ORIGINAL RESEARCH

Patient attitudes toward issues of environmental health

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Objective.—Although the place of environmental health in medical education has been cautiously explored, patient attitudes toward environmental issues have been largely ignored in the medical literature. The purpose of this study was to evaluate the baseline level of family practice patient concerns about a variety of environmental issues, including their major sources of information and their level of trust in each source. Patient desire for more environmental education was also assessed.

Methods.—This cross-sectional, descriptive study was based on a confidential, 14 question survey administered to a convenience sample of 373 adult family medicine patients at 4 University of Wisconsin-Madison Department of Family Medicine affiliated clinics, including 2 urban, 1 suburban, and 1 rural site. Of 496 patients approached, 415 accepted, and 373 returned complete and acceptable questionnaires. The level of patient concern for each environmental issue, patient trust in each source of information, and the amount of education patients felt they had received from their physician were measured.

Results.—A high level of concern for environmental issues existed among the study sample patients. Although only 18% of patients reported utilizing their physician as a major source of environmental information, physicians were considered the most trustworthy source. In general, patients felt that they had received an inadequate amount of environmental education from their physician regarding all environmental issues presented.

Conclusions.—Patients desire and would be receptive to more environmental education from their physicians.

Key words: environmental medicine, environmental health, patient education, survey, family medicine

Introduction

Public interest in the environment and the environment's impact on health, coalescing with the publication of *Silent Spring*¹ in 1962, is significant in the United States.² More recently, Rosenblatt introduced an "ecobiopsychosocial" perspective from which to approach patient care,³ taking into account the increasing role that environmental degradation plays in human health. This perspective examines human health in 4 dimensions, thus acknowledging the combined and interactive roles of biological, psychological, social, and environmental factors.

A handful of studies have examined the potential

place of the environment in medical school curricula. Academic deans reported that expected competency levels in environmental medicine were only low to moderate for graduating medical students. Most (70%) of the deans stated that their curricula placed only minimal emphasis on environmental health,⁴ often combining this discipline with occupational health. Although interested in environmental issues,⁵ medical students rated the environmental medicine component of their training the least important out of 9 components.⁶

High levels of public interest in environmental issues as they relate to health have been assumed on the basis of levels of environmental activism.^{7,8} Only on rare occasions within the medical literature, however, have patients been asked directly about their general environmental concerns. The purpose of this descriptive study was to define the level of interest and concern of primary care patients regarding a variety of environmental issues. In addition, major sources of environmental information

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were evaluated, as was the level of trust placed in each of these sources. From this information, a better understanding may be achieved from which to direct future medical education and physician involvement in the environmental health of their patients.

Methods

QUESTIONNAIRE DESIGN

A 14-item, 3-page questionnaire was developed and administered to a convenience sample of adult (≥ 18 years of age) patients at 4 University of Wisconsin-Madison Department of Family Medicine affiliated clinics. Two clinics (Wingra and Northeast) represented urban patient populations, whereas the others were dominated by suburban (Verona) or rural (Belleville) populations.

Five questions permitted demographic analysis of the study sample. The remaining questions allowed for a general assessment of patient attitudes toward a number of environmental issues and concerns. Specifically, the questions examined: 1) the level of patient interest and concern regarding each of 7 environmental issues (air quality, water quality, radiation, population growth, land use, biodiversity, and food quality), 2) the level to which patients felt environmental problems affected their health and well-being and that of their families, 3) major sources of environmental information, and 4) the level of patient trust in these sources. Patients were also given the opportunity to rate the environmental knowledge level of their physician, the adequacy of education that they had received from their physician concerning each of 7 environmental issues, and whether they would want more environmental education from their physician. Each question was presented in a 7-point Likert scale or multiple-selection format.

Patients were approached by a research assistant (JCM) in clinic waiting rooms and given a short explanation of the research project before being invited to participate. A cover letter was also included with the questionnaire to further explain the project, its purpose, and the confidential nature of responses. Questionnaires were returned to the research assistant before or after the patient's appointment, depending on the length of time in the waiting room.

QUESTIONNAIRE ANALYSIS

Descriptive statistics were employed for the initial analyses of the patient responses and demographic data. Composite levels of interest and of adequacy of information received were calculated for each patient by totaling the responses to the 7 environmental issues and

dividing by 7, thus yielding a continuous scale from 1 to 7. Analysis of variance (ANOVA) was used to assess the relationships among continuous variables. Significance among discrete variables was tested using χ^2 statistics.

