

Sustainability in Health Care Organizations: Successes, Challenges and Opportunities

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Sustainability initiatives in organizations have become increasingly prevalent amidst not only requests and demands from stakeholders for such but also from the documented realization of the operational and financial benefits frequently associated with such activity. Health care institutions, particularly hospitals, have the potential to assume a significant leadership role in the implementation of sustainable business practices. This paper explores the context in which health care institutions can engage in sustainability and provides some examples of successful sustainability initiatives, whose lessons can be applied in organizations of all sizes across industries.

INTRODUCTION

In what might, in retrospect, be considered the industry's first foray into sustainability initiatives, health care institutions began removing mercury from their operations in the mid-1990s. This action was in response to studies which showed that mercury being used in thermometers, cleaning agents, florescent lighting, computer equipment and other areas of operations was a dangerous human toxic which could have adverse effects on both brain and kidney functioning, completely contrary to the mission of health care institutions. When mercury was replaced with safer substitutes, health care leaders received another unanticipated benefit; these substitutes were not only safer than mercury but also most cost-effective (Cohen, 2017). Hence, a realization that a safer patient and employee work environment wasn't contrary to more efficient operations and cost savings took place.

Health care institutions, particularly hospitals, are afforded tremendous opportunities to both improve patient outcomes and public health and be leaders in promoting sustainability and environmental stewardship. Given that hospitals never close, operating 24/7/365, and utilize expensive, technologically sophisticated equipment, they are among the most energy-intensive facilities in our economy and society. While US hospitals occupy 2 percent of commercial floor space, they use nearly 6 percent of all energy delivered to and utilized by commercial enterprises (Sanborn, 2017). At the same time, only select areas of hospitals are used continuously and many are used sporadically and at less than full capacity. The result is that hospitals in the United States alone spend over \$8 billion annually on energy, 90 percent of which comes from non-renewable sources (Levine, 2016). This energy consumption has been estimated to produce 8 percent of domestic greenhouse gas emissions (Sanborn, 2017).

Health care is a \$3 trillion industry and accounts for 17 percent of US gross domestic product. The United States Environmental Protection Agency estimates that hospital operations generate an average of 29 pounds of waste per staffed bed per day; the equivalent of 6,500 tons of daily waste nationwide

(Jarousse, 2012). On an annual basis this amounts to 5.9 million tons of waste, the equivalent of 500,000 garbage trucks of waste (Levine, 2016). The majority of this waste is transported to landfills and eventually left to decompose or burn in incinerators.

The greenhouse gas emissions from health care institutions and the fossil fuels which produce them have been associated with asthma, chronic bronchitis and other serious respiratory conditions. These effects on our environment are completely at odds with the mission of health care institutions. Hence, there is a reciprocal relationship between health care and its impact on the environment whereby certain outcomes of health care have a significant detrimental impact on the environment, and therefore, public health. While the consideration of reducing carbon emissions and utilizing clean energy and/or renewable energy sources is critical, our society finds itself at a crossroads of sort as the business models used to support and fund sustainability initiatives are in a state of flux as is the entire industry of health care. However, there is an acute need for increased sustainability initiatives on the part of health care institutions, particularly hospitals, as the benefits from sustainability strategies have been found to simultaneously reduce operating costs and create better patient outcomes / improve public health.

WASTE

As noted above, hospitals produce a significant amount of waste, however, waste is a complex issue for hospitals in that a significant amount of that waste requires special handling. Typically, 15 percent of a hospital's waste is infectious, toxic or radioactive (World Health Organization, 2018). Typical medical waste disposal costs can be nearly five times those of traditional waste while hazardous waste disposal costs are ten times that of conventional, non-hazardous waste.

On a global scale, developed countries generate an average of .5 kg of hazardous waste per hospital bed per day while lesser-developed countries generate an average of .2 kg (World Health Organization, 2018). However, in lesser-developed countries waste isn't usually separated into hazardous and non-hazardous categories making the actual volume of toxic waste much higher as the hazardous waste infects the nonhazardous waste. This is doubly unfortunate as approximately 50 percent of nonhazardous waste is easily recyclable and recycling can significantly reduce overall waste disposal costs.

