

An Intimate Relationship:

Medical Theory, the Environment, and Hospitals

By: Devin Williams
Department of History
University of Texas at Arlington

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Advisor: Dr. Christopher Morris

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Introduction

Prior to the full acceptance of bacteriology and germ theory in the late nineteenth to early twentieth century, medicine relied heavily upon the natural environment and cultivated flora from various regions around the world to implement in therapeutics.¹ As a result of various medical theories and practices during the long nineteenth century the hospital became the physical embodiment of such practices and became modified as these medical theories advanced toward an acceptance of bacteriology. The following discourse uses the hospital as a backdrop of how medical theory integrated itself into society and how people came to rely on this combination of natural and built environments to sustain their health. It also demonstrates how medical theory prior to germ theory shared a very close relationship with the natural environment and depended upon it as physicians prescribed their treatment regimens. Initially serving as a marker for the boundary between the built and natural environments and dedicated solely to the poor, hospitals also relied heavily upon the natural environment in the treatment of patients and became reflected, through much trial and error, in their design.² As the acceptance of bacteriology (a.k.a. germ theory) proliferated and medicine became a laboratory science, a paradigm shift occurred in the design of hospitals and the use of the natural environment as a therapeutic fell out of favor. From the second quarter of the twentieth century on, hospitals no longer required the natural environment as part of their services to the sick and injured, became

¹ Londa Schiebinger and Claudia Swan, eds., *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*. (Philadelphia: University of Pennsylvania Press, 2005), 121

² Annmarie Adams, *Medicine by Design: The Architect and the Modern Hospital, 1893-1943*. (Minneapolis: University of Minnesota Press, 2008), 112-113

more integrated into the urban setting, and set out to manipulate, control, and artificially create environments within its own walls.

From the times of Hippocrates, physicians relied upon using the natural environment to treat their patients as the belief carried forward that a person's surroundings in tandem with their physical and emotional disposition factored heavily into their health. A marriage ensued between the environment and medicine that affected medical decisions and the therapeutics implemented during the course of a patient's treatment. Initially, the primary location for healing occurred in the home of the patient for those who could afford such fees.³ Whether seeking treatment in the domestic environment, an almshouse in the case of many impoverished persons, or at the office of a private physician, the therapeutics remained similar; consuming a concoction of some sort and then hoping it worked. This became the status quo for centuries in the medical community.

The proliferation of the charity hospital as an entity separate from the almshouse during the mid-eighteenth century allowed physicians to leave a legacy of sorts to their pursuit of health in an edifice that incorporated their medical philosophy. Medical practices varied widely during this period due to the lack of provable and repeatable scientific evidence, however the common thread between the myriad of different medical theories lay in blaming the environment corrupted by humans for illness but also incorporating it into a patient's treatment regimen.⁴ As the hospital emerged as a beacon for the poor seeking medical treatment, physicians and architects collaborated and also argued over how to create an environment conducive to a patient's convalescence.

³ Jeanne Kisacky, *Rise of the Modern Hospital: An Architectural History of Health and Healing, 1870-1940*. (Pittsburgh: University of Pittsburgh Press, 2017), 17

⁴ Owen Whooley, *Knowledge in the Time of Cholera: The Struggle Over American Medicine in the Nineteenth Century*. (Chicago: University of Chicago Press, 2013), 79-80

Hospitals originally became the dividing line between the city and country due to this area's abundance of fresh air, natural light, and significantly cleaner water than what was found in the city. With miasma theory as the orthodox medical theory of the period, building materials used in conjunction with the natural environment also became items of scrutiny as physicians and architects attempted to stave off and prevent illness. The term "hygienic" became a common adjective in the design of hospitals as many of the patients admitted originated from some of the most polluted and dilapidated sections of any city so a struggle to imbibe them with a greater sense of cleanliness ensued once within the walls of the hospital. The impoverished were often viewed as the cause of disease due to their vices- alcoholism, gambling, and prostitution- as it appeared to physicians and the wealthier class that most of the epidemic diseases originated from the poorer sections of town. The hospital, whose primary function served the impoverished of a community when they became too ill or injured to treat themselves, also functioned as a temple to morality since immorality created the pathway to poverty and poverty combined with immorality created disease.⁵

By the mid nineteenth century, only a few physicians affixed their attention to the microscopic environment and began to wonder if these organisms may themselves possess and cause the diseases they encountered. This work focuses on four main physicians and scientists who built upon each other's work in order to better understand the transmission and causes of disease which in turn finally created a paradigm shift in how medicine approached etiology. Jacob Henle, Louis Pasteur, Joseph Lister, and Robert Koch became some of the main characters in this shift from medicine as a philosophy to medicine as a laboratory science.⁶ With Koch's

⁵ Charles Rosenberg, *The Care of Strangers: The Rise of America's Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 19

⁶ Christoph Gradmann, *Laboratory Disease: Robert Koch's Medical Bacteriology*. Trans. by Elborg Forster. (Baltimore: Johns Hopkins University Press, 2009), 25, 28

four postulates and the discovery that bacteria were the cause of tuberculosis and cholera, the field of bacteriology emerged as the mistress that came between the natural environment and medicine.

As a result of this discovery, the shift in medical theory, and a new approach to etiology, architects and physicians again collaborated to create a hospital that coincided with the emerging medical theory. The environment fell under the control of physicians as its implementation as a therapeutic served the purpose of healing the patient, but in some respects, could actually cause them more harm as a vector for disease. By the early twentieth century, natural light and fresh air no longer served the patient physiologically but more psychologically and the location of hospitals no longer marked the dividing line between the city and country.

A broad historiography exists in relation to medical theory, the hospital, and the environment; however, they do not appear as the focal point of study and research. In Linda Nash's book, *Inescapable Ecologies*, she approaches nineteenth century medical theory as deeply intertwined with the local environment in which one lives and how local ecosystems affected a person's health. As the miasma theory enjoyed a marriage with the environment, marshy areas, arid, humid, and torrid regions all played a role in a person's health and the healthcare they received.⁷ Yet, while approaching the relationship to miasmas and the environment, Nash does not directly include any discussion about hospitals and their relationship to medicine or the environment.

Melanie Kiechle describes in her work, *Smell Detectives*, the methods employed by urban physicians and civic leaders to ameliorate the spread of disease, especially in regards to the domestic environment. By transplanting certain aspects of the natural world into the domestic

⁷ Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge*. (Berkeley: University of California Press, 2006), 15

sphere, (items such as aromatic flowers in the entry way) people held the belief that disease could be kept at bay outside their homes.⁸ Kiechle also approaches the environment and miasmas and how civic leaders and notable physicians of the nineteenth century attempted to work together to reduce the spread of disease by focusing on the urban and domestic environments but the hospital environment seemed beyond the scope of her research.

In *Foul Bodies*, historian Kathleen Brown delves into the domestic environment and how people viewed cleanliness in relation to disease and social status in their community. Eighteenth and nineteenth-century communities created certain protocols when judging a person's moral character and the appearance of cleanliness served as one of the major criteria for such a judgment.⁹ Brown focuses heavily on how social stratification and the appearance of cleanliness became intertwined with each other during the eighteenth and nineteenth centuries.

Other historians' work focuses on aspects of the charity hospital as a social institution and its effects upon the societies in which they existed. David Rosner explores how hospitals changed the social environment as they not only became more expensive to operate but also by the technological, biological, and chemical breakthroughs in medicine in his work *A Once Charitable Enterprise*. The acceptance of partial pay and full pay patients signifies, in his opinion, a significant paradigm shift in the function of a hospital as it transitioned from a purely charitable enterprise meant to serve the deserving poor of a community to a benevolent business.¹⁰ While Rosner's work focuses primarily on hospitals as institutions, the scope of his work does not include the environmental perspective of medicine and hospital construction.

⁸ Melanie A. Keichle, *Smell Detectives: An Olfactory History of Nineteenth-Century Urban America*. (Seattle: University of Washington Press, 2017), 87-88

⁹ Kathleen M. Brown, *Foul Bodies: Cleanliness in Early America*. (New Haven: Yale University Press, 2009), 283

¹⁰ David Rosner, *A Once Charitable Enterprise: Hospitals and Health Care in Brooklyn and New York, 1885-1915*. (Princeton: Princeton University Press, 1982), 113

Likewise, notable historian, Charles Rosenberg also comments in great detail in *The Care of Strangers* about how the changes in medical and social philosophy in regards to hygiene and cleanliness aided in transforming the hospital from an under-funded charity experiment to help the poor into a physical manifestation of evolving medical theories and how the Nightingale reforms helped to reduce post-operative infections and curtail the outbreak of disease.¹¹

Rosenberg does devote some attention to the environmental conditions within a hospital and how the people of the nineteenth century reacted to them, yet he appears to skip over the importance of medicine's relationship with the environment and how this affected hospital design.

Rosenberg's primary argument centered around how hospitals were once seen as little more than almshouses dedicated to healing poor patients and avoided by the wealthy to institutions that became accepted by all classes and even seen as fashionable by the upper class in the late nineteenth and early twentieth century.

This work attempts to build upon the studies of previous historians by combining all three elements into one discourse and focusing on how the environment affected medical theory prior to the twentieth century and medicine's eventual divorce from the environment as the overarching cause for illness and as a physical therapeutic. The argument posed is that hospital construction and design became the physical manifestation of this marriage and eventual divorce from the environment and eventually became an ecosystem unto itself in how it came to manipulate the natural environment through the technology it incorporated.

Chapter One focuses on how medicine incorporated an almost inexhaustive amount of plants and minerals from around the globe for utilization in European-based medical therapeutics. Physicians exploited conquered regions such as the Americas and Africa for their

¹¹ Charles E. Rosenberg, *The Care of Strangers: The rise of America's Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 228

flora and continued bioprospecting not just for medical gain, but for financial gain as well. Doctors adopted the journal as a method of disseminating information about current medical practices and discoveries from various colonies and the mother country which created a global market for pharmaceuticals since much of the vegetation could not be grown outside of certain climates. While various theories and philosophies about medicine and treating the sick existed during this period, one over-arching constant remained: the belief that the natural environment healed the body and the urban environment polluted it.

Chapter Two discusses how hospitals either connected themselves with almshouses where physicians would donate a certain portion of their time each week to caring for the impoverished sick and injured, or served as temporary structures during a conflict or epidemic. While the almshouse often became a permanent fixture in a city through charitable donations, hospitals and lazarettos often became reclaimed by either the urban or natural environment once the conflict or epidemic passed. While the care for injured and sick patients usually fell to the woman of the house, some became so ill or so injured that around-the-clock care was needed; something that the domestic environment could not provide. The caveat for this treatment was the hospital, like the almshouse, initially treated the impoverished of a city. While the wealthy and middling classes could afford the fees of a private physician and receive treatment in their home, the poor could not and relied heavily on the charity of the wealthier classes. While the permanent hospital itself was not a new idea and flourished in some parts of Europe such as England and France, the idea of a hospital where someone impoverished could recover from an illness or injury rather than die was the novel idea.

Chapter Three focuses on the idea of constructing a hospital and how it served a two-fold purpose, isolating the sick from the healthy population in a city, and providing the wealthy with

an avenue for ensuring a legacy through philanthropic work. Many hospital committees existed even before the construction of the physical building itself and political infighting often plagued these groups since they were comprised of notable physicians, wealthy laymen, and architects. Many hospital committees held competitions for designs, and others sent architects overseas to Germany, France, and England to study the designs of their hospitals. Even though architects and doctors often found themselves at odds over certain aspects, they did collaborate effectively on how to incorporate the natural environment in order to maximize its healing qualities. The ward system of hospital design emerged out this collaboration during the first third of the nineteenth century. Segregating patients on a nosological basis rather than grouping them all together where contagions could spread from one sick patient to another allowed for doctors to treat multiple patients simultaneously since they were grouped by illness.

Chapter Four underscores that medicine during the nineteenth century included the sensation of pain in almost every aspect, diagnosis, treatment, surgery, and even recovery. A patient in pain often affected the decisions a physician made in regards to their treatment, especially in the aspect of surgery. The development and implementation of two anesthetic chemicals began to change the approach doctors took toward surgery and physiological research. And, while surgery became more popular during this period, the increase of patient deaths also increased due to infection. Holding on to the miasma theory of medicine, physicians still blamed the environment for illnesses and infections and a rising sect of society decided to help make their domestic and urban environments safer for human habitation. While these sanitary-minded people ushered in a desire for hygiene and cleanliness, hospitals also followed suit in their approach to hygiene and infection.

Chapter Five investigates the arguments and debates that surrounded the emergence of bacteriology and the sanitarian movement that rose in popularity alongside this medical discovery. While the medical and lay communities could not come to a complete agreement over miasmas or germ theory, some middle ground became established during this transition period as doctors debated and conducted further research and Sanitarians sought to cleanse the body and the city. However, both sides of the debate did come to an agreement that cleanliness helped to reduce illness and epidemic diseases.

Chapter six discusses how the implementation of germ theory, updated hygienic practices, and the implementation of new diagnostic equipment altered the construction and operation of the hospital. During the beginning of the twentieth century, medicine has emerged as a laboratory science and hospital design became reconfigured to account for this. With the natural environment no longer viewed as a therapeutic, hospitals could now find a home in the urban setting and due to the cost of urban real estate, hospitals now climbed vertically instead of spreading out over acres of land in the country. Hospitals have also become expensive, front-loaded investments that required a shift in how administration approached the comfort of patients. Attracting more paying patients affected the design of hospitals since paying patients required more privacy than what was afforded them in an open ward.

Chapter One: *In the Beginning*

Medical theory of the eighteenth and most of the nineteenth century straddled the natural and built environments, including hospitals, cultivating one in order to serve the inhabitants of the other. Doctors who established a notable reputation not only communicated their findings and experiments with other physicians through journals and monographs, they also communicated their treatment regimens with the lay literate public through these same publications available to any who could afford them. While the wide spread use of the printing press appeared to broaden the available medical knowledge, conflict strained the limitations of contemporary medicine by focusing on the treatment of wounds and known camp illnesses, yet concurrently, it also relieved certain limitations through the incorporation of African and Amerindian medical practices.

The communication of certain therapeutic techniques along with medical experiments helped to not only relay information to physicians in different regions of the world, but also cultivated the natural environment by the manner in which these doctors communicated with the medical community at large. Within the medical community, physicians harvested numerous natural resources not just for the aim of treating patients, but for the transmission of information as well.

In addition to communication, an industry emerged that centered around the production and sale of pharmaceuticals by supplying apothecaries and physicians with the various raw materials needed for the treatment of patients. These pharmaceuticals also found their way into hospitals as staple items along with other items such as bed linens and bandages rather than delivered by apothecaries on an as needed basis. The existence of an on-site pharmacy became one of many instances that later helped to separate the charity hospital from the almshouse.

Wholesalers ventured out on to the high seas to the far corners of the known world and collected these raw materials which they then sold for a profit to refiners back in the mainland. These refiners would mix the certain pharmaceuticals in bulk and market their finished products to the various retailers, who in turn, would sell smaller quantities to the apothecaries and physicians.¹² For these merchants of medicine, many of them came into great fortunes by creating an industry that many people viewed as valuable and necessary.

Medical theory changed little since the time of Hippocrates and many of the existing theories and practices employed during the late eighteenth and nineteenth centuries would remain familiar to the ancients. Miasma theory, or as some physicians termed, zymotic theory, relied heavily on not just the disposition of the patient but also incorporated their surroundings in the construction of a diseased body. The balancing of the four humors served as one of the leading tenets of medical practice: the close watch over blood, phlegm, black bile, and yellow bile. From the Medieval period, some men could literally be diagnosed as being sick with love as their emotions for a particular woman caused their blood to run too hot and caused them to succumb to an illness.¹³ As these Medieval theories built upon the work of Hippocrates, the location of people within the natural environment also contributed to their physical and emotional disposition. Hippocrates spoke of the Phasians, located on the eastern shores of the Black Sea and of their region as “the most stagnant of all rivers, and runs the smoothest; all the fruits which spring there are unwholesome, feeble and imperfect [in] growth.” He goes on to describe the Phasians’ physical attributes which were the cause of their environment, “they are large in stature, and of a very gross habit of body... in color they are sallow, as if affected with

¹² Pratik Chakrabarti, *Materials and Medicine: Trade, Conquest and Therapeutics in the Eighteenth Century*. (Manchester: University of Manchester Press, 2010), 35

¹³ Michael Solomon, *The Literature of Misogyny in Medieval Spain: The Arcipreste de Talavera and the Spill*. (New York: Cambridge University Press, 1997), 53

jaundice. Of all the men they have the roughest of voices, from their breathing an atmosphere that is not clear, but misty and humid.”¹⁴

By 1769, The American Philosophical Society (est. 1743) published a list of “botanical items” available throughout the British Empire along with their commercial and medical benefits. Listing items in their Linnean and English forms, any natural scientist or literate lay person could easily reference these materials and their uses. Items such as *Ceratonia Siliqua* (Locust Tree or St. Johns Bread) “the pods [of which] are good for hard-working cattle.”¹⁵ One of the medicinal plants mentioned is the *Convolvulus Scaunmonia* (Gum Scammony) which details that the “seeds of the plant, from whence this excellent drug is produced... requires the warmer climates of Carolina and Georgia”.¹⁶ Members of the American Philosophical Society included notable figures such as Benjamin Franklin (a founding member), James Madison, and John Marshall, all of whom resided in the class of American colonial elites, both intellectually and financially. The American incarnation of the Royal Society shared in the separation of the classes and had yet to adopt a more egalitarian view of the world.

These publications, encyclopedias, treatises, and journals became a source of valuable information for physicians and were not quickly discarded. Doctors would also maintain a catalogue of these materials that circulated around the British Empire to utilize as a reference guide when they encountered a particularly difficult case. Additionally, these reference materials also found their way into medical school libraries and when hospitals became more prevalent so too did these research materials become part of their administration office’s on-site library.¹⁷

¹⁴ Hippocrates, *On Airs, Waters and Places*. Kessinger’s Legacy Reprints, ed. (Kessinger Publishing, 2019), 21

¹⁵ “A Catalogue of Such Foreign Plants as Are Worthy of Being Encouraged in the American Colonies, for the Purposes of Medicine, Agriculture, and Commerce”, *The American Philosophical Society* vol 1 (Jan 1769-1771): 256

¹⁶ *The American Philosophical Society* vol 1 (Jan 1769-1771): 257

¹⁷ Cameron Logan, “Preserving Health: Modern Hospitals as Historic Places.” *The Journal of Preservation Technology* 42, no. 2/3 (2011): 48

Just as with parchment and vellum producers, papermaking thrived as an industry all over Europe. Instead of using animal skins as their base, papermakers used materials from the plant world instead.¹⁸ These journal publications during the eighteenth and nineteenth centuries helped to bring the natural environment into hospitals, medical schools, and doctor's offices not through physical building materials but through intellectual building materials. Commonly made of flax fibers, whose plants mature within three to four months, these plants found their way to the artisanal papermakers of the age in the form of discarded rags and worn-out clothing.¹⁹ While fine paper could take months to produce through the process of soaking, bleaching, drying, pressing, and cutting, the paper used in journals did not utilize high quality expensive paper. In a time saving measure, these journal pages were bleached less (which took up the lion's share of time in the papermaking process) and used more heavily dyed and coarse linens instead of the more pure white linens used for finer paper.²⁰ The natural environment made its way into the medical community not just through chemotherapies such as opium and cathartics, but also through the intermediaries of the textile and papermaking industries as physicians communicated with each other throughout the British Empire.²¹

The close relationship that the medicine shared with the environment helped to embed itself within the larger medical community through print culture and the use of environmental natural materials which facilitated communication between physicians. The use of natural resources to communicate in writing helped to further solidify the zymotic theory of disease among physicians in different regions of the world. In addition, through print culture, physicians

¹⁸ [Differences between Parchment, Vellum and Paper | National Archives](#)

¹⁹ [European Papermaking Techniques 1300-1800 - Paper Through Time: Non-Destructive Analysis of 14th through 19th Century Papers - University of Iowa \(uiowa.edu\)](#). "Materials" heading.

²⁰ [European Papermaking Techniques 1300-1800 - Paper Through Time: Non-Destructive Analysis of 14th through 19th Century Papers - University of Iowa \(uiowa.edu\)](#). "Figure No. 5"

²¹ Leonard N. Rosenband, "The Industrious Revolution: A Concept Too Many?" *International Labor and Working-Class History*. no. 90 (Fall 2016): 217

also utilized the natural environment to achieve ends that extended beyond just the creation of medicinals or the prevention of disease; the flax, velum, papyrus, and other natural resources used for written communication allowed physicians to engage in a printed conversation about the intricacies of their profession.

In addition to the natural environment making its way into the medical community and its structures through journals, a tangent occurrence ensued as well. Many of the weavers, tailors, journeyman papermakers, apprentices, rag sorters, and rag collectors may have utilized the services of the charity hospitals established in their cities and depended upon the physicians who garnered cutting edge therapeutics from the very paper they created. Perhaps even the worn out bandages and bed linens made their way to the shops for these skilled and unskilled laborers to make future paper for future journals.

The hostilities that broke out between France and Britain during the Seven Years War proved that combat served as a crucible for medical study and improvement. With large numbers of men dispatched to various regions around the British Empire, the differences in climates became extreme in comparison to their customary surroundings in England. Combined with the intentions to conduct combat operations, the quantity of human capital that took ill due to their new surroundings and the incessant flurry of musket and cannon fire (accompanied with the occasional bayonet or sword) provided a plethora of wounds upon which any surgeon could gain a portmanteau's worth of clinical experience. However, the main enemy of armies during the eighteenth century came not from battlefield wounds garnered from a government's desire to secure or expand its borders, the seemingly invisible invader common to; all disease. Far more soldiers encountered their mortal end by an enemy they could not see and possessed no training to expel at their commander's orders.

In many instances, doctors (who volunteered, or were pressed into military service) began to combine the indigenous flora with their homeland medical education in the service of curing ill soldiers. Without proper knowledge of immunology or nutrition, scurvy afflicted soldiers by the thousands and forced physicians to utilize any means at their disposal to prevent and cure, at times, entire battalions. On mainland North America, British commanders and physicians noticed a Native American concoction that appeared to stave off scurvy and return an otherwise suffering patient to their natural health. As the British enjoyed their tea immensely, spruce tea became the go-to therapeutic for replenishing the body of vitamin-C and ascorbic acid. General Jeffery Amherst, architect of the campaign to capture New France during the Seven Years War, noted his advocacy for “spruce beer” along with his disdain for the commoners not only among his ranks but within the colonies as well, “Fresh provisions now and then and a constant supply of spruce beer keeps the army in good health and they work well which helps toward the health of the provincials, who if left to themselves would eat fried pork and lay in their tents all day.”²² So impressed by the curative power of spruce beer, he included a recipe for the mixture on the back of his personal journal.