Results

RESPONSE RATE

Of the 496 patients approached, 415 patients accepted the questionnaire, and 373 patients returned complete and acceptable questionnaires. A response rate of 75.2% was therefore obtained. The study sample included approximately equal representation from the 4 family practice clinics involved. Of the complete and suitable questionnaires collected, 92 (24.7%) were from Wingra, 102 (27.4%) from Verona, 93 (24.9%) from Belleville, and 86 (23.1%) from Northeast. Most refusals were based on process (eg, lack of time, significant illness, or the presence of small children) rather than on content issues.

GENERAL DEMOGRAPHICS OF STUDY SAMPLE

The demographics of the study sample followed those of the clinics' usual patient populations (Table). The mean age of respondents was 41.5 years, although the sample ranged from 18 to 86 years of age. The majority of respondents were female (70.4%), and 79.5% of respondents had children (ie, were parents).

PATIENT CONCERNS, INFORMATION SOURCE, AND TRUST

Patients rated their level of interest and concern regarding 7 different environmental issues using a 7-point Likert scale (1 representing "very interested" and 7 representing "not at all interested"). High levels of interest (median; mean) were recorded for all issues: food quality (1; 1.78), water quality (1; 1.84), air quality (2; 2.02), land use (2; 2.26), biodiversity and wildlife (2; 2.29), radiation (2; 2.37), and population growth (3; 2.76). Overall, the mean composite level of interest in environmental issues was 2.18 (median = 2; Figure 1), indicating a general high level of interest and concern. The composite level of interest was related to age (ANOVA: $F_{[3,330]} = 5.36$; $P = .001$), but not significantly related to sex, ethnicity, education level, parental status, or clinic affiliation. Respondents between the ages of 45 and 59 expressed the greatest level of interest and concern about environmental issues (mean = 1.93) whereas the youngest group (18–29 years old) had the lowest level of interest (mean = 2.57).

Study demographics

	<i>n</i> *	%†
Sex		
Female	259	70.4
Male	109	29.6
Age, y		
18–29	72	20.5
30–44	145	41.3
45–59	95	27.1
60+	39	11.1
Parental status		
Children	290	79.5
No children	75	20.5
Ethnicity		
White	317	86.9
African American	22	6.0
Mixed	11	3.0
Asian	7	1.9
Hispanic	6	1.6
Native American	2	0.6
Education level completed		
Grades 1–8	2	0.6
Grades 9–11	19	5.4
Grade 12 or GED‡	128	36.3
1–3 years college	95	26.9
College graduate	73	20.7
Postgraduate	36	10.2

* Totals are less than 373 due to missing data on questionnaires.

† Percentages based on total number of responses for each question.

‡ GED indicates General Equivalence Degree.

Composite level of Patient Concern over Environmental Issues

Figure 1. Composite level of patient interest and concern regarding environmental issues.

Perceived Effect of Environmental Problems

Figure 2. Perceived effects of environmental problems.

Perception of environmental risk was assessed using 2 questions. First, respondents were asked to what degree environmental problems affect them or their family. On a 7-point Likert scale with 1 meaning “very much” and 7 meaning “not at all,” the median (mean) response to this question was 2 (2.72). Then patients were asked to what degree environmental problems affect their health or the health of their family. With the same scale as before, the median (mean) response was 2 (2.67). The majority of respondents strongly felt that environmental problems affected them and their health (Figure 2).

Patients were asked to identify from a list their major sources of information on environmental issues (Figure 3). These included television (broadcast media), magazines and newspapers (print media), church or clergy, politicians, doctors, family, friends, and environmental organizations or activists. The greatest percentage of patients utilized print (87.3%) and broadcast (83.3%) media as major sources of information. Approximately one third of respondents used friends (35.6%), family (33.7%), and environmental activists or organizations (27.2%). The least utilized sources included doctors

Major Sources of Environmental Information

Figure 3. Utilization of major sources of environmental information.

Patient Trust in Sources of Environmental Information

Figure 4. Level of patient trust in various sources of environmental information.

(18.7%), politicians (11.3%), and church or clergy (10.5%).

Significant differences in level of trust were found among the sources of information (ANOVA: $F_{[7,2605]} = 83.80$; $P < .001$; Figure 4). Although physicians represented one of the least likely sources of information on environmental issues, the respondents rated doctors the most trustworthy with a median (mean) rating of 2 (2.33) on a 7-point Likert scale (1 representing "high level of trust" and 7 representing "no trust at all"). Sex was the only significant demographic factor in determining level of trust in doctors. Women were more trusting of physicians than men (ANOVA: $F_{[1,317]} = 6.04$; $P = .015$). Broadcast and print media received median (mean) ratings of 3 (3.20) and 3 (2.95), respectively. Lower scores (median; mean) were awarded to family (3; 2.69), friends (3; 2.89), church or clergy (3; 3.33), and environmental organizations or activists (3; 3.37). Politicians were rated the least trustworthy with a median (mean) score of 5 (4.85).

PHYSICIAN KNOWLEDGE AND ADEQUACY OF INFORMATION

Patients were asked how knowledgeable their physician was about environmental issues and their effects on patients' health (Figure 5). On a 7-point Likert scale (1 representing "very well informed" and 7 representing "not informed at all"), the median (mean) level of environmental knowledge given to doctors was 4 (3.41). However, patients responded that their physicians had higher levels of knowledge (median = 2; mean = 2.69) when asked, "How knowledgeable is your doctor about environmental effects on your health?"

A minority of respondents (22.5%) had discussed an environmental issue and its effect on their health with a

Perceived Level of Physician Knowledge Regarding Environmental Issues and Their Effects on Health

Figure 5. Perceived physician knowledge on environmental issues and environmental health.

doctor. This level was in good agreement with the percentage of patients regarding their physician as a major source of environmental information. Of these patients, the average length of time since that discussion was 1.06 years. When asked if they would like more environmental education from their doctor, 54.6% of surveyed patients responded "yes." Women were more likely to respond "yes" than men (58.5% vs 46.5%; $\chi^2 = 4.112$; $df = 1$; $P < .05$). Significant differences also existed between clinics. Patients from the urban clinics (65.5% and 65.3%) were more likely to answer "yes" than those from the suburban (45.6%) and rural (44.4%) sites ($\chi^2 = 14.207$; $df = 3$; $P < .005$).

In general, the majority of the patient population (73.4%) felt that they had received too little information and education from their physician regarding environmental issues (Figure 6). Only 6% of patients felt that they had received too much information. The mean (median) composite level of information received was 2.43

Adequacy of Information on Environmental Issues from Family Physicians

Figure 6. Composite level of adequacy of amount of information on environmental issues received from family physicians.

(2) on a 7-point Likert scale (1 representing “too little” and 7 representing “too much”). Specifically, patients felt that they had received too little information concerning land use (median = 2; mean = 2.25), radiation (2; 2.26), biodiversity (2; 2.27), population growth (2; 2.34), air pollution (2; 2.52), water pollution (2; 2.56), and food quality (2; 2.74). Significant differences in the adequacy of environmental information or education received were detected among demographic groups on the basis of parental status and clinic affiliation. Patients without children reported receiving less information and education than those with children (means of 1.94 vs 2.55; ANOVA: $F_{[1,295]} = 9.40$; $P = .002$). Subjects from the urban (means of 2.22 and 2.42) and suburban (2.19) clinics reported receiving less information than patients at the rural (2.90) site (ANOVA: $F_{[3,297]} = 4.39$; $P < .005$).

Discussion

Physicians currently attend to patients who have grown up exposed to familiar works on environmentalism such as Rachel Carson's *Silent Spring*¹ and Dr. Seuss's *The Lorax*⁹ and have considerable interests in environmental issues.² In addition, physicians are in greater demand to provide patient and community groups with information on environmental risks.⁴ Consequently, there have been a few recent reports signaling the responsibility of the medical community in addressing environmental problems as they relate to health.^{3,10,11} The development of a 4-dimensional ecobiopsychosocial perspective in the family practice literature has been proposed to acknowledge “the fact that the health of our patients and ourselves is affected by events that take place on a global scale.”³ In this context, attention to environmental issues is essential.

Although primary care physicians are often the first contact for patients presenting with environmentally-induced illness,^{12,13} few studies exist evaluating physicians as sources of environmental health information^{12–14} or the interests in environmental issues by primary care patients.¹⁵ This study sought to describe the current environmental interests and attitudes of family practice patients.

Patients encountered in our family practice clinics were, in general, very interested in environmental issues, with most reporting that environmental problems had effects on their health and the health of their families. Issues of water, air, and food quality were at the forefront of their environmental concerns. Although the patients were slightly less concerned with radiation, population growth, biodiversity, and land use, these issues were of high interest as well.

Family physicians were seen by their patients as being moderately well informed about environmental issues in general and very well informed regarding their health effects. Despite that fact, only 1 in 5 patients had discussed an environmental issue with his or her physician. Likewise, surveys of residents in 6 communities across the United States¹⁴ and in Canada¹² have indicated that physicians were the least commonly used source of information on environmental risks.

Even though physicians were not readily utilized as sources of information in this study, they received the highest level of trustworthiness concerning environmental issues. Similar levels of trust have been documented regarding environmental risk information in a community survey.¹⁴ Results of a Health Canada survey¹² have also documented the disparity between high trust and low utilization of the medical community as a source for information on issues of environmental health.

Most patients reported that they had received inadequate amounts of information and education from their physicians regarding environmental issues. Although some of these are not traditionally in the context of a medical visit (biodiversity, population, and land use), others clearly are (air, water, and food quality). Patients with children and patients in rural settings tended to report that they had received more information than other patient groups. These differences may be the result of routine lead screening with associated questions about the home environment that occur during well-child examinations and the day-to-day exposures of farm families to various agricultural chemicals. For example, a study of Australian physicians found that rural physicians were utilized twice as often for questions of environmental health than were urban colleagues.¹³ Female patients and patients in urban areas tended to be more interested in receiving more environmental information.

Several limitations exist within this study. Although a reasonable response rate was obtained, some patients did not return the questionnaire or agree to participate in the study. It should be noted, however, that most patients refusing participation did so because they did not feel well or were preoccupied with children.

A bias toward overrating the general level of trust in doctors concerning environmental issues may be present. Because this questionnaire was administered in the waiting rooms of family practice clinics to patients awaiting their appointments, patients may have extended their trust of doctors on medical issues to environmental issues. Also, people found at the doctor's office probably trust their physicians more than people who do not visit their doctors when sick or for routine visits. Despite the potential bias, this study focused on the perspectives of

family practice patients so that changes could be made within the clinic setting if appropriate.

Although the demographics reflected patient populations of each clinic, generalizability of this study to other geographical areas may be limited. Nevertheless, a comparable study of 343 elderly patients in 6 family medicine clinics in South Carolina¹⁵ produced very similar results in terms of patients' sources of environmental information, with television and newspapers cited as the most common major sources of information, followed by friends and environmental groups. The low utilization of doctors also closely resembled results found in this study. Moreover, respondents' major concerns were in good agreement with the results found here.

In summary, this study provides an estimate of family practice patients' level of interest and concern among several environmental issues, their major sources of information, and their trust in these sources. The majority of patients surveyed felt that environmental problems affect their health. It is reasonable to conclude that patients do perceive environmental health risks in their lives. They highly trusted their physicians' knowledge of environmental health issues. Doctors, however, were underutilized as a source of environmental education. Moreover, patients felt that they did not receive enough environmental education from their physicians, despite being a highly trusted source.

Factors that may contribute to this underutilization may be found in the lack of public policy directed to environmental health issues¹⁶ and the minimal formal training that physicians receive in environmental medicine and health.⁶ Although medical students express interest in environmental medicine,⁵ medical school curricula are extremely crowded,^{4,17} with the average student receiving only 4 hours of instruction on environmental and occupational medicine over 4 years.¹⁸ Thus, most physicians are inadequately trained to discuss issues of environmental health.

We believe family physicians and other primary care physicians should address the environmental concerns of their patients more often, offering information on how environmental problems may affect their health or the health of their families. An enormous opportunity exists within primary care medicine to embrace environmental health. From the perspective of medical school deans,⁴ no clear consensus emerged on which department (Occupational Medicine, Community Medicine, Family Medicine, or Internal Medicine) should teach environmental health. Regardless, more of this training needs to occur.¹⁹ Because patients with environmental health issues are often encountered in the primary care arena and because environmental issues have an impact on the biological, psychological, and social spheres of our patients, it may be time to adopt an ecobiopsychosocial

perspective and capitalize on the high levels of trust that our patients bestow on us.

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