"Climatitis!" Global Warming Meets Healthcare in the Big Apple

By Anmol Gupta | 15 November 2017

Hospital expansion is booming for the Mount Sinai Medical Center, located in New York City. The health system recently grew its footprint in 2013, acquiring St. Luke's Hospital's 495 beds, Roosevelt Hospital's 514 beds (now Mount Sinai West), the 32-bed New York Eye and Ear Infirmary, and the 812-bed Beth Israel Medical Center from Continuum Health Partners [1].

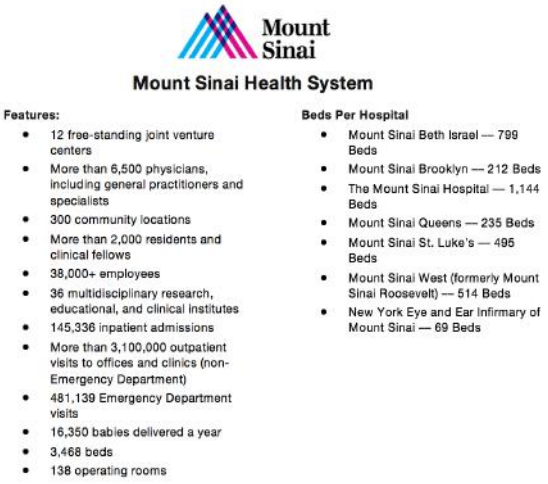

Figure 1: Mount Sinai Health System [9]

That said, Mount Sinai is in the process of shutting down the Beth Israel Medical Center, which has struggled financially utilizing less than 60% of its beds on average. Sinai intends to sell the property and open a new 70-bed hospital and emergency room in 2020 two blocks away from the current facility in lower east Manhattan [2].

Figure 2: Mount Sinai Beth Israel in Manhattan [2]

Of course, this merger took place just months after Hurricane Sandy devastated Lower Manhattan. During the storm, nearby Bellevue Hospital and New York Langone Medical Center had to be evacuated amid all the flooding, as their electrical systems were located in the basement. Millions of dollars of medical equipment, patient specimens, and research laboratories were destroyed due to loss of power and adequate refrigeration. The hospital shut down for nearly three months [3].

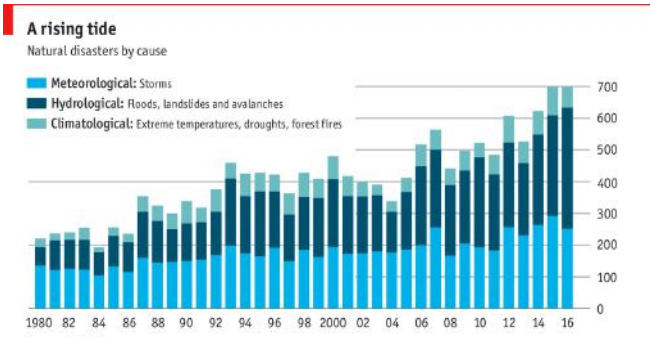

Figure 3: Natural Disasters by Cause Over Time [10]

Around the globe that year, we experienced massive droughts, unprecedented air pollution, and the continued melting of the polar ice caps. Climate change is believed to have played a significant role in the increased frequency of natural disasters (Figures 2 and 3), the number of medical emergencies related to heat stress, and even the increasing rate of asthma/allergies in the population (Figure 4), the latter likely due to pollution levels [4, 5]. In light of this and other effects of climate change, what considerations should Mount Sinai make in designing and constructing its new hospital?

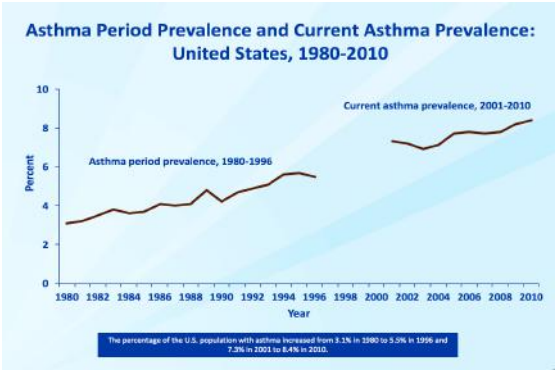

Figure 4: Asthma Prevalence Over Time [5]

One obvious thought is to avoid putting critical mechanical and electrical equipment in the basement or the lower floors of the facility, given what happened during Hurricane Sandy. Many of the newer hospitals have taken note of this design flaw and placed said equipment on the roof/higher floors. Mount Sinai will likely do the same. It may also explore more energy efficient designs for rooms and fixtures such as windows, thermostats, and doors.

Nevertheless, it is imperative that Mount Sinai appropriates a sufficient budget toward a robust backup system for extended emergencies. Hospitals are plagued by power problems more frequently than other high-tech facilities, such as banks and data centers, often because of budget constraints or because accountants often do not consider fail-safe 24/7 power for hospitals to be cost effective [6]. Upfront investments in backup equipment and reliable on-site power generators that operate independently of the electrical grid are critical for functionality during emergencies or supply chain crises.

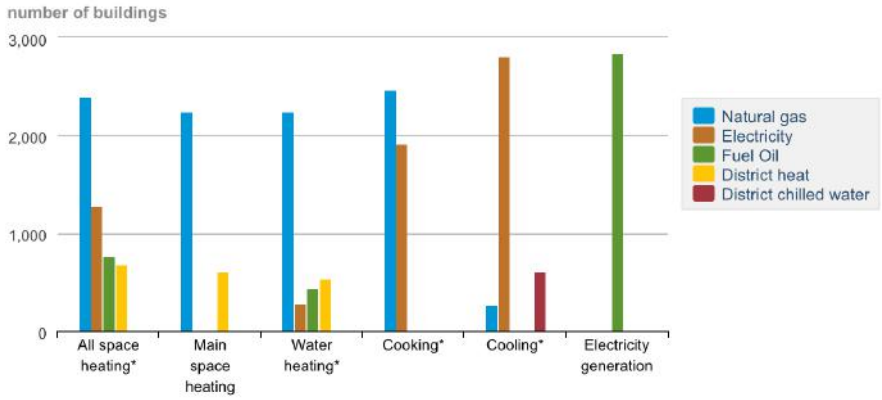

Figure 5: Fuels and Energy End Uses in Large Hospital Buildings, 2007 [11]

Another possible course of action is to reduce the hospital's carbon footprint. This can be done through the prioritization of energy-efficient medical equipment over cost when making purchases for the new hospital. As one of the largest health systems in the country, Mount Sinai could utilize its immense bargaining power with medical device manufacturers and hospital equipment suppliers to incentivize the production of environmentally friendly products.

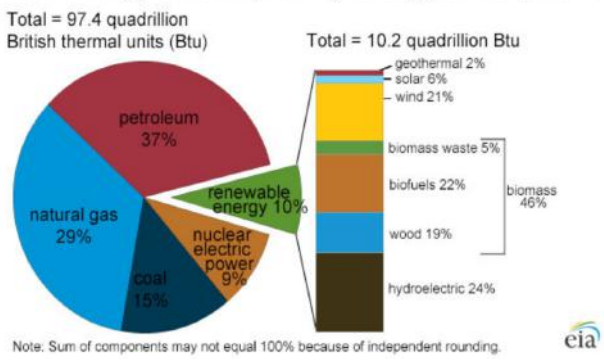

Figure 6: Energy Consumption by Source in U.S. in 2016 [12]

Greater environmental sustainability can also be achieved through the use of alternative energy to power the hospital. Coal and natural gas are far more harmful to a community than renewable energy sources such as solar panels. As part of its mission, Mount Sinai seeks to not only provide compassionate care to patients but also to serve the greater community. Solar or wind powered hospitals would demonstrate social responsibility that other hospitals could follow and, in turn,do right by this mission.

Finally, given its lasting commitment to scholarship and education, Mount Sinai should continue to invest in research projects and initiatives that help us understand the link between healthcare and climate change. It has done so not only through funding medical research but also via its partnership with Apple, Inc. Together the two organizations have created an Asthma Mobile Health Study App powered by Apple's new ResearchKit. The app enables users to gain greater insight into their asthma status, helps them avoid triggers, and monitors nearby air quality [7]. If utilized to its fullest potential, it can a powerful platform for physicians to educate patients about the harmful effects of climate change on our health.

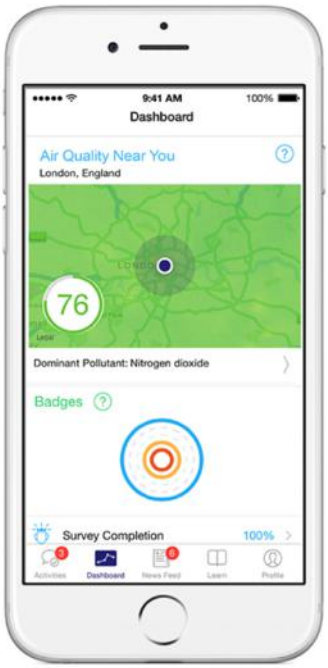

Figure 7: Asthma Mobile Health Study App [7]

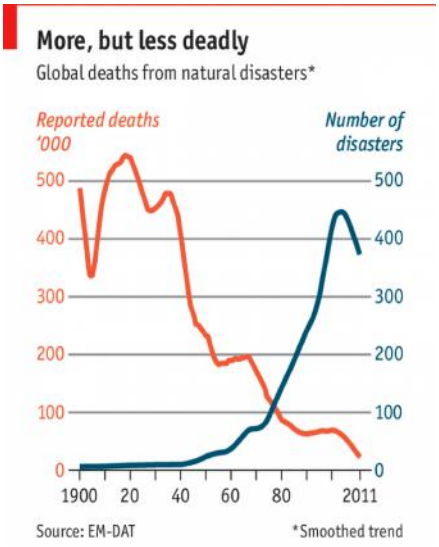

Figure 8: Natural Disasters vs. Deaths [10]

The United States spends approximately 20% of its GDP on healthcare [8]. We need to involve this 20% in our battle against global warming. Climate change will continue to result in more frequent natural disasters, heat waves, droughts, incidences of asthma/allergies, and the like. With this in mind, what environmental considerations and supply-chain measures should be taken when building new state-of-the art hospitals, such as the New Mount Sinai Beth Israel Hospital? What social responsibility does a hospital have beyond providing healthcare? And how can a hospital emerge as a model for functionality in times of crisis? **(799 words)**

References:

1. Evans, Melanie. "Continuum, Mount Sinai Complete Merger in N.Y." *Modern Healthcare,* 30 Sept. 2013. www.modernhealthcare.com/article/20130930/NEWS/309309966.
2. Ramey, Corinne and Melanie Evans. "New York City's Beth Israel to Close Hospital, Open Smaller Facility." *The Wall Street Journal*, Dow Jones & Company, 25 May 2016. www.wsj.com/articles/beth-israel-to-shutter-hospital-open-smaller-facility-1464187852.
3. Sifferlin, Alexandra. "Lessons from Storm Sandy: When Hospital Generators Fail." *Time Magazine*, 30 Oct. 2012. www.healthland.time.come/2012/10/30/lessons-from-storm-sandy-when-hospital-generators-fail.
4. D'Amato, Gennaro, et al. "Climate Change and Respiratory Diseases." *European Respiratory Society,* 1 Jun 2014. *http*://err.ersjournals.com/content/23/132/161.
5. "Asthma. Data, Statistics, and Surveillance." *National Center for Environmental Health*, Center for Disease Control and Prevention, 8 Sept. 2016. https://www.cdc.gov/asthma/asthmadata.htm.
6. Harrington, Mike. "Emergency: The Critical Condition of Hospital Power." *Electrical Construction and Maintenance (EC&M) Magazine,* Informa. 13 Apr 2012. http://www.ecmweb.com/cee-news-archive/emergency-critical-condition-hospital-power.
7. "Asthma Health App: Apple ResearchKit." *Icahn School of Medicine at Mount Sinai*. Accessed 14 Nov. 2017. http://apps.icahn.mssm.edu/asthma.
8. Orszag, P. R., & Ellis, P. (2007). The challenge of rising health care costs--a view from the Congressional Budget Office. *N Engl J Med, 357*(18), 1793-1795. doi:10.1056/NEJMp078190
9. "Mount Sinai Facts and Figures." *Mount Sinai Health System,* Icahn School of Medicine at Mount Sinai. Accessed 14 Nov. 2017. https://www.mountsinai.org/about/facts.
10. "Weather-Related Disasters Are Increasing." *The Economist,* The Economist Newspaper, 29 Aug. 2017, https://www.economist.com/blogs/graphicdetail/2017/08/daily-chart-19.
11. "Energy Characteristics and Energy Consumed In Large Hospital Buildings in the United States in 2007." *U.S. Energy Information Administration (EIA) Independent Statistics and Analysis.* Accessed 14 Nov 2017. https://www.eia.gov/consumption/commercial/reports/2007/large-hospital.php.
12. "U.S. Energy Facts Explained: Americans Use Many Types of Energy." *U.S. Energy Information Administration (EIA) Independent Statistics and Analysis.* Accessed 14 Nov 2017. https://www.eia.gov/energyexplained/?page=us_energy_home