

Go Green!
*How Physicians Can Interfere Positively
on Environmental Impact in Hospitals
and Clinic Settings. Is There a Need for
EVERYTHING To Be Disposable?*

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This chapter is not about making you a believer or a doubter in global warming, this is not making you feel guilty for the part you have/have not played on global green stage, making you believe that we have it all figured out and know all the answers at this point of time. It is about providing some facts and figures relevant to the healthcare industry and beyond. It is about laying the foundation for further exploration, and discussion of these issues. It is about planting the seeds for a paradigm shift from consumerism to one of sustainability. It is trying to, if you like **change your mindset**, to get you to think about things that superficially do not seem relevant, but in a bigger picture they really are.

Environmental sustainability

Environmental sustainability is the notion that the current population develops consumption patterns and habits that meet their needs without compromising the ability of future generations to meet their own needs. In other words is trying to ensure that future generations, our children, our grandchildren, do not carry the burden of the excess of consumption that we have as a society at this time.

Objectives

Explanation of why is our responsibility as physicians to paly a leadership role in effecting changes that improve health of our patients, the public, and the environmental ecosystem;

Overview of key factors in the hospital environment that can have a harmful effect on the health of our patients, our population, and our planet;

Outline the steps we have begun at Cincinnati Children's Hospital to "GO GREEN".

What are some of the barriers to success? A lot of hospitals were surveyed by Practice Greenhealth (PG) and asked: overall, what are the biggest challenges to implementing "green" interventions in our organization's Operating Rooms (ORs)? Do you think that are hospital "green" places? What can we do to influence this? Some important aspects were analyzed: cost, culture, patient safety concerns, lack of information or data, inadequate/inferior technology (**Figure 1**).

What is our responsibility as physicians?

Should we limit this only to caring for individual patients and treating distinct pathologic entities in our own specialty? Alternatively, to uphold our responsibility as "healers", should we broaden our perspective and look beyond individual pathology?

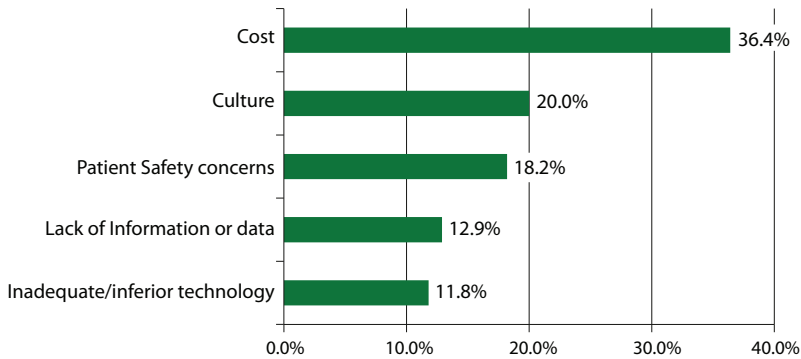


Figure 1. Survey by Practice Greenhealth (PGH) ¹

The key point is: As physicians, we must uphold the Latin maxim *primum non nocere* (first, do not harm). To knowingly participate in healthcare practices that are harmful is contrary to this ethic.

In other words, we are doctors, we have looked after the individual problems of our individual patients but, in the bigger picture, we really should be looking beyond our patient’s particular problems, broaden-up the spectrum and look at the wider picture that do no harm. What can we do for our patients in a more generous way that is going to be of benefit to them, and to our society, and for sure, to our environment.

Going Green

“Going Green” is a popular term that refers to adopting practices that minimize harmful effects on the environment and on human health. Such practices include:

- Reducing Waste reduction
- Reusable materials
- Trying to use non-toxic products
- Recycling, and
- Increasing energy efficiency

Key point: There is a lot we can do within our hospital environment to reduce the harmful effects on the environment and human health.

So, what is our motivation here? Why should hospitals want to improve the environmental performance? A few figures are useful. In US alone, hospitals spend \$ 3 billion dollars annually on electricity. That is a lot of electricity! Many cleaning and disinfecting solutions in OR’s contain toxic chemicals. And there are a lot of medical devices or equipment. And so, why should hospitals want to improve their environmental performance?