Many physicians noted that tropical and humid environments played a particularly dangerous role in one’s health, as the humidity and temperature often struck down new arrivals to the West Indies and the southern United States with yellow fever. However, the argument arose about whether yellow fever should be classified as contagious since it sometimes reared its ugly head in northern regions of the United States such as New York and Philadelphia. William Currie, in a 1799 paper to the American Philosophical Society, noted the experiments conducted by certain botanists and chemists with their conclusions pointing to the mixing of nitrogen and

²² National Archives of Canada. MG 18-L4, A-1826 015, “Jeffery Amherst Journals 1758-1763”.

oxygens gases as one of the causes of yellow fever.²³ Stating that the main composition of the soil in these marshy and wetland areas consisted mostly of vegetable and animal substances which “constantly putrify in hot weather, it has been supposed [the] miasmata issue, which give origin to the diseases peculiar to marshy situations,... if those diseases depend upon miasmata or effluvia, these miasmata must consist of one or more of the gases enumerated.”²⁴ Even Thomas Paine broke from political agitation pamphlets and noted that marshy and low-lying areas spawned yellow fever and took hold of a “prosperous mercantile town near the river.”²⁵

In many cases, distant colonies in the British Empire found themselves dependent upon local therapeutics that mimicked imported chemotherapies simply for the reason of transportation problems. Spoilage, damage to packaging (broken vials, bottles, and shipping crates), and shipwrecks often plagued doctors in the American colonies and West Indies. In other cases, physicians who procured local medicinals often incurred a lesser cost than having ordered them from overseas. Items such as musk, camphor, and opium which found their way to distant regions of the British Empire by earlier settlers could be had for a fraction of the cost instead of using the middle-men in mainland England.²⁶

However, in the absence of known materials, doctors came up against the dilemma of incorporating indigenous cures out of necessity, or even ignorance. Plantation owners in the West Indies assumed responsibility for the healthcare of the enslaved population, even if only on the most rudimentary of levels, and they often did not hire the most astute of physicians.²⁷

²³ William Currie, “An Enquiry into the Causes of the Insalubrity of Flat and Marshy Situations: And Directions for Preventing or Correcting the Effects Thereof,” *Transactions of the American Philosophical Society* 4 (1799): 128

²⁴ William Currie, “An Enquiry into the Causes of the Insalubrity of Flat and Marshy Situations: And Directions for Preventing or Correcting the Effects Thereof,” 129

²⁵ Thomas Paine, *The Cause of the Yellow Fever: and the Means of Preventing it in Places not yet Infected with it*. (London: Clio Rickman Printers, 1807), 5

²⁶ Pratik Chakrabarti, *Materials and Medicine: Trade, Conquest, and Therapeutics in the Eighteenth Century*. (Manchester: University of Manchester Press, 2010), 37-39

²⁷ Pratik Chakrabarti, *Materials and Medicine*. 155

Patrick Browne, a prominent physician in Jamaica during the mid-eighteenth century, held a very low opinion of the incoming doctors who treated the enslaved population by highlighting their inexperience in stating that the “raw youth” would suffer their patients to “be vomited and blistered to death in a yellow fever, and the ladies, poisoned with bark in verminous inflammations.”²⁸ While lacking the appropriate pedigree in England needed to establish a reputable practice, or as seen here, lacking the advanced university medical training, many of these immigrant doctors sought their fortunes in less suitable climates. Having to learn about tropical diseases as they encountered them in their new surroundings, many of these fresh doctors took up residence at a slave hospital; an institution designed to segregate the sick and injured slave from the healthy population as a means of control more than convalescence.²⁹ This afforded inexperienced doctors with a plethora of patients upon which to hone their craft and simultaneously generate an income. One of the methods employed by white doctors to gain notoriety among the plantocracy in the West Indies was to become adept at treating black people, which also included conferring with African healers and their therapeutic methods.³⁰

Medical theories during this time did regard Africans as humans, yet they were regarded as a sub class of human compared to Europeans and while anatomically similar, Africans became considered intellectually and physically inferior to the population of European descent. An 1838 article demonstrates how the assumption that African troops maintained a lower infectivity rate of yellow fever compared to white troops in the West Indies, they failed miserably in staving off diseases of the lungs, stomach, and bowels and “extended to every climate in which they have

²⁸ Patrick Browne, *The Civil and Natural History of Jamaica*. Vol I. (London. N/A, 1756), 25

²⁹ Rana A. Hogarth, *Medicalizing Blackness: Making Racial Difference in the Atlantic World, 1780-1840*. (Chapel Hill: University of North Carolina Press, 2017), 147

³⁰ Rana A. Hogarth, *Medicalizing Blackness*. 159-165

been employed; thus inducing the supposition that there must be in the constitution of the negro some peculiarity which predisposes him to affections of the lungs.”³¹

Carl Linnaeus in his tenth edition of *Systema Naturae* included Africans, Native Americans, and Europeans as primates and mammals but describes them in vastly different ways. The *Americanus* (Native Americans) are described as “red, choleric, upright”; Africans described as “black, phlegmatic, lax”, and finally Linnaeus describes whites as “white, sanguineous, muscular.”³² While Linnaeus’ *Systema Naturae* underwent ten editions, the notion that Africans filled a subservient role to that of whites remained well into the nineteenth century. Physicians even into the mid-nineteenth century sought to create a divide between whites and those of African descent by not only using medical expertise but mixing it with Christian doctrine in proving Linnaeus correct that the African race was indeed lax. Practicing primarily in Mississippi and Louisiana, and developer of the mental illness *drapetomania* (the desire of a slave for freedom), Samuel Cartwright invoked his Christian belief that Africans not only descended from the tribe of Ham, but that they also could not breathe in as much oxygen as whites, do not “breath as pure air, and hence, when they sleep, cover their heads with a blanket,” and are therefore mentally deficient.³³

The conquest of the African continent by Europeans created one of the most, if not the most, despicable industries known to man: the slave trade. While the slave trade opened up economic and financial opportunities for the unscrupulously greedy, the medical complex also benefitted from the slave trade by incorporating African medical practices into the larger

³¹ A. M. Tulloch, “On the Sickness and Mortality Among the Troops in the West Indies.” *Journal of the Statistical Society of London* 1, no 7 (November 1838): 429

³² Carl Linnaeus, *Systema Naturae: Regnum Animale 1758*. Tenth ed. (Leipzig: Guilielmi Engleman Printers, 1894), 20-22

³³ Samuel Cartwright, *The Western Journal of Medicine and Surgery*. 10, no 4 (October 1852): 363

portmanteau of medical knowledge. Bioprospecting became a booming industry during the eighteenth century as commerce between the Atlantic continents increased exponentially. However, while a large degree of African cures lay in combining a spiritual affiliation with the diagnosis, Europeans only became interested in the flora itself and how it could heat or cool a person's constitution.³⁴ In this respect, Europeans used Christianity to undermine African medical practices and relegate them to a subservient role while simultaneously exploiting their medical knowledge.³⁵

Absalom Jones' ancestors and countless other anonymous Africans who faced enslavement originally arrived in the form of captives, some as prisoners from tribal wars, from the continent. Seen as a threat to the victors, these African soldiers often found themselves sold to European slave traders for the purpose of eliminating the probability of an insurrection.³⁶ However, since many of the tribal leaders possessed medical knowledge and religious status, they too became customary victims to the slave trade for the same political reasons as the soldiers.

Known commonly as Obeah, African ritual medicine crossed the Atlantic with people such as Domingos Álvares in the early eighteenth century. As historian James Sweet describes in this African's biography, Álvares was groomed from an early age in the art of spiritual-medical healing and continued his practice in the New World during his enslavement.³⁷ While his desire to practice his art garnered him and his owner a considerable amount of money and

³⁴ Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World*. (Cambridge, Ma.: Harvard University Press, 2004), 87

³⁵ Rana A. Hogarth, *Medicalizing Blackness: Making Racial Difference in the Atlantic World, 1780-1840*. (Chapel Hill: University of North Carolina Press, 2017), 83

³⁶ John Thornton, *Africa and Africans in the Making of the Atlantic World, 1400-1800*. Second ed. (New York: Cambridge University Press, 1998), 123

³⁷ James H. Sweet, *Domingos Álvares: African Healing, and the Intellectual History of the Atlantic World*. (Chapel Hill: University of North Carolina Press, 2011)

fame in South America, the rise of the slave population created a sense of fear among the white population and oppressive measures became enacted to discredit Obeah with the intention of keeping the slave population passive. Even as late as 1783, physicians and natural philosophers wrote about African herbal remedies yet excluded the spiritual aspects of the treatments.³⁸ A report presented by notable eighteenth century botanist Joseph Banks cited how ambergris made its way through African culture and “is not only used as a medicine and as a perfume, but a great use of it is also made in cookery, by adding it to several dishes as a spice”.³⁹ Banks goes on to note the popularity of ambergris in European culture for various reasons, adding that it could also find a medicinal purpose based upon the established African uses as a purgative.⁴⁰

As noted by numerous historians, the elite considered themselves morally, financially, as well as physically, superior to those upon whom they depended for labor and the generation of such wealth. Outbreaks of disease became an endemic problem in the urban areas of the British Empire and early United States and much of the blame for such epidemics found itself squarely upon the shoulders of the impoverished. The densely populated quarters of lower-class neighborhoods, rubbish-filled streets and alleys, human waste discarded into the streets or poured into leaky privy vaults that rarely received the removal of its contents, created the ideal vectors for disease to flourish among the neighborhood’s inhabitants.⁴¹

During the long eighteenth century, when an epidemic overran a city, those with means often fled in terror to the clean air of the country and sparsely populated estates to ride out the outbreak and leave the impoverished and enslaved to their own devices in the city. One of the

³⁸ Londa Schiebinger, *Secret Cures of the Slaves: People, Plants, and Medicine in the Eighteenth-Century Atlantic World*. (Stanford: Stanford University Press, 2017), 119

³⁹ Joseph Banks, “An Account of Ambergris, by Dr. Schwediawer; Presented by Sir Joseph Banks, P. R. S.” *Philosophical Transactions of the Royal Society of London* 73 (1783): 240

⁴⁰ Joseph Banks, “An Account of Ambergrise, by Dr. Schwediawer; Presented by Sir Joseph Banks, P. R. S.” 240

⁴¹ Melanie Kiechle, *Smell Detectives: An Olfactory History of Nineteenth-Century Urban America*. (Seattle: University of Washington Press, 2017), 65

most notable evacuations in American history, the yellow fever epidemic of 1798 in Philadelphia, caused thousands of deaths, created panic among all classes, and witnessed the desertion of the gentry. Freeman, Absalom Jones, and co-founder of the Free African Society noted in his telling of events that few physicians chose to remain, Benjamin Rush among them, and offer what aid they could but that “two thirds of the persons, who rendered these essential services, were people of colour.”⁴² With the daunting task of caring for possibly thousands of sick and a severely depleted medical staff, Jones articulated the amount of trust that Rush placed in the hands of Africans, both free and enslaved, for their treatment of the sick and removal of the deceased.⁴³ However, it is not known whether Rush undertook these actions out of sympathy for the abolitionist movement in Philadelphia, a personal trust in Jones, desperation out of finding himself so short-staffed during an epidemic, or a combination of all three.

In the early nineteenth century, epidemics still ravaged urban areas with efficiency and deadly precision, especially yellow fever. By 1819, its origins still remained a mystery to physicians but they did understand that it was endemic to mostly warm and humid climates. When an outbreak of disease occurred, some evacuations were voluntary while a few others became compulsory. The yellow fever outbreak of the same year in New York City found blame in multiple facets, from the unusually warm late summer weather, the filth of the Old Slip district (centered around modern-day Pier 11 on the East River off FDR Drive), and arriving vessels from the West Indies created an outbreak that worried city leaders as noted by Charles Drake, a

⁴² Absalom Jones, *A Narrative of the Proceedings of the Black People, During the Late Awful Calamity in Philadelphia, in the Year 1793 and a Refutation of Some Censures Thrown Upon Them in Some Late Publications*. (Philadelphia: William W. Woodward Printers, 1794), 5

⁴³ Absalom Jones, *A Narrative of the Proceedings of the Black People, During the Late Awful Calamity in Philadelphia, in the Year 1793*. 5

prominent attending physician at Bellevue Hospital.⁴⁴ The city Board of Health established a quarantine around the district and evacuated the impoverished tenants and prohibited any vessels from docking in the harbor. As an act of charity towards these poor evacuees, they “were provided for at the public charge at Fort Richmond on Staten Island.”⁴⁵

Additionally, orthodox medicine of the period aided, either intentionally or accidentally, in further solidifying the social stratifications in urban areas by incorrectly making the assumption that when epidemics did occur their epicenter typically found itself among impoverished neighborhoods and were typically the filthiest and most polluted in any city. First noticed in India around 1817, reports flooded in from the Ganges Delta, of a disease that worked its way east, arriving in the Ottoman Empire around 1821.⁴⁶ The first cholera outbreak in the United States in 1832 not only demonstrated the paralysis that physicians experienced when attempting to treat afflicted patients but the disdain for the urban environment and its inhabitants held by upper-class people. Once in the grips of the water-borne pathogen, a human body will rapidly expel its fluids thickening the blood and causing such strain on the heart that it ceases to function.⁴⁷ Some reports stated that a healthy man would rise at six o’clock in the morning, go off to work, and be dead by ten that night. What frightened doctors and lay people alike was the speed with which cholera claimed its victims. Again, the wealthy elite could evacuate to the country while the impoverished suffered a gruesome and painful death.

Another notable physician from Bellevue, David Meredith Reese, assessed the nation’s outbreaks of cholera and located their epicenters in “The Five Points and Harlem, New York,

⁴⁴ Charles Drake, “Original Essays: An Account of the Endemic Yellow Fever, as it Occurred in the City of New York, During the Summer and Autumn of 1819.” *The Medical Repository of Original Essays and Intelligence, Relative to Physic, Surgery, and Chemistry*. N/A vol 6, no 2 (March 1821): 127

⁴⁵ Charles Drake. “Original Essays.” 128

⁴⁶ J. R. Lichtens, ed., “History of the Epidemic Spasmodic Cholera of Russia.” *The North American Medical and Surgical Journal*. vol 12 (October 1831): 393

⁴⁷ <https://www.cdc.gov/cholera/illness.html>. Accessed 09/10/2021

The Brick Yards at Philadelphia, Ruxton-lane in Baltimore, and along the canal in Washington D.C.” and that this supported the argument that those “from crowded apartments where personal cleanliness and wholesome fare is neglected” served as the etiological foundations for the spread of disease.⁴⁸ Reese also labeled certain dietary causes of cholera ranging from the consumption of pork, shellfish, certain berries, beer and ale, wine, and cheese especially “if these articles were eaten or drank just before going to bed; and a full meal, under such circumstances, produced an attack just before morning.”⁴⁹ However, Reese did do his patients some good in comparison to some of his colleagues, he strongly cautioned against the use of “spiritous liquors or fermented drinks”, the use of opium, and cathartics and other purgatives (which most likely would have killed a patient with speed). With very little understanding of human physiology, doctors rarely considered the dangers of dehydration, especially with respect to cholera so the prescription of cathartics such as calomel, which induced vomiting and diarrhea, often brought a cholera patient even faster to death’s door.

General Winfield Scott even mentioned the toll cholera had on his relief soldiers coming out of Chicago in 1832. This could be a frightful thought when having to subdue chief Black Hawk’s uprising while not knowing the communicability of this disease. Scott appeared to have little choice in the matter as he ordered these Chicago companies “stationed on an island on Rock River, several miles from the Fort, and all communication prohibited by special order.”⁵⁰

In most cases, the wealthy viewed the symptoms of poverty as the causes by holding the opinions that alcoholism, adultery, and a general filthiness in clothing, bathing, and domestic

⁴⁸ David Meredith Reese, “Review of Reese on the Cholera: A Plain and Practical Treatise on the Epidemic Cholera,” *The Methodist Magazine and Quarterly Review* 15, no 1 (January 1833): 302

⁴⁹ David Meredith Reese, “Review of Reese on the Cholera: A Plain and Practical Treatise on the Epidemic Cholera,” 303

⁵⁰ “Record of Occurrences,” *The North American Magazine* 1, no 1 (November 1832): 55

surroundings were what kept the poor impoverished rather than meager wages, unsafe working conditions, and lack of a proper university education.

With the realization that medicine was continually evolving and making new discoveries, physicians of the eighteenth and early nineteenth centuries rarely discounted anyone who claimed medical knowledge even though some of the writings by university educated doctors demonstrated otherwise. The acceptance of foreign and non-white help appeared to weaken the trust that the medical community had worked so diligently to earn from the lay public, many of these physicians and apothecaries felt the need to scorn those in the lower classes for their attempts to present themselves as equals to university-trained doctors. While some seemed as grifters eager to relieve unsuspecting victims of their currency, others actually possessed measure of medical training and even degrees and advertised themselves as specialists in certain diseases.⁵¹ A specialist, in modern society, is often viewed as the most knowledgeable physician in a certain field and highly regarded in the medical community. But, for the eighteenth and early nineteenth centuries, specialization became frowned upon and doctors who did specialize often became known as quacks for not practicing the entirety of medicine.

Yet, and to the point of hypocrisy, in 1789, Rush imparted some words of wisdom to graduating physicians on the subject of quacks and the practice of non-white medicine. In stating to his students, “Remember how many of our most useful remedies have been discovered by quacks... By conversing with quacks, we may convey instruction to them, and thereby lessen the mischief they may otherwise do to society.”⁵² Almost seemingly in the same breath, Rush credits Native American and Africans with a back-handed compliment by further directing his

⁵¹ Roy Porter, *Quacks: Fakers and Charlatans in Medicine*. Fourth ed. (Gloucestershire, UK: Tempus Printing, 2003), 193

⁵² Benjamin Rush, *Medical Inquiries and Observations, To Which is Added an Appendix, Containing Observations on the Duties of a Physician, and the Methods of Improving Medicine*. Second ed. (Philadelphia: N. A., 1789), 256

students that “even negroes and Indians have sometimes stumbled upon discoveries in medicine. Be not ashamed to inquire them.”⁵³ During this period, maintaining racial and intellectual superiority over people of color seemed necessary even though the European medical complex had exploited the ecology of these people’s native lands. While desiring to maintain racial superiority over Africans, white physicians appeared to have no qualms about incorporating African and Native American medicines into their treatment regimens.

While the built environment epitomized economic and industrial progress, many Europeans viewed the very same surroundings as polluted, filthy, and at times uninhabitable. However, those with financial investments and governmental influence appeared to simply raise their hands in defeat and accepted this as the price paid for their wealth and human advancement. Even though minor efforts to ameliorate the problem of urban pollution emerged throughout the decades, the population often remained too large, the financial resources of the local government too meager, and the will to cleanse their city too broken. The establishment of practices in urban areas often defines the nexus of medicine, however doctors simultaneously reached into distant and rural areas to procure their chemical therapeutics.

Environmental historian, Linda Nash, describes the connection between humans, civilization, and the natural environment in her book *Inescapable Ecologies*, by noting that humans remained only a cog in a larger piece of natural machinery under the miasma theory of disease rather than possessing complete control over such machinery.⁵⁴ In the miasma theory, the quality of the environment played a crucial role in the spread of disease. Congested urban areas could breed disease just as easily as low-lying, humid, and swampy regions that remained

⁵³ Benjamin Rush, *Medical Inquiries and Observations, To Which is Added an Appendix, Containing Observations on the Duties of a Physician, and the Methods of Improving Medicine*. 257

⁵⁴ Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge*. (Berkeley: University of California Press, 2006), 48

largely uninhabited.⁵⁵ However, botanists, physicians, and apothecaries alike all sought out rural areas for finding a cure for urban diseases such as typhoid, gout, and even tuberculosis. Some of the main ingredients found in an apothecary's or physician's employ would be opium, mercury (mostly for sexually transmitted diseases such as syphilis) and an item known as either Jesuit/Peruvian Bark, a quirky substance that, while unknown at the time, contained quinine. Later discovered to help alleviate the symptoms of malaria and yellow fever, "the bark" as it was commonly referred, found immense popularity in combination with opium for just about any ailment that resulted in a fever.

Eighteenth and nineteenth century medicine did not view itself as static, singular, or even stagnant. Physicians believed they made headway in medical advancements and came closer to curing the diseases that afflicted people and therefore brought them closer to a morally and physically superior state of existence.⁵⁶ A global medical complex emerged from the earlier Age of Conquest, relying on plants and theories transported from one region of the world in order to treat patients in another. Not only did people move from one continent to another, across vast oceans risking their lives for capital or religious gains, but their ideas and discoveries also traversed these lands and seas in the holds of the very same ships that brought so many European and African inhabitants to the New World and Europe. In addition to these new medical discoveries and the realization that many parts of the world shared similar climates, physicians encountered problems with communication. No longer did exchanging letters between individual doctors or authoring lengthy and time-consuming treatises suffice to communicate new information and discoveries in a speedy manner across the various empires. A method of

⁵⁵ Linda Nash, *Inescapable Ecologies*. 87

⁵⁶ Charles Rosenberg, *The Care of Strangers: The Rise of America's Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 18-21

distributing these findings and discoveries needed to be implemented but in such a way that provided a relatively low cost not just for the printer but for the consumer as well.

Along with these discoveries in distant lands and colonies, a culture of printing, and consuming information in print, established itself in the Empire during this period and became part of the English cultural identity. With a rapidly expanding global empire, physicians realized they needed a system of communication in order to share ideas with those in distant lands, and more importantly to educate the lay public when a physician could not be located. Publishing in the traditional Latin, a common practice among the medical community in Western Europe, no longer remained a feasible method of disseminating medical information. Thomas Sydenham, a notable and often referenced physician by later generations, published his 1676 treatise *Observationes Mediciae* and his 1666 publication *Methodus Curandi Febres* in Latin, yet later publications could be found translated into English, some of them as early as 1695. British medical treatises and pamphlets now found a broader market when published in the vernacular. As similar disease symptoms emerged in various regions of the Empire and a shortage of university-trained doctors outside England, physicians from around the world could now communicate with each other and the general public in hopes of curing patients they could not treat in person.⁵⁷ No longer did physicians keep their trade secrets under the lock and key of Latin as the expansion of the Empire forced the medical community to cease their intellectual insulation.

These publications also became valuable commodities to those who did not possess the funds to hire a physician or lived in remote regions of the Empire.⁵⁸ Physicians no longer held a

⁵⁷ Suman Seth, *Difference and Disease: Medicine, Race, and the Eighteenth-Century British Empire*. (New York: Cambridge University Press, 2018), 27

⁵⁸ Jennifer Richards, "Useful Books: Reading Vernacular Regimens in Sixteenth-Century England," *The Journal of the History of Ideas* 73, no. 2 (April 2012): 251

one-to-one relationship with their patients, treating them based upon their environment, but rather treating patients based solely upon their symptoms.⁵⁹ Vernacular publications in the form of dictionaries and encyclopedias contained descriptions of treatment for various illnesses in which the lay public could refer time and again without incurring the fees of a physician.

William Buchan, a well-respected physician and medical professor at the Royal College of Physicians in Edinburgh in 1772, stated in the introduction of his treatise, *Domestic Medicine*, that the majority of his colleagues warmly received his work as countering the falsehood that “all physicians wish to conceal their art.”⁶⁰ Deeper into his preface, Buchan elucidated, and possibly encouraged his lay readers, when he explained that “many of the peasants at present know better how to use some of the most important articles in the *materia medica*, than physicians did a century ago.”⁶¹ While he indicated intelligence among the lower classes, he appears to maintain the social stratification of the period and the paternal authority of the gentrified class.

Robert James, in 1745, authored a medical dictionary in the vernacular intended for mass publication and attempted to provide all necessary information about “physic, surgery, and anatomy” along with an appendix on medicines.⁶² Having studied medicine at the Royal College

⁵⁹ Elisabetta Lonati, *Communicating Medicine: British Medical Discourse in Eighteenth-Century Reference Works*. (Milan: University of Milan Press, 2017), 21. In addition, R. A. Houston, *Literacy In Early Modern Europe: Culture and Education, 1500-1800*, provides additional information that Lonati did not mention in her work. Reading and publishing became acts in which a medically educated gentleman would participate, and along with France and Germany, Britain became one of the printing powerhouses in world. Movable type and less expensive methods of producing paper aided in making England a dominant force in Western European printing by the opening of the eighteenth century. In the year 1790, approximately 56,000 titles emerged from British printing presses and circulated the globe. During the early days of printing in the sixteenth century, a complete Bible would cost an ordinary artisan over a month’s wages, whereas by 1711 the same printing would cost about one and a half day’s wages; and concurrently, a multipage pamphlet during the late eighteenth century could be had for a price on par with a loaf of bread. By the close of the eighteenth century, the educated inhabitants of the British Empire read more on a myriad of topics than had previously occurred in the prior centuries. These passages reference pages 175 and 203-204.

⁶⁰ William Buchan, *Domestic Medicine: Or a Treatise on the Prevention and Cure of Diseases by Regimen and Simple Medicines*. Second ed. (London: N/A, 1772), v

⁶¹ William Buchan, *Domestic Medicine*. xii

⁶² Robert James, *A Medicinal Dictionary: Including Physic, Surgery, Anatomy, Chymistry, and Botany; In All Their Branches Relative to Medicine*. (London: T. Osborne Printers, 1748)

of Physicians in 1728, he also received his Royal Mandate as a doctor of medicine later that same year. Initially intended primarily for medical students, James' medical dictionary also found a home among the lay inhabitants of the British Empire. The preface lays out a rudimentary history of medicine so any literate person could understand the foundations of eighteenth-century medical practices and theories.⁶³ As pamphlets, medical dictionaries, and encyclopedias gained popularity over the latter half of the eighteenth century, physicians capitalized on a more popular form of publication that many purchased by subscription: the *journal*. Shorter than a dictionary or encyclopedia, less expensive to produce, but longer than a newspaper article, the journal provided valuable medical information to the general public by trusted physicians of the time.

