided qualitative feedback through open-ended survey responses, focus group discussions, and during the question-and-answer sessions at the end of the presentation. Participant evaluation comments generally fell into one of two themes: changes to PLANET content and suggestions for how to better disseminate PLANET to more HCPs. Participants reported that the brief

Table 1: Participants in Pediatric Lead Assessment Network Education Training (PLANET) flipbook small-group interactive presentation (n=46).

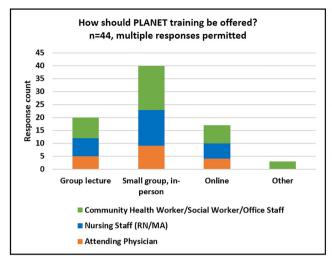
Trainee category	n (%)
Attending physicians and physicians in training	12 (27)
Attending physicians	10
Residents	1
Medical students	1
Nurses, medical assistants, and office staff	21 (43)
Nurses (RN, LPN)	9
Medical assistants	7
Office/support staff	5
Community health workers and social workers	13 (30)
Community health workers	11
Social workers	2

Table 2: Responses to Likert-style questions regarding achievement of learning objectives (1=strongly disagree, 5=strongly agree).

Question	Flipbook	Somewhat or strongly agree
	$\textbf{Mean} \pm \textbf{SD}$	n (%)
1. How strongly do you agree that the PLANET training made you aware of the Ohio lead testing guidelines? (n=43)	4.75 ± 0.78	41 (95.3)
2. How strongly do you agree that the PLANET training prepared you to identify the negative effects of lead poisoning on child development? (n=44)	4.57 ± 0.79	41 (93.2)
3. How strongly do you agree that the PLANET training helped you to educate parents on preventing lead poisoning? (n=43)	4.56 ± 0.93	40 (93.0)

PLANET, Pediatric Lead Assessment Network Education Training.

case studies included by the facilitator were powerful illustrations of the impact that lead exposure can have on patients, and they suggested that additional clinical vignettes would be helpful. Participants also recommended adding more recommendations on the medical management of lead-exposed children, because the PLANET program presented to them focused on sources of exposure as well as the identification of lead-exposed children. In keeping with this, they also wanted additional anticipatory guidance, recommendations, and more discussion of other sources of lead beyond housing, e.g., soil, food, cosmetics, etc. Some respondents requested additional information regarding the pathophysiology of lead. Finally, participants suggested the PLANET training include more information on how to better educate parents



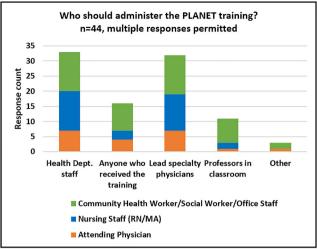


Figure 1: Preferences regarding Pediatric Lead Assessment Network Education Training (PLANET) training sessions. All respondents (n=44).

about the risks of lead exposure, particularly parents bringing lead into the home from their work, and about the abatement programs offered by the ODH.

The other theme from qualitative participant feedback related to how to better educate healthcare professionals about the risks of pediatric lead poisoning. Many participants suggested providing free Continuing Education (CE) credits. Others suggested presenting PLANET at pediatric conferences or pediatric grand rounds around the region. Perhaps reflecting the concern of HCPs who take care of children at high risk for lead exposure, participants suggested that there be more outreach to hospitals and practices, that requirements for lead testing be toughened to hold doctors more accountable for lead testing, and that PLANET training be required with relicensure. Finally, one group suggested that PLANET should be required for practices in the state of Ohio to receive lead testing equipment.

# **Discussion**

Despite many years of recommendations that environmental health be incorporated into mainstream medical training, there are still gaps in HCPs' knowledge of environmental health [3, 10, 22-24]. Although pediatricians report high self-efficacy for managing childhood lead exposure, management of lead exposure is still the number one reason for a physician to contact the PEHSU Network [10, 25], demonstrating an ongoing need for training on this topic.

The PLANET program started with a guidelines-based training for practitioners to help them reduce childhood lead exposure developed by the ODH. As part of a process to improve training for wider dissemination, we carried out the current evaluation. Our collaborative work identified three key recommendations for health departments to consider when providing such training.