US hospitals produce a lot of waste. It is been estimated 7,000 tons of waste per day. Some hospitals throw up to 70% of their waste into the biohazardous waste stream. The CDC – Centers for Disease Control and Prevention - suggests that only 2% to 3% of OR waste it is actually truly infectious waste. To deal with biohazardous waste it is far more expensive and uses a lot more energy: high-temperature incineration. And also, many plastic and plastic products that we use day by day, particularly PVC and DEHP used in the OR (IV bags and tubing) are toxic to patients.

Hospitals really should not have garbage problems, but they have so much waste, and the operating room is a major culprit. It is been estimated that the operating room is responsible for 20-30% of a hospital's waste stream.

So let us work through some of these topics. Let us start talking about **medical waste and iatrogenic pollution**. There is an increasing realization that the healthcare sector is environmentally irresponsible. They have been blinded by patient care to the point they are not caring for the environment. One of the main topic of interest at the moment is healthcare toxins. Particular attention has focused on two toxins that are very inter-related: PVC (polyvinyl-chloride) and DEHP (2-ethylhexyl-phthalate). PVC is a rigid plastic, containing chlorine that is widely used in making synthetic medical devices. Unlike many other plastics not manufactured with chlorine, PVC requires a softening agent (plasticizer) to make it flexible. DEHP is the plasticizer commonly combined with PVC in devices such as:

- Blood, intravenous and TPN bags and tubing;
- Nasogastric, hemodialysis and endotracheal tubing;
- Examination gloves;
- Respiratory masks;
- Plastic food wraps.

DEHP (from a family of chemicals called phthalates) is a known reproductive and development toxicant. Could damage your brain and damage your gonads. DEHP does not bond with PVC, and can leach from medical devices. Children are particularly susceptible to DEHP toxicity, and neonates in ICUs receive the highest exposure in hospitals. Children with tracheotomy tubes are chronically exposed. DEHP is used in everything from gloves to even the food wrap that you put over your food. Do not put food wrap in the microwave, by the way. It is amazing what it does to leach out DEHP.

Key point: Although PVC is uniquely hazardous among plastics; it is ever present in our hospital settings and clinical practices.

What can we do to change this?

- Educate our medical colleagues so that they live up to a higher ethical standard;
- Exert pressure on manufacturers to develop PVC- and DEHP-free alternatives;
- Urge hospital-wide PVC audits

Key point: The goal is the elimination of these products. Only by doing this can we live up to our commitment as physician to do no harm and to promote good health.

So, it is important to exert pressure in order to come up with alternatives. There are alternatives, they just cost more. In our hospital, for instance, we changed to a tracheotomy tube that does not contain DEHP, partly because of this. And that tracheotomy tube is actually slightly cheaper than the one we used before. Our goal is the ultimate elimination of these products.

So now let us move into **energy**. According to US Department of Energy, US hospitals use 836 trillion of BTUs of energy annually. Just a 30% reduction in energy consumption would be the equivalent of removing 15.8million cars from US highways.

Key point: The US has 138 million cars, so a 30% reduction effectively removes 10% of the cars from the environment. So this is a big deal, and it is achievable.

The key issue really is not only the direct energy cost of healthcare, but the secondary effects. Adverse effects on health result from local air pollution (particulate matter, acid emissions, and heavy metals) and carbon dioxide emissions. In other words, the more energy you use, the more pollutants you cause indirectly, the higher the carbon dioxide emissions and you could get a secondary health consequence related to more energy consumption.

Let us move into **Material Handling / Waste Management**. US hospitals generate an absolutely staggering amount of waste each day (more than 7,000 tons of waste per day). And much of it, as it was mentioned before is thrown to the hazardous waste stream. This is all, ultimately, a knock-on effect of the impact of HIV two decades ago. It costs ten times as much to deal with hazardous waste. Very high temperature incineration and, for most of it, it is a waste of time. You do not need to do it and, if you can be a bit more selective, recycling, redistributing the hazardous waste stream, you could save a lot of money, a lot of energy and also put less toxic chemicals into the environment.