The early to mid-eighteenth century marks the very seminal beginnings of a professionalization within the medical community. While attempting to remain, or climb into, the upper echelons of British society, an egalitarian view of self-help began to take hold in the Empire. Even though physicians worked with their hands, just as the skilled artisan, the cultural standards imposed upon them exceeded that of artisans and laborers.⁶⁴ The vernacular publications from the medical complex offered literate lay people the opportunity to treat themselves under the instruction of a notable physician even though they were not at the patient's bedside.

⁶³ Robert James, *A Medical Dictionary*.

This preface makes an account of accepted medical origin theories of the age and also credits the "Americans" with contributions to medicine such as Peruvian Bark even though they may not have understood the chemical processes or medical theories behind such cures due to their "illiteracy". ix

⁶⁴ Michael Brown, *Performing Medicine: Medical Culture and Identity in Provincial England, c. 1760-1850*. (Manchester: Manchester University Press, 2011), 23

According to research conducted by historian Kevin Siena, the wealthy viewed the lower classes as a threat to the health of not only the wealthy but to the health of the state as well.⁶⁵ His work, *Rotten Bodies*, demonstrates that the views of egalitarianism among the upper social classes in Britain remained intentionally omitted, and that medical publications served a two-fold purpose. One, to communicate with other learned physicians from around the Empire and keep abreast of emerging medical theories and practices. And two, these publications in the vernacular served as a guide on how to segregate filthy and disease-ridden plebeians from their own class as a measure of safeguarding themselves rather than working in the more noble interest of public health.⁶⁶ These publications often served the poor as a virtual treatment by a notable physician while maintaining some distance between the poor and wealthy.

A holdover from the medieval period, the credibility of the person delivering a message became almost as important as the information conveyed. An important component of any healthcare philosophy lay in disseminating and circulating emerging, as well as existing, information for people to utilize. With print news and pamphlets rising in popularity within the British Empire, this appeared the most effective method of medical communication. However, during the mid to late eighteenth century, the reputation of the author often dictated the credibility of the contents.⁶⁷ With pamphlets and news broadsheets, the author could take certain risks such as publicizing controversial political views since these forms of public information sharing could often be published anonymously.

⁶⁵ Kevin Siena, *Rotten Bodies: Class and Contagion in Eighteenth Century Britain*. (New Haven: Yale University Press, 2019), 28

⁶⁶ Kevin Siena. *Rotten Bodies*. 64-65

⁶⁷ Andrew Pettegree, *The Invention of News: How the World Came to Know Itself*. (New Haven, Ct.: Yale University Press, 2014), 2

Pettegree argues throughout his book that from the Middle Ages to the close of the nineteenth century the reputation of author often gave credence to the validity of what was being reported.

Medical information needed not only possess credibility but often required a great deal of detail in their explanations which, due to their length, lacked in popularity with broadsheet publishers.⁶⁸ The journal appeared as a serial form of communication in the mid-eighteenth century and often appeared either weekly or monthly and reviewed all manner of cultural, political, and scientific ideas. The articles tended to exceed the length of the existing standard for pamphlets and broadsheets, were vetted by those knowledgeable in the particular field, and most importantly, required a signatory.⁶⁹ These periodicals became extremely popular among English physicians and the lay public since they could easily be catalogued, referenced, and dissected for every bit of useful information. With the headquarters of these journals usually centrally located in London and then dispersed throughout the Empire, physicians could now carry on a conversation in print with their colleagues from around the Empire with relative ease.

Within a century of its original establishment in 1660, the Royal Society became a hub of knowledge for all fields of study and journal publications. Apothecaries, physicians, philosophers, and other natural scientists eagerly accepted the invitations of fellowship in the Society and just as eagerly shared their knowledge, experiments, and discoveries with their fellow members. The publicity arm of the Royal Society became known as the *Philosophical Transactions*, a title which clearly indicated the science-based nature of the publication.⁷⁰ Their journal included contributions from the entirety of the Empire.

British inhabitants could read not only about how to treat illness in their particular region, but could also adapt treatments developed in remote areas of the Empire and even on the high seas. Charles de Martens, a former British Navy doctor and later physician at the Foundling

⁶⁸ Andrew Petegree, *The Invention of News*. 219

⁶⁹ Andrew Petegree, *The Invention of News*. 269

⁷⁰ Andrew Petegree, *The Invention of News*. 271

Hospital in London, penned an article about scurvy and its possible cures. The language he employs remained plain and straightforward for the period and highly utilized the vernacular. This would allow people without scientific training to easily digest and employ the information when needed. De Martens elucidated that he was “persuaded that sea and land scurvy are the same disorder, arising from familiar causes, that is, living upon salt meat or fish, few or no vegetables, damp housing, etc.”⁷¹ Further in his article, he goes on to state how he increased the vegetables in the diets of children at the Foundling Hospital and its success in curing most cases of land scurvy.⁷² Had de Martens intended this information solely for fellow physicians, the usage of scientific language might have been much more pronounced. Additionally, making the connection between scurvy on land and sea, de Martens reached out to readers from all walks of life including farmers, artisans, factory workers, and also sailors.

With this proliferation of the journal, a hierarchy quietly but insistently established itself within the medical field. Even the upper echelons of society possessed a stratification recognized by those within upper the classes. Those publishing articles and gaining empirical knowledge quickly became the main influencers in the medical field and created a form of intellectual currency. An elite few now wore the crown of medical expertise and sought to guide and instruct those within the British Empire about medical practices and treatments. In regards to the Royal Society, while physicians from around the Empire joined, prominent men who chose careers in professions other than medicine and natural science accepted the invitations of membership as well. While physicians became noted as P.R.S., noting that they held the title of *Physician of the Royal Society*, laymen had bestowed upon them a somewhat lesser title of

⁷¹ Charles de Martens, “Observations on the Scurvy”. *Philosophical Transactions of the Royal Society of London* 68 (1778): 662-663

⁷² Charles de Martens, “Observations on the Scurvy”. 672

F.R.S., or *Fellow of the Royal Society*. The establishment of such a hierarchy further demonstrates the segregation of the elite from the filthy lower classes as a matter of selfish health reasons since no artisan or laborer was allowed a fellowship or even attendance to meetings.

However, as these titles exhibited a clear hierarchy, some of the F.R.S. members also contributed greatly to the transmission of medical knowledge by including their accounts in the Society's journal. One such member, Captain James Cook F.R.S., published an account of his attempts to maintain the health of his crew while he circumnavigated the globe. Taking on fresh foods while in various ports appears to have ranked high in his priorities in conjunction with careful and measured exposure to the elements.⁷³ Cook concludes his account plainly and assertively states that fresh water, smoke and fire to "clear miasmas from the lower decks", and cleanliness will stave off the scurvy.⁷⁴ The learned physicians and gentlemen that comprised the Royal Society authored journal articles and gained the trust of the general public primarily based upon the reputations of those who submitted articles for publication.

The University of Philadelphia's medical school, the preeminent North American university for medicine at the time, was staffed mostly by physicians educated at the University of Edinburgh and in London which provided a pathway for English medical theory to influence future generations of American physicians. In his book *The Contagious City*, Simon Finger makes mention that three of the directors of the university (Benjamin Rush, John Morgan, and Samuel Latham Mitchill) all held medical degrees from Edinburgh. The vernacular publications in the form of pamphlets, treatises, and serial journals remained popular among the medical

⁷³ James Cook, "The Method Taken for Preserving the Health of the Crew of His Majesty's Ship the Resolution During Her Late Voyage Round the World." *Philosophical Transactions of the Royal Society of London* 66 (1776): 403-404.

⁷⁴ James Cook, "The Method Taken for Preserving the Health of the Crew of His Majesty's Ship the Resolution During Her Late Voyage Round the World." 405

community in early America since this became a steadfast means in which to communicate with medical students and the lay public in rural areas of the fledgling country. American physicians of this time simply continued what they had already instituted as a successful means in which to communicate publicly with each other, the greater global medical community, and assume a paternalistic stance with the general public.

During the period of the Revolutionary War, many American physicians attempted to disseminate information to under-trained or inexperienced physicians and surgeons who served the Continental Forces. The ability to use print instead of a lecture hall to educate those in the medical profession became a priority once casualties from the battlefield came pouring into the first aid stations and make-shift field hospitals. Physician John Jones authored a manual for “the use of young military and naval surgeons of North America” in 1776 acknowledging the shortage of trained medical personnel during this period.⁷⁵ In his dedication to colleague Thomas Cadawaller, Jones noted that “many of the Gentlemen engaged in that service are young men, whose opportunities of instruction or practice, have been confined within narrow limits...will find in the piece, no unuseful guide.”⁷⁶ Jones’ recognition of an inexperienced North American medical complex during a time of war exposed the need for physicians to become more than just doctors during a time of emergency. They also needed to adapt to performing the duties of the lower arts as well, that of surgery and even nursing.

While war created a crucible for medical practice and multiple opportunities to expand upon medical therapeutics in a relatively short period of time, an entire economy based upon medical theory grew out of imperial expansion. Plants from all corners of the British, Spanish,

⁷⁵ John Jones, *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures*. (Philadelphia: Robert Bell Printers, 1776)

⁷⁶ John Jones, *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures*. 4

and French empires created financial opportunities for those with the means to invest in, and establish, the pharmaceutical industry. According to Jones' treatise, in accordance with the "nature and urgency of the symptoms; emollient glysters, cooling nitrous drinks, anodynes to assuage pain, a most rigid exact diet, consisting solely of thinly diluting drinks, perfect quiet, and a posture which at once contributes to the patient's ease" would have access to medicines from one, or all, of these empires.⁷⁷ The traditional black medical bag that physicians carried contained a constellation of regions from around the globe in chemical form to ease a patient's suffering and treat their ailments.

European medical theories, along with the plant and mineral-based therapeutics, traveled aboard the British fleet for the purposes of commerce, conflict, and colonization. Eventually, these pharmaceuticals not only incorporated themselves into European medical practices, they too travelled the globe in search of creating fortunes and improving the health of those that cultivated and ingested them. Middle-Eastern opium found its way not only to Europe but every other continent with the exception of Antarctica in the eighteenth and nineteenth centuries. Jesuit bark accompanied physicians into humid climates such as the Caribbean, India, and coastal Africa in hopes of treating yellow fever and other illnesses that presented similar symptoms. Physicians and druggists actively participated in colonization not just by curing those indigenous and transplanted peoples of the British Empire, but they introduced distant plants to distant people and expanded the British medical complex because of this transportation of plants and minerals.

As industrialization gained a foothold on the urban environment in the British Empire and United States, it seemed to do so at the expense of sanitation and public health. While

⁷⁷ John Jones, *Plain Concise Practical Remarks on the Treatment of Wounds and Fractures*. 26

fortunes rose exponentially for some due to investments in these emerging commercial technologies, so too did the pollution. While growth became one of the urban environment's hallmarks, it also became its greatest adversary.⁷⁸ Filth and endemic diseases such as typhoid, yellow fever, and dysentery served as reminders that the city was a dangerous place for human residence, yet these same people that polluted their environment appeared to throw up their hands in surrender when presented with financial gain since they could segregate themselves in cleaner regions during a wave of disease; while those forced to labor under the oppressive thumb of these industry titans became the city's prisoners.

⁷⁸ Benjamin Sells, *The Tunnel Under the Lake: The Engineering Marvel that Saved Chicago*. (Evanston: Northwestern University Press, 2017), 9

Chapter Two: *What's a Hospital? I Don't Know, Do You?*

The concept of the hospital as a repository for the sick and injured who could ill afford treatment at home did not emerge as a new concept in the late eighteenth century; military hospitals, lazarettos, foundling hospitals (a modern term for this would be an orphanage), and even almshouses for impoverished residents provided some measure of medical care. Yet, these almshouses, lazarettos, and other structures became the predecessors to the establishment of public hospitals and the treatment of the poor. The clergy and the wealthy of British society seemed to take some measure of interest in raising not just the health and living standards of the impoverished population but the moral standards as well. Sailors and soldiers could find comfort during the later years of their lives (if they survived their service long enough to retire) by applying for respite at a military or naval hospital. Impoverished women and men could find some resources for survival and a moderate measure of medical care at various almshouses though some payment may be required after their discharge and a strict set of requirements for entry also applied, meaning that they must be deemed as salvageable both morally and physically. Foundling hospitals also rose in popularity as the impoverished section of British cities found themselves unable to care for the younger generation.

During the eighteenth and early nineteenth centuries the concept of perpetual healthcare in the form of permanent structures appeared to be less of a priority to government entities than the economic issues of the day. However, hospitals did emerge during times of public emergency such as epidemics but would disappear just as quickly once the city became relatively healthy again. The early permanent hospitals that did appear during the Antebellum period often resembled the structure of the almshouse along with the conditions within its walls. Arguments over design and operation raged between architects, administrators, and physicians as medical

theories and design philosophy competed for funding. A closer view of these institutions prior to the establishment of permanent hospitals not only sheds light on the abject poverty in which many people lived and died, but also the contempt that some in the upper echelons of society held for those in poverty.

The diseases and injuries treated at these almshouses, military hospitals, and foundling hospitals often reflected the physical danger to which the poor population became subjected as a means of survival. Diseases such as tuberculosis, conjunctivitis, and other “bilious and remittent fevers” combined with fractures of arms, legs, and hands (in several cases, compound fractures) found company with the aged whose bodies had been worn down by intense physical labor and could no longer endure such work. The almshouses of the United States and Britain during the late eighteenth and early nineteenth centuries often included merchant sailors discharged from their employment due to illness or injury and dock workers who sacrificed the health of their bodies by loading and unloading cargo on those merchant ships.⁷⁹

Many hospitals began as something akin to modern nursing homes where aged and infirmed sailors could live out their twilight years in moderate comfort and under the care of the crown. Greenwich Hospital, founded in 1694, cared for retired as well as active seamen in the British Navy and by a 1792 report expanded into a sprawling complex of multiple buildings each containing several wards and a central courtyard.⁸⁰ These hospitals and almshouses often received charitable donations from the wealthy citizens of the Empire, became established by acts of Parliament under the direction of the sitting monarch, or a combination of the two. Bancroft’s Hospital, established in 1737 after the passing of Francis Bancroft in 1728 who

⁷⁹ Simon P. Newman, *Embodied History: The Lives of the Poor in Early Philadelphia*. (Philadelphia: University of Pennsylvania Press, 2003), 62-63

⁸⁰ Church of England Chaplains ed. *A Concise Description of the Royal Hospital for Seamen at Greenwich*. (N/A, 1792.)

operated a Drapery (textile company), became an almshouse in London for “twenty-four old men, with a convenient chapel, and school room for one hundred poor boys” according to the dictates of his will.⁸¹

Orphanages also became a place where the impoverished youth of a city could find some measure of medical and nutritional care when their parents could no longer care for them due to death or lack of income. One of the most notable orphanages in Britain, the Foundling Hospital in London, was originally established in 1739 by Thomas Coram, a successful merchant who catered to the commercial needs of the American colonists.⁸² As a seafaring man, Coram most likely witnessed his fair share of husbands lost at sea through shipwreck or piracy and sailors duping young women into less than honorable activities. These destitute and desperate women with bastardized children, either through the death of the father or ill-advised sexual activities of their mother, placed them in a situation that almost guaranteed starvation or infanticide. As Thomas Bernard, later treasurer of the Foundling Hospital wrote in 1799, “The detail of their wretched and deserted situation, sometimes too well confirmed by the almost starved condition in which some of the infants are brought into the hospital... a detail which, if it could be given to the world without injury to the unhappy subjects of it, would serve to deter from vice those who might otherwise have been the victims of seduction.”⁸³ Unfortunately, the foundling hospital operated as an orphanage rather than an almshouse so the mothers of these children could find no respite at the Foundling Hospital and sought their refuge elsewhere or were sent to the workhouse as punishment for conceiving out of wedlock.

⁸¹ Francis Bancroft, *A True Copy of the Remarkable Last Will and Testament of Mr. Francis Bancroft*. (London: J. Peele and Locke, 1728), 12

⁸² Thomas Bernard, *An Account of the Foundling Hospital in London, for the Maintenance and Education of Exposed and Deserted Young Children*. Second ed. (London: Thomas Jones Printers, 1799), 3

⁸³ Thomas Bernard, *An Account of the Foundling Hospital in London*. 10

Across the Atlantic, medical care for the impoverished followed much the same route as in England with almshouses and physicians visiting the homes of the sick and injured who could afford it. Epidemics also ravaged many of the urban areas during the eighteenth century creating the need for temporary hospitals, or keeping a ship originating in the Caribbean from docking in cities such as Philadelphia, Boston, or New York due to an outbreak of malaria or yellow fever during its journey. Yet, permanent hospitals dedicated to the injured and ill still remained a rare sight for those in search of medical care.

During the early eighteenth century colonial America, the hospital served mostly as a lazaretto during the outbreak of a city-wide disease. A majority of the wealthy would flee to their estates in the country, but those that remained would usually commandeer or erect a temporary structure to treat those who succumbed. During the yellow fever epidemic of 1793 in Philadelphia, Absalom Jones and those assisting him commandeered Bush Hill Estate on the outskirts of the city. Initially erected in 1737 by Andrew Hamilton, a close confidant of William Penn, the deserted estate became a repository for those who succumbed to yellow fever. Little treatment could be had since most physicians had either fled, and those that did remain, such as Benjamin Rush, found themselves overwhelmed by the number sick pleading for help. Jones and others attending the afflicted, who among them numbered “convicts... voluntarily offered themselves as nurses to attend the sick” at the Bush Hill estate offered what few comforts they could to ease the suffering of the sick until death claimed them or they began to recover.⁸⁴ In the case of Bush Hill Estate, after the epidemic had passed it once again became abandoned since the need to care for large numbers of sick residents at a single time sharply declined.

⁸⁴ Absalom Jones, *A Narrative of the Proceedings of the Black People, During the Late Awful Calamity in Philadelphia, in the Year 1793 and a Refutation of Some Censures Thrown Upon Them in Some Late Publications*. (Philadelphia: William W. Woodward Printers, 1794), 4

Prominent physician Samuel Brown, graduate of Edinburgh medical school and student of Benjamin Rush, noted in his remarks on the Yellow Fever that struck Boston in 1798 that people remained treated in the home under the section he titled “Apartments” where he stated “the sick should be the highest in the house without being immediately under the roof. The more elevated the room, the purer the air will be found.”⁸⁵ The establishment of a full-time hospital in Boston remained over a decade in the future, so many residents in Boston had no other alternative than to treat afflicted family members in the home. At the time of the outbreak, Boston’s population hovered around 25,000 permanent residents, and during the epidemic from July to October of that year, Brown reported the official death toll at 250, although he speculated privately that the reality of the yellow fever’s mortality rate was much higher.⁸⁶

During this period, a person’s home often became their refuge and place to convalesce while suffering an illness. Traditionally viewed as woman’s work by the social dictates of the period, treating minor illnesses and injuries became common among wives and daughters. Only during severe cases, such as yellow fever, typhoid, and various other undiagnosed (or misdiagnosed) illnesses would the knowledge and treatment of a physician be required.⁸⁷ Medical doctrine of the time also dictated that during epidemics quarantining of the sick in the home best served the community since travelling even to the almshouse or doctor’s office for treatment could severely affect others as the arguments for and against the contagiousness of disease raged on. The domestic environment often served as more than just a residence and living quarters for human inhabitants, but for the ill and injured it provided a space for treatment and convalescence, and in extreme cases it also served as a surgical theater when a doctor needed

⁸⁵ Samuel Brown, *A Treatise on the Nature, Origin and Progress of the Yellow Fever, with Observations on Its Treatment*. (Boston: Manning and Loring Printers, 1800), 70

⁸⁶ Samuel Brown, *A Treatise on the Nature, Origin and Progress of the Yellow Fever*. 25

⁸⁷ Kathleen M. Brown, *Foul Bodies: Cleanliness in Early America*. (New Haven: Yale University Press, 2009), 215

to operate on a patient. Surgeons would perform all manner of operations in a person's home, amputations, mastectomies, the removal of abscesses and tumors near the surface of the skin, and the patient's bed or dining table often served as the operating table.

With respect to rural areas, illness and injury often became the responsibility of the entire community with not only family, but neighbors taking shifts to care for the sick and injured. Thomas Jefferson wrote definitively on the subject in his *Notes on the State of Virginia*. Jefferson laments this shortage of medical expertise in stating that "one branch only of hospital institution is wanting with us... an able surgeon cannot be had in every parish."⁸⁸ Also commenting on the shortage of hospitals and physicians, the community must come together during an illness or injury with the hope of applying whatever treatment a lay person can provide, "where every member emulous to do them kind offices, where they are visited by all their neighbors, who bring them the little rarities which their sickly appetites may crave, and who take by rotation, the nightly watch over them, when their condition requires it"⁸⁹ In instances such as these, a dedicated staff of medical caretakers appeared lacking and in response members of the community filled the role of medical staff and the domestic environment served the purpose of a hospital.

Up until about the mid-eighteenth century the thought of dedicating a structure to those in need of medical care appeared to elude most people in the British Empire with the exception of attempting to care for those who had dedicated their lives to the empire by serving in the military. As epidemics arose in cities so too did hospitals and lazarettos, but as those epidemics moved on to claim lives in other cities and towns the hastily erected or commandeered medical facilities became reclaimed by the city for other uses or were left abandoned. Those living in the

⁸⁸ Thomas Jefferson, *Notes on the State of Virginia*. (Richmond: J. W. Randolph Printers, 1853), 144

⁸⁹ Thomas Jefferson, *Notes on the State of Virginia*. 144

country and without access to university educated physicians, neighbors and family members filled the role of nurse and doctor. As for the impoverished living in the city who could not afford the fees of a private physician to visit them in their homes, the almshouse became the only source of medical care outside of the domestic environment.

Having to admit a sick relative or spouse to an almshouse in the United States during the late eighteenth and early nineteenth centuries never ranked high on the poor's list of ideal places for recovery. Often dilapidated and unsanitary due to lack of proper funding, the mentally ill and vagrants also found shelter at almshouses which presented an issue of physical safety for the sick poor. Several almshouses in the United States charged for their services, modest and customarily paid through an exchange of labor rather than specie, a person who recovered could expect to toil in the almshouse garden or tend to other sick patients until they repaid their debt, costing their family even more in lost income.⁹⁰ Although the need for charity loomed over the heads of the impoverished, even the deplorable conditions of some almshouses could not dissuade them from seeking refuge as a matter of desperation. Between the years of 1800 to 1814 those who passed through the doors each year of the New York City almshouse rose from 874 to 1201 inmates.⁹¹ However, in an odd twist of historical accounting, the number women that Almshouse Superintendent Richard Furman listed outnumbered men by an almost a 2:1 ratio for the year 1812.⁹² In addition, domestic-born poor seeking assistance comprised just over two thirds of the inmate population compared to foreign-born inmates although the genders of the foreign-born population went unlisted by Furman.

