The Case for Preventative Medicine: Minimizing the Impact of Hospitals on the Environment in Order to Defend Against Future Health Risks

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Executive Summary

Human behavior is changing our planet’s climate and depleting its natural resources. A considerable amount of work has been done studying and documenting the health impacts of these changes. As a result, scientists and policy makers now understand the impact climate change is having on increased rates of vector-borne diseases, allergies, mental health conditions, and injuries caused by the increased frequency of extreme weather. The impact of lost species that could have held the key to treating difficult diseases is equally well documented.

Because chemicals are rarely screened for health impacts, most are deemed safe until proven otherwise. Recent compelling studies have documented the toxicity of many chemicals and their impact on cell mutation. Chemical body burden tests have also been finding that the average person carries about 700 chemicals. While some of this work has led to chemical bans or the phasing out of commonly used chemicals like BPA through market pressures, these are still the exception. Hospitals’ products and research still use many of these untested chemicals.

Researchers, scientists, and economists have been trying to understand the impacts of an exponentially growing population on a planet with a rapidly dwindling set of finite resources. In most cases, the acknowledgement of the problem of diminishing supplies of fossil fuels, metal and arable land needed to feed a growing population are done by those looking for innovative solutions. A group at MIT trying exclusively to understand the limits of population growth created a model that pulled together multiple factors. Based on their projections, the earth’s ability to sustain growth will end in about 20 years. Beyond that point, the population will decline from formerly treatable medical problems: hunger, war wounds, and increasing disease.

What has been less examined by health practitioners is the role their own practices play in exacerbating these trends. The American healthcare industry produces 8% of US greenhouse gas emissions and throws away 6,600 tons of trash per day. This means that the practice of treating current patients is unintentionally creating new patients. Because hospitals and medical research laboratories are resource, energy, and chemical intensive, they contribute disproportionately to this climate and resource doom loop.

While some damage to the planet’s climate and natural resources can’t be eliminated, it can be minimized by targeting and changing practices that needlessly contribute to the problem.
Environmental Impact of Health Care Consumption

_Hospitals’ Use of Disposable Items is Contributing to Resource Depletion_

We live on a finite planet with dwindling resources and an exponentially growing population. When the population’s resource needs exceed earth’s production capacity, there will be an economic and population collapse, resulting in consequences for human health: increased hunger, war wounds and disease proliferation.

Hospitals rely increasingly on disposable products: some of this shift towards disposables is driven by infection control. Revenue needs also play a role; basement space once used to house sterilizers can be more valuable housing an MRI. As a result, the average hospital produces almost 30 lbs. of trash per patient day,1 adding up to a collective 6,600 tons of trash per day. Because disposable products require a constant supply of raw materials, that is 6,600 tons per day of quickly depleting resources.

_Hospitals’ Energy Intensive Infrastructure is Contributing to Climate Change_

Energy consumption contributes to climate change and hospitals are large contributors. According to the Environmental Protection Agency, hospitals are the second biggest commercial energy users. Because of their size, complex energy intensive equipment, operating hours, and unique needs for specific air quality and temperature, large hospitals consume about 5.5% of the commercial sector’s energy usage, a disproportionate amount compared to total floor space.2

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1 Practice Green Health: Waste. [https://practicegreenhealth.org/topics/waste](https://practicegreenhealth.org/topics/waste)

In addition, the health care sector contributes 8% of the United States’ total greenhouse gas emissions. The additional energy is used to transport people and supplies, as well as extract and process raw and waste materials.

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**Health Care’s Reliance on Chemicals is Accelerating our Pollution of Water, Ground and Air**

Chemicals cause ecosystem devastation, and eventually disease. Hospitals contribute to this problem by using large amounts of chemicals in their products, medications, procedures, and research. Prescription drugs are one of health care’s largest chemical contaminants. Through both patient use and disposal, pharmaceuticals are now present at measurable levels in many waterways. Because human bodies don’t fully absorb drugs, much of the chemical enters the water supply through routine human excretion. For example, researchers have found that only 50% of an oral dose of Atenolol, a drug used to treat high blood pressure, is metabolized before excretion. In addition, the Pharmaceutical Research and Manufacturers of America estimates that 3 percent or 2.8 million pounds of medications go unused. A survey in 2006 found that half of patients flushed these medications down the toilet, where they enter the water supply. As a result, a 2002 USGS study of wastewater contaminants found hormones and steroids in 80% of the tested water sources and frequently found antibiotics and prescription drugs.