There are some examples of steps taken by hospitals to reduce waste and cost:

- Share medical publications;
- Eliminate frequently unused items from surgical packs;
- Switch from disposable to reusable medical instruments;
- Replace paper towels with air dryers;
- Purchase washable surgical gowns and sterilizations trays, replace disposable admissions kits, bed linens, bed pads, emesis basins with reusable products.

Reusable versus Disposable

A typical 300-bed hospital incurs an additional \$250,000 every week in costs associated with **discharging on disposables products**. And that is only part of the cost. (**Figure 2**)

$$\begin{array}{l}
 \text{Purchase Price of Disposable} \\
 +\text{Cost of Disposal} \\
 +\text{Occupational Health Cost} \\
 +\text{Environmental Impact} \\
 +\text{Warehousing Cost} \\
 \hline
 = \text{TRUE COST OF DISPOSABLES}
 \end{array}$$

Figure 2. True cost of disposables.

It is necessary to add in the cost of disposal, the environmental impact. All of the disposables have to be stored somewhere: the true cost is actually significantly higher. And so reusable medical devices again, result in many problems on our planet and some of them unforeseen. The terror of HIV ended up with a huge number of hospitals insisting in disposable instruments, single-use equipment, in some senses the slow viruses had a similar effect. In some senses this has been a bit illogical. It is actually not necessary to go that extent. And some of this was driven not so much by medicine as by litigation. The fear that something might go

wrong and you might be sued. And the conclusion at the moment is that there is no elevated health risk from using reprocessed single-use devices. We have gone too far to the opposite way.

Let us comment about **recycling**. It is actually wonderful if you walk down the corridor to see the recycling bins. That is all well for discarding, to try and get more responsible. We are not in a hospital, right now. And a lot of hospitals are only very slowly buying into the concept of waste segregation. And a lot of this is education and a lot of this is culture. It is getting into the habit of recycling at home, at work, wherever you are. And there are many little aspects that all add up with time. There is a lot of what we use in the OR that is disposable. And frankly, it need not be so. Let us go through some of these things as we comment about perspectives.

So, how can we, as doctors reduce waste and become agents of change? The key here is that you have got to think holistically, not only about your patient but about their community, your community and the environment. And you also have to start small. Influence what you can influence. And move forward. And this is really what we tried to do in our hospital in Cincinnati. And in Cincinnati we started with a **“Go Green” initiative**, a small group of concerned people actually went to senior administration to try and work on many different areas. Small group began meeting monthly to discuss easy to remedy issues like plastic, glass, paper recycling, reusable drink cups in the cafeteria, education and communication.

Our mission and vision statement is to make our hospital a leader not only in clinical service and research, but protecting the environment.

The **vision statement** is to make Cincinnati Children’s Hospital not only a leader in clinical service and research, but also protecting the environment by **REDUCING, REUSING and RECYCLING** waste.

The **mission statement** is to be a steward to our community, both locally and nationally. The Green Team will work toward reducing the impact the Cincinnati Children’s Hospital Medical Center (CCHMC) has on the environment through waste reduction, decreased consumption, and increase awareness by become an active partner with other green organizations and:

- Becoming active partners with Ohio Hospital Association;
- Becoming active partners with Hospital for healthy Environment;
- Modeling and encouraging programs in local hospitals and business.

As an active partner with other green organizations, the CCHMC would like to become a model. And this has been done also in terms of the products we choose to use in the hospital. One example is the tracheotomy tubes, and also the way we clean things. We are trying to reduce the energy footprint, and something even as simple as changing the air flow cycles in the operating room, particularly when the operating room is not being used is simple, and is money-saving and energy-saving.

The CCHMC first steps to focus:

- Product selection: currently conducting an inventory of products containing PVC and DEHP. Identifying alternative products for use, replacing products as we proceed.