⁹⁰ Seth Rockman, *Scraping By: Wage Labor, Slavery, and Survival in Early Baltimore*. (Baltimore: Johns Hopkins University Press, 2009), 196

⁹¹ Richard Furman, "New York Almshouse." *Boston Recorder* 2, no. 7 (February 1817): 28

⁹² Richard Furman, "Condition of the Poor House in the City of New York 1812-1813." *The Medical Repository of Original Essays and Intelligence, Relative to Physic, Surgery, Chemistry, and Natural History* 1, no. 3 (1814): 314

In the case of the Tewksbury Almshouse in Massachusetts, the largest almshouse in the state, and for a time the largest almshouse in the country, served as a beacon of hope for many who found themselves in poverty. Historian David Wagner illustrates in his study of the inmate records of Tewksbury, that several preferred the conditions of the almshouse over starvation and frostbite. His work notes that some people would travel up to three hundred miles by foot to find sanctuary at Tewksbury⁹³ and many women, both married and single, would venture there as well to find medical treatment while delivering their children. Wagner makes mention of a twenty seven year-old woman landing in Boston from Nova Scotia in 1866, pregnant out of wedlock and seeking to give birth away from her mother because of the stigma placed upon children from unwed mothers.⁹⁴

A plausible argument for the function of the almshouses in various states lies in their eventually becoming a “catch-all” for the poor and destitute and also as a weigh station for orphaned children and the insane who would be shuffled off to other charitable institutions. They provided not only some medical treatment, but a moderate amount of respite for those on the brink of starvation and homelessness, and also struggled to find appropriate accommodations for children and the insane by sending orphans to foundling hospitals or had them bound out as apprentices and transported the insane to asylums. People arrived, were inducted, convalesced, labored, received some education, departed, and sometimes returned. Overall, the almshouse settled itself among the culture of the impoverished and became a fixture of urban development which largely subsisted upon the philanthropy of those with means and sometimes in conjunction with the taxes of those with real estate holdings.⁹⁵

⁹³ David Wagner, *Ordinary People: In and Out of Poverty in the Gilded Age*. (Boulder, Co.: Routledge, 2008), 61

⁹⁴ David Wagner, *Ordinary People*. 64

⁹⁵ “New Almshouse Boston.” *The Youth’s Companion* 23 no. 50 (April 1850): 200

Concurrently, as the wealthy and other taxpayers contributed to the construction and maintenance of the almshouse, certain measures were undertaken by their superintendents to help reduce costs and attempt to create a self-sufficient entity. The Deer Island Almshouse in Boston Harbor, established in the early months of 1850, the administration provided work rooms for those able to labor and produce items for sale, a garden in which to grow crops, and a school house for children where they would receive a rudimentary education.⁹⁶ One of the hopes the financial contributors had for those admitted into the almshouse was that they would undergo a moral transformation through honest labor, temperance, and religious worship and escape the vices that led them into poverty.

The opinion of those with financial security upon the poor and pauperism often reflected the symptoms of poverty as the causes. Alcoholism, prostitution, gambling, and domestic violence often drove people into poverty and perpetuated their status as paupers. As borne out by an eye witness to the Tewksbury Almshouse, Silas Brown noted in his opinion that these religious sins created the illnesses and poverty that the inmates experienced, yet seems to hold out some hope that the conditions of the almshouse would benefit the moral character of such people. He observed that “my impression was that if those who were taxed to build and support the establishment were susceptible to envy, they must feel a degree of it on seeing facilities and conveniences so much superior to their own for rendering the burden of labor light.”⁹⁷ Brown laments innocent children suffering the wrath of God because of the sins of their parents as they arrive at the almshouse with various diseases which lead to the “curse threatened in the commandment of ‘visiting the iniquities of the parents upon the children to the third and fourth

⁹⁶ “New Almshouse Boston”. 200

⁹⁷ Silas Brown, “State Almshouse at Tewksbury, Massachusetts.” *The New England Farmer; A Monthly Journal* 6, no. 10 (October 1854): 455

generation”⁹⁸ In many instances, in addition to laboring at the almshouse if one was able, religious instruction and worship also became compulsory as it was the expectation of inmates to improve their moral character through religious worship and sobriety.⁹⁹

Former physician at New York Hospital, a founding member of the Society for the Prevention of Pauperism, Quaker John Griscom decided to break with tradition and reversed the view of the impoverished as he attributed their circumstances as the symptoms of poverty rather than as a cause. He held the belief that a destitute lifestyle brought on alcoholism, vice, and apathy, or as he stated, it would be “impossible to maintain their former tone of morals and domiciliary cleanliness.”¹⁰⁰ In his opinion, the environment in which the poor found themselves encouraged the lack of moral character and industriousness; a fault that would befall even the most upright of families if they somehow fell into a similar situation. Griscom appeared to fight an uphill battle in changing the minds of those who worked with the poor that poverty itself was to blame for the sinful coping mechanisms the impoverished employed in order to ease the emotional strain of their position in life. Griscom’s correspondence with J. B. Horton, a local minister, Horton demonstrated that he placed very little faith in the reformation of the poor as they “habitually live in squalid filth, negligent of domiciliary and personal cleanliness, like wicked men and seducers, wax morally worse and worse.”¹⁰¹

The incessant moving, often occupying an apartment for only a few weeks, prevented people from maintaining proper cleanliness along with inadequate access to clean water and an

⁹⁸ Silas Brown, “State Almshouse at Tewksbury, Massachusetts”. 455

⁹⁹ Anne Borsay and Peter Shapely eds., *Medicine, Charity, and Mutual Aid: The Consumption of Health and Welfare in Britain, c. 1550-1950*. (New York: Routledge, 2007), 26

¹⁰⁰ John Griscom, *The Sanitary Condition of the Laboring Population of New York with Suggestions for Improvement*. (New York: Harper & Bros., 1845), 24

¹⁰¹ John Griscom, *The Sanitary Condition of the Laboring Population of New York with Suggestions for Improvement*. 29 While Griscom discusses the almost nomadic lifestyle of the poor in New York City, moving every few weeks from tenement to tenement, he never seems to discuss why the impoverished moved so often which could be a topic for further research and discussion.

inability to properly launder their linens and clothing.¹⁰² However, Griscom did manage to find some people sympathetic to his argument. Horace Mann, Whig Party politician and advocate for educational reform shared his sentiments with Griscom and accepted a portion of the blame for the impoverished in a letter to Griscom: “We are parties to their degradation, inasmuch as we permit the inhabitants of places, from which it is not possible in condition or habits can come. We suffer the landlord to stow them, like cattle, in pens, and compel them to swallow poison with every breath. They are allowed, may it not be said, required, to live in dirt, when the reverse, rather, should be enforced.”¹⁰³ However, one of the arguments conspicuously absent from the plight of the wealthy in their philanthropy to the poor was wages. The wages and length of employment a person received remained elusive to those who wished to raise their moral character and social standing in the community. Instead, it appears that philanthropists and wealthy advocates for the poor invested their finances into almshouses, and subsequently, hospitals.

Nothing novel or new existed in the implementation of measures to assist the sick poor, but the idea of assisting the sick without the expectation of payment and utilizing the most modern medical therapeutics in a location specifically designed for such an end gained some forward momentum among the wealthy of the United States since Benjamin Franklin proposed the idea in 1750. In his appeal for a hospital in Philadelphia he reminded his listeners and readers that “the great author of our faith, whose life should be the constant object of our imitation... always showed the greatest compassion and regard for the sick.”¹⁰⁴ Franklin not

¹⁰² John Griscom, *The Sanitary Condition of the Laboring Population of New York with Suggestions for Improvement*. 7

¹⁰³ John Griscom, *The Sanitary Condition of the Laboring Population of New York with Suggestions for Improvement*. 23

¹⁰⁴ Benjamin Franklin, “Appeal for the Hospital, 8 and 15 August, 1751.” founders.archives.gov accessed 09/15/2021.

only attempted an appeal to the assemblymen's Christian character but to their pocketbooks as well by citing the greater cost of caring for patients in the home in comparison to a hospital providing the ability for a doctor to treat multiple people in a central location. Yet, much of this forward momentum became lost during the time of the Revolution and once again hospitals as permanent structures found themselves deprioritized.

While populations in urban areas multiplied exponentially in the years of the early Republic and Antebellum period, very little appeared in the way of addressing the sick and injured of such cities. Poverty affected the wealthy of these cities to a great degree, especially since they believed that poverty was preventable. Hard work, saving money, temperance, and education provided an avenue for wealth and leisure even when a person found themselves impoverished. Again, vice served as the causes of poverty rather than symptoms which led to people living in filthy and poorly ventilated conditions and in turn created ill health and rampant disease.¹⁰⁵ The trustees of hospitals, usually comprised of wealthy businessmen of the city, often invested large sums of money in such charitable institutions for several reasons, mostly to either leave a legacy of some sort and to ensure that their deity looked favorably upon them should they happen to meet.¹⁰⁶ Writing during the mid-nineteenth century, famed British architect Benjamin Linfoot noted in a more nuanced manner that the Episcopal Hospital in Philadelphia "owes its existence partly to the desires which existed in many hearts for such a broad charity, and partly to the imperative need which there was in our city for increased accommodation for the sick and

¹⁰⁵ Simon Finger, *The Contagious City: The Politics of Public Health in Early Philadelphia*. (Ithaca: Cornell University Press, 2012), 61

¹⁰⁶ Charles E. Rosenberg, *The Care of Strangers: The Rise of America's Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 49

wounded; for, while the population of the city had marvelously multiplied, there had been little increase in hospital accommodation for a century.”¹⁰⁷

From a top-down perspective, the charity hospital seemed a sure win for any city as wealthy donors could leave their benevolent mark upon their community, physicians could gain knowledge through practice on an increased number of patients and therefore solidify their reputation and gain wealthy patients for their private practice, and the poor could find free medical treatment and finally begin to correct the moral wrongs of their lives once discharged.¹⁰⁸ While many undertakings begin with the best of intentions, not all goes according to plan. For instance, while architects possessed the blueprints of a successful hospital, designing such a structure became a daunting task. With so many differing opinions and people desiring control over the drafting table, hospital architecture became an arduous process.¹⁰⁹ Physicians wanting to control the design based upon medical theories and practices, trustees attempting to dictate the overall cost of a hospital (so as to find supernatural forgiveness without having to dig too deep into their pockets) architects of the day faced not only a medical dilemma but a political one as well.

Hospitals often became mired in political fights especially when it came to the location of these repositories of disease. Most physicians either emerged from or elevated themselves to the upper class of society and usually maintained homes within a neighborhood that reflected their upper class status.¹¹⁰ Many doctors opened an office in order to treat patients, but often visited the homes of those too ill or injured to make the trek. Because of this, their patient lists reflected

¹⁰⁷ Benjamin Linfoot et. al., *The Hospital of the Protestant Episcopal Church in Philadelphia: Its Origin, Progress, Work, and Wants*. (Philadelphia: J. B. Lippincott & Co., 1869), 8

¹⁰⁸ David Rosner, *A Once Charitable Enterprise: Hospitals and Health Care in Brooklyn and New York, 1885-1915*. (Princeton: Princeton University Press, 1982), 17

¹⁰⁹ Jeanne Kisacky, *Rise of the Modern Hospital: An Architectural History of Health and Healing, 1870-1940*. (Pittsburgh: University of Pittsburgh Press, 2017), 31

¹¹⁰ David Rosner, *A Once Charitable Enterprise*. 15

the demographic within a certain radius of their home and office rather than a broader view of their entire city. Depending upon the density of the population, their sphere of treatment could encompass only a few blocks to a few miles which also limited the scope of illnesses they encountered as a practitioner.

One of the primary and most glaring distinctions between the almshouse and the charity hospital lay in its design. Physicians now possessed an outlet for inscribing medical theory upon the architecture of a structure rather than just acting as a visitor to one as in the case of the almshouse. They could now invest a measure of ownership and have a physical expression of their expertise. A hospital dedicated to the healing of the sick and injured rather than just a lazaretto or almshouse appeared within the grasp of urban physicians. The time at which hospitals in the United States and Europe grew in popularity also brought with it some significant changes in the public opinion of medicine and medical treatment. The first half of the nineteenth century brought the practice and theory of medicine out from under the umbrella of natural philosophy, once thought of as an intellectual pursuit for wealthy gentlemen, it became a respected science unto itself. In addition, specialization in certain aspects of medicine and surgery as well became respected pursuits instead of frowned upon as quackery.¹¹¹

Even though the practice of medicine as a whole grew in respectability and as a profession, very little federal or state regulation existed for the protection of patients. As a result of this, the profession of medicine remained locked in a civil war with orthodox medical theory clashing and competing with the various fringe practices of the era.¹¹² The standard Galenic medicine competed with homeopathy, Thomsonism, hydropathy, and various other folk

¹¹¹ Roy Porter, *Quacks: Fakery and Charlatans in Medicine*. Fourth ed. (Gloucestershire: Tempus Printers, 2003), 37-38

¹¹² W. F. Bynum and Roy Porter, eds., *Medical Fringe and Medical Orthodoxy: 1750-1850*. (New York: Routledge, 1987), 46-47

remedies. Part of the reason for such an array of medical theories and practices emerged from the first cholera outbreak in the United States in 1832; a deadly disease at the time which established itself quickly and violently in its victims and often carried them into death within hours. The majority of physicians in the country never experienced a disease so violent to the body and induced death so quickly which almost paralyzed the entire medical community. As Galenic physicians attempted to treat their patients, the cathartics, purgatives, and bleedings often exacerbated their patients' fragile and dehydrated condition. These actions eroded the trust the general public held for orthodox doctors and they often sought the assistance of those considered on the fringe of medicine for relief.¹¹³

The result of the first cholera outbreak forced Galenic medicine to share the limelight of the healing arts with various other medical practices and the disdain felt by many orthodox practitioners spilled over into print. A renowned physician, botanist, and geologist, Charles A. Lee, who also served as professor of medicine in many New York universities and established the Northern Dispensary for the poor in New York City allowed his opinions to be blatantly known to an incoming class of medical students at Sterling Medical College in 1852 by noting that "the homeopathic law of cure flies in the very face of the theory of disease... the homeopathic hypothesis is calculated to please and fascinate superficial minds... it flatters impatience and idleness."¹¹⁴

Even though homeopathy achieved pariah status among orthodox physicians, many of these orthodox doctors adopted the philosophy of homeopathy in the treatment of their patients. One physician, S. C. Davids, a graduate of the University of Glasgow medical school and full

¹¹³ "Remarks on Cholera". *Boston Medical and Surgical Journal* 13 no. 1 (August 1835): 13-14.

¹¹⁴ Charles A. Lee, *Homeopathy: An Introductory Address to the Students of Sterling Medical College*. (Columbus, Oh.: Osgood, Blake, and Knapp Printers, 1853), 9, 39

member of the Royal College of Physicians in Edinburgh, penned his remarks on homeopathy which survived to see several editions. Developed during the late eighteenth century, German-born Samuel Hahnemann developed the medical theory of *similia similibus curentur*, translated to like cures like. While many physicians during the antebellum period embraced vaccination, especially against smallpox, this practice of using disease to cure disease delved straight to the heart of homeopathy and something that Galenic physicians grudgingly accepted. One of the main reasons that orthodox doctors despised the method of smallpox vaccination was that it gave credence to the homeopathic philosophy of like cures like.¹¹⁵ Matter collected from the pustules of smallpox patients and then inserted under the skin of healthy recipients served as the traditional medium for inoculation.¹¹⁶ However, much of the attraction to homeopathy by the lay public rested in its bedside manner of small dosages of medicines instead of the often gargantuan ones prescribed by Galenic doctors, particularly when it came to purgatives.¹¹⁷ Homeopathy's popularity rested on the premise of caring for the patient and allowing them to rest while recuperating instead of administering purgatives and cathartics.

In his 1847 edition, Davids expands on the duties of a homeopathic physician as a defense to the attack by orthodox medicine stating that “for the selection of an appropriate Homeopathic remedy, the physician must possess a vast and accurate knowledge of the medicines.”¹¹⁸ Furthering his defense, Davids asks the central question as to why homeopathy finds little acceptance among the orthodox medical schools. His response goes to the heart of orthodox medicine its and belief in the teaching of ancient Greek philosophical practices in

¹¹⁵ W. F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century*. (New York: Cambridge University Press, 1994), 52

¹¹⁶ Michael Bennett, *War Against Smallpox: Edward Jenner and the Global Spread of Vaccination*. (New York: Cambridge University Press, 2020), 35

¹¹⁷ S. C. Davids, *A Sketch of Homeopathy: Or, The System of Medical Treatment with Specific Remedies in All Cases*. Third ed. (London: Gillet and Moore Printers, 1847), 19

¹¹⁸ S. C. Davids, *A Sketch of Homeopathy*. 11

medicine and that such a long-standing establishment cannot accept “truth in an early stage” and dedicates itself to maintaining the status quo.¹¹⁹

Even though doctors, both recently graduated and tenured, entrenched themselves on both sides of this war over sickness and health, common ground did exist. Both orthodox and fringe physicians agreed that the environment played a pivotal role in the health of their patients and they wanted the hospital to become the physical embodiment of those beliefs. With medical knowledge finding itself somewhat lacking in the United States compared to certain countries in Europe, a thorough study of health systems in nations like England, France, the Papal States, and Venice ensued. Physicians also continued to utilize the journal for the dissemination of information on hospital design and emerging European medical techniques. *The British Medical Journal* excitedly reported on the works of French anatomist and surgeon Alfred Marie Velpeau and his successful femoral hernia surgical technique. Serving as a resident surgeon at the Hospital la Charité in Paris, his technique is detailed for all to study and adopt.¹²⁰ The editors of the journal noted that “we think it is worthy of trial because the method is so simple, that it has the advantage of causing no permanent pain even if it fails.”¹²¹

Likewise, the substandard conditions and poor ventilation at the Hotel Dieu in Paris made their way into the medical journals of the time, yet the attending physicians found worthy praise from observers for their “enlightened... practice on the doctrines of physiological and pathological science” as they had their treatment regimens for cholera published. Even though these regimens varied to some degree: some using purgatives, some bleeding, and some a less

¹¹⁹ S. C. Davids, *A Sketch of Homeopathy*. 20

¹²⁰ M. Valpeau, “Foreign Medical Intelligence,” *Provincial Medical and Surgical Journal, BMJ* 1, no. 7 (November 1840): 116

¹²¹ M. Velpeau, “Foreign Medical Intelligence”. 116

invasive approach by employing opium, the praise emerged from a deep empathy that European physicians held for their patients.¹²²

Not only did medical journals find eager readers on both sides of the Atlantic, many American doctors ventured to Europe to gain first-hand knowledge of emerging medical practices and hospital design. Charles A. Lee, while he demonstrated his indignity and insolence toward homeopathy, he found a softer tongue during his travels abroad in Rome, Venice, and London. In his correspondence, Lee offers the known facts of water and its ability to sustain or destroy cities and that “the purest water is the healthiest”. Although he did not subscribe to hydropathy as a medical science, he understood the therapeutic value of potable water and its ability to contribute greatly to the health of individuals.¹²³ He also extolled the involvement of the British government in testing the water of the Thames once each month for pollution and conveyed the usefulness of using carbon as means of filtration (something not used widely in the United States at that time).

His next correspondence from Venice in the latter months of 1862 showed his amusement of streets paved with water and that “Venice is a glorious place for cripples, for as all locomotion is by gondolas.”¹²⁴ Contrasting with London’s supply of water and government oversight, he noted that Venice lacks in spring water and what is delivered seems saturated with pigeon dung.¹²⁵ As Lee made his tour of the city, he remarked on the quantity and quality of food items available to its inhabitants and their superiority to those supplied to Americans.

Supplied by the countries from around the Mediterranean, the finest beef, veal, poultry, seafood,

¹²² “Foreign Department.” *Provincial Medical and Surgical Journal, BMJ* 13, no. 14 (July 1849): 387-388

¹²³ Charles A. Lee, “The Water Supply of London: Filtration.” *Medical and Surgical Reporter* 8, no. 22 (August 1862): 491

¹²⁴ Charles A. Lee, “Venice, Its Peculiarities, Hospitals, Etc.” *The Ohio Medical and Surgical Journal* 15, no. 5 (September 1863): 389

¹²⁵ Charles A. Lee, “Venice, Its Peculiarities, Hospitals, Etc.” 390

French and Spanish wine, and the variety of fresh produce are procured by the residents of Venice at inexpensive prices.¹²⁶

In his letter to the States, he devoted the majority of writing to the hospitals around Venice and his singular correspondence from Rome in the Papal States. His tour of the Civil Hospital in Rome accounts for its accommodation of up to 2,000 patients and that the wards “each have very high ceilings and grouped around six courtyards,” and that such height in the ceilings provides for “about 1,200 cubic feet of air to every bed.”¹²⁷ His mention of the administration of the hospital also makes its way into his account as the two wards employ a total of eleven full-time physicians, fourteen assistants (most likely medical students), sixteen sisters of charity (nuns), eight apothecaries and a director-general. However, what intrigued Lee the most about his tour of these two hospitals lay in their acceptance of all who apply for treatment: no recommendations and no restrictions on who could seek treatment, something that surprised him greatly.¹²⁸

In the United States, the almshouse accepted all who applied yet the few hospitals in existence at the time stipulated who could be admitted. One must obtain a recommendation from either a physician or member of the governing council because the applicant must be deemed “worthy” of treatment by not being an alcoholic, prostitute, or vagrant, and most importantly, they must be curable as chronic or terminal illnesses were directed back to the almshouse.

Just prior to Charles A. Lee’s tour of Europe in 1858, a recent graduate of the New York Medical College, Benjamin Lee (no relation) toured France observing and practicing medicine and published his observations in journal articles that circulated throughout the United States.

¹²⁶ Charles A. Lee, “Venice, Its Peculiarities, Hospitals, Etc.” 390

¹²⁷ Charles A. Lee, “Venice, Its Peculiarities, Hospitals, Etc.” 391

¹²⁸ Charles A. Lee, “Venice, Its Peculiarities, Hospitals, Etc.” 392

He noted that physicians would often choose a specialty while receiving instruction and became quite common in Paris.¹²⁹ Lee also marveled at something quite common in academia today, but appeared rather unique and cutting-edge for his day, the existence of student teachers. While medical students in Paris were required to attend twelve classes in addition to making rounds with patients under the supervision of the attending doctor, the attending physician possessed little time to meet with every single patient of their assigned ward and maintain lectures. Senior medical students who had completed their coursework relieved overburdened doctor-professors of their teaching duties by lecturing over specialized subjects drawn from experiences with peculiar medical cases. Concurrently, lecturing also provided a modest income for these select students since the internship and coursework went unpaid.¹³⁰

Just as with the multitude of medical theories swirling around the Atlantic world, ideas about the construction of hospitals also created a stir in the medical and philanthropic world. While philanthropists and physicians attempted to create a charitable institution, politics always seemed to create a major hurdle for those who financed and managed these institutions. Balancing the medical theory of the time with the lay people who held the purse strings often led to misunderstandings about the day-to-day operations of a hospital, who held authority over the patients admitted to the institution, and what was considered a necessity in a hospital especially in light of technological advances. These misunderstandings gave way to disagreements, such disagreements gave way to political friction, and eventually political friction gave way to the possibility of mismanagement.