Even though hospitals produce the bulk of waste in healthcare organizations and tend to be the focus of sustainability initiatives in the industry, there are numerous other kind of health care facilities which produce waste and often are outside of the attention of many sustainability program promotions. These facilities include laboratories and research centers, mortuary and autopsy centers, animal research and testing laboratories, veterinary medical facilities, medical schools and other health care educational facilities, blood banks and collection services, and nursing homes, among others. All of these different kinds of health care institutions have varied missions, but all involve commitments in one way or another to improving individual, community, public, and population health. Because the improper management of health care waste can pose a significant risk to all of these domains of health, sustainability initiatives need to be promoted to and considered and adopted by a complete range of health care institutions.

The kinds of waste produced by these organizations include (World Health Organization, 2018):

- **Infectious waste:** waste contaminated with blood and other bodily fluids (e.g. from discarded diagnostic samples), cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories), or waste from patients with infections (e.g. swabs, bandages and disposable medical devices);
- **Pathological waste:** human tissues, organs or fluids, body parts and contaminated animal carcasses;
- **Sharps waste:** syringes, needles, disposable scalpels and blades, etc.;
- **Chemical waste:** for example, solvents and reagents used for laboratory preparations, disinfectants, sterilants and heavy metals contained in medical devices (e.g. mercury in broken thermometers) and batteries;
- **Pharmaceutical waste:** expired, unused and contaminated drugs and vaccines;

- **Cytotoxic waste:** waste containing substances with genotoxic properties (i.e. highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), such as cytotoxic drugs used in cancer treatment and their metabolites;
- **Radioactive waste:** such as products contaminated by radionuclides including radioactive diagnostic material or radiotherapeutic materials; and
- **Non-hazardous or general waste:** waste that does not pose any particular biological, chemical, radioactive or physical hazard.

A distinct challenge of waste management in hospitals is that it comes from so many different sources of operations and is processed in streams or groups (such as solid, regulated medical, hazardous, pharmaceutical, food, general, recycled) that are managed by different, autonomous areas of operations without a central point of accountability and responsibility. More so, these areas typically utilize a variety of different vendors, making centralized coordination a challenge without the presence of a champion who understands the totality and complexity of a hospital's waste and can develop a plan to effectively manage it holistically.

As one example, 25 percent of a hospital's waste comes directly from food (Cohen, 2017). Unless unused food is composted or donated prior to its expiration, it will end up in landfills, decomposing and releasing methane into the air, adversely counteracting the impact of any kind of local climate mitigation strategy which may be in place. Similarly, the treatment and disposal of general hospital waste can pose health risks indirectly through the release of chemical, pathogens and toxic pollutants into the environment via land, air and waterways.

Hospital patient room items such as furniture, bedding and draperies which have been treated to be flame-retardant often contain toxins which can be both harmful to patients who are under care as well as the environment if these products are not properly discarded. If they are properly discarded, such action usually comes at significant extra costs for the special handling and treatment necessary. These toxins associated with flame-retardant items have been tied to reproductive problems, cancer, and developmental delays (Cohen, 2017). A number of major health centers have taken the lead in purchasing furniture and related items in which patients are in close contact that are more standard and untreated, resulting in not only better environmental and personal health outcomes but also decreased operating expenses. As hospitals increase their demand for these untreated items, the laws of supply and demand dictate that not only will become more available but will do so also at decreased costs.

While the improved management of hospital waste and health care waste in general provides near-limitless benefits at reduced costs, many health care institutions have been slow to implement more effective and sustainable waste management practices. Domestically, a lack of awareness about the health hazards related to health-care waste, inadequate training in proper waste management, absence of appropriate waste management and disposal systems, insufficient financial and human resources, and the low priority given to overall waste management and disposal are the most common reasons for lack of positive activity in this area. On a global level, many countries either do not have appropriate regulations for the management and treatment of health care waste, or have regulations but do not enforce them, exacerbating the problem worldwide. The critical first steps in better managing health care waste involve