- Cleaning/Disinfecting products: partnering with Aramark (our environmental services vendor), and Infection Control to identify least toxic, most effective, cleaning products.
- Energy Utilization: currently conducting a pilot survey to determine if we can decrease energy use by decreasing air flow cycles, yet maintaining safe particle counts during non-operational hours in the OR.
- Waste management: design a waste segregation strategy. Educate all team members on proper waste disposal.
- Supply Utilization: Investigate utilization of reusable vs disposal supplies. Waste managing, recycling, so let's give you some examples.

Many of your hospitals use instrument packs like these (**Figure 3**). The blue polypropylene is quite a nasty substance that takes 400 years for it to decompose in a landfill. It is 20% of the surgical waste in the operating room. The tape on it is actually quite a nasty stuff. And what are the barriers? If you wanted to change this, to let us say to a plastic tray that is reusable, you got an initial capital purchase, you need a little bit more storage space but, if you did this, you pay for it within a year and the amount of waste you generate, and this is not friendly waste, would be significantly reduced. We are not also putting recycling bins all over our hospital and often we are trying to do simple things. Recent trash audit however still show low compliance. If you put it right besides where people are, by the anesthesiologist equipment, it is much more user friendly. We should engage all members of the operative team and consider workflow – most of the recyclable waste improperly segregated is generated from Anesthesia where the recyclable bins were not easily accessed (at the end of the room). But if you put the recyclable bins right besides where people are, by the anesthesiologist equipment, it is much more “user friendly”.



Figure 3. Hospital instrument packs

Some CCHMC current efforts are **OR kit reformulation and doctor preference cards 2**. OR supply packs can contain redundant or unnecessary supplies – often “have available” supplies are opened, not used and thrown in hazardous waste receptacles. In surgeries we do we often have a doctor preference card, and a lot of the stuff

on that - frankly! Do we really need everything that we pull out for some operations? We are trying to go through what we want for each case, have another look: do we really need all of these instruments? How about all of the packaging that goes with them, particularly some of the things on there that have not been used for 20 years and they just keep on being put back on the pack.

So, the other goal is: Can we start **going back to reusables textiles**? The disposable gowns we use? If you go back to a reusable gown, they are actually much nicer to use, and modern materials are actually perfectly safe to use. And if you have something that is safer, and nicer to use, cheaper, it may be worth going

back to it, even if it is a slightly higher initial capital outlay. Switching to reusable gowns, towels, back tables, drapes, and basins can produce a 64.5% reduction in surgical waste generated (**Figure 4**)³. New materials available today extremely reduce the negative feedback once associated with reusable materials – too hot, tearing, liquid barrier concerns ³.

Figure 4. Surgeons' preference for disposable and reusable OR supplies³

	Superior	Good	Fair	Poor
Gown Comfort				
Disposable	6%	38%	23%	33%
Reusable	86%	10%	4%	0%
Ease of Towel				
Disposable	33%	47%	19%	1%
Reusable	87%	11%	2%	0%
Protective properties of gowns				
Disposable	30%	45%	20%	5%
Reusable	96%	6%	2%	0%

And so to conclude. “Going Green” starts with each of us as individuals trying to look after our patients in the wider sense of that short process. Gather a team, set short-term and long-term goals and get things moving. Educate yourself and your team on what is harmful and what those harmful effects can be, because things will not change overnight. You have to start somewhere, educating those around you and this is not an abrupt change. If we move forward slowly and carefully, we can make our hospitals a more environmentally friendly place, healthier and greener (**Figure 5**).

This is a lovely quote from Margaret Meade:



“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has”.

If you care, you have already won 90% of the battle. And for our future generations.

Figure 5. We take a team effort

References

1. Greenhealth Magazine June/July 2011.
2. Kanich, DG, and Byrd, JR. *How to Increase Efficiency in the Operating Room*. Surgical Clinics of North America. February 1996. Vol.76, Issue 1. Available at: [http://www.surgical.theclinics.com/article/S0039-6109\(05\)70429-1/abstract#bib13](http://www.surgical.theclinics.com/article/S0039-6109(05)70429-1/abstract#bib13).
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