An 1835 graduate of Yale Medical School and co-founder of the Hartford Hospital in Connecticut, George Hawley remarked on the dangers of politics mixing with medicine at the

¹²⁹ Benjamin Lee, "Hospital Instruction in Paris." *Medical and Surgical Reporter* 2, no. 3 (April 1859): 68

¹³⁰ Benjamin Lee, "Hospital Instruction in Paris." 68

expense of the patient. While even philanthropists could be generous in their donations and perpetual subscriptions to an institution, they often tighten the amounts donated in reaction to the current market if it happens to recede. Hawley noted that “it is not enough that an institution is richly endowed, or that large sounding names are connected with its government... their mismanagement and misrule, together with their bad ventilation, and filthy condition, caused them to become the graveyards of the poor.”¹³¹ He advocated for a superior heating system installed in the Hartford Hospital, and though expensive due to its contemporary design, would create the necessary ventilation for a healthful therapeutic result. Hawley believed that such an update to the ventilation system of the Hartford Hospital would greatly increase the recovery rate of its patients. This steam-powered fan not only heated the room through piping in the walls, but also forced the “exhalations of the sick” through vents in the ceiling instead of coming to rest at the floorboards where they are inhaled again.¹³²

Fresh air and clean water became some of the main concerns to physicians when they considered the treatment of those admitted as medical theory held that contamination of either created illness. Each of the four wards at Hartford contained floor to ceiling windows and, a novelty during the antebellum period, hot and cold running water supplied by the Hartford Water Works through a gravity-fed system stemming from the third, and highest, floor.¹³³ How the water was delivered was not mentioned, but with knowledge of the technology of the era the roof of the building may have contained cisterns to which a pump was attached to a well and either a hose or pipe for manually filling the cisterns. Each ward contained twenty beds and provide

¹³¹ George B. Hawley, *Address Delivered on the Occasion of the Dedication of the Hartford Hospital in Hartford Connecticut*. (Hartford: Case, Lockwood, and Co., 1859), 12

¹³² George B. Hawley, *Address Delivered on the Occasion of the Dedication of the Hartford Hospital in Hartford Connecticut*. 16

¹³³ George B. Hawley, *Address Delivered on the Occasion of the Dedication of the Hartford Hospital in Hartford Connecticut*. 22

approximately 1,417 cubic feet of air per patient (more than the amount needed to prevent exhalations from one patient to affect another according to contemporary data which allowed for 1,134 cubic feet).¹³⁴

One of the most notable nurses in the annals of history, Florence Nightingale, served the British during the Crimean War in 1854 nursing wounded soldiers during the onslaught against the Ottoman Empire. Her 1859 publication of *Notes on Hospitals*, drew heavily from her experience during the war and swings wide the door on hospital sanitation, construction, and environmental therapeutics. She delineates that European hospitals, such as in Paris and England, grossly want of fresh air and proper ventilation in the treatment of ill patients and that some of the contemporary conditions of the wards resemble the dilapidated conditions of the almshouses. A position which seems to agree with Benjamin Lee and disagree with that of Charles Lee's visit to Venice and the Papal States. She continues by noting that "natural ventilation, or that by open windows and open fireplaces, is the only efficient means of producing the life-spring of the sick- fresh air."¹³⁵

Nightingale also joins in the argument by finding common ground between those who finance the building and operation of the hospitals and those who treat its patients. Understanding that poor soil, such as marshy areas and polluted urban settings created and prolonged illness, she highly recommended dry land and country settings away from the contamination of the city.¹³⁶ Nightingale states that "if the recovery of the sick simply is to be the object of hospitals, they will not be built among dense unhealthy populations."¹³⁷ In

¹³⁴ George B. Hawley, *Address Delivered on the Occasion of the Dedication of the Hartford Hospital in Hartford Connecticut*. 24

¹³⁵ Florence Nightingale, *Notes on Hospitals*. Third ed. (London: Longman, Green, Longman, Roberts, and Green Printers, 1863), 16

¹³⁶ Florence Nightingale, *Notes on Hospitals*. 26

¹³⁷ Florence Nightingale, *Notes on Hospitals*. 26

appeasing the financiers of hospitals she bluntly commented on the expense of urban land and the acreage needed for hospitals within the city limits could not justify its purchase in her opinion.¹³⁸

While arguments about medical theory continued throughout the antebellum period and doctors desired to place their personal stamp on hospital design, they also borrowed from more familiar edifices of treatment: the almshouse. While physicians and architects verbally sparred over design and hygienic construction materials, both viewed some of the almshouse design as beneficial to a hospital. Prominent New York humanitarian activist, Quaker, and later Whig Party member, John Stanton Gould found himself commissioned by the state Board of Emigration in conjunction with the state Board of New York Almshouses to deliver a report on the current conditions and recommendations for improvement in almshouses and prisons. In 1852 he published his findings from topics ranging from the diet of inmates (both almshouse and prisoners), personal and building hygiene, heating and ventilation, and overall design; the intent of which was to save money for the state and to provide adequate care for both inmates and convicted criminals so they could productively return to society.¹³⁹ Both physicians and architects took notice of his remarks on “Dormitories” where beds should be lined next each other along the walls in a large and open room that facilitated proper ventilation.¹⁴⁰

A large amount of argument, contemporary medical theory, and at times, confusion surrounded the defining features of a hospital. However, some common ground was reached in the medical community in the agreement that ventilation to remove diseased and putrid air, and

¹³⁸ Florence Nightingale, *Notes on Hospitals*. 27

¹³⁹ John Stanton Gould, *A Report on Food and Diet, With Observations on the Dietetical Regimen, Suited for Almshouses, Prisons, and Hospitals, Also on Heating, Ventilation, Etc., With Practical Recommendations*. (New York: William C. Bryant and Co. Printers, 1852), 5-6

¹⁴⁰ John Stanton Gould, *A Report on Food and Diet, With Observations on the Dietetical Regimen, Suited for Almshouses, Prisons, and Hospitals, Also on Heating, Ventilation, Etc., With Practical Recommendations*. 47

the therapeutic value of fresh air not yet contaminated by urban settings proved vital in their design. Hospital design during the antebellum period drew from a multitude of sources from around the Atlantic world, design ideas from Venice and Paris, management style and patient acceptance philosophy from Rome, and the design of wards from the United States all contributed to the contemporary hospital design. In some instances, physicians, architects, and philanthropists did not always know what they wanted in the design of a hospital, but indeed knew what they could not have in a hospital which was a place where the sick came to die rather than heal.

Chapter Three: *How Do We Even Build A Hospital?*

The construction of a hospital should take into account more than just the physical materials necessary for its construction. It must also create an umbrella under which the psychological, philosophical, and even the legal aspects of an era coexist in tandem with the physical. As a temple and symbol of healing and convalescence, the hospital incorporated the psychological aspects of its patients during their process of admission and treatment which correlate directly to the social stratification that existed within nineteenth-century society. Does a person possess the moral faculties required for admittance to a hospital and worthy to receive the charity that particular society will bestow upon them? Are they insane, given over to various vices, negligent in their spiritual and familial obligations? What agency does a worthy person possess during their time as a patient? Could patients direct their own methods of treatment while a patient in a hospital? And, what recourse does a patient have available to them when a doctor becomes careless or negligent in their treatment of a patient? What entered and exited the hospital through its doors, windows, and waste drains remained just as important as the materials of its construction.

While placing a charity hospital in a location near to the impoverished residents of a city seemed practical, many physicians chose to forego a position as an attending doctor due to the distance they would be required to travel multiple times each week. Concurrently, many people viewed hospitals as nothing more than death houses and epicenters for disease, so those with influence in city politics voted to have a hospital on the outskirts of town which provided a lesser distance for the physician to traverse, but an almost impossible trek for the poor in need of their

services.¹⁴¹ Metropolitan Hospital's physicians and interns, located on Wards Island in New York centered between Manhattan and Queens, often used a combination of carriage, ferry, and foot to make the three hour commute from a residence in Manhattan.¹⁴² This dilemma left architects, physicians, and trustees with the initial question of where to locate a charity hospital. The optimal location for any hospital according to the medical theory of the time would be on the outskirts of the city where large amounts of sunlight and, more importantly, fresh air could be had since miasmas created a majority of the illnesses doctors encountered. However, a compromise in location became needed so as to reduce the distance that both doctors and patients would need to travel for either work or treatment.

Philadelphia Hospital exemplified the dilemma of hospital location, standing at Market Street and Fifth, it acted as a de facto dividing line between the rich and poor and at a distance from any industrial production and any related water pollution.¹⁴³ As the population grew, the location of the Pennsylvania Hospital moved west indicating the surge in working poor and the wealthy's attempt to maintain a certain level of separation from this class of people and the more polluted industrial sections of the city. As the city grew, the site of the hospital became relocated so as to maintain the compromise needed by placing the hospital within a distance that both the physician and the poor patient were willing to travel.

Likewise, trustees and donors also sought to secure a hospital location on the outskirts of town, but not always for medical reasons. While seeking to secure their legacy and fulfill

¹⁴¹ Jeanne Kisacky, *Rise of the Modern Hospital*. 33

¹⁴² David Rosner, *A Once Charitable Enterprise*. 14

¹⁴³ "Hospitals: Pennsylvania Hospital." *Medical and Surgical Reporter* 1, no 14 (January 1859): 242
A map dated 1800 depicts the hospital in its new location further west and south located at Eighth, Spruce, and Walnut Streets and its previous location being turned into a cemetery. This would show not only economic growth in Philadelphia between 1751 (construction of the original hospital) and 1800, but also the growing population of the working poor who centered themselves near the Delaware River yet the hospital seems to maintain that dividing line between rich and poor. (<https://www.loc.gov/resource/g3824p.wd000171/?r=0.504,0.424,0.318,0.202,0>)

charitable duties to their city, they also kept a close eye on their finances. Urban real estate, even during the nineteenth century, commanded steep prices as opposed to more rural plots of land. As its 1811 charter states, the Massachusetts General Hospital comprised four acres of land which could have created insurmountable wealth for any landlord in an urban setting. With a combination of state and private funds the \$30,000 allotment allowed the trustees to purchase the land and erect the building for the purposes of charity to the sick poor.¹⁴⁴ In addition to the cost of real estate, donors and trustees found themselves in a conundrum over the design of the edifice itself. A modest architectural plan would indeed save money while providing the necessary services but the egos of the wealthy demanded intricate details and a stately presentation to all who entered. Ornate stonework and Greek inspired columns which supported the portico to the entrance inspired architects to employ both neo Greek and neo Gothic-style adornments to hospital exteriors which provided the impression that representatives of state conducted business within those walls rather than a gathering place for the sick and injured. The design of Massachusetts General much resembled the White House with its central portico and rotunda housing the administration offices and the two wings at its flanks.¹⁴⁵

Distance not only factored into the location of a hospital, but odor also played just as important a role. The industrial and working-class sections of cities like Philadelphia, Chicago, and New York, along with the residents of these neighborhoods, created vast amounts of waste, both organic and otherwise. The carcasses of all manner of animals (dogs, cats, rats, pigs, cows, and fish) littered the streets of these areas, and also lacking proper sewerage systems, human waste was discarded in the street along with all other household refuse and rubbish. In cities like

¹⁴⁴ Nathaniel I. Bowditch, *A History of the Massachusetts General Hospital*. (Boston: John Wilson & Son, 1851), 18

¹⁴⁵ Jeanne Kisacky, *Rise of the Modern Hospital: An Architectural History of health and Healing: 1870-1940*. (Pittsburgh: University of Pittsburgh Press, 2017), 27

Chicago, refuse and offal from packing plants and tanneries ended up in either the Chicago River or Lake Michigan.¹⁴⁶ In New York by the second quarter of the nineteenth century, it became difficult to differentiate between mud and waste since both had become so intertwined and deep enough to cover the cobblestones.¹⁴⁷ In physician Asa Greene's work, *A Glance at New York*, he retells an 1819 anecdote of a young woman prodding the mud-filled street with a stick murmuring, "Aye, he's about here somewhere the dear creature." A passing man asks her what she is searching for and she replies, "my little darling Jimmy, he's lost in the mud."¹⁴⁸

Not only did businesses generate an enormous amount of waste, individual people did as well. Archeologist Rebecca Graff demonstrates in her book, *Disposing of Modernity*, exposed the amount of waste that individuals generated while excavating the vacant lot behind Charnley-Perskey house in Chicago.¹⁴⁹ In using the 1893 Columbian Exposition and the upper-class Charnley-Perskey house, she demonstrates that not only did industry and the impoverished residents create waste, but the wealthier people as well since her excavation turned up all manner of glass items such as empty perfume and liquor bottles, broken plates, tea cups, and other dinnerware items all discarded behind the home in a rubbish pile.

Organic waste create a malodorous and rank atmosphere for urban residents and it also created severe problems with water pollution. City leaders, backed into a political corner by the residents they represented, sought methods of obtaining clean water while either ignoring (or paying lip service) to the issue that created the problem in the first place: land and water pollution. While steps by city leadership were taken to secure a clean water supply in 1842 by

¹⁴⁶ William Cronon, *Nature's Metropolis: Chicago and the Great West*. (New York: W. W. Norton and Co., 1991), 210

¹⁴⁷ Catherine McNeur, *Taming Manhattan: Environmental Battles in the Antebellum City*. (Cambridge, Ma.: Harvard University Press, 2014), 97

¹⁴⁸ Asa Greene, *A Glance at New York*. (New York: A. Greene, 1837), 171-172

¹⁴⁹ Rebecca S. Graff, *Disposing of Modernity: The Archaeology of Garbage and Consumerism During the Chicago's 1893 World's Fair*. (Gainesville: University of Florida Press, 2020), 65

placing a pumping station at the shore of Lake Michigan, only one mile of pipe had been laid to service residents.¹⁵⁰ This left the majority of residents to continue using wells, drawing their water from an increasingly polluted Chicago River, or hiring water cart services who also drew their water from the same polluted river. While the shallow water table for the region provided easy access to individual water supplies, the poorly constructed privy vaults intended for human waste often leaked contaminating the adjacent well. In addition, industrial waste (animal carcasses, offal, and other refuse) found its way into the river or the shores of the lake further contaminating the water supply for Chicago.¹⁵¹ A combination of all these elements came together and created an environment ripe for the spread of disease. A cholera epidemic that erupted in the summer 1852 proved that Chicago's civic leaders could no longer sit idly by as their city became overrun with pollution and disease. By the time the epidemic subsided in the winter of 1852, the disease had painfully taken the lives of 1,424 people, almost five per cent of the city's population.¹⁵²

While Chicago continued to endure minor resurgences of cholera, dysentery, and typhoid her residents also attempted to gain control of these problems by daring to dream of solutions that seemed impossible by contemporary standards. By the time the Civil War had reached its midway point, Chicago's city leaders understood that the need for potable water could no longer sit on the back burner of issues in need of attention. The amount of pollution mounted along the shores of the Chicago River and Lake Michigan to such a dangerous level that even the pumping station drew in waste through its intake pipe along with small fish and other various water

¹⁵⁰ Benjamin Sells, *The Tunnel Under the Lake: The Engineering Marvel That Saved Chicago*. (Chicago: Northwestern University Press, 2017), 14-16

¹⁵¹ Sells. *The Tunnel Under the Lake*. 20

¹⁵² [Epidemics \(chicagohistory.org\)](http://chicagohistory.org) accessed 3/23/2021

creatures.¹⁵³ The city contracted Ellis Chesbrough, an engineer that earned his reputation by working for various railway lines and aided in designing Boston's Cochituate Aqueduct.¹⁵⁴ The plans submitted by Chesbrough included an audacious scheme of tunneling under Lake Michigan for two miles and constructing an intake crib at the terminus.¹⁵⁵ The United States had never undertaken an ambitious plan such as this and all eyes were now squarely on Chicago as work got underway; and three years and eight days after the first spade of earth was removed, on March 25, 1867 Chicagoans took their first drink of clean lake water.¹⁵⁶

Viewing the Chicago tunnel as a success for the city, their victory became bitter-sweet since they needed to devise a plan to keep further pollution from flowing into Lake Michigan. By dredging the Chicago River and reversing its flow from emptying into the lake, it now emptied into the Illinois River and eventually connecting with the Mississippi.¹⁵⁷ While Chicago possessed the opportunity to provide cleaner drinking water to its residents it ignored the pollution abatement problem altogether and seemingly allowed its problems to flow downstream and on to other cities.

Urban industrial areas in the United States fared similarly in pollution to other cities across the Atlantic. London had long searched for measures to ensure potable water for its residents as the city experienced an exponential population growth alongside its industrial growth. This became a problem with which city leaders and Parliament could not keep pace. Many of the poor in London could not draw water directly from the banks of the Thames or have it piped into their homes, so they depended upon water cart services. Various companies

¹⁵³ Sells. *The Tunnel Under the Lake*. 39

¹⁵⁴ Sells. *The Tunnel Under the Lake*. 35

¹⁵⁵ Sells. *The Tunnel Under the Lake*. 43

¹⁵⁶ Sells *The Tunnel Under the Lake*. 118

¹⁵⁷ David Sedlak, *Water 4.0: The Past, Present, and Future of the World's Most Vital Resource*. (New Haven: Yale University Press, 2014), 65-67

charging various prices for their services delivered water to the residents of the city and depending upon where they had rights to draw their water dictated the prices they charged. The Chelsea Waterworks, for example, had a charter to draw their water from a location upstream of the industrial section of London and therefore drew measurably less polluted water for their customers. Whereas Marchants Waterworks drew from the area around the docks and provided a substandard product at a substandard price.¹⁵⁸

With medical theory based in miasmas, centering a hospital among such putrid aromas seemed a self-defeating endeavor. The need for fresh air and potable water to treat patients ranked near the top of concerns for every physician of the era. As the trustees hashed out the details of land acquisition architects found themselves at odds once again with doctors on hospital design. Some physicians such as John Green, physician and Fellow of the Massachusetts Medical Society, suggested in 1861 that two locations for hospitals should exist, one for treatment in the city, and one for convalescence in the country.¹⁵⁹ A suggestion such as two locations and the requirement of two plots of land, one of them at urban real estate prices, would have certainly chafed the financial sensibilities of those controlling the purse strings.

Yet, with growing populations in major cities on both sides of the Atlantic, heated debates about hospital expansion and relocation ensued. These arguments centered around pure air which became a scarce commodity in the urban industrialized areas and accessibility to the poor who found themselves in need of a hospital. The expansion of St. Thomas' Hospital in London lay at the center of this debate during the mid-nineteenth century and eventually the argument of accessibility won out, but only after several medical investigations ordered by

¹⁵⁸ Leslie Tomory, *The History of the London Water Industry, 1580-1820*. (Baltimore: Johns Hopkins University Press, 2017), 150

¹⁵⁹ John Green, *City Hospitals*. (Boston: Little, Brown & Co., 1861), 10

Parliament. St. Thomas' would procure a new location only a few city blocks from its original location for the purpose of accessibility to its patients.¹⁶⁰

While these debates raged, American physicians also noticed urban encroachment upon established hospitals such as the Episcopal Hospital in Philadelphia and St. Luke's Hospital in New York. Looking to other hospitals across the Atlantic, they followed suit in the belief that an agreement could be reached between accessibility to their services and the necessity for fresh air. The area around urban hospitals should nest itself within an area that contains no signs of industry such as tanneries, slaughterhouses, and breweries as their waste often creates atmospheric conditions injurious to those already afflicted. In an olive branch measure to satisfy both physicians and patients, trustees invested heavily in real estate for future growth.¹⁶¹ German, British, French, and American hospital trustees all secured expansion sites ranging from approximately seven to fifteen acres of land.

From these arguments between physicians and architects grew the *ward-pavilion system* of hospital design. One aspect on which antebellum-era architects and physicians could agree was that the design of a hospital should consist of either a single building or a series of multiple buildings encompassing a sprawling courtyard. Buildings usually took on a U or H-shape design with administration offices centered in the hub and the wards encompassing the wings.¹⁶² Standing two to three stories in height, the design of each ward provided for the maximum amount of sunlight and circulation of fresh air, two environmental aspects long viewed as positive therapeutics.¹⁶³ Since Hippocrates, physicians long believed that fresh air could aid in

¹⁶⁰ "Article XIX- Hospitals and Hospital Construction," *The American Journal of the Medical Sciences* 56, no. 111 (July 1868): 187

¹⁶¹ "Article XIX- Hospitals and Hospital Construction," *The American Journal of the Medical Sciences* 56, no. 111 (July 1868): 189-191

¹⁶² Stephen Smith, *Principles of Hospital Construction: Being an Abstract of a Report on Hospital Construction to the Trustees of the Roosevelt Hospital*. (New York: Holman Printers, 1866), 4-6

¹⁶³ Jeanne Kisacky, *Rise of the Modern Hospital*. 43

the curing of any sick patient and that the geographical establishment of a city affected its residents.¹⁶⁴ Gerard van Swieten, a notable student of Herman Boerhaave, continued this philosophy of clean air in his work by noting that “where a great number of wounded patients lie together in a hospital, the air is filled with putrid exhalations... It is indeed often advised to perfume the place for that purpose; but changing of the air is much more serviceable to the diseased.”¹⁶⁵ Many physicians in antebellum medicine held to the belief that low-rise buildings and large windows provided for the optimal amount of airflow when treating a patient.

The need for proper ventilation and fresh air existed as a basis for good health in the medical community for centuries prior to the antebellum period. John Pringle made mention of the importance of fresh air upon the health the body during the mid-eighteenth century in his 1752 book on military diseases. In the very first chapter he mentions that “another and more general cause of the humidity and corruption of the atmosphere, is from imperfect ventilation.”¹⁶⁶ But, as Pringle and his contemporaries chose to focus on the health of the individual, the study of epidemiology began to focus on groups of people and the effects that poor ventilation and putrid air had among them, mostly originating from the slave ships of the Atlantic.

During the final quarter of the nineteenth century, many British naval some physicians found themselves redeployed on slave ships after the American Revolution; one such person was Thomas Trotter. After the Revolution, Trotter became the ship’s physician aboard the *Brookes*, a slave ship that made regular stops in West Africa and the Caribbean. Upon seeing the cramped

¹⁶⁴ Hippocrates, *On Airs, Waters and Places*. Trans. by Francis Adams. (Whitefish, Mt. Kessinger Publishing, 2015), 5-8

¹⁶⁵ Gerard van Swieten, *Commentaries on the Aphorisms of Boerhaave: Vol. II*. (London: Robert Horsfield and Thomas Longman Printers, 1773), 181

¹⁶⁶ John Pringle, *Observations on the Diseases of the Army in Camp and Garrison*. (London: A. Millar & D. Wilson Printers, 1752), 4

conditions in which slaves were transported, combined with the death rate while in route, Trotter came to the conclusion that larger ships so the slaves could have more room, and adequate ventilation of the lower decks would help reduce the mortality rate.¹⁶⁷ Trotter stated that “there is no situation where so large a number of human beings are confined in so small a space.”¹⁶⁸ As the antebellum period progressed, the study of epidemiology increased in with regards to groups of people and the spread of disease. Eventually, prisons, almshouses, and hospitals became focal points for this emerging science and not just for physicians but for architects as well.

As physicians focused more of their attention on groups of bodies and the transmissibility of disease, they realized that disease spread more easily and quickly when these bodies were in a finite space containing stagnant or putrid air. The calls for reforms in prison and almshouse design during the antebellum era demonstrated that while physicians did not grasp the exact causes for disease transmission, they did infer through the information they gathered when epidemics broke out that adequate ventilation for groups of people confined to a particular space helped to keep these people healthy.¹⁶⁹ One of the most visible outcomes of these earlier epidemiological studies came about in the Nightingale Reforms of the mid-nineteenth century. Nightingale’s studies of the military hospitals during the Crimean War and subsequent study of the cholera outbreak in India provided the British government with statistical data that pointed toward the need to improve ventilation in confined spaces.¹⁷⁰

Learning from the military hospitals and slave ships of the past along with the obstinate and dilapidated condition of the almshouses, contemporary physicians set out to create a more

¹⁶⁷ Jim Downs, *Maladies of Empire: How Colonialism, Slavery, and War Transformed Medicine*. (Cambridge, Ma.: Harvard University Press, 2021), 11

¹⁶⁸ Thomas Trotter, *Medicina Nautica: An Essay on the Diseases of Seamen*. (London: T. N. Longman and O. Rees, 1803), 274

¹⁶⁹ Jim Downs, *Maladies of Empire: How Colonialism, Slavery, and War Transformed Medicine*. 17

¹⁷⁰ Jim Downs, *Maladies of Empire: How Colonialism, Slavery, and War Transformed Medicine*. 107-109

sanitary and morally useful edifice in which the sick poor could find respite from disease and injury. Revolutionary War physician and surgical professor at King's College (later renamed Columbia University), John Jones toured the French and English hospitals of the late eighteenth century and lamented at the "sad spectacle of misery which presents itself...with four to six patients on each bed; and I have more than once in the morning rounds, found the dead lying with the living."¹⁷¹ Several years later, Benjamin Rush noted that "hospitals are the sink of human life... they robbed the United States of more citizens than the sword."¹⁷² Antebellum doctors understood that sanitary conditions must improve and one method to enact such improvement was through air.

Studies in air consumption and the need for a certain amount of cubic feet per person in order to expel effluvia from the ward were undertaken and became reflected in the design of the wards for many northern hospitals. These design ideas, incorporating proper ventilation for the wellness of patients, often ran afoul of architects who intended to house as many bodies as possible within a finite amount of space. The health of the patient and the cost of construction once again created friction between physicians, trustees, and architects.¹⁷³

Segregation of patients became crucial to their efficient treatment based upon nosological and gender criteria as patients also met the admitting administrator who served as the gatekeeper to their healthcare needs in their attempts to enter the hospital for treatment. The separation of the poor into the deserving and undeserving began at the administration office where patients

¹⁷¹ John Jones, *Plain Concise Practical Remarks, on the Treatment of Wounds and Fractures; To Which Is Added an Appendix, on Camp and Military Hospitals*. (Philadelphia: Robert Bell Printers, 1776), 103

¹⁷² Benjamin Rush, *Medical Inquiries and Observations*. Second ed. (Philadelphia: Thomas Dobson Printers, 1794), 127

¹⁷³ "Article XIX- Hospitals and Hospital Construction," *The American Journal of the Medical Sciences* 56, no. 111 (July 1868): 185

This article included reference to John Jones and his tour of British and Parisian hospitals during a tour in the late eighteenth century. He noted the defects of the architecture and how they played into the purse strings of the financiers rather than the best interests of the patient in accordance with contemporary medical theory.

sought admission for treatment. When seeking treatment for an illness, the potential patient would enter into the administrative section of the hospital and undergo an assessment of their character prior to any consultation with a physician or present a recommendation garnered from another administrator, board member, donor, or clergyman. If admitted, they would then be segregated in regards to their gender as most hospitals constructed a men's and women's ward, and often subdivided those into nosological differences as well. The one exception to this moral scrutiny of a potential patient centered around emergencies such as broken bones, lacerations, and other work-related injuries.¹⁷⁴ Customarily a lay person (most likely a trustee or board member) would grant access to the hospital based upon the belief of whether or not the patient could contribute to society after their discharge and their moral behavior prior to seeking treatment.¹⁷⁵ To the physicians and trustees, it would be nothing less than a waste of money, time, and medical supplies to treat an alcoholic if their intent upon release lay in locating the nearest public house for a pint or a prostitute who saw no need to discontinue her vocation. Upholding the moral character of the hospital and its trustees was paramount along with the augmentation of such moral character in its patients.