- reducing the overall volume of waste generated by purchasing reusable / recyclable products
- ensuring appropriate waste segregation and subsequent environmentally-appropriate destruction and disposal practices
- implementing alternative safe and environmentally sound treatment of hazardous health care wastes (e.g., by autoclaving, microwaving, steam treatment integrated with internal mixing, and chemical treatment) over incineration
- raising awareness of the risks related to health-care waste and the benefits of safer waste management practices
- establishing a holistic approach to waste management with clear lines of authority, responsibility and accountability, whether centralized or decentralized (World Health Organization, 2018)

ENERGY

As noted above, health care institutions, particularly hospitals, use significant amounts of energy to maintain their operations and the traditional sources of energy (i.e., fossil fuels) have detrimental effects on both patient outcomes and public health. Thankfully, the percentage of health care facilities which generate or purchase renewable energy has increased by 82 percent in the past three years (Cohen, 2017). Many hospitals are finding that they can receive decades-long guaranteed returns on their investments from contracting for and using renewable energy, which also eliminates the uncertainty which fuels (no pun intended) obtaining energy from more traditional sources at prices which can fluctuate widely given global markets, economies, and politics. Abandoning the use of fossil fuels is, again, also consistent with the health mission of hospitals given some of the detrimental outcomes which have directly been linked with the use of fossil fuels.

However, evidence has shown that when hospitals are faced with the choice of maintaining the efficiency and reliability of existing systems versus implementing new systems, which can achieve sustainability outcomes, decision makers often opt to maintain the status quo and stay with what is existing and known. Such actions are usually less expensive in the short-run, as evidence has shown that every \$1 invested in preventive maintenance offsets \$4 in future repairs (Bison & Dahl, 2016), whereas the costs and benefits of new technologies, practices and procedures may be more difficult to quantify and/or have less-immediate positive financial effects.

The highly decentralized nature of providing patient care in hospitals usually results in hospitals being in a near-constant state of upgrade, modification, or expansion and such activities are typically undertaken in a project/piecemeal/short-term fashion (Bison & Dahl, 2016). In areas of continued operations, such as an emergency room, hospitals can ill afford to make massive, rather than incremental and/or “upgrade” changes at the expense of disrupting continuous operations. The decentralization of healthcare operations into specialties also reinforces this “disconnected” practice of improvement initiatives not being systemic. Departments typically operate within a vacuum, making organization-wide, strategic energy and operational sustainability planning difficult due to the rapidly changing external environment (i.e., new and improved technologies and medicines/treatments/therapies) in which health care facilities operate.

Hence, there very much needs to be a “champion” of sustainability initiatives organization-wide who 1) can create and implement a culture which is responsive to (at worst) or demands (at best) sustainable practices; 2) assemble a team to push, communicate, and promote the benefits of sustainability; and 3) make the important “business case” to senior leaders as to the complete positive impact that sustainability initiatives can have on both operations and the environment.

Fortunately, anyone who assumes such a role has an important ally in their crusade. The Healthier Hospitals Initiative (HHI) was established in 2012 and is now a permanent program of Practice Greenhealth. To date more than 1,300 health care organizations have participated in its program. The HHI has established a “data-driven platform designed to help healthcare organizations commit to sustainability goals and track their environmental efforts.” Its platform has three levels of progressive accomplishment for each of six broad sustainability impact initiatives (engaged leadership, healthier food, leaner energy, less waste, safe chemicals, and smarter purchasing). Participating organizations are required to establish measurable sustainability objectives and accompanying metrics and are held accountable for achieving these outcomes (Healthier Hospitals, 2018). The establishment of three distinct levels within the program makes the initiative available to healthcare organizations of all sizes and scopes of operations and sustainability experience, including those who are brand new to sustainability.

RECOMMENDATIONS AND SUCCESS STORIES IN SUSTAINABILITY INITIATIVES IN HEALTH CARE ORGANIZATIONS

Hospitals and other health care institutions can benefit from the success stories of a number of their peer institutions in implementing sustainability initiatives which have achieved better patient outcomes, costs savings and improved public health. Regarding energy usage, hospitals can examine and better manage heating, cooling, and lighting in unoccupied areas, install energy efficient lighting, and implement operating room setbacks which reduce air changes per hour when the rooms are not in use, in addition to more large-scale changes in the types and sources of energy they utilize. Even seemingly small initiatives can have significant impact. When St. Mary's Hospital of Leonardtown, MD replaced all of its light sources with more energy-efficient options they achieved subsequent annual energy savings of more than \$20,000 via this project which had a four-year payback period (Health Research & Educational Trust, 2014). On a larger scale, Minnesota-based Health Partners (with 22,500 employees) partnered with its utility supplier to install LED lights and variable frequency drives, which allow heating and cooling systems to be efficiently moved to lower setting when not in use, resulting in \$1.3 million in annual savings (Sanborn, 2017).

