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The Environmental History in Pediatric Practice: A Study of Pediatricians' Attitudes, Beliefs, and Practices

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We conducted a mail survey of practicing pediatricians in Georgia to assess their knowledge, attitudes, and behaviors regarding recording patients' environmental histories. Of 477 eligible pediatricians, 266 (55.8%) responded. Fewer than one in five reported having received training in environmental history-taking. Pediatricians reported that they strongly believe in the importance of environmental exposures in children's health, and 53.5% of respondents reported experience with a patient who was seriously affected by an environmental exposure. Pediatricians agreed moderately strongly that environmental history-taking is useful in identifying potentially hazardous exposures and in helping prevent these exposures. Respondents reported low self-efficacy regarding environmental history-taking, discussing environmental exposures with parents, and finding diagnosis and treatment resources related to environmental exposures. The probability of self-reported history-taking varied with the specific exposure, with environmental tobacco smoke and pets most frequently queried and asbestos, mercury, formaldehyde, and radon rarely queried. The pediatricians' preferred information resources include the American Academy of Pediatrics, newsletters, and patient education materials. Pediatricians are highly interested in pediatric environmental health but report low self-efficacy in taking and following up on environmental histories. There is considerable opportunity for training in environmental history-taking and for increasing the frequency with which such histories are taken. *Key words:* **children's environmental health, clinical history, environmental history, environmental medicine, medical history.** *Environ Health Perspect* **110:823–827 (2002). [Online 8 July 2002]**
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Children confront a wide range of potential hazards in the environment and are especially susceptible to toxic effects because of their developing organ systems, immature biologic defenses, and increased exposure due to small size, diet, behaviors, and other factors (*1*). Public concern for these exposures is high (*2*), and patients frequently ask their physicians about the health effects of environmental exposures (*3*). In recent years the intersection of pediatrics and environmental health, or "children's environmental health," has attracted considerable attention (*4*). This field has been defined as "the diagnosis, treatment, and prevention of illness due to perinatal and pediatric exposures to environmental hazards," together with "the creation of healthy environments for children" (*5*).

Clinical practice plays an important role in advancing and protecting children's environmental health. Health care providers such as pediatricians can help limit children's exposures to environmental hazards by educating parents, identifying hazardous exposures, diagnosing and treating children, and advocating for prevention (*6*). However, physicians have little training in environmental health (*7*). A series of studies by Levy assessing the extent of teaching in occupational and environmental medicine in U.S. medical schools (*8–10*) and a more recent study focusing exclusively on environmental medicine (*11*) found a fairly stable pattern: about one in four schools offer no instruction at all in this area, and of schools that do, the mean number of hours of instruction over 4 years is < 10. Over two-thirds of medical school deans reported that the emphasis on environmental medicine in their schools' curricula is "minimal" (*12*). A similar pattern prevails in residency training (*13–17*).

The clinical history is an essential part of data collection and doctor–patient communication (*18–22*). The environmental history (questions eliciting the parents' concerns and probing potential environmental hazards to which a child is exposed) is readily included in the routine medical history (*23–25*). However, medical professionals seldom elicit an environmental history from their patients (*26,27*). Pediatricians who do ask about environmental exposures usually limit their inquiry to lead and environmental tobacco smoke (*28*).

Whether providers perform preventive practices such as history-taking, vaccination, and lead screening is significantly affected by their knowledge, attitudes, and beliefs (*29,30*). More generally, Bandura (*31*) has identified several factors that help predict behaviors, including self-efficacy and outcome expectancy. Self-efficacy is a person's level of confidence about performing a particular behavior, including confidence in overcoming barriers to performing that behavior. Outcome expectancy refers to the belief that a particular (desired) outcome will follow as a consequence of a behavior. For example, a pediatrician who is confident about environmental history-taking (high self-efficacy) and who expects useful information to flow from this portion of the history (high outcome expectancy) is more likely to take a history than is a physician without these attributes. Assessing these constructs within a population provides the opportunity to identify strategies for behavior change as well as methods for accomplishing these changes (*32,33*).

In the present study we assessed the attitudes, beliefs, and practices of Georgia pediatricians regarding children's environmental health, focusing particularly on the environmental history. We also sought additional information regarding the pediatricians' training and informational sources. We interpreted the results with reference to the conceptual constructs of outcome expectancy and self-efficacy.

