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Environmental Challenges and Visions of Sustainable Health Care

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As long ago as the 4th century BC, Hippocrates advocated a framework that related medical and public health practices. He urged physicians to pay attention to the environmental, social, and behavioral context in which illness occurs. The airs "peculiar to each particular region", the "properties of the waters" that individuals drink and use, and the "mode of life" of inhabitants were, he said, essential to understanding their health. Much later, in the 19th century, Florence Nightingale promoted this same framework with her emphasis on the importance of clean water and air, along with adequate sanitation. At the same time, Rudolf Virchow, considered by many to be the founder of modern pathology, emphasized the importance of social and political factors in determining health. Virchow described medicine as a social science and politics as the practice of public health on a large scale.

Throughout most of the 19th century, clinical medicine and public health were closely linked, but in the US at the beginning of the 20th century, their paths began to diverge. A wedge was driven by various factors, including cultural differences among disciplines, evolving scientific knowledge that led to specialization, an imbalance in funding, competition, and a growing lack of trust and communication. Biomedical advances gave individual practitioners curative tools and skills previously unknown. Medical education focused on teaching individual practitioners to recognize and treat disease in individuals. Medical schools developed curricula and examinations intended to hone those skills. Individual patients benefited.

Public health, however, continued to be practiced by a mixture of nurses, physicians, statisticians, demographers, epidemiologists, bacteriologists, engineers, politicians, and others. Impressive public health benefits, seen particularly in the decline of infectious diseases, resulted from improved sanitation practices, living conditions, and vaccination programs. As clinical medicine continued to focus increasingly on high-tech curative approaches and mechanisms of disease, however, little attention was paid to how that medical care might adversely impact either public health or the environment, since all eyes were on patient outcome.

The impacts of this limited focus are now becoming clear. The medical-industrial complex is a large and diverse enterprise, representing about 12% of the gross national product (GNP) in the US. Its "ecological footprint" is large. Hospitals, medical and dental offices, nursing homes, and home-health agencies consume, use, and dispose of large quantities of diverse natural resources and manufactured goods. On a square foot basis, hospitals and related facilities are second only to manufacturing in electricity use in the US. Water consumption and discharge to public sewer systems are excessive. "Waste" water contains toxic industrial and pharmaceutical compounds, many of which are not broken down in sewage treatment plants and are disposed of in landfills, sewage sludge applied to farmland, or in rivers and streams.

An endless flow of materials through medical facilities ends up in a large, diverse, and toxic waste stream, much of which is carried away to distant landfills or burned in incinerators that release hazardous substances into the air and onto the surface of the earth. According to the US Environmental Protection Agency (EPA), medical waste incinerators are the second leading quantified source of environmental dioxin emissions and are responsible for about 10% of anthropogenic mercury emissions to the environment. Both dioxin and mercury biomagnify as they pass up the food chain and return to us in fish, beef, pork, dairy products, cheese, and breast milk. Each is particularly dangerous for the fetus and infant in extraordinarily small amounts that are similar to current exposure levels in some of the general population. Mercury damages the developing brain. Dioxin fundamentally alters many aspects of development, including the immune, endocrine, reproductive, and central nervous systems. Dioxin is also a carcinogen. In addition to humans, wildlife, like loons and other fish-eating birds and mammals, are often contaminated with mercury and dioxin with resultant health effects.

Intact ecosystems provide services essential for human and wildlife health, including clean air, water, and food, and waste recycling. Resource consumption, contamination of air, water, and soil with chemical and biological agents, stratospheric ozone depletion, global warming, acid rain, and eutrophication of fresh and coastal waters degrade those ecosystems. The medical-industrial complex directly contributes to each of these. Unfortunately, until recently, with their focus on therapeutic medicine, heath care providers and

institutions were largely unaware of the public health and environmental impacts of their practices. Now, that is beginning to change with increasing demands that health care institutions take responsibility for practices that degrade ecosystems and damage the health of humans and other species. The challenge is to minimize adverse impacts through reduction of natural resources and materials use, product reformulation, closed loop manufacturing and recycling processes, increased energy efficiency and use of renewable energy sources, and attending to entire product life cycles, while continuing to provide high quality patient care. Specific examples include elimination of mercury- and PVC-containing products where possible, preferentially choosing reusable products, eliminating unnecessary packaging, increased daylighting to reduce electricity use, recycling programs, paper use reduction, and double-sided copy machines.