Hospitals use a tremendous amount of water in their operations. US hospitals alone consume 133 billion gallons of water, 7 percent of all corporate and institutional usage (Sanborn, 2017), at a cost of \$615 million annually. This heavy usage is not only costly but also strains municipal water supplies. Simple actions which can conserve water usage include the insulation of hot water systems, closer monitoring of leaks, minimizing water used for laundry, and the installation of low-flow shower and low-flow flush toilets. Since the 80 bed Huntington Veterans Affairs Medical Center (of West Virginia) implemented a faucet and shower head replacement program, the realized savings are a reduction in use by 1.5 million gallons/year resulting in a \$20,000 annual savings. The project had a two month payback period and cost less than \$3500 (Health Research & Educational Trust, 2014).

Improved waste management can greatly improve both health and efficiency outcomes in health care organizations. 80 percent of hospital purchases eventually become waste, a good deal of which is unregulated (as opposed to regulated waste and hazardous chemical waste) and can be reused or recycled. Savings can be significant, again, even on a small scale. When Sacred Heart Hospital (of Eau Claire, WI) switched to reusable sharps containers, waste generation was reduced by 40,000 pounds annually, resulting in a 5 percent decrease in annual operating expenses (Health Research & Educational Trust, 2014). Significant outcomes can be realized relative to waste before it even enters operations via purchasing. Those responsible for purchasing can undertake programs by which packaging waste is minimized, fewer hazardous chemicals are used in operations, and purchase prices for all items used in operations and any disposal costs are negotiated more favorably. When Kaiser Permanente (of California) needed to replace computers, they negotiated purchase of replacements which were manufactured with fewer toxic materials, had minimal packaging and were operated with minimal energy. The negotiated, cost-neutral purchase had annual resultant energy savings of \$4 million (Health Research & Educational Trust, 2014).

The above examples illustrate the impact of single action initiatives. Sustainability initiatives which are more holistic in nature can have even more significant impact on operations and outcomes in health care institutions. Wentworth-Douglass Hospital (of Dover, NH) is a 178-bed general medical and surgical center with approximately 1 million square feet of space. When an internal partnership was established between hospital's "green team" and facilities department, four integrated projects, whose payback periods ranged from 3-5 years, were implemented with the following operational outcomes; energy-efficient lighting in conference rooms and garages (annual savings of \$45,000); energy-efficient lighting in other areas of operation (annual savings of \$150,000); low-flow flush fixtures (annual savings of \$200,000); motion sensors to turn off vending machine lights when not in use (annual savings of \$1,700) (Health Research & Educational Trust, 2014).

Imagining this on a larger scale, the Cleveland Clinic switched to locally manufactured LED light bulbs and realized resultant annual savings of \$3 million simply by replacing light bulbs. This action also

reinvested money into the local economy. When the Clinic implemented a program which ensured that air conditioning was not turned on during non-use times of operating rooms, an annual savings of \$2 million was realized. The recycling / reuse of various medical devices which were previously repurchased has resulted in \$2.5 million/year savings. Finally, the use of recycled packaging and enforcement of double-sided printing as a default setting saves \$250,000 and an estimated 6,000 trees/year (Sanborn, 2017).

CONCLUSION

Health care organizations, particularly hospitals, can achieve significant outcomes for not only themselves and their patients but also the physical world by embracing sustainable business practices in their operations. Sustainability initiatives have resulted in hospitals using resources far more efficiently and experiencing improved patient outcomes, in addition to the environmental and public health benefits of undertaking such activities. Given their collective size and relative position in our economy, the sustainable practices implemented by health care organizations can only have significant impact in and of themselves but also be benchmarks for organizations in other industries. Their collective experiences show that even relatively small organizations can reap benefits from sustainability and have an impact or “footprint” on the larger world which transcends their size.

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