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3 Practice Green Health: Energy, Water, and Climate. [https://practicegreenhealth.org/topics/energy-water-climate](https://practicegreenhealth.org/topics/energy-water-climate)


Patient drugs aren’t the only issue. Only 43% of the 2,800 chemicals that are produced in volumes greater than 1 million tons per year have been tested for human health effect. Many are used in hospital products, procedures, and research. In addition, the Toxic Substances Control Act allows doesn’t require chemical manufacturers to disclose ingredients to the EPA. When it was passed in 1976, over 60,000 chemicals that were already on the market. Of these, only 200 had been tested. As a result of incomplete chemical testing, recent studies have found that many of the chemicals used to make life saving medical supplies contribute to increasing rates of cancer and thyroid diseases. Some also inhibit fetal or infant development.

Finally, and ironically, many of the drugs used in disease-curing research cause diseases. For example, common research chemicals like ethidium bromide and chloroform are known mutagens. Chloroform is also a carcinogen.

The planet’s ecosystems cannot process many of the man-made chemicals that end up in the air and water. Unprocessed, they linger intact, contaminating people and causing health problems.

**Health Consequences Associated with Environmental Degradation**

*Climate Change Increases Infectious, Mental Health, and Weather-Related Disease*

Climate change causes extreme weather including powerful storms, floods, and heat waves, all of which increase disease and death. Hospital energy consumption is contributing directly to climate change because the current fuel blend emits greenhouse gasses that are altering the earth’s atmosphere.

Since 1901, the average surface temperature in the United States has risen .14 degrees Fahrenheit per decade, and the rate is increasing: seven of the top ten warmest years have occurred since 1990. Worldwide, 2001-2010 was the warmest decade recorded.

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7 “HPV Chemical Hazard Data Availability Study.” [http://www.epa.gov/hpv/pubs/general/hazchem.htm](http://www.epa.gov/hpv/pubs/general/hazchem.htm)

8 “What is TSCA?” Safer Chemicals, Healthy Families. [http://www.saferchemicals.org/resources/tsca.html](http://www.saferchemicals.org/resources/tsca.html)

Increased heat kills both directly and indirectly. For example, the Intergovernmental Panel on Climate Change estimates that during an average summer 400 Americans die from heat related injuries. In contrast, during Chicago’s heat wave in the mid-90s over 700 people died in Chicago alone. A few years later, the 2003 European heat wave killed 70,000. Heat also kills indirectly. Studies linking hot weather to increased aggression have found murders, assaults, and domestic violence all increase with rising temperatures.  

As these warming trends continue, the accompanying shift in climate will also increase disease proliferation and allergy exposure. For example, in northern parts of the United States, the growing season has already been extended by over 20 days. For people with allergies, this means ragweed pollen season has grown longer and is moving north.


The warmer weather has also created a more hospitable environment for bugs and animals carrying diseases, such as Lyme disease and West Nile Virus. Ticks are limited by temperature, but as warming continues, their range will increase. Similarly, West Nile Virus, a disease that thrives in warmer climates, is moving further north. Regions will need to quickly adapt to increasing levels of disease-carrying animals, or suffer from increased hospitalizations.

As the climate warms, rising sea levels make flooding more likely. From 1993 to 2011 the average sea level rose at a rate of .11 inches per year, compared to the rate since 1880 of .07 inches per year. With half of Americans living in coastal regions that are at risk for flooding, these slight changes are magnified into serious problems. Extreme weather, another side effect of climate change, can trigger flooding and spread disease by damaging infrastructure and displacing large populations. Some of the damage comes from direct injury and lack of clean water and food. Others are hurt by a loss of access to health care in the storm’s aftermath. A final consequence of flooding is environmental contamination. For example, after Hurricane Sandy, industrial chemicals, raw sewage, and oil were released into the environment through flooding, with 630 reported oil spills, and 10 sewage treatment plants that reporting discharges of untreated sewage.

Climate change related mental health conditions will also become increasingly common due to anxiety about changes to a relatively stable climate. A study for the National Wildlife Federation’s Climate Change Education Program estimates that around 200 million Americans are likely to experience direct effects of climate related events. In keeping with traditional responses to tragedy, an accompanying rise in depressive and anxiety disorders, PTSD, substance abuse, suicide, and violence among its victims is expected. In additions, some patients with anxiety will add climate change related danger to their list of things to be anxious about.

Mass Extinctions Will Inhibit the Search for Effective Disease Cures

As human activity and climate change pose a risk to habitats, scientists agree that there is currently a mass extinction- one caused by unsustainable behavior. According to Chivian and Bernstein, this “loss of species deprives us of invaluable tools for biomedical research that provide insights into how human cells and organ systems function in health and illness, and precludes our developing important new medicines for currently untreatable human diseases.” Plants and animals hold many medical solutions. As species become extinct, we lose these resources. For example, a pain killer derived from the predatory function of cone snails is 1000 times more effective than morphine, but cone snails are threatened by the destruction of coral reefs due to carbon dioxide driven acidification in the ocean. There are a many more species whose extinctions would be a loss to biodiversity and medical research. They may hold cures to chronic diseases and cancer. But as their habitats disappear, so do these species.

12 “Human Health Impacts and Adaptation.” http://www.epa.gov/climatechange/impacts-adaptation/health.html
Resource Depletion will Increase and Hinder Treatment of Historically Preventable Medical Conditions

A 1972 MIT study projected a population collapse by 2030 due to an exponentially growing population consuming finite and quickly dwindling resources. A recent revisiting of their projections found population growing faster than predicted while resources are diminishing a little more slowly. While this collapse may be delayed until 2050 or 2100, this fundamentally flawed math problem doesn’t change. If population growth and resource consumption can’t be reined in, the result will be an explosion in medical conditions, including hunger, disease, and war wounds, which will cease to be treatable due to lack of resources.

Although the consumption of disposable products is depleting many resources, one concern that will impact medical suppliers directly is metal depletion. Because most of the metal left to be mined is difficult to access, many necessary metals, including nickel, iron, and zinc, are expected to run out in less than 50 years. Recent hospital conversions from reusable to disposable metal instruments are exacerbating this problem. By consuming metal now, less will be available for future patients and for electronics necessary for hospitals to function.

A Proliferation of Chemicals is Increasing Cancer, Thyroid Problems, and Fetal Development

Chemicals in the environment are making people sick both inside and outside the hospital. Because people do not have natural defenses against these chemicals, they become sick as these chemicals enter our air and water supply or leach into the food or skin through direct contact.

As previously mentioned, prescription drugs are now pervasive in the water supply. The first sign of their impact is already visible in fish. For example, a study of fathead minnows


Beth Israel Deaconess Medical Center
A teaching hospital of Harvard Medical

Healthy Work Healthy Home
Meeting the Challenge of Environmental Responsibility
exposed to un-metabolized psychoactive pharmaceuticals in levels observed in the current natural environment had gene expression with autism like symptoms.18

Medical research is finding important cures; however, the process uses many hazardous materials. Even if researchers use correct safety protocols and disposal procedures, there are still many opportunities for chemicals to enter the environment during production and disposal. For example, Kettleman City, CA hosts a regularly inspected hazardous waste management facility.19 However, it has failed to report 72 hazardous material spills over the last four years, resulting in $311,000 in fines. In that same time window, 11 babies were born in Kettleman City with physical deformities.20

Chemicals in hospitals are also a health risk. Chemicals not restricted by the Food and Drug Administration could still have direct health consequences for patients and providers using many of these chemicals. To demonstrate this, Physicians for Social Responsibility (PSR) bio-monitored twelve doctors and eight nurses from ten states to determine which of 62 chemicals across 6 chemical groups with known health risks were in their bodies. Results found that five of the chemical groups and eighteen individual chemicals were universal. While the chemical exposure happened both at work and at home, the chemicals tested are prevalent in hospital equipment.21 In other words, chemicals in hospitals end up in hospital employees.