Environmental performance as a core value

Historically, environmental performance has rarely been a core business value for hospitals, which have had little incentive to monitor or improve their performance beyond regulatory requirements. Success in meeting the need for equipment, materials, and services for healthcare professionals has been judged largely by availability, affordability, and performance, while little attention has been paid to the environmental impact of materials manufacture, use, and disposal. Hospital waste disposal practices are usually guided by regulatory requirements and limited economic considerations--not by an ecological analysis that internalizes the diverse impacts of those practices and that shows concern for how others outside the institution might be affected.

The environmental performance of healthcare facilities varies widely. A few have shown outstanding leadership in improving their practices, often because an individual or a small committee within an institution has prioritized the issue and forced it onto the agenda. A somewhat larger number have taken early steps to reduce the volume of regulated waste, primarily because of cost considerations. But many hospitals and other related institutions have done very little to improve their performance. In other words, a snapshot of the field shows a spectrum of behaviors that range from bare regulatory compliance to creative and innovative strategies that reflect a deeper understanding of the importance of what is at stake. For discussion purposes, these may be somewhat artificially divided into three "tiers".

Tier I

Currently, in the US, healthcare institutions must comply with standards or regulations established by the EPA (under authority of the Clean Air, Clean Water, Resource Conservation and Recovery Acts), Occupational Safety and Health Administration, Department of Transportation, the Centers for Disease Control and Prevention, and with state and Publicly Owned Treatment Works (POTW) requirements.

Although the Joint Commission for Accreditation of Healthcare Organizations (JCAHO) is an accrediting organization, it functions as a virtual regulatory agency since hospitals must be JCAHO accredited in order to receive federal funds. The JCAHO standard for management of the environment of care says that the goal is to provide a safe, functional, and effective environment for patients, staff, and other individuals in the hospital. It says nothing about the facility's impact on the environment outside the walls of the institution, though it does include the requirement for a hazardous materials and waste management plan.

None of these standards requires healthcare managers or practitioners to look upstream at general materials policies, life-cycle analyses, or specifically to consider environmental impact outside the institution, except to the degree that they may be forced to do so in order to come into compliance. The environmental performance goal of Tier I institutions is simply to do what they must to stay open.

Tier II

Some healthcare institutions have moved beyond compliance, driven primarily by economic incentives and sometimes by community pressures. They reduce the volume of regulated medical waste by waste segregation and intensive educational efforts, developing recycling programs, and addressing purchasing practices that strikingly influence the volume of the waste stream.

When administrators are concerned about the public health and environmental impact of their purchasing and disposal practices, they may, for example, choose to

phase out use of mercury-containing devices, and polyvinyl chloride (PVC) plastics where possible, without sacrificing quality of care. However, even here, economic considerations often override concern for public health and the environment.

Tier II hospitals begin to look at life-cycle analyses and identify opportunities to reduce, reuse, and recycle. These efforts, however, are largely driven by economic incentives and are unlikely to be sustained if they do not have a neutral or positive impact on the bottom line

Tier III Moving from Tier II to III requires a commitment to environmental performance as a core institutional value. Ethical concerns become primary motivators to move to this level. For a healthcare institution, this is an opportunity to consider the degree to which it truly believes that health promotion requires contributing to the conditions that promote physical and mental health as well as treating injury or disease. Tier III institutions understand the inextricable link between human health and the environment. These hospitals have closed the gap between clinical medicine and public, environmental, and occupational health in a fundamental way that reflects a deeper understanding of their interrelationships. They know the material and energy inputs into their facilities and their outputs. They have long-term plans in place to reduce their ecological footprint.

For these healthcare institutions, environmental performance directly relates to the core purpose of the organization inasmuch as pollution and environmental degradation have direct impacts on ecosystem health. At Tier III, environmental performance is not an add-on, useful perhaps for public relation purposes, but subject to neglect, depending on the priorities of individual decision-makers. At Tier III, environmental performance is institutionalized as a core value at all levels.

Summary

Personnel of health care facilities have not routinely considered the environmental and public health impacts of their practices as they strive to provide high quality medical care. In part, this reflects a lack of attention to the connection between environmental factors and human health, a blind spot that is in no way unique to the health care sector. But it also reflects a cultural divide between clinical medicine and public health practice that developed over 100 years ago. As health care facilities increase their focus on environmental performance they may then begin to participate more fully in the sustainable use of natural resources and sharply reduce adverse impacts on ecosystems, including people and wildlife. This effort will begin to provide much needed leadership toward integrating clinical medicine with public and environmental health.

Notes

1. Backyard barrel burning and landfill fires are other potentially large sources that are not well quantified.

2. See Appendix for details of a potential program to plan, monitor, and evaluate environmental performance. Appendix: A Program for Planning, Monitoring, and Evaluating Environmental Performance in Health Care Facilities

Appendix

A Program for Planning, Monitoring, and Evaluating Environmental Performance in Health Care Facilities

I. Change Policies, Practices, and Procedures
For example:

A. Mission Statement: From the Top Down
Healthcare facilities should re-examine mission statements for evidence of concern about public health and environmental impacts. The institution should examine the social contract that is implicit or explicit with the community in which it is located.

B. Departments: From the Ground Up
Require each department to assess environmental and public health impact of policies, practices, and procedures before adoption.

II. Select Indicators for Evaluating Performance

A. Define Boundaries of Analysis

1) Consider local, regional, national, and global environmental factors when setting priorities. Describe the condition and character of the environment in which the facility exists and identify unique qualities that may influence the choice of indicators and actions to improve environmental performance.

2) Lifecycle Impacts: address upstream and downstream impacts of material and disposal choices, and operations
   a) Material Choices: for example, mercury and polyvinyl chloride containing products pose serious adverse effects both upstream and downstream of health care facilities.
   b) Disposal Choices: for example, if a hospital chooses to close an incinerator because of concerns for impact on public health and environment, but contracts with a waste disposal vendor who autoclaves the waste and then ships disinfected waste to a municipal waste incinerator, there may be no gain.
   c) Operations: for example, energy and water consumption, and facility maintenance.

3) Stakeholders: solicit input from the community, patients, workers, and environmental organizations on what to cover in the analysis.

4) Legal and Regulatory Requirements: integrate data collection and analysis with legal mandates.

B. Possible Indicators[1]

1) Inputs
   a) Materials: including those used in direct and indirect patient care, and organizational support.
   b) Energy: overall consumption and sources (e.g., coal, gas, oil, etc.). For some facilities this may be normalized by consumption per day-bed occupancy.

[1] Environmental indicators for healthcare are in early stages of development and, as with other sectors, metrics (indicators of material use, waste and harm) need to be developed which enable comparison of institutions in meaningful ways. Activities within hospitals vary considerably (e.g. tertiary care facilities provide services that differ from those in primary and secondary facilities) and metrics will need to reflect those differences in order to fairly assess environmental performance. As data are gathered on environmental performance, options for normalizing those data will become more apparent.

Appendix *(cont.)*

c) Transportation: staff and patients.
d) Water Consumption
e) Service Inputs: including cleaning, janitorial, groundskeeping, maintenance, transport, delivery, information and communication, security, food, waste disposal, and pest control

2) Outputs
a) Material Wastes: including hazardous, radioactive, regulated, and unregulated waste. "Pounds of red bag waste per patient day" is an example of a material waste indicator.
b) Materials, Other: recycled materials and reusable products sent off-site for re-processing.
c) Air Emissions: toxic emissions, criteria air pollutants (e.g., nitrogen oxides), and greenhouse gases. Sources of air emissions include energy generation, transportation, and waste disposal (e.g., incinerators).
d) Water: total water discharge, toxic contaminants.

III. Monitor and Evaluate Environmental Performance
A. Incorporate environmental performance evaluations into the regular business function of the organization - at all levels
B. Incorporate economic data into evaluations. For example, compare disposal costs and volume (in each material output category) from year to year.
C. Schedule routine assessments of environmental performance.

IV. Change Behavior
A. Change Purchasing Policy, give priority to:
1) reusable products
2) products made from recycled materials
3) materials with less environmental impact in manufacturing, use, or disposal (e.g., PVC-, DEHP-, and mercury-free products)
4) products that minimize packaging
5) suppliers/manufacturers willing to label the materials present in packaging and products
6) environmentally and occupationally safer cleaning agents, disinfectants, and pesticides
7) products and procedures that reduce generation of hazardous materials, red bag waste, and radioactive waste

B. Institute Recycling and, Energy and Water Conservation Programs

C. Address Staff and Patient Transportation
1) Promote use of public transportation and car pooling.
2) Explore opportunities for electronic education programs that minimize travel.