### Recommendation #1

Training will be best received when conducted in-person in small group sessions. AD is a method that has been shown to promote behavior change in HCPs, but there is limited evidence regarding utilizing these visits for nonprescribing behaviors, such as our study, which pertains to screening and treatment behaviors [17, 20].

### Recommendation #2

Trainers should be experts in the field (i.e., public health practitioners or environmental health physicians). This is a fundamental principle of AD, and participant feedback in this study supported its importance, from the learners' perspective. In a study of general practitioners in the Netherlands, physicians visited by a peer showed greater practice behavior change than those visited by a nonphysician [26].

### Recommendation #3

Improve the clinical correlation of the material by incorporating vignettes and providing more anticipatory guidance to educate parents about the risks of lead exposure. Additionally, CE credits would encourage participation, as would requiring the completion of PLANET for relicensure or to receive lead testing equipment.

These recommendations, small groups, and in-person training by physicians or other expert health professionals will require significant funding from health departments. Given the constraints in funding in health departments, this may not be attainable; however, the recommendations outlined in this report can be utilized to develop a robust online training. Our work also suggests that the AD model for delivering PLANET is also beneficial. This work is imperative as we aim to prevent childhood lead poisoning. Given the relatively low case ascertainment rate for childhood lead poisoning [7], adapting and disseminating this type of training to other parts of the country with low testing rates may have a significant impact.

One existing resource that state or local health departments could leverage is the PEHSU Network, a national network with representatives in each federal region, funded through the US Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry (ATSDR) to perform education, outreach, and technical assistance activities regarding Pediatric Environmental Health problems, including lead poisoning across the United States [27]. This network provides an excellent opportunity to disseminate the PLANET training program and best practices through systems improvement [28]. Because there are a limited number of PEHSU sites, with one center typically being shared over multiple states, the development of learner-acceptable educational activities, such as AD, to close knowledge gaps in pediatric environmental health is important. Local or state health departments could work with their regional PEHSU to train cadres of "Lead Poisoning Faculty Champions," similar to the successful Asthma Faculty Champions program [29]. Our work is innovative because it leverages the resources of a state health department with the pediatric environmental health and clinician-outreach expertise of the regional PEHSU.

Nearly 40% our participants were interested in online educational offerings; these materials could be adapted to create a virtual flipbook-style presentation, particularly with modern cloud-based conferencing tools. Utilizing what was learned with this project, we developed a series of online virtual trainings based on this work in the context of a practice-based quality improvement project that provided CE credits as well as the maintenance of certification hours for participating clinicians. This was one of the suggestions from the participants in our project.

There are online training resources offered through the PEHSU Network as well as through ATSDR, but because many environmental health problems are local problems

requiring engagement from local stakeholders, having a method to train frontline HCPs utilizing locally relevant guidance is important. This project illustrates that targeted AD sessions are one way that this can be done, although online training is likely a necessary corollary, as recommended by participants.

There were limitations to this study. The participants were selected through a convenience sample in a single Midwestern American city; however, this may limit generalizability. Intentionally, all of the participants care for children who were designated by the ODH as being at high risk for lead exposure. We were not able to measure whether this training resulted in a behavior change in the HCPs trained because it was a study to examine the acceptability and feasibility of the training, although measuring change in testing rates because of training could be an important next step. Anecdotally, one of the participating practices requested technical assistance from one of the trainers to develop a quality improvement project to improve lead testing and the response to elevated blood lead levels in their clinic.

# Conclusions

Lead exposure continues to be a public health problem for high-risk children, yet many children are not receiving recommended screenings or preventive interventions. Clinicians have an important role in identifying these children. We demonstrated that a standardized childhood lead poisoning prevention educational activity offered via AD was acceptable to a multidisciplinary group of healthcare workers who care for at-risk children. This adds to the existing evidence that AD can be utilized to educate clinicians regarding preventive health guidelines. As new environmental exposures important to health are identified such as perfluoroalkyl and polyfluoroalkyl substances, wildfire smoke, and others, having methods to educate clinicians in practice regarding these environmental exposures is one step toward identifying and addressing them.

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