As the 1847 constitution for a Philadelphia charity hospital noted that the administration staff should, "discriminate between the deserving and the undeserving... Our object is not to encourage inactivity and improvidence."¹⁷⁶ Movement of workers, both skilled and unskilled, became commonplace between cities and regions as men and women moved about in search of income. These artisans and laborers often suffered illness through malnourishment due to their poverty or injuries due to their working conditions and needed medical care just as the more

¹⁷⁴ Charles E. Rosenberg, *The Care of Strangers: The Rise of America's Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 20

¹⁷⁵ Charles E. Rosenberg, *The Care of Strangers*. 22

¹⁷⁶ Board of Trustees, *Constitution of the Philadelphia Lying-In Charity*, no. N/A. (1834): 3

permanent residents of the city.¹⁷⁷ Whether a migrant laborer or a permanent resident of a particular city, the admissions process applied equally to all, which sometimes proved a disadvantage to migrant laborers. Obtaining a written endorsement from a “respectable” member of the community often served as an entrance ticket for the hospital administrator.¹⁷⁸ A permanent resident could often secure a recommendation from a clergyman, respected employer, or even one of the trustees, but those who migrated to the city in search of employment often found themselves without such contacts who were willing to risk their good name for a stranger.

The antebellum charity hospital not only separated the deserving from the undeserving, men from women, they also separated the urban poor by means of race as well. During the first half of the nineteenth century, slavery remained in full force throughout the southern states of the country. While the majority of African Americans lived and worked on plantations in the southern United States and Caribbean, a measurable percentage of the African American population lived in urban areas such as Baltimore either as freemen or as slaves. The urban enslaved often found themselves contracted out to employers for wages that undercut many of the free laborers yet still presented a tidy profit for their owners.¹⁷⁹ What could be easily mistaken in modern times for creating a racially diverse workforce, employers in the nineteenth century did not foster any sense of racial equality on the jobsite. Most African Americans were relegated to the dirtiest and most dangerous positions, both enslaved and free. However, the free African Americans often possessed little power in employment negotiation and encountered a disadvantage since they did not have the benefit of a white owner who could dictate what work they would, and would not, perform.¹⁸⁰

¹⁷⁷ Seth Rockman, *Scraping By: Wage Labor, Slavery, and Survival in Early Baltimore*. Baltimore. 26

¹⁷⁸ Charles E. Rosenberg, *The Care of Strangers*. 18

¹⁷⁹ Seth Rockman, *Scraping By*. 73

¹⁸⁰ Seth Rockman, *Scraping By*. 72

Viewed legally and personally as property, slaves had no claim to treatment in the charity hospitals. Therefore, as owners of such human property, as with ownership of any property, the responsibility of maintenance fell upon the owner and whatever costs incurred by illness or injury. Slaves on a plantation could expect some treatment from a physician coming to their residence on the property, or in cases of the Caribbean, a slave would find treatment and convalescence at a slave hospital in town.¹⁸¹ While many of the slave hospitals in Jamaica, Cuba, and modern-day Brazil charged less for treatment than the plantation visit, these hospitals served more of a political and economic purpose than a humanitarian one. Obeah eventually became outlawed on plantations throughout the Greater Caribbean because it provided a means to practice tribal medicine imported from Africa and transferred a measure of authority from the plantation owner and overseer to certain slaves versed in medical and spiritual practices, such as in the case of Domingos Álvares whose biography during the early eighteenth century became the subject of historian James Sweet's monograph.¹⁸² This separation of the ill and injured slaves from the healthy population not only aided in the curtailment of the spread of disease, but also helped to expel Obeah and reduce the potential of rebellion on the plantation.

Freemen in urban areas found themselves in much the same situation as migrant laborers, finding difficulty in securing adequate healthcare despite the high quality of their morality. Even the social stigma of treating blacks alongside whites proved a difficult hurdle since most patients chided the idea of any equality among the black and white race and that resources would be wasted in such an endeavor. Concurrently, free blacks often lacked the proper social networking

Having a financial investment in a slave, often several hundreds if not thousands of dollars, provided the owners with a significant amount of power and influence over certain employers which increased the amount of safety a slave experienced as contract labor.

¹⁸¹ Rana A. Hogarth, *Medicalizing Blackness: Making Racial Difference in the Atlantic World, 1780-1840*. (Chapel Hill: University of North Carolina Press, 2017), 157

¹⁸² James H. Sweet, *Domingos Álvares: African Healing, and the Intellectual History of the Atlantic World*. (Chapel Hill: University of North Carolina Press, 2011)

needed to gain a recommendation for admission to a hospital and therefore usually found treatment within the domestic sphere from a spouse or family member or if they could afford the fee, have a physician summoned for treatment.¹⁸³ Some northern hospitals such as those in Massachusetts and New York that accepted government funds found a stipulation attached to those funds that African Americans must also be admitted under the same criteria as deserving whites. However, as many of the records demonstrate, the administrators of these hospitals abided by the bare minimum in order to keep the government funds flowing in.¹⁸⁴

As deserving poor patients entered the hospital, they experienced a rather complicated relationship between the hospital, contemporary medical theory, and the environment. While initially hospital administration attempted to prevent certain aspects of the urban environment from entering, once within the hospital's walls not only did a further separation of this environment ensue but an attempt at joining certain aspects of the environment with therapeutics also occurred. Patients entered the hospital with whatever clothing they had on and in whatever condition-- new, ragged, or blood-soaked from injury in addition to whatever happened to be contained within those clothes also entered as well whether that be dirt, grease, or other items that escaped the naked eye.

Upon a cursory examination by a physician, patients would be assigned a ward-floor or building depending upon the size of the hospital based upon their symptoms or injuries. The primary intention for this emerged from a two-fold strategy of preventing the spread of disease once within the hospital and allowing the attending physician to treat multiple patients with the

¹⁸³ Simon P. Newman, *Embodied History: The Lives of the Poor in Early Philadelphia*. (Philadelphia: University of Pennsylvania Press, 2003), 81

¹⁸⁴ Walker Gill Wylie, *Hospitals: Their History, Organization, and Construction*. (New York: D. Appleton and Co., 1877), 118

same/similar disease more efficiently.¹⁸⁵ Those suffering injuries such as broken bones, abscesses, and/or lacerations appeared lumped together in a single ward and not differentiated by their type of injury. Patients were then assigned a bed but no clothing for the duration of their stay, so what they entered wearing usually served as their garb unless a relative or friend visited and brought them a fresh set of clothes.

In keeping with the miasma theory of disease, most physicians also believed that water and air, both considered important to a patient's recovery, should not mix, especially in matters of ventilation. Doctor John Green, fellow of the Massachusetts Medical Society, suggested that while cold water pipes and misting systems served beneficial purposes for cooling wards during sweltering summer months, the air would eventually become saturated with water and therefore prevent the expulsion of putrid effluvia.¹⁸⁶ He further suggested that increasing the amount of air circulation per patient from twenty cubic feet to thirty cubic feet would better serve their therapeutic purposes by carrying off the contaminated air.

During the antebellum period, the rise of indoor plumbing began to shift from a novelty and luxury enjoyed in wealthier homes to a more commonplace appearance in the homes of the middling class as well. The use of privy vaults for the storage and eventual removal of human waste rose dramatically during the middle portion of the nineteenth century. Supplying water from a reservoir central to the city remained intermittent at best. Many rural and poor people still used hand-operated cylinder well pumps and buckets to collect ground water and some utilized rainwater and snow-melt cisterns. Some people who utilized the cistern method for collecting water either buried them in the ground in close proximity to their homes, allowing for the runoff to be channeled into these containers or built them on stilts (much like a water tower

¹⁸⁵ Jeanne Kisacky, *Rise of the Modern Hospital*. 23

¹⁸⁶ John Green, *City Hospitals*. (Boston: Little, Brown, and Co. Printers, 1861), 26

in modern times) employing gravity to pressurize the delivery lines.¹⁸⁷ Hospitals quickly capitalized on this concept of indoor plumbing for all manner of uses, cleaning, bathing, and cooking, but not all hospitals managed to utilize this technology as Nightingale notes that water closets must employ an appropriate amount of running water and ventilation for the removal of waste or the stench and health risks to patients would drastically increase.¹⁸⁸ Some smaller and underfunded hospitals still employed outhouses, bedpans, and privy vaults for the removal of human waste, and as attested to by Nightingale, a shift in the wind direction could bring the aromas of such waste wafting into the wards. In this case, the old adage of outhouses seems to ring true once again that in the winter time, they are one-hundred feet to far, and in the summer they are one-hundred feet too close.

Since no central sewage treatment plant existed during this time, the removal of human waste encountered very few technological advancements. Simply tossing the waste into a privy vault, having it flushed by water into the privy vault, or removed through a drain of some sort into an open body of water or sewage ditch appeared to solve the problem of removing human waste from a structure. The mid-nineteenth century experienced a tug-of-war between water and earth closets. While using water to flush away waste, the increased volume of waste combined with water often stressed the privy vaults and caused severe leakages, sometimes into the well water. Contemporary privy vaults consisted of a brick construction which allowed for liquid waste to evaporate, but with the addition of water as a removal medium, these vaults often filled beyond capacity before the water could evaporate and a night soil service could empty the vault.

¹⁸⁷ Maureen Ogle, *All the Modern Conveniences: American Household Plumbing, 1840-1890*. (Baltimore: Johns Hopkins University Press, 1996), 40

¹⁸⁸ Florence Nightingale, *Notes on Hospitals*. Third ed. (London: Longman, Green, Longman, Roberts, and Green, 1863), 44

Coupled with the water cisterns, flushing often experienced the problem of low water pressure due to a low water level in the cistern.¹⁸⁹ In conjunction with water pressure issues, an 1866 article in *Scientific American* also made note of faulty pipes (due to either poor construction or absentminded installation) often created “the escape of offensive and unpleasant effluvia”.¹⁹⁰ While a water-based removal system quickly removes all waste from a structure, it does not occur without certain concerns and issues that arise. One of the competing creations during this period was the earth closet. An article in the same periodical three years later lauds the advantages of an earth closet over a water closet. Most importantly, the article noted that earth removes the foul odors of such waste because of its “chemical reaction” and “absorbent nature”. The author goes on to enumerate other advantages such as water conservation, protection against “the impregnation of wells with excrementitious matter,” and the financial benefit of profiting from the waste as fertilizer.¹⁹¹

Just as in the case of water closets, earth closets also came with their own set of complications. The container for the earth would need to be replenished after each use and would increase the labor demand considerably since the typical hospital of the time provided one water closet per ward. Also, without the assistance of gravity as in the case of the water closet, the earth closet is limited to single-floor structures as pipes or chutes for upper floors would probably become congested due to the build-up of soil.

One of the main problems that housing encountered in the delivery of water into the home lay in the lack of mechanical pressurization for water lines. In modern homes, people simply open the tap and water will come rushing out of the faucet until the supplier ceases

¹⁸⁹ Maureen Ogle, *All the Modern Conveniences*. 90

¹⁹⁰ “Improved Water Closet.” *Scientific American* 15, no. 15 (October 1866): 236

¹⁹¹ “Earth Closets.” *Scientific American* 20, no. 20 (May 1869): 313

delivery due to lack of payment. Whereas in the nineteenth century, water lines became pressurized through gravity. This system typically meant that a cistern needed to be placed in the attic of a home or hospital as the weight of the water contained in the cistern pressurized the delivery lines until empty. For homes this created a dilemma due to the weight of water (a standard gallon usually weighing around eight pounds) and creates stresses on the wooden joists and flooring which could cause a collapse in the structure over time.¹⁹² However, if incorporated into the design of a hospital, these additional stresses could be accounted for and reinforced during the construction process.

These foresights, while seemingly innovative at the time, still did not solve the issue of filling these cisterns. While some hospitals had the opportunity to use the deep pockets of donors and connect to the city water system, such as in the case of the Hartford Hospital in Connecticut, some of the smaller and older hospitals either had to retrofit their plumbing for city service or continue to use human labor in pumping the water and delivering it to the various wards of the hospital.¹⁹³ Being “abundantly supplied with hot and cold water”, the Hartford Hospital, at least in Dr. Hawley’s opinion, served as an example of modern technology implemented for the treatment and comfort of sick patients. He described a closed-circuit heating system of boilers and pipes that circulated steam throughout the hospital warming patients during the winter months. However, the technological limitations of the era required that the fire to heat the boiler still need to be fed and stoked by hand. As with the design of the Episcopal Hospital in Philadelphia, originally constructed in 1860, the U-shaped hospital (with three stories of wards on one side and a chapel on the other) contained two towers for “wash

¹⁹² Maureen Ogle, *All the Modern Conveniences*. 41

¹⁹³ G. B. Hawley, *Addresses Delivered on the Occasion of the Dedication of the Hartford Hospital in Hartford, Connecticut on the 18th of April, 1859*. (Hartford: Case, Lockwood, and Co., 1859), 22

rooms, bathrooms, water closets” and the roof of each housed cisterns containing about 2,000 gallons of water.¹⁹⁴ No direct mention of a connection to the city’s aqueduct exists, however a safe assumption could be made that for the ease of labor a pumping system existed to fill these rooftop cisterns during periods of little precipitation. Having hospital staff going up and down flights of stairs, or creating a bucket brigade would seem impractical.

While the medical theory of hydropathy remained a fringe medicine during the nineteenth century, few Galenic physicians could refute the therapeutic properties of water and bathing. The antebellum period saw advertisements for “sea bathing” along New Jersey’s southern Atlantic shore during the summer months, and even aristocratic white southerners enjoyed the mineral springs in their region dating back to the eighteenth century.¹⁹⁵ A *British Medical Journal* article briefly laid out the advantages of bathing, and water in general by demonstrating that not only did the ancient Greeks and Romans apply these methods, but that modern medicine proved it useful by “regulating the circulation and temperature of the body” and that the “value and readiness of application cannot be too prominently brought before the profession, in order that it may become better known and more frequently resorted to in ordinary practice.”¹⁹⁶

While mineral spring resorts sprung up across the nation in the post-Civil War era for the wealthy to enjoy both physiologically and psychologically, the patients of charity hospitals could find no reprieve in such springs. Yet, the use of water gained in popularity among those in the medical community. While the “bath rooms” mentioned in most primary sources conjure images of a modern bathroom consisting of sink, commode, and shower/tub, it was not always so.

¹⁹⁴ Board of Managers, *The Hospital of the Protestant Episcopal Church in Philadelphia: Its Origin, Progress, Work, and Wants*. (Philadelphia: J. P. Lippincott & Co., 1869), 24

¹⁹⁵ Kathleen M. Brown, *Foul Bodies: Cleanliness in Early America*. (New Haven: Yale University Press, 2009), 293 & 304.

¹⁹⁶ A. S. Myrtle, “Hydrotherapeutics: The Resources of Harrogate Specially Considered.” *The British Medical Journal* 1, no. 487 (April 1870): 430

Patients did not always find themselves immersed in a tub when undergoing a therapeutic bath; they simply sat (either nude or just in a shirt) on a wooden stool while buckets of water were dumped over them. On other occasions, those who could not rise out of bed often had water-logged sheets suspended and dripping over them or nurses wringing sponges over their faces.¹⁹⁷ Former physician at Bellevue Hospital in New York, Walker Gill Wylie, published his opinions on bath rooms in hospitals as a certainty seeing to his plans for a hospital should have such a bath room with an impermeable floor with a drainage pipe, large windows, and partitions between the hot water and steam baths.¹⁹⁸

Physicians, surgeons, apothecaries, and architects all conducted their business within the framework of what the natural environment provided for them, and a sense of social control seems to appear as a direct result. The social construct of the nineteenth century remained largely unchanged from previous centuries in its approach to social stratification as the undeserving poor occupied the lowest rung of society and the elite hospital trustees (usually the wealthiest in a community) occupied the top tier with a constellation of people occupying the various rankings in between. The Jacksonian Era of egalitarianism and the later nineteenth century proliferation of Horatio Alger's works of "rags to riches" created a belief in American industry that anyone could accumulate wealth through hard work and frugal spending, but further could be from the truth when viewing society from the vantage point of the poor.

In relation to the undeserving poor, the wealthy believed that the curtailment of vices such as prostitution, alcoholism, adultery, and gambling would set their lives on a path aimed toward becoming one of the deserving poor. Hence, the deserving poor, through their moral

¹⁹⁷ A. S. Myrtle., "Hydrotherapeutics: The Resources of Harrogate Specially Considered." 430. And, James Risdon Bennett. "Hydrotherapy in Hospital Practice." *The British Medical Journal* 1, no. 54 (January 1862): 47

¹⁹⁸ Walker Gill Wylie, *Hospitals: Their History, Organization, and Construction*. (New York: D. Appleton and Co., 1877), 112

fortitude of absconding from vice would allow them to climb the financial ladder to success even if they did not make their way into the wealthier social circles. So, at least philosophically, the lessons of Horatio Alger need reworking in that the people of his age should not have aspired to go from “rags to riches” but should have put their aim squarely on “rags to respectability.” As people became more respectable, their desire for domestic sanitation would also improve and lead them down the path of a healthier life and lifestyle.

This sense of social standing also intersected with and influenced the medical profession. In the medical field, physicians, often through education and apprenticeships with notable doctors, secured a measure of social standing that allowed them a large amount of control over their patients and how their treatment would ensue. A measure of paternalism grew out of this field where the impoverished in a hospital gained entrance for treatment through a recommendation and then subjected themselves to the dictates of the attending physician. Their life, death, and recovery became the primary responsibility of the physician. Treatment regimen, dosages, diet, discharge orders, even the decision for surgery fell under the control of the physician and remained beyond rebuke by nurses, administration, and even student doctors. As an occupant of one of the lowest rungs on the social ladder, the deserving poor had little choice but to trust the knowledge, experience, and authority of the physician assigned to them.

Surprisingly though, when patients died or slowed in their recovery, while the treatment regimen and surgical decisions may have been under the authority of the physician, failure to heal and recover rested solely on the shoulders of the patients themselves as the physician usually accepted very little to no blame. An 1847 article in *Dwight's American Magazine* noted that women undergoing a “cold water treatment” may not survive due to a “weak constitution or

nervous distemper.”¹⁹⁹ Physicians not only attributed the death of a patient to not having the physical or moral fortitude to endure treatment regimens, they also attempted to use pre-existing conditions such as a compromised physical or emotional constitution as a scapegoat. Noting a *Medical and Surgical Reporter* article from 1859, the author cites “pre-existing textures” in the epithelium of the lungs as the cause for tuberculosis inferring that the patient was somehow predisposed to the development of the disease.²⁰⁰ This measure circled the wagons not only around fellow physicians, but also around medicine’s relationship with the environment. In having such a close relationship with the environment as a valuable resource for therapeutics, the patient would have to bear the blame for illness because of their corruption of the environment in which they lived, corruption of their bodies through vice, or weak constitutions (something modern physicians would call pre-existing conditions in modern terminology).

Even though statutes for medical ethics either lacked or were poorly enforced during the antebellum period, those who could afford the fees of an attorney sought legal retribution against physicians whom they assumed were incompetent or careless. Lawsuits for medical malpractice began to rise in Britain and the United States during the first half of the nineteenth century but appeared mostly in the cases of fractures and amputations that healed irregularly or were brought to court on behalf of the deceased patient who succumbed to infection.²⁰¹ Judges often had to face making the decision of whether or not a university educated physician made erroneous or extravagant claims about their healing abilities or were derelict and negligent in their care of the patient.²⁰² While judges struggled with the legal issues at hand and tended to rule in favor of the

¹⁹⁹ “Health: Description of the ‘Water Cure’.” *Dwight’s American Magazine, and Family Newspaper, for the Diffusion of Useful Knowledge and Moral and Religious Principles*. (July 10, 1847): 447

²⁰⁰ W. B. Atkinson, “Medical Societies: Philadelphia. Pathology and Treatment of Tuberculosis.” *Medical and Surgical Reporter* 3, no. 7 (November 1859): 159

²⁰¹ Allen D. Spiegel and Florence Kavalier, “America’s First Medical Malpractice Crisis, 1835-1865.” *Journal of Community Health* 22, no. 4 (August 1997): 285

²⁰² Allen D. Spiegel and Florence Kavalier, “America’s First Medical Malpractice Crisis, 1835-1865.” 289-290

physician based upon the plaintiff's inability to prove malice and did "intend to do harm", juries often ruled with their emotions and found in favor of the plaintiff as their eyes would often take in the gross horror of a disfigured or missing limb.

In a strange twist of fate, unorthodox healers often saw their cases dismissed when sued due to no existing legal precedent. Homeopaths, hydrotherapists, Indian healers, and root doctors possessed no university medical education as with the case of orthodox doctors therefore no standard of education or expertise existed upon which to hold them liable.²⁰³ A university educated physician could be held legally liable since they possessed the knowledge to support any claims they may have made to a patient.

While some physicians found themselves on trial for medical malpractice, some courts did not appear ready to convict them, as seen in the appeal of two doctors in Susquehanna County, Pennsylvania. In 1879, the two physicians found themselves as defendants in a civil suit brought by Charles E. Gere stemming from the treatment of a compound fracture to his femur which Gere claimed healed improperly. The appeals court for the county reversed the decision of the lower court in 1882 freeing the two doctors from liability. In response to the good fortune of the doctors, the *Medical and Surgical Reporter* stated that "the public are altogether too ready to institute suits of malpractice" and that it "gives us great pleasure to record this act of justice to our profession."²⁰⁴ This report seems to insinuate that such legal cases rose sharply in the intervening years and come close to being called commonplace. As some physicians escaped liability, others' fortunes fared far less optimistically as an 1882 Indiana court decision reasoned

²⁰³ Allen D. Spiegel and Florence Kavalier, "America's First Medical Malpractice Crisis, 1835-1865." 300-301

²⁰⁴ "Medical Malpractice." *Medical and Surgical Reporter* 47, no. 26 (December 1882): 717

that \$4,500 in damages was not excessive due a patient's loss of both legs due to their doctor's malpractice.²⁰⁵

Robert Christison, physician and President of the University of Edinburgh Medical School, published a treatise in 1829 on toxicology (specifically poisoning) and legal jurisprudence. However, he held the physician as an innocent being and student of toxicology who generated remedies for such poisonings and insinuates that the moral character of the physician would never lead to such acts in regards to their patients.²⁰⁶ The physician, according to Christison, is morally and ethically barred through his education from acting with any malice.