Methods

Our target population consisted of pediatricians practicing in Georgia. We obtained the mailing roster from the Georgia Chapter of

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the American Academy of Pediatrics. The roster consisted of 1,416 potential respondents, of whom we eliminated 41 because their practices were outside Georgia or because they were not pediatricians. Of the remaining 1,375, we randomly selected 500 to receive a mail survey.

The questionnaire consisted of 21 items divided into four separate domains. The first domain ascertained information about the pediatrician's demographics, the practice setting, and the patient population. The second domain queried attitudes, beliefs, and self-efficacy on children's environmental health, with an emphasis on environmental history-taking. The third domain inquired about the pediatricians' current behaviors, with questions on how often particular questions are asked during patient visits and on the circumstances in which they are asked (i.e., routinely, based on suspicion of a possible environmental exposure, based on a parent's concern about a possible environmental exposure). The final domain, on information, asked about the pediatricians' preferred sources of information and about what sources or methods they would find most helpful in learning more about children's environmental health. Before the survey, we pilot tested the questionnaire on five pediatricians and made modifications to improve clarity and convenience.

We mailed the questionnaire with a cover letter and a stamped, addressed return envelope in February 2000. We sent a second mailing, with a reminder letter and a second copy of the questionnaire to all nonrespondents. During data entry, we identified missing values and excluded them from the data analysis; we checked data by running frequencies on each variable to check for outliers and data entry errors, and we randomly sampled and checked 10% of the questionnaires for accuracy. We ran descriptive statistics using SPSS, version 10.0.5 (SPSS Inc., Chicago, IL).

The study was approved by Emory University's Human Investigations Committee.

Results

Of the 500 questionnaires mailed, 266 were completed and 23 were returned as undeliverable. The overall response rate was therefore 266 of a possible 477 respondents, or 55.8%. We excluded 38 of the 266 returned questionnaires from analysis because the respondents reported that they were not currently in pediatric practice. Therefore, the final sample analyzed consisted of 228 practicing pediatricians.

We compared respondents and nonrespondents in two ways: urban–rural residence (from the addresses) and date of licensure [from Georgia Composite State Board of Medical Examiners records, which are publicly accessible on the Internet (*34*)]. Date of licensure is a rough proxy of age. Of the 156 surveys sent to rural physicians, 8 were returned as undeliverable, and 91 of the remaining 148 were returned, a response rate of 61.5%. Of the 344 surveys sent to urban physicians, 15 were returned as undeliverable, and 175 of the remaining 329 were returned, a response rate of 53.2%. Among the respondents, the mean number of years of licensure (± SD) in Georgia was 14.9 ± 13.9, and among nonrespondents, the mean number of years of licensure (± SD) in Georgia was 13.5 ± 12.4. Therefore, respondents were slightly more likely to be rural than were nonrespondents, and the two groups did not differ regarding years of medical licensure in Georgia.

Demographics. Table 1 shows the demographic characteristics and practice profiles of the respondents. The mean age (± SD) was 45.7 ± 12.1 years, and the mean number of years in practice was 14.8 ± 11.4. The respondents were about equally divided between men and women, the majority was white, and the majority practiced in urban locations, mostly in private, primary care practices. However, various specialties were also represented, including pediatric cardiology, rheumatology, and immunology;

Table 1. Description of respondents and their practices.

Characteristic	No.	Percent
Age (mean ± SD)	45.7 ± 12.1	
Years in practice (mean ± SD)	14.8 ± 11.4	
Sex		
Male	125	54.8
Female	103	45.2
Race		
African American	17	7.5
Asian	31	13.6
White	165	72.4
Hispanic	10	4.4
Native American	1	0.4
Other or not specified	3	1.3
Location		
Urban	149	65.4
Rural	79	34.6
Type of practice		
Primary care	184	80.7
Specialty	34	14.9
Urgent care/emergency	10	4.4
Practice setting		
Private without HMO	154	67.5
Public	40	17.5
Teaching	14	6.1
Other	7	3.9
Private with HMO	9	3.9
Research	1	0.4
Patients on Medicaid or public assistance		
0–24%	52	22.8
25–49%	65	28.5
50–74%	60	26.3
75–100%	45	19.7

HMO, health maintenance organization.

Table 2. Pediatricians' background in environmental medicine.

