



Medical Education and Global Climate Change: Report of a Third-Year Course

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We introduced a curriculum element on global ecological change and destabilization into our introductory third-year course for medical students on occupational and environmental health. The case study was based on a reading from a report on ecosystem and human health prepared for the Canadian Public Health Association. Students were required to submit a response to a questionnaire on the issues. It was well received by the students, receiving the highest personal interest score among a series of case studies in the course. Individual responses by students demonstrated insightful thinking and enthusiasm. [JGIM 1993;8:116-120]

Global ecological change and ecosystem destabilization are issues barely mentioned in the medical curriculum, despite their profound importance to human health. In a crowded course of study, issues of ecological change do not compete successfully with topics more directly germane to clinical management. However, the absence of such an element in the curriculum sends to students its own message that these matters are not a serious concern for the medical profession [1]. If physicians of the future are to be prepared to deal with the implications of these issues—let alone to work effectively toward their resolution—issues of global change must be represented in the medical curriculum. We intro-

duced an element into the curriculum on an experimental basis to determine acceptance and interest on the part of students.

The traditional public health view of “environmental health” considers environmental determinants of human health, with an emphasis on direct effects. However, within the environmentalist community, and particularly among activists, environmental health is as often used in the sense of “the health of the environment.” Emphasis is placed on indicators of instability or overt degradation in natural systems. The connection to human health is indirect in this latter definition and may be mediated by the social and economic implications of the ecological disturbance as much or more than by exposure-response relationships. We use here the term “ecosystem health” to describe the integrity of environmental systems on a regional or larger basis without direct reference to human health. This concept of “ecosystem health” helps one to perceive human health problems as

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comprising one of a set of outcomes that may result from environmental disturbances. Human health problems, once widely recognized, are probably more likely in contemporary society to stimulate a response to bring them under control. The identification of human health problems tends to motivate action on underlying environmental problems, but the identification of environmental problems without a health component is less likely to provoke a response.

Physicians have been shown to be the professional group carrying highest credibility in the minds of the public in several recent surveys [2]. Pronouncements on environmental health matters by physicians are generally given great weight by the public. However, the reality is that very few physicians are rigorously trained in environmental health and most of these are out of the mainstream of medical practice, working in the public health system, government, or in research settings. Even fewer are systematically trained in ecosystem health and when this occurs it is usually because of personal dedication to an issue or because their premedical training happened to include it. Thus, physicians are only rarely able to meet the inflated public expectations of credibility in this issue on the part of the medical profession, and there is a grave risk that without adequate preparation their leadership in forming local opinion will be misleading or worse. Our undocumented impression is that at present there is much misinformation being put forward by physicians who do not know what they

do not know. Ideally, some physicians who have exposure to this topic in medical school will be motivated to learn more and to become resources in their community. A few may pursue career interests in the field, most will at least follow the drift of issues and will interpret medical implications for their patients with reasonable accuracy, and the remainder will be aware that they do not know enough to comment, will acknowledge their ignorance, and perhaps seek to learn more.

To address this gap in the medical curriculum, we designed an exercise around an authoritative report on ecosystem and human health developed by the Canadian Public Health Association [3] and incorporated it into the introductory course in occupational medicine at the University of Alberta, given to students in their third year.

METHODS

Community Medicine 431B, "Occupational Medicine," is a required course for medical students in their third year at the University of Alberta Faculty of Medicine. It is part of a predominantly clinical lecture series for students entering the first half of their clinical phase of education (Phase IIIA). The course consists of 12 contact hours divided into lectures on toxicology and occupational medicine and four case studies in which students are encouraged to work in small groups. The case studies are a recent innovation in the course. They consist of an introduction, a presentation or reading, a query and response sheet, and

Table 1. Student Response Questions for Case Study #4: Large-scale Ecological Issues

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1. a. What do you think are the three principal hazards to human health likely to result from ecosystem destabilization as described?
b. What information would you want to confirm or correct your impression?
 2. a. What do you think are likely to be the three most significant health problems to result from ecosystem destabilization as described?
b. What information would you want to confirm or correct your impression?
 3. a. What are the most essential changes that must occur for health problems resulting from ecological changes to be avoided?
b. What can physicians do?
 4. a. What is the role of biomedical research in dealing with global ecological changes?
b. What is the role of clinical medicine in dealing with global ecological changes?
 5. On a scale of 1 to 10 where 10 is highest, how interesting did you personally find this material?
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Table 2: Distribution of Overall Personal Interest Scores for Four Case Studies

Case Study	Median Score	Aggregated Scores (Scale: 1-10)					
		1 - 2	3 - 4	5	6 - 7	8 - 9	10
Occupational Injury	5	7	14	43	32	23	2
Occupational Illness	6	2	5	27	41	37	8
Indoor Air Quality	7	9	11	23	56	17	4
Global Environment	8	4	7	13	35	42	18
Interpretation:		Boring	Uninteresting	Neutral	Interesting	Very Interesting	Exceedingly Interesting

a discussion of the current answers. Each case study was evaluated by students for interest and relevance.

In 1992, we introduced a module on ecosystem and human health as the fourth case study. As a reading, we used the text of the Report of the Task Force on the Implications for Human Health of Global Ecological Change of the Canadian Public Health Association. The query-response sheet, which must be completed and turned in by the students for credit in the course, is given as Table 1. The conclusions of the report were used for the discussion section of the exercise.

RESULTS

Table 2 presents the distribution of responses for the evaluations of each of the four exercises, comparing the ratings given to the exercise on ecosystem health to those of the other three, which were much more directly clinically relevant. Of the four exercises, the one on ecosystem health received the highest ratings by students and the most consistently high ratings.

Because the completion of the response sheets was an open book class exercise, they are invalid as a survey of student opinion. Responses were essentially 100% for identifying global warming, ozone depletion, and pollution as major hazards and requesting further documentation (although three students volunteered that the documentation they had reviewed satisfied them). Likewise, almost all concluded that food shortages, toxicity, and climate-related health

problems would be among the most significant health problems. Every student also responded that physicians have a duty to educate the public and that science must document the problem further.

Table 3 presents selected responses submitted by individual students for specific items on the query-response sheet. It can be assumed that the students completed these items before they read the conclusions of the document, as designed, as there was no penalty for incorrect or poorly justified responses; credit for the exercise was given for completion alone. These spontaneous responses were exceptional in that they appear to represent students' personal opinions and values rather than the case material.

DISCUSSION

In July 1992, a conference on the environment as a theme in medical education and the responsibility of physicians in this area was held at the Johnson Foundation's Wingspread Center in Racine, Wisconsin, convened by the Medical College of Wisconsin. The deliberations at that meeting highlighted the inadequate preparation of physicians to address environmental issues and called for the introduction of environmental issues into the medical curriculum. The medical curriculum is, of course, already crowded and intensive. The addition of another major component will not be easily achieved. We have tried to do so on a trial basis in order to gauge medical student receptiveness and interest.

Table 3: Selected Comments from Individual Students

1. *On what physicians can do with respect to health problems associated with global ecological change (3b):*

Universal responses: educate the public, advocate, set a good example.

"Do our part as individual citizens ..[but] we should not bear any more responsibility than any other citizen! (This does not mean doing nothing!)"

Reduce standard of living and income (to set an example). Work with local environmental organizations, community-based groups (5 responses). Environmentally friendly office practices.

Stimulate the development of "green teams" at local hospitals.

2. *On the role of biomedical research in dealing with global ecological change (4a):*

Universal responses: document and monitor the problem.

"Genetic engineering of species to cope with environmental change."

Develop a long-acting but reversible form of contraception.

Nonpolluting measures for treating human disease, controlling public health problems, and protecting food supplies.

3. *On the role of clinical medicine in dealing with global ecological change (4b):*

Universal responses: identify and monitor environmental-related disorders.

Work toward prevention rather than cures.

Develop cures for environmental diseases.

More vigilance needed in looking for environmental effects.

"Imagine treatment of multifactorial diseases."

4. *General:*

"Good soul-searching...exercise!"

"The most interesting and useful [part of] material relates to global thinking."

"[This exercise] took more than 30 minutes to complete [time period allotted in calendar]."

The high acceptability of this curriculum element on ecosystem health should be encouraging to efforts to introduce this topic into medical education. It suggests that ecosystem health issues can compete successfully with clinical topics for the attention of medical students.

In future offerings of this course, we intend to add ungraded questions to the final examination in order to test retention of the material on ecosystem health. If these demonstrate the effectiveness of the module as a teaching instrument on a par with other elements

of the course and if student acceptability remains high, we will then consider adding graded questions. At present we are reluctant to do so because we do not wish to undermine the hard-won acceptance of core material in occupational medicine elsewhere in the course. We would rather the student become accustomed to this unusual material first before declaring it core content.

The comments offered by the students beyond the stereotypical responses required by the exercise give a glimpse of their thought process. At least one obvi-

ously felt put upon, singled out as a physician-to-be and defensive about assuming disproportionate responsibility. One was either idealistic (or sarcastically cynical) in proposing material sacrifice by physicians. Perhaps the most interesting comments were those that called for practical nonpolluting measures for treatment and control of public health problems.

The exercise is based on an authoritative document produced in 1991. Inevitably it will require revision, but we expect that it will remain acceptably accurate for at least a few more years. At present, it is partic-

ularly effective for our purpose because it is self-contained, health-oriented, Canadian in perspective, and written in a relatively engaging style. ■

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