Yale graduate and legal scholar, Francis Wharton, finds mention in *The American Journal of Medical Sciences* where his *Treatise on Medical Jurisprudence* had been updated after five years and released in 1861 for the general public. The reviewer of the updated edition made mention that several sections had been added to the treatise, among those “the Psychological Indications of Guilt, Legal Relations of Identity, and Medical Malpractice” could be found among its three hundred new pages.²⁰⁷ While the idea of medical malpractice seemed to gain some attention in the public eye, medical associations still viewed doctors as paragons of morality. In 1872, the American Medical Association (AMA, established in 1848) during their twenty-third annual meeting noticed that physicians had become more involved in criminal proceedings, but not as defendants, as expert witnesses. A concern among the governing body noted that as prosecution and defense called expert witnesses, this could be construed as partiality among physicians. To alleviate this dilemma, the governors of the AMA voted to require the court to appoint a panel of expert witnesses from which to choose and provide

²⁰⁵ “Weekly Digest of Recent Cases.” *The Central Law Journal* 15, no. 22 (December 1882): 436

²⁰⁶ Robert Christison, *A Treatise on Poisons: In Relation to Medical Jurisprudence, Physiology, and the Practice of Physic*. (Edinburgh: Adam Black Printers, 1829), 75

²⁰⁷ E. H., “Review #11- No Title.” *The American Journal of the Medical Sciences* 41, no 81 (January 1861): 228.

testimony.²⁰⁸ In July of the same year, the *British Medical Journal* reported an abbreviated version of the AMA's proceedings and also noted that expert witness panels "should also apply to cases of surgical and medical malpractice" which appears to demonstrate that such cases were on the rise in the United States during the latter third of the nineteenth century.²⁰⁹

As described with the doctor-patient relationship, the authority of the attending physician became almost absolute and certainly unquestioned by those in lower social brackets. However, this authoritarian grip seemed to loosen somewhat in the face of the environment and its elements. Physicians attempted, at least superficially, to foster a working relationship with the environment and not exercise as much control over it in relation to the control they exerted over their patients. Using the environment, especially fresh air and water as therapeutics, required a certain level of cooperation forcing physicians to humble themselves a degree and admit that while the environment cannot be completely and wholly controlled by man, it can be manipulated to a certain extent. The opening and closing of windows and curtains either allowed or prevented sunlight and air to enter the hospital even though control of the seasons lay beyond the grasp of physicians. Fires could heat the air during the winter and open windows could cool it, but winter still remained winter and summer remained summer.

Even as physicians controlled a majority of the goings-on in hospitals, many things entered in which they could not control, unseen things whose discovery only created philosophical debates and then discarded as medical heresy. The microscopic world entered as a companion to all who set foot into a hospital; doctors, nurses, patients, and administration alike all carried with them parasites, bacteria, and other items not normally seen with the naked eye. With miasma theory directing medical thought and practice during the mid-nineteenth century,

²⁰⁸ "Medical Societies." *Medical and Surgical Reporter* 26, no. 20 (May 1872): 442.

²⁰⁹ "Medical Evidence In Courts of Law." *British Medical Journal* 2, no 603 (July 1872): 73

these microscopic organisms often rarely entered the thoughts of most physicians as the cause for disease and infection. While many physicians subscribed to the “zymotic” theory of disease where putrefaction created disease *de novo* and the fermentation of such microorganisms could affect a larger being.²¹⁰ Therefore, putrid air and exhalations from ill patients required evacuation from a hospital ward or at least dilution through allowing fresh air to enter. These ferments were believed to have been chemical in nature and not living organisms according to the medical zymotic theory of the mid-nineteenth century and primarily rotting matter could generate diseases which coalesced with the larger theory of miasmas.²¹¹

As an inadvertent result of the miasma and zymotic medial theories, the door remained wide open on debates about the contagiousness of disease. While some diseases such as smallpox and anthrax found acceptance among the medical community as contagious, others such as tuberculosis, typhoid, and conjunctivitis remained in the category of non-contagious but still open for debate. These debates also aided in preventing many of the sanitary measures that modern hospitals exercised. During this period there appeared no need for sterilizing surgical instruments or the use of non-porous building materials since disease mostly moved about through putrid air. And, if the hospital staff maintained the ventilation systems and the opening of windows, the putrid air would be removed and keep the patients safe from further infection. As physicians and trustees exercised a large amount of control on what entered the hospital, the technology and medical theories of the time limited their ability for complete control as so much passed through the scrutinizing gaze of both.

²¹⁰ Charles E. Rosenberg, *The Care of Strangers: The Rise of America's Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 129

²¹¹ Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life*. (Cambridge, Ma.: Harvard University Press, 1998), 27

Chapter Four: *Can You Tell Me Where It Hurts?: Pain, Infection, and Chemicals*

Hospitals, of any classification- charity hospitals, lying-in hospitals, sanatoriums- have become beacons for those suffering illness or injury and a Mecca for physical pain. All those who ventured to this institution dedicated to human suffering and seeking admission within its walls knew full well the environment into which they were about to enter: a crucible of pain, suffering, and possible death, but also possible treatment and recovery. While staffed by those dedicated to the “healing arts” not everyone healed, and although certain therapeutics such as opium and Jesuit bark could alleviate pain, in many instances, it only did so temporarily. Those admitted to a hospital could take a measure of comfort in the fact that others around them in their assigned ward would be suffering in a similar fashion to themselves if not even more so.

Historian Joanna Bourke in her monograph *The Story of Pain* takes her reader on a philosophical journey through the myriad of definitions of pain beginning in the nineteenth and into the twenty-first centuries. How people viewed pain through these centuries played a pivotal role in how physicians treated patients in pain. In addition, how the lay public viewed pain over these centuries helped to transform Western civilization’s response to it. Her introduction cites philosophers such as Nietzsche who affectionately created a name for his pain calling it “dog” as it was always present and ever loyal.²¹² Focusing her work on physical pain, Bourke argues that “pain events” are social and include people other than the sufferer either for consternation of their pain, sympathy, or any measure of relief. And yet, a paradox arose during the nineteenth and early twentieth centuries by those in pain who chose to remain silent for fear of upsetting friends and family.²¹³ Enduring pain, according to Bourke, not only enhanced the Christian

²¹² Joanna Bourke, *The Story of Pain: From Prayer to Painkillers*. (London: Oxford University Press, 2014), 9

²¹³ Joanna Bourke, *The Story of Pain*. 35

sufferer spiritually by atoning for their sins and also interpreted by the clergy as a “gift from God” to suffer as Christ suffered for humanity; yet over time, the laity and clergy both began to view “religious pain” to encompass something more emotional rather than physical.²¹⁴ Clergy members referred to remorse and guilt as forms of spiritual pain rather than physically suffering a “pain event”.

Pain, as a sensation, often aided doctors and increased their fascination with the human body. Understanding that the brain perceived pain in some form or fashion, the mystery of pain captivated doctors even though they often met with inconclusive results in their attempts to understand the origins of the sensation. Autopsies on deceased humans, and even the morally and ethically controversial vivisections of animals provided no pathway to a better understanding of this sensation. Sir Charles Bell, member of the Royal Society in London, remarked about such a fascination in 1834 “if the real intricacy of the brain, and the disappointments met with, have inclined many to consider it as an inextricable labyrinth.”²¹⁵

Doctors, despite their religious views, also viewed pain as something social and agreed that patients should be able to describe their pain when asked about it. Physicians viewed pain as somewhat of a roadmap to disease and spoke of it in their journal articles quite frankly, but also managed to use descriptive terms such as “excruciating” or “throbbing” which could help denote the location and especially the severity of the illness.²¹⁶ It does not appear that doctors employed a universal taxonomy of pain, and yet words such as *sharp*, *dull*, and *aching* provided the physician with some indication as to the level of pain a patient suffered. Even though doctors

²¹⁴ Joanna Bourke, *The Story of Pain*. 124

A primary source citation on this could also be found in an article penned by F. Le Gros Clarke F.R.C.S. in 1868, yet instead of referring to ministers as “clergy” he prefers the term “scholar” in pain as an admonition for sin. *British Medical Journal* 2, no. 396 (August 1868): 99

²¹⁵ Charles Bell, “On the Functions of Some Parts of the Brain, and on the Relations Between the Brain and Nerves of Motion and Sensation.” *Philosophical Transactions of the Royal Society of London* 124 (1834): 472

²¹⁶ “Guy’s Hospital.” *The Provincial Medical and Surgical Journal* 1, no. 10 (December 1840): 165

did not use the wide-ranging vocabulary of the English language to describe pain in their publications, they did acquiesce to the existence of such a vocabulary. As in the instance of F. Le Gros Clarke, surgeon and professor of surgery at St. Thomas' Hospital, who conceded that a "litany of epithets has been employed in denoting the sensations of suffering patients."²¹⁷ While using pain as a roadmap to generate a diagnosis and treatment regimen in the absence of external lesions, lacerations, or compound fractures, some physicians also noted that pain could mislead a doctor in their diagnosis. For example, a woman's complaint of a "throbbing" pain behind her eye misled her attending physician to diagnose her illness as rheumatism rather than the aneurism that a post-mortem autopsy indicated. Another case involving a young man with "severe abdominal pain" initially diagnosed as constipation revealed a rupture of the appendix in his post-mortem autopsy.²¹⁸

While many physicians experienced difficulty in lowering their ego to publicly speak about their failures in healing a patient, a select few managed to set aside their pride and use the pain, suffering, and even death of their patients to help others in the medical field to learn from these events. One such physician, T. M. Greenhow, Senior Surgeon at Newcastle and Fellow of the Royal College of Surgeons, stated in an 1844 address to his colleagues that "to relate cases that were less successful, or altogether failed, and to point out with candour and unflinching fidelity the supposed sources of failure; to acknowledge errors in diagnosis, prognosis, or therapeutic practice requires a firmer resolve and a degree of self-sacrifice at the shrine of science from which many shrink."²¹⁹ In the four "failures" he mentions from his own case notes, the most painful appears to come from a 44-year old patient named Robert Dover whose initial

²¹⁷ F. Le Gros Clarke, "Lectures on the Principles of Surgical Diagnosis: Especially to Shock and Visceral Lacerations." *The British Medical Journal* 2, no. 396 (August 1868): 99

²¹⁸ "Guy's Hospital." 165-166

²¹⁹ T. M. Greenhow, "Cases In Surgery." *Provincial Medical and Surgical Journal* 8, no. 22 (August 1844): 332

admittance stemmed from a bladder stone which caused him “discomfort” for many years. During his roughly six weeks stay, which included two successful surgeries to remove the stone, and countless doses of anodynes, cathartics, and emetics, Dover also developed a large “tumor” in his groin and on 23, February Mr. Dover “expired”. What Greenhow listed as a “tumor” in Dover’s groin must have appeared during his treatment and could have been an infection of the lymphatic system (inflamed lymph nodes in that region of the body) which indicates a symptom of an advanced stage of sepsis. It was not until his autopsy that Greenhow discovered not only did Mr. Dover suffer from a bladder stone which would have caused an inordinate amount of pain rather than the “discomfort” he initially mentioned, Greenhow discovered an actual large cancerous tumor which had grown between the anterior side of the bladder and prostate.²²⁰

While Robert Dover’s undiagnosed cancer appears as the largest failure in Dr. Greenhow’s career since this tumor would not have led to Dover’s death in such a short period of time. What eluded Greenhow, and just about every other physician of his time lay in what modern medicine refers to as *post-operative infection*, a diagnosis which would explain Dover’s swollen and inflamed groin following his bladder surgery.²²¹ Common risk factors following surgery up to the late nineteenth century were sepsis and septicemia, or what became termed during this period as *hospitalism*. Without a working knowledge of bacterial and viral infection, and continued and heated debates on the contagiousness of disease, physicians and surgeons thought very little about sterilization during surgery and antiseptic measures in recovery. While people seeking treatment in a hospital sometimes endured great physical pain, a sensation which more than likely brought them to the doorstep of that hospital, anesthetics for surgery, and

²²⁰ T. M. Greenhow, “Cases In Surgery.” 333

²²¹ [Sepsis - Symptoms and causes - Mayo Clinic](#) accessed 12/30/2021

antibiotics that did not yet exist. Causing a patient pain during a surgical procedure and then having to roll the dice on hospitalism increased the opportunities of a patient's pain.

The microbe, while known to exist by physicians since the invention of the microscope in the seventeenth century, the view it provided physicians prevented them from making the connection between these organisms and disease until the late nineteenth century due in large part to the accepted beliefs of miasmatic theory and its connection to putrefaction.²²² So rather than delve further into this mysterious world of living microorganisms, physicians instead, by all outward appearances, focused on the alleviation of pain. Diethyl ether, (C₂H₅)₂O, a European discovery of the sixteenth century, rarely made headlines as an anesthetic since it was primarily prescribed in small doses as the effects resembled amphetamines combined with a sense of euphoria. However, the experimentation of dentist William Morton had shown that in larger quantities the organic compound acted as a sedative, and a successful tooth extraction by Morton at Massachusetts General Hospital in 1846 paved the way for anesthetics in surgery.²²³

Etherization gained a rather spotted reputation during its time since few physicians knew how to correctly administer the substance, yet few could easily dismiss its potential in the medical community. The older and established physicians in the medical community approached the introduction of ether with incredulity and scorn and sought to sway public opinion away from its use and view it as something dangerous and even deadly. They ensured that negative articles reached the medical journals on both sides of the Atlantic in order to curtail the possibilities of ether. An 1849 journal article in the *Medical News* described a death from ether at the Hotel Dieu in France and details of the subsequent autopsy (perhaps to provide a

²²² [The Microscope | Science Museum](#) accessed 12/30/2021

²²³ Stephanie J. Snow, *Blessed Days of Anesthesia: How Anesthetics Changed the World*. (London: Oxford University Press, 2008), xii

grotesque image to the reader) and described the lungs as “severely protracted” and the “sinus duramater contained a large quantity of black, uncoagulated blood.”²²⁴ When used in large enough quantities, some detractors suggested that ether could serve as an alternative to hanging as a more humane form of execution.²²⁵

Others hailed this new anesthetic as a miracle and even a life saver. An 1849 article in *The Western Journal of Medicine and Surgery* noted that in European hospitals (British and French) an average of six lives were saved as a result of etherization prior to leg or arm amputation as opposed to using no anesthesia.²²⁶ While the author freely admits that deaths due to the implementation of ether prior to surgery have occurred, such deaths are quickly dismissed by assuming an impurity in the ether itself or by invoking the favored excuse of a weak or compromised constitution of the patient which went unforeseen.²²⁷ The author further goes to an almost extreme in his rebuke of those in opposition to the use of ether by stating that accepted, and often implemented, substances such as opium, hydrocyanic acid, calomel, and surgical instruments such as the lancet (scalpel) have all caused the death of a patient at one point or another.²²⁸

Even Henry J. Bigelow, one of the early researchers and proponents of ether makes note of the caution that must be exercised when using ether as in a few cases patients experienced “discomfort... in only part of the cases; this discomfort being trifling compared with the pain of

²²⁴ “Foreign Intelligence- More Deaths From Ether.” *Medical News* 7, no. 76 (April 1849): 31

²²⁵ “Use of Ether in Capital Punishment.” *Prisoner’s Friend: A Monthly Magazine Devoted to Criminal Reform, Philosophy, Science, Literature, and Art.* (May 1849): 394

²²⁶ J. T. Simpson, “Anesthesia, or the Employment of Chloroform and Ether in Surgery, Midwifery, etc. etc.” *The Western Journal of Medicine and Surgery* 4, no. 2 (August 1849): 136

²²⁷ J. T. Simpson, “Anesthesia, or the Employment of Chloroform and Ether in Surgery, Midwifery, etc. etc.” 138-139

²²⁸ J. T. Simpson, “Anesthesia, or the Employment of Chloroform and Ether in Surgery, Midwifery, etc. etc.” 139

the incision an inch in length.”²²⁹ Similarly, Bigelow also reproves his opponents by citing the effects of ether as harmless when “men who had been for years harmlessly exhilarated by ether,” and how thousands may have died of alcohol poisoning had their stomach not been pumped.²³⁰

In addition to an insensibility during surgery, another painful experience for people, especially women, of the nineteenth century was that of childbirth. The reduction or elimination of pain during childbirth remained something that not only delivering mothers hoped for, but their obstetricians as well. Professor of midwifery at the University of Cambridge, Walter Channing, provides information and statistics about his use of ether during childbirth and its need for caution, but also extols its ability to ease childbirth and recovery. Channing makes note that thirty two children had been saved by the use of ether who would have otherwise perished during delivery, and goes on to state that the current state of obstetrics without anesthesia and the pain caused by labor and obstetric operations “is not only a very great present evil, but that it renders convalescence uncertain and protracted.”²³¹ Further, a report read before the Boston Society for Medical Improvement delineates three cases on the implementation of etherization during labor and how with careful usage, it could be used as a successful anesthetic. A 23-year old woman in labor for the past twenty four hours first offered ether stated that she felt nauseated and confused ceased the use of ether, but as her pain became “expulsive” and “violent”, a Dr. Putnam offered a second dose of ether which proved successful as she was “breathing deeply when the sponge was applied... and three or four inspirations were enough to give entire relief.”²³²

²²⁹ Henry J. Bigelow, “Etherization- A Compendium of its History, Surgical Use, Dangers, and Discovery.” *The Boston Medical and Surgical Journal* 38, no. 12 (April 1848): 2

²³⁰ Henry J. Bigelow, “Etherization- A Compendium of its History, Surgical Use, Dangers, and Discovery.” 7

²³¹ Walter R. G. Channing, “Critical Analysis Part X: A Treatise on Etherization in Childbirth.” *New York Journal of Medicine and Collateral Sciences* 2, no. 5 (March 1849): 237

²³² C. G. Putnam, “On Etherization in Labor.” *The Western Journal of Medicine and Surgery* 1, no. 3 (March 1848): 255

While seemingly first on the scene of medical anesthesia which rendered a patient completely “insensible”, ether’s fame lasted for about two years. It appears that the political fight over the chemical in the medical community proved too strong for its survival and gave way to another discovery which appeared more palatable for physicians: chloroform (CHCl₃). Less sensitive to temperature as far as evaporation rates, chloroform seemed easier to administer to patients and with better results. While some physicians still scoffed at this type of anesthesia, one case in particular seemed to have solidified chloroform’s role in medical and surgical practice. In labor with her seventh child in 1853, later to be named Prince Leopold, Queen Victoria underwent a dosage of chloroform to ease her labor pains. Knowing the spotted reputation of chloroform sometimes killing its victims rather than sedating them, the watchful eyes of Royal Court Doctors, Clark, Locock, and Ferguson carefully scrutinized the administering physician Dr. John Snow.²³³ At this point, the Royal Court Physicians only agreed to allow Dr. Snow the opportunity to administer chloroform to the Queen because of his current reputation as a savior of London and his experience with curtailing the cholera epidemic of 1851 and his epidemiological research proving that the parasite was water borne.²³⁴ With the infant prince delivered, Dr. Snow was pleased with the “very satisfactory effect; and the Queen expressed herself as grateful for the discovery of this means of alleviating and preventing pain.”²³⁵ It appeared that with this success on such a high profile person, chloroform had arrived and had no intentions of leaving any time soon.

The ability to render a patient unconscious and insensible during surgical procedures opened up a wide range of possibilities for the medical field. Firstly, it now allowed for the

²³³ “Foreign Intelligence: Accouchment of Queen Victoria.” *Medical News* 11, no. 127 (July 1853): 112

²³⁴ [You Know Everything, John Snow: Cholera in the 19th Century — The History Corner](#) accessed 01/04/2022

²³⁵ “Foreign Intelligence: Accouchment of Queen Victoria.” 112

ability to conduct exploratory surgery and gain a broader knowledge of human physiology. Second, doctors no longer had to rush through a surgery since the patient would no longer be writhing in pain and resisting with every ounce of their being. With this, anesthesia also allowed for more complex surgeries which required more time than the simple amputation or mastectomy. Surgeons could now go deeper (literally and figuratively) into the human body. Third, it could finally put to rest one of the oldest arguments in medical ethics, vivisections and animal cruelty. To understand physiology, animals were often vivisected without anesthesia to better understand anatomy; a topic approached as a necessary evil by some physicians and noted in the early nineteenth century.²³⁶ With exploratory surgery now a viable alternative to vivisection, physicians now experienced a gradual decline in what later became known as a cruelty to animals.

As chloroform gained popularity among the newer generation of physicians, a steady rise in surgical procedures became apparent. While many surgeries still remained minor during the 1860s to 1880s, the addition of operating theaters increased in existing hospitals along with architects designing new hospitals that included operating theaters in their blueprints.²³⁷ Prior to these additions to hospital architecture, many surgeries often found fellow patients as spectators as the amputation of a limb or removal of an abscess occurred on the ward floor. Well-funded hospitals could afford to have a surgical theater where students could observe procedures which consisted of either a small greenhouse-like building or as part of the top floor of a hospital for the

²³⁶ “Notice of Magendie’s Physiological Experiments.” *The New England Journal of Medicine and Surgery, and Collateral Branches of Science* 14, no. 1 (January 1825)

“Article X: Anatomy and Physiology of the Ganglionic Nervous System.” *The North American Medical and Surgical Journal* 11 (April 1831)

Both of these articles do not specifically state that vivisection on animals is a “necessary evil” but both allude to the vast amount of information gained by conducting such experiments.

²³⁷ Charles Rosenberg, *The Care of Strangers: The Rise of America’s Hospital System*. (Baltimore: Johns Hopkins University Press, 1987), 144

abundance of natural light. In the case of the Philadelphia Presbyterian Hospital which received a total endowment of over \$300,000 with the wealthy wife of a late aristocrat who donated \$5,000 specifically for the construction of the surgical theater itself.²³⁸ A newly opened hospital in London also boasted of having enough floor space for each patient to have 1,200 square feet to themselves and a compliment of five surgical rooms rather than the standard singular surgical theater.²³⁹ These two decades experienced some of the most massive growth in hospital construction during the nineteenth century. Jeanne Kisacky's research alludes to twenty-nine new hospitals constructed in the United States during this period, and some of them remain the most distinguished during even the modern period; Roosevelt Hospital, Johns Hopkins, and Cook County Hospital find themselves among these now behemoths of medicine and medical education.²⁴⁰ Each of these newer and "state-of the art" hospitals contained not only surgical theaters but lecture halls as well for incoming medical students, two accommodations absent during antebellum hospital construction.

Since this period lacked for the reliable production and delivery of electricity, the majority of operating theaters needed vast amounts of natural light, so the majority of these rooms were located on the top floors of hospitals or in what seemed to be a greenhouse from an initial glance. Large skylights and windows provided the light necessary to operate safely, saving night time surgeries for emergencies only. Physicians appeared to find themselves at the mercy of the earth's rotation since candles and gas lamps proved an insufficient source of artificial light. But, no longer did a doctor have to open a patient in front of other patients convalescing or awaiting the same procedure. Students now had access to elevated bleachers to

²³⁸ "The Presbyterian Hospital In Philadelphia." *New York Evangelist* 48, no. 22 (May 1877): 4

²³⁹ "Recent Hospital Construction." *Scientific American* 33, no 18 (October 1875): 274

²⁴⁰ Jeanne Kisacky, *Rise of the Modern Hospital: An Architectural History of Health and Healing, 1870-1940*. (Pittsburgh: University of Pittsburgh Press, 2017), 85

view a surgical procedure without having to see past the heads of their fellow (and sometimes taller) classmates or stand on chairs for a better angle of vision. Surgeons now had a convenient place in which to conduct a procedure where the instruments of their profession would be easily accessible, ample light provided, and enough room for them to move around the patient if needed (as would be restricted on the ward floor or a person's home).

As hospitals moved into the late nineteenth century, the economy fluctuated in typical fashion with its highs and lows; and with those swings in fortunes, so the fortunes and state allotments did the same with hospital budgets. The Panic of 1873 saw such fortunes slip through the fingers of otherwise financially secure people. While the super wealthy such as the Vanderbilts, Carnegies, and Rockefellers had the ability to weather a temporary downturn in the economy, people of more modest means could not. One such person was that of Robert D. Honeyman of Hannibal, Missouri who made a modest fortune through owning a successful lumber mill and possessed real estate holdings totaling \$6,700. As timber prices fell throughout the decade so did his fortune and had to rely on the aid of his youngest son Oliver with whom he lived from 1884 until his death in 1899 at the age of 81.²⁴¹ In the twilight of his life, he never managed to recover his fortune and provide an inheritance for his children.

Major economic depressions occurred during the 1870s and 1890s, but with even minor recessions the donations from the wealthy diminished and became scarce, and as tax revenue retracted, state expenditures toward charity hospitals also declined. These sways in budgets forced hospitals to seek capital in other and more creative ways. One such avenue for revenue

²⁴¹ Lavinia Honeyman Porter, *By Ox Team to California: A Narrative of Crossing the Plains in 1860*. (Copyright 1910), 11 Porter provides some genealogical information that appears to be confirmed by the 1860 census as this publication was her journal while enroute from Missouri to California. Other resources listed also attest to the later financial hardship that Robert Honeyman faced in his life. [United States Census, 1860: https://familysearch.org/ark:/61903/3:1:33S7-9BSZ-9VGC?cc=1473181&wc=7QJZ-5T2%3A1589429312%2C1589422242%2C1589430826](https://familysearch.org/ark:/61903/3:1:33S7-9BSZ-9VGC?cc=1473181&wc=7QJZ-5T2%3A1589429312%2C1589422242%2C1589430826) accessed 03/18/2022. [Robert Davison Honeyman \(1814-1899\) - Find a Grave Memorial](#) accessed 03/18/2022.

became that of the *private pay patient*; with the rise in hospital stays due to better surgical techniques and subsequent hospital construction, the middle-class began to view the hospital as a viable source of treatment.