Question	Response	No.	Percent
Any specific training in environmental history-taking?	Yes	34	14.9
	No	188	82.5
Past experience with a patient affected by an environmental exposure?	Yes	122	53.5
	No	103	45.2
Do you own a copy of the *Handbook of Pediatric Environmental Health*?	Yes	50	21.9
	No	172	75.4

Table 3. Pediatricians' self-reported attitudes, beliefs, and self-efficacy regarding environmental health.

	Mean ± SD
Attitude statements[a]	
Conducting an environmental health history on all my patients would	
Help parents prevent exposures to environmental threats (n = 223)	3.97 ± 0.70
Identify the exposures causing specific symptoms (n = 222)	3.91 ± 0.69
Add more work on my staff (n = 223)	3.53 ± 0.97
Take up too much time (n = 223)	3.11 ± 0.93
Create a potential reimbursement problem (n = 220)	3.06 ± 1.12
Belief statements (n = 227)	
The role of environmental health impacts on children is of little importance (1) → of great importance (5)	4.30 ± 0.78
Assessing environmental exposures through history-taking in pediatric practice is of little importance (1) → of great importance (5)	4.00 ± 0.86
The magnitude of children's environmental related-illnesses is decreasing (1) → increasing (5)	3.85 ± 0.82
The amount of control pediatricians have over environmental health hazards is minimal (1) → maximal (5)	2.78 ± 0.87
Self-efficacy statements[b] (n = 221)	
Taking a patient history that includes questions on environmental exposures	2.80 ± 0.72
Discussing with parents or guardians the impact of environmental issues on health	2.81 ± 0.74
Finding treatment and diagnosis resources related to environmental exposures	2.51 ± 0.77

[a]Response choices ranged from 1, strongly disagree, to 5, strongly agree. [b]Response choices ranged from 1, not confident, to 4, very confident.

neonatology; allergy and asthma; and hematology/oncology. About one-half of the respondents reported that ≥ 50% of their patients were enrolled in Medicaid.

Training and past experience. As shown in Table 2, fewer than one in five respondents reported having had any training in environmental history-taking. Just over one-half of the respondents reported a past experience with a patient who had been "seriously affected" by an environmental exposure, such as a case of lead poisoning. Approximately one in five respondents had a copy of the American Academy of Pediatrics' *Handbook of Pediatric Environmental Health* (*25*), which was published approximately 6 months before the survey. Several reported in handwritten notes that they were planning to order the handbook, and one requested ordering information.

The pediatricians' answers to these questions did not differ by sex, race, rural–urban location, or practice type (data not shown).

Attitudes, beliefs, and self-efficacy. Table 3 shows data on the pediatricians' attitudes, beliefs, and self-efficacy regarding environmental history-taking. Respondents scored the attitude statements using a Likert scale of 1–5, from "strongly disagree" to "strongly agree." As shown in Table 3, pediatricians agreed relatively strongly that environmental history-taking would help parents protect their children from hazardous environmental exposures (mean, 3.97) and would help identify exposures causing specific symptoms (mean, 3.91). There was less agreement that taking an environmental history would create more work for office staff (mean, 3.53). However, other statements of logistic barriers—that taking an environmental history would take too much time or would create reimbursement problems—elicited little or no agreement (means, 3.11 and 3.06, respectively, with 3.00 representing the midpoint between disagreement and agreement). One pediatrician wrote an additional response to the final question: "We do not get paid for counseling." We found no gender, rural–urban, or practice type differences in the answers to these attitude questions (data not shown). However, Asian-American pediatricians tended to have a stronger belief and white pediatricians a weaker belief, compared with African-American and Hispanic pediatricians, that environmental history-taking would help parents prevent exposures to environmental threats.

As shown in Table 3, we asked respondents to respond to four belief questions. Respondents also scored these questions on a Likert scale from 1 to 5, with the lower scores representing less belief in the importance of environmental health issues. The responses generally indicated that the pediatricians attach considerable importance to environmental exposures. The "role of environmental health impacts on children" yielded a mean score of 4.30, and "assessing environmental exposures through history-taking in pediatric practice" yielded a mean score of 4.00. Pediatricians showed a tendency to believe that the magnitude of children's environment-related illness is increasing (mean, 3.85). However, the responses suggested little belief that pediatricians have control over environmental health hazards, with the mean score (2.78) falling below the midpoint of the continuum. We also found no gender or urban–rural differences in the self-reported beliefs. However, white pediatricians gave slightly lower scores and Asian-American pediatricians gave slightly higher scores to the importance of the role of environmental health impacts on children and the importance of assessing environmental exposures through history-taking. Moreover, urgent care providers gave slightly lower scores to these items than did primary care providers or specialists (data not shown).

As shown in Table 3, we asked respondents to respond to four self-efficacy statements, also using a four-point Likert scale. For all three self-efficacy statements—on history-taking, on discussing environmental exposures with parents, and on finding diagnosis and treatment resources related to environmental exposures—the mean responses fell between "somewhat confident" and "confident." We found no gender, racial, or rural–urban differences in the answers to these items, but urgent care providers reported lower self-efficacy in taking a patient history that includes questions on environmental exposures than did primary care providers or specialists (data not shown).

We asked respondents if they would like to learn more about children's environmental hazards. A large majority—89%—answered affirmatively. One pediatrician indicated a desire to get involved in children's environmental health efforts in Georgia: "I am very interested in helping any way I can."

Practices. Figure 1 shows data on the pediatricians' self-reported interview practices. We presented pediatricians with a list of environmental exposures and asked them which of the exposures they routinely include in their histories, which of the exposures they had asked about during the previous month based on clinical suspicion, and which of the exposures they had asked about in the previous month in response to parental concerns. High numbers of respondents reported routinely asking about cigarette smoking around the child (88.2%), pets in the home (73.7%), source of drinking water (65.4%), lead (59.6%), and housing (54.4%). We saw a similar pattern regarding clinical suspicion, although for three exposures (molds, home heating source, and indoor air) clinical suspicion had triggered more questions than had routine history-taking. We also saw a similar pattern (albeit with lower proportions) for exposures discussed as a result of parental concern, although parents were relatively less likely to

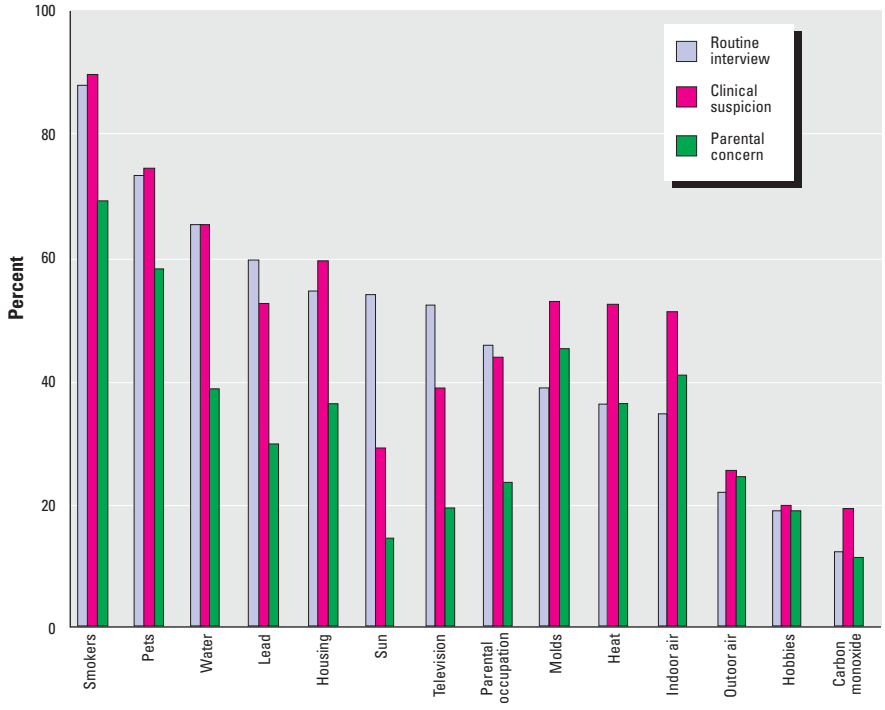

Figure 1. Percentage of pediatricians reporting asking about individual exposures and the triggers for asking about them.

initiate discussion about drinking water, lead, housing, sunlight, and television exposures, and relatively more likely to ask about molds and indoor and outdoor air pollution. Fewer than 5% of respondents reported asking about asbestos, mercury, nitrates, formaldehyde, and radon in response to any of the three triggers (data not shown).

Male and female pediatricians were equally likely to report routinely taking a basic environmental history (housing, parental occupation, and environmental tobacco smoke). However, this routine history-taking varied by race/ethnicity (72.1% of whites, 82.4% of blacks, 51.6% of Asians, and 80% of Hispanics; $p = 0.05$). Pediatricians in urgent care and emergency practices (90%) and in specialty practices (79.4%) were more likely to routinely take a basic environmental history than were those in primary care practices (66.3%), although this difference did not reach statistical significance ($p = 0.11$). Urban pediatricians were more likely than their rural counterparts to take such a history (73.8% and 60.8%, respectively; $p = 0.04$).

Sources of information. We asked the pediatricians about their sources of information on environmental exposures. Their responses are shown in Table 4. The most common source of information identified was the American Academy of Pediatrics (89.0%). Other important sources included professional literature (67.5%), government agencies (58.8%), mass media (27.2%), and colleagues' opinions (27.6%). When asked about sources they would find most helpful in obtaining further information, the responses were similar, as shown in Table 5: guidelines from the American Academy of Pediatrics (69.3%), newsletters (58.8%), patient education materials (51.3%), continuing medical education classes (43.0%), and journals (39.9%).

Conclusions

Georgia pediatricians who participated in our survey evidenced a high level of interest in children's environmental health, a high level of belief in the impact of environmental exposures on their patients' health, and a high level of interest in learning more about the field. Moreover, they perceived few logistic barriers, such as time, effort, or cost, to incorporating the environmental history into their clinical visits.

On the other hand, pediatricians reported very little prior training in taking environmental histories and low self-efficacy regarding taking these histories, discussing environmental exposures with parents, and locating diagnosis and treatment resources related to environmental exposures. Low outcome expectancy—the belief that it is difficult to follow up on interview responses by providing appropriate information, diagnosis, and treatment—aggravates the impact of low self-efficacy. These findings would adversely affect the likelihood that pediatricians elicit environmental histories from their patients.

This was a study of attitudes and behaviors, and not of knowledge. A separate set of questions relates to what pediatricians know about pediatric environmental health issues: how to recognize, treat, and prevent lead toxicity; how to diagnose and treat pesticide toxicity; how to evaluate indoor environments for health hazards; and so on. Pediatricians' knowledge can be assessed through study of relevant questions on board examinations and through surveys similar to the one reported here.

Our data point to clear opportunities to address these problems. In addition to their high level of belief that environmental exposures are important, respondents were able to identify strongly preferred sources of information. Chief among them is the American Academy of Pediatrics, which enjoys very high credibility among pediatricians. Newsletters and government agency publications are also preferred sources of information, more than professional journals and considerably more than Internet-based sources (although this may change over time with growing use of computers). Interestingly, of those currently obtaining information from World Wide Web sites, nearly twice as many report using professional organization sites as commercial medical information portals.

Our response rate of 55.8% was reasonable for a mail survey. However, it was well below 100%, which may have introduced some selection bias. By available measures—rural–urban status and years of licensure in Georgia—the repondents and nonrespondents were roughly similar. However, respondents may still have been more interested in pediatric environmental health and more eager to engage the subject (including learning more about it) than nonrespondents. Our results may therefore overstate the level of interest among pediatricians. Similarly, because our results are based on self-report and because respondents may be motivated to give the "right" answer, the level of interest may be overstated. Nevertheless, we believe our results indicate a considerable reservoir of interest in pediatric environmental health, considerable opportunity for educating pediatricians about this field, and considerable opportunity for increasing environmental history-taking.

Table 4. Physicians' sources of information on children's environmental health.

Source of information	No.	Percent
American Academy of Pediatrics	203	89.0
Professional literature	154	67.5
Government agencies	134	58.8
Colleague's opinions	63	27.6
Mass media	62	27.2
World Wide Web, total	38	16.7
Professional organization sites[a]	30	13.2
Medical sites[b]	18	7.9
General search engines	8	3.5
Advocacy groups	16	7.0

[a]For example, American Academy of Pediatrics (*35*), American Medical Association (*36*), American Chemical Society (*37*). [b]For example, Dr. Koop (*38*), WebMD (*39*), Medscape (*40*).

Table 5. Sources that pediatricians believe are most helpful in gaining further information on children's environmental health issues.

Sources	No.	Percent
American Academy of Pediatrics	158	69.3
Newsletters	134	58.8
Patient education materials	117	51.3
Continuing medical education classes	98	43.0
Journals	91	39.9
Internet	68	29.8
Videos	9	21.5
Multimedia	19	8.3

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