The Chemicals

- Bisphenol A (BPA) is used to make rigid plastic like baby bottles, plastic water coolers, and DVDs. BPA is also in the linings of many food containers. It is an endocrine disruptor shown to have health impacts at the levels found by the bio-monitoring in the PSR report. Possible health impacts include miscarriages, infertility, cancer, obesity, heart disease, diabetes, and thyroid dysfunction.
- Phthalates, used to make plastic flexible, are found in cosmetics, hair spray, and many IV bags and tubing. Low level exposure can affect embryos and fetuses.
- DEHP is another chemical commonly found in hospitals, and it particularly hazardous because it does not bind strongly with plastic. DEHP is a phthalate, added to IV tubing, and bags. When fluids come in contact with DEHP through the IV tubing, DEHP easily detaches from the PVC and can enter the patient. Infants in NICUs have a higher exposure risk because of their fragile systems. It is recommended that pregnant women, breastfeeding mothers, infants, males before puberty, and patients undergoing cardiac bypass or heart transplant surgery not come into contact with DEHP.22


PFCs or perfluorinated compounds are used in carpets, paper coatings, and non-stick pans. PFC’s are linked to hormone and immune disruption and interrupted fetal development.

Hospitals use PBDEs or polybrominated diphenylethers as flame retardants in furniture, computers, and electronic medical equipment. PBDEs are associated with memory, learning, and behavior disorders, reproductive effects, thyroid problems and cancer.

Mercury is now heavily controlled, but is still found widely in the health care setting. Environmental buildup in fish threatens consumers, as mercury is a neurotoxin that attacks the nervous system and therefore the brain. Mercury passes from the mother to child, resulting in learning disabilities.

Triclosan is a synthetic antimicrobial agent used in toothpaste and antibacterial soaps commonly found in hospitals. Triclosan can disrupt thyroid function and other hormone functions. It accumulates in human breast milk.23

Minimizing Future Damage: Contribution of Health Care Systems

Not all solutions to these problems need to be difficult or require legislative changes. The first and most important change is to one’s mindset. Awareness and acceptance that hospital practices are contributing to climate change and environmental degradation, and therefore creating health hazards, is an important step for the medical community. Healthcare professionals who take responsibility for minimizing environmental damage will find many opportunities for changing their daily work flows in order to reduce, reuse, and recycle more of their supplies and reduce their energy consumption.

Hospitals do an enormous amount of good by researching and implementing new cures and medicines. To prevent tainting that good with the overconsumption of energy and resources, hospitals can make changes to minimize future health risks caused by current practices. Hospitals cannot eliminate key medical research, deny patients helpful prescriptions or employ unsafe medical practices, but an awareness of the impact each action has on the environment and human health can inform future actions. It is important for hospitals to remember that increasing disease, a decreasing ability to obtain medical supplies, and chemical pollution create patients that may not be hospitalized for many years, but will eventually suffer the consequences of current hospital behavior.


Small Changes

- Request and use reusable/reprocessed supplies, where available.
- Where disposables are the only option:
  - Choose the option that consumes the fewest resources.
  - Actively recycling what you can
  - Buy products made from recycled materials
- Recycle and compost at the cafeteria- or bring your own silverware and cup.
- Turn off your junk mail.
- Promote paperless clinical work flows.
- Save energy by putting computers to sleep when not in use, and by turning off lights in empty rooms.
- Ask sales reps for chemical profiles of their supplies.
- Only prescribe drugs when absolutely necessary.
- Use greener research chemicals.
- Educate your patients about safe drug disposal options.
- Educate/challenge your peers.