While these people could afford to contribute to either some, or all, of their treatment this did not come without certain stipulations as privacy being chief among them. Wealthier patients did not expect to be housed with the “deserving poor” on a regular ward, they wanted their own room and a certain level of privacy that accompanied their status in society. An 1880 letter to *The Spectator* elucidates one man’s experience as a pay patient in London as he “had every comfort that a sick man could want, and everything that skill and kindness could do for me was done.”²⁴² Also by this man’s experience, a separate set of rules applied to the paying patient as opposed to the charity patient on the ward floor. Aside from a private room, paying patients usually had their private physician that came to visit them instead of the customary attending. Secondly, visiting hours for these patients seemed relaxed as friends and family could come and go as they pleased. In addition, paying patients could also expect a more comfortable experience by having the comforts of home surrounding them: feather mattresses, rocking chairs, rugs, knickknacks, and other items brought from home if the stay were an extended one.²⁴³ To some observers, this method of acquiring income appeared more as though some patients were checking into a hotel rather than a hospital as the domestic environment began to entangle itself with the hospital environment.

With the admittance of more people to the hospital, the inclusion of some items from home, the general pollution of city life during this period, and the current medical theory of miasma, an increase in post-operative infection accompanied these occurrences. Sir James

²⁴² “Hospital Accommodation for Paying Patients.” *The Spectator* 53, no. 1278 (October 1880): 1283

²⁴³ Charles E. Rosenberg, *The Care of Strangers*. 245

Simpson, successful obstetrician and early proponent and prescriber of chloroform, suggests that patients succumbing to hospitalism (sepsis) could be as high as 33% in some cases.²⁴⁴ Surgery still posed a risk for many patients since the medical theory of the period did not concern itself with microorganisms causing infection. As historian Christoph Gradmann explains in his book *Laboratory Disease*, since infection and disease arose from emanations due to putridity and other organic rotting matter, the medical community had no need to seek elsewhere for the causation of disease and infection.²⁴⁵ The etiological explanation for disease had already been provided and the marriage that medicine enjoyed with the environment remained intact.

While amputations, both partial and complete, still remained among the most common surgical procedure, physician and surgeon John Erichson appears to confirm Simpson's claims of a high mortality rate due to hospitalism. At University Hospital in London where Erichson was employed, of the eighty total amputations completed between the years 1870 and 1873, the mortality rate after surgery reached almost twenty-seven percent.²⁴⁶ He gives further statistics of London, Edinburgh, and Glasgow hospitals which reported mortality rates from amputations at 36.7 percent, 43.3 percent, and 39.1 percent respectively, demonstrating that mortality rates at his hospital appear as the exception rather than the rule. He also gives a somewhat sideways nod of approval to American hospitals as their mortality rates seem more on par with University Hospital in London; where Pennsylvania Hospital only suffered a 24.3 percent mortality rate and Massachusetts General suffered 26 percent.

²⁴⁴ Holmes Coote F.R.S., "On Hospitalism." *The British Medical Journal* 1, no. 442 (June 1869): 565

²⁴⁵ Christoph Gradmann, *Laboratory Disease: Robert Koch's Medical Bacteriology*. Trans. by Elborg Forster. (Baltimore: Johns Hopkins University Press, 2009), 24

²⁴⁶ John E. Erichsen, "Lectures on Hospitalism: And the Causes of Death After Operations." *The British Medical Journal* 1, no. 681 (January 1874): 65

Erichson attributes the causes of such high mortality rates to a “run of luck” during certain parts of the year which would coincide with the etiological medical theory of miasmas. In blaming the time of year for the majority of these mortality rates he states “there are in all hospitals healthy and unhealthy seasons and periods- times in which every operative case, of whatever kind, does badly, from the influence of certain injurious epidemic conditions.”²⁴⁷ However, in his very next statement, he seems to point the blame at lackadaisical adherence to hygienic procedures in post-operative cases. Erichson observes that when new techniques or surgical procedures emerge, their early days were followed with strict adherence to protocol since the developers of such techniques and procedures appeared “peculiarly anxious about their success”; therefore, less apathy toward patient mortality rates was experienced. Yet, as the fanfare over new procedures and techniques abated, the system once again became lax and less stringent. But he concludes his remarks by letting these apathetic physicians off the hook by stating that more research needs to be conducted about the causes of such high mortality rates.²⁴⁸

With such high mortality rates, both within and outside the hospital, a group of concerned citizens began to form a coalition known as *Sanitarians* which were people who approached curtailing public and domestic pollution as one of the most important means of disease prevention. The roots of sanitary science were born out of this movement during the late nineteenth century with concerns over potable water and in such people as Edwin Chadwick, a British public health officer and architect of the Public Health Act of 1848 which provided a pathway for improved sewer construction after the Great Stink of London. Later in the century, George Waring, a sanitary engineer for the National Board of Health, aided in redesigning the Memphis, Tennessee sewer system after endemic outbreaks of cholera and malaria during the

²⁴⁷ John E. Erichsen, “Lectures on Hospitalism: And the Causes of Death After Operations.” 65

²⁴⁸ John E. Erichsen, “Lectures on Hospitalism: And the Causes of Death After Operations.” 66

1870s.²⁴⁹ His idea of creating a system of graduated steps within the sewer pipes borrowed heavily from Chadwick which allowed the sewage to be caught at the foot of each step while the water runoff could continue. While Waring still subscribed to the miasma theory of disease and the dangers of effluvia from rotting sewage, he conceded that “there is no doubt that some of the well accepted theories of the present day are destined to be set aside by future investigation... they contain a sufficient element of certainty to justify local Boards of Health in establishing rules and regulations... to bring about a marked improvement in the condition of life of all classes of the people.”²⁵⁰ Cleanliness, both domestically and publicly became *en vogue*.

Window screens to keep out flies and other pests went up around major cities in the United States. Fumigation of apartment buildings and homes came into practice during the last quarter of the nineteenth century, although not without some fatalities as some people did not evacuate their apartments during the fumigating process which could last up to twenty-four hours. Reasons being, either they did not understand the hazards of the chemicals employed, or they could not afford the cost of a hotel for the night.²⁵¹ Sanitarians also attempted to educate the general public about cleanliness and filth through articles and broadsides. In an address to Aberdeen University in Scotland, Edwin Chadwick gave praise to the efforts put forth by sanitary reformers and gave hope to the future in that “we may, with a complete arterial system of water supply and surface cleansing... insure reduction of death rates... to a mean rate of 10 in 1000.”²⁵² *The Independent* in 1878 notified housewives that “the sweeping and dusting are not merely the removal of clear dust, but of materials which, if collected and remaining, deteriorate

²⁴⁹ Frederick S. Odell, “The Sewerage of Memphis With Discussions.” *Transactions of the American Society of Civil Engineers* 9 (February 1881): 24-26

²⁵⁰ George E. Waring. “Sanitary Drainage.” *The North American Review*. Vol 137, No 20, July 1883. 61

²⁵¹ Dawn Day Biehler, *Pests in the City: Flies, Bedbugs, Cockroaches, and Rats*. (Seattle: University of Washington Press, 2013), 51

²⁵² Edwin Chadwick, “Sanitary Science and Its Practical Results.” *British Medical Journal* 35, no. 419 (November 1877): 173

the general health of the family.”²⁵³ Women, particularly housewives, were now charged as the bodyguards of their family through sanitary practices.

Hospitals also began to take note of the sanitary science movement by undergoing renovations that would make the surfaces of wards, operating theaters, washrooms, and water closets easier to clean and less susceptible to the accumulation of effluvia and decaying organic matter. In the same article of *The Independent*, the author also makes mention of several tradesmen scraping the walls of the New York Hospital coming down with fever due to the “organic particles that float off into the air from our person or from animal and vegetable matter,” indicating that not even the watchful eyes of a trained hospital staff can guard against these unseen invaders and usurpers of good health.²⁵⁴ One such reason for this lapse in cleanliness could arise from the fact that sanitation had yet to become part of the medical school curriculum. *The Medical and Surgical Reporter* laments in 1877 that classes in hygiene exist at the University of Pennsylvania Medical School, but only as elective classes and that very few students attend.²⁵⁵

By the end of the 1870s, hospitals became outfitted with a substantial amount of non-porous materials from floor to ceiling. Marble now covered the floors and halfway up the walls of operating theaters if the hospital coffers were deep enough for such a product. In the absence of financial resources, hospitals often refitted their operating rooms with ceramic tile instead of the more expensive marble. Wooden ward floors became covered in linoleum, a product created in 1855 as a cheaper alternative to rubber by Frederick Walton but rarely used in large quantities until this period. Wooden furniture such as tables, bed frames, and chairs became replaced with

²⁵³ “Sanitary Work for the Household.” *The Independent* 30 (June 1878): 6

²⁵⁴ “Sanitary Work for the Household.” 6

²⁵⁵ “Why Is Hygiene Not Taught In Medical Colleges?” *Medical and Surgical Reporter* 37, no. 21 (November 1877): 416

cast iron and painted white to better show dirt when neglected and cleanliness when maintained.

²⁵⁶ Even as late as 1905, architects and physicians remained concerned with sanitary science and the construction materials of hospitals. German-born immigrant and architect, William Paul Gerhard, instructs his readers that “all sharp corners in which dust is apt to lodge should be avoided,” and “walls may be tiled or lined with marble, or finished in hard plaster painted with white enamel.”²⁵⁷ In addition, the ornate wooden fixtures surrounding and encapsulating commodes and sinks in water closets which gained prominence during the Victorian Era also fell out of favor due to sanitary reforms, and the basic stand-alone porcelain toilet and pedestal sink emerged as the standard.²⁵⁸ Bed pans and bedside wash basins now only became used for non-ambulatory patients or those in traction along with catheterization.

In addressing the hospital kitchen, Gerhard goes on to mention the “wooden sinks, at best last only a few months and then become rotten, leaky, and foul-smelling is a practice which must be severely condemned. Drain boards for kitchen sinks should be made of slate, or of Alberene stone,” and the use of copper sinks in the pantry for the washing of cups and plates.²⁵⁹ He also makes mention of cold storage appliances in the pantry and how they should never have any close contact with the sewer drain given that they usually store raw food products. In his reference to the operating and autopsy rooms he recommends “a glass slab, marble, or porcelain-glazed tables and sinks with connections to a waste drain.” In addition, the floors should also be

²⁵⁶ Annmarie Adams, *Medicine by Design: The Architecture and the Modern Hospital, 1893-1943*. (Minneapolis: University of Minnesota Press, 2008), 49-49

²⁵⁷ William Paul Gerhard, “Hospital Sanitation: Part I.” *The American Architect and Building News* 87, no. 1530 (April 1905): 129

²⁵⁸ William Paul Gerhard, “Hospital Sanitation: Part I.” 129

²⁵⁹ William Paul Gerhard, “Hospital Sanitation: Part II.” *The American Architect and Building News* 87, no. 1531 (April 1905): 135

made of Alberene stone since “this material is non-absorbent and resists efficiently the action of chemicals.”²⁶⁰

Other practices within the hospital’s function also generated a great deal of sanitary consciousness such as the implementation of disposable rubber gloves and gauze. Prior to sanitary reforms, many hospitals reused surgical gloves (or just omitted them altogether and operated bare-handed) and washed gauze to be readministered to the wounds of another patient either out lack of hygienic knowledge or the desire to reduce the cost of supplies.²⁶¹

Implementing a plaster covering over an open wound no longer sufficed since the putrid effluvia could not escape, physicians sought other methods of allowing the fresh air to cleanse such wounds. Some manufacturers focused on satisfying physicians’ demands by experimenting with alternative methods of producing materials such as gauze and cotton batting to dress wounds: cotton-wool, gauze and lint, and a loosely woven cloth (similar to cheese cloth).²⁶²

Concurrently, some physicians also experimented with sand, sawdust, and even Spanish moss in hopes of reducing the instances of post-operative infection.²⁶³

One of the positive aspects that did emerge from the sanitarian movement, physicians and architects began to work more in harmony with each other as each viewed their work as necessary to public health and saw themselves as aiding in a method that helps protect the public from disease furthered their reputations than attempting to save donors a few dollars. George Waring advised members of the *American Institute of Architects* “I do not stand here, gentlemen, to ask you to pay some regard to a new subject, and to consider whether you may not profitably

²⁶⁰ William Paul Gerhard. “Hospital Sanitation: Part II.” 136

²⁶¹ Charles E. Rosenberg, *The Care of Strangers*. 246

²⁶² Joseph W. England, “Antiseptic Cottons and Gauzes.” *American Journal of Pharmacy*. (April 1887): 173

²⁶³ Louis McClane Tiffany, “The Employment of Spanish Moss (*Tillandsia Usneoides*) as a Surgical Dressing.” *Medical News* 57, no. 24 (December 1890): 624

give it a modicum of thought. I ask you to consider, after careful study, whether you should not pay it a very profound regard, and accept it as part of your duty to the public, which carries with it a grave question of life and death.”²⁶⁴

Little did George Waring know how prophetic his statements in 1883 would be in that the current medical theories of his day would soon be set aside by further investigation. Within his own lifetime, he would witness what the medical community had accepted since the days of Hippocrates and Galen thrown into question and heated debate. While understanding that even accepted medical theories would change over time, Waring probably expected these changes to occur at an evolutionary pace and had no idea as to how controversial and divergent these new medical theories would become to the medical community. Divergent to the point that the Catholic and Greek Orthodox churches would stand proud at the schism created by such unorthodox, progressive, and heretical, but seemingly provable ideas with repeatable laboratory results. Two main camps would form, the older generation of physicians who held on to orthodox medicine, and the younger generation of doctors who followed a path blazed by a few notable scientists who built upon each other’s work and would revolutionize medical theory and practices.

²⁶⁴ George E. Waring, “Essay Upon Sanitary Science.” *The American Architect and Building News* 2, no. 98 (November 1877): 360

Chapter Five: *Plants, Animals, and Germs*

Taking his place behind the lectern and standing before all the members over whom he presided, Frank Ulysses Grant Agrelius, President of the Kansas Academy of Science, delivered his 1918 inaugural address. Titled, “A Half Century of Bacteriology”, Agrelius praised how far medicine, agriculture, and commerce have developed and progressed since the establishment of the field of bacteriology. A botany and bacteriology professor at Kansas State Teachers College (now Emporia State University in Kansas), Professor Agrelius opened his comments by stating that “for untold ages of time he [mankind] had been enslaved by insidious enemies, scourged by tyrannical foes, thwarted again and again in his endeavors by forces more powerful than he.”²⁶⁵ One might be persuaded with this statement to conjure up images in their mind armies shaking the very ground they marched upon due to their gargantuan size, villainized tyrants such as Xerxes and Caligula, or Zeus having a laugh at Sisyphus as he neared the summit of his hill only to have the boulder roll back to the base. Yet, Agrelius notes that these “enemies” and “tyrannical foes” can only be seen under a microscope and regardless of their size they remain “nevertheless powerful and harmful” and that such “germs are at all times ready to cause him suffering and often death.”²⁶⁶

Professor Agrelius places the crown of discovery squarely upon one man and his work which “had overthrown the doctrine of spontaneous generation as then understood.”²⁶⁷ For Agrelius, Louis Pasteur holds the title of Grand Master of Bacteriology due to his experiments and discoveries relating to fermentation. While Pasteur’s work created fjords rather than minute cracks in the miasma theory of disease, this Frenchman did have predecessors and

²⁶⁵ Frank U. G. Agrelius, “A Half Century of Bacteriology.” *Transactions of the Kansas Academy of Science* 29 (March 1918): 23

²⁶⁶ Frank U. G. Agrelius, “A Half Century of Bacteriology.” 23

²⁶⁷ Frank U. G. Agrelius, “A Half Century of Bacteriology.” 24

contemporaries upon whose work created the scaffolding necessary to make the transition from miasma to the germ theory of disease. However, many people in the medical and biological fields agreed that the work of Pasteur held far reaching implications and that the world as they knew it was about to change. Theodore Potter, physician and professor of pathology at Indiana Medical College and son to Reverend Ludlow D. Potter, a Presbyterian minister, made a prophetic statement just two decades prior to Agrelius' inaugural speech by surmising that "it is also safe to say that the medical historian of the future will describe our age as chiefly characterized by the developments in this direction, and that, in the world picture, the germ theory of disease will stand out pre-eminent."²⁶⁸

Potter supported the germ theory of disease and medical bacteriology whole-heartedly and realized that the work of the Sanitarians could serve as both blessing and curse without a more complete understanding of chemistry and human physiology. He noted that while "earth, air, water, foods, hands, instruments, fomites of various kinds, are made to yield their secrets, and are known as, not hypothetical, but proven carriers of disease."²⁶⁹ And, that sanitary science in its current state lacks the specific chemical knowledge to effectively eliminate harmful germs and effluvia while maintaining the safety of its users. In presenting the argument that all germicides are poisons, some of those poisons could not only destroy harmful bacteria, but the human host of such bacteria in their processes and that deodorants no longer become labeled and assumed as disinfectants.²⁷⁰

The emergence of a substantial and provable theory that the corruption of the environment did not create disease, but elements within the environment caused illness created a

²⁶⁸ Theodore Potter, *Essays on Bacteriology and its Relation to the Progress of Medicine*. (Indianapolis: The Indiana Medical Journal Publishing Company, 1898), 13

²⁶⁹ Theodore Potter, *Essays on Bacteriology and its Relation to the Progress of Medicine*. 24

²⁷⁰ Theodore Potter, *Essays on Bacteriology and its Relation to the Progress of Medicine*. 25-26

paradigm shift in the medical community and how physicians approached disease vectors and causation. The physician could no longer blame the patient for their illness; the patient no longer corrupted a pure urban or rural environment through immoral living, filthiness, vice, or even a naturally occurring weak constitution. The relationship medicine shared with the environment began to weaken under this theory and it started to become evident that it was the patient that needed protection and not the outside world. The elements contained within the environment itself could affect even the strongest, healthiest, and cleanest of people and this required a reimagining of the relationships that medicine sought in society.

The study and inclusion of bacteriology did not emerge suddenly upon the medical scene or explode into existence or acceptance among the medical or biology community. Several people influenced and steered the study of etiology and redesigned nosological theories that had been entrenched for centuries. Among these scientists and physicians, Jacob Henle, Louis Pasteur, Joseph Lister, and Robert Koch found a measure of notoriety and admiration among the members of the medical community. Even building upon the work of these now scientific behemoths, many physicians during the late nineteenth century approached germ theory and the emergence of medical bacteriology as nothing more than a fringe theory and just as easily dismissed it. A period of transition ensued throughout the final two decades of the nineteenth century and into the early twentieth where further research into the infant field progressed and eventually the evidence became too overwhelming for even the most ardent of detractors to deny.

At approximately the same time that Pasteur conducted and published his work on fermentation during the decades between 1860 and 1880, a Glasgow University professor and surgeon to the hospital became interested in the rise of hospitalism in patients under his care. A

subscriber to the sanitary science movement that was gaining traction, Joseph Lister began to research a more antiseptic method of treating lacerations, both accidental and surgical. During the 1850s, Lister became interested in the connection between inflammation, fever, and gangrene yet he remained a supporter of the miasma theory of disease.²⁷¹ During the decade of the 1860s, he perused Pasteur's work and agreed that certain airborne particles could create infection and Lister wanted to bring these studies to the hospital and experiment with certain antiseptic techniques and lower the mortality rate at the Glasgow hospital.²⁷²

Without a true and accurate realization as to the extent of bacteria, fungi spores, and viruses that wafted through the air, Lister did understand that it would be a near impossibility for him to prevent such airborne particulates from coming into contact with his patients.²⁷³ Lister greatly publicized his experiments in the *British Medical Journal*, and noted that in his agreement with Pasteur “the injured part might be avoided without excluding the air, by applying as a dressing some material capable of destroying the life of the floating particles.”²⁷⁴ His experiments included the use of carbolic acid “used at full strength” as a packing in larger wounds, however he admits that this would only aid in the prevention of superficial infections; non-contused infections remained an entirely different matter for investigation.²⁷⁵ After a cleansing of the wound with carbolic acid, the wound should then be repacked with a fresh dressing also dipped in the acid, but at a diluted strength by “twenty parts of water”, then

²⁷¹ Lindsey Fitzharris, *The Butchering Art: Joseph Lister's Quest to Transform the Grisly World of Victorian Medicine*. (New York: Scientific American, 2017), 120

²⁷² Lindsey Fitzharris, *The Butchering Art*. 159

²⁷³ Joseph Lister, “On the Antiseptic Principle in the Practice of Surgery.” *The British Medical Journal* 2, no. 351 (September 1867): 246

²⁷⁴ Joseph Lister, “On the Antiseptic Principle in the Practice of Surgery.” 246

²⁷⁵ Joseph Lister, “On the Antiseptic Principle in the Practice of Surgery.” 247

covered with plaster to prevent any further air from entering the wound for approximately forty-eight hours.²⁷⁶

Hailed as a success in reducing the instances of hospitalism, the *Lister Antiseptic Method* made the rounds at hospitals across Britain and mainland Europe. About a decade later in 1875 at the annual meeting of the *British Medical Association*, Lister delivered an address about his European mainland tour on the successes that physicians experienced by implementing antiseptic methods in the dressing of lacerations, contusions, and compound fractures. In Halle, Germany, physicians who could not visit Glasgow or Edinburgh to witness the procedure first hand utilized the available medical journals and also made their own contributions in the area of treating tetanus by using the same method.²⁷⁷ From Munich, Berlin, Halle, Copenhagen, to Paris, it would appear that Lister succeeded in bringing antiseptic and sanitary techniques to the fore in medical therapeutics with the reduction of hospitalism and other superficial infections.

Pasteur and Lister approached the problem of infection and disease from two different viewpoints. While hospitalism weighed heavily on the minds of both men, their approach to research remained vastly different. Pasteur approached the ecology of the outside world as more of a public health measure in researching that groups of bodies could be subject to the same disease in a particular environment. The conclusion of Pasteur's work demonstrated that social class, occupation, race, and even perceived cleanliness did not contribute to the spread of disease among groups of people, but the ecology of the environment in which they lived became the primary contributing factor and vector for illness.

²⁷⁶ Joseph Lister, "On the Antiseptic Principle in the Practice of Surgery." 249

²⁷⁷ Joseph Lister, "An Address on the Effect of the Antiseptic Treatment Upon the General Salubrity of Surgical Hospitals." *The British Medical Journal* 2, no. 782 (December 1875): 771

Lister's approach did not involve groups of people and the ecology of the environment, but more the ecology of the individual human body itself. In his attempts to prevent hospitalism, Lister accepted the conditions of the Glasgow Hospital and that what entered appeared beyond control. As a response, his focus became the individual patients and how to prevent contamination of their internal ecosystem by the hospital environment. As Pasteur searched for control over the environment external to the human body by understanding what caused disease, Lister searched for methods to safeguard his patients from the hospital environment and leaving the external as a constant in the equation rather than a variable that could be manipulated.

One of the movements that grew alongside Lister and his antiseptic approach to surgery and wound treatment was the Sanitarian movement. As people noticed that disease spread more easily when their surroundings remained in a state of filth, many people on both sides of the Atlantic urged for a more hygienic populace and less waste-ridden cities. John Duffy, in his book *The Sanitarians*, argues that the movement truly began in the early nineteenth century, gained some steam during the cholera outbreaks of 1832 and 1848, but appeared to ebb somewhat until about the final quarter of the century with the establishment of permanent health boards in cities across Britain and the United States.²⁷⁸ Sanitary science became deeply concerned with the exponentially increasing pollution (nuisances as they were termed in the nineteenth century) created by exponentially increasing urban populations and these cities' reluctance to address such problems.

In many instances, the wealthy of a community led the charge for sanitation in a city and exercised considerable political and financial influence to bring about certain nuisance reforms and to help curtail pollution. Especially in growing cities such as Chicago the stench from

²⁷⁸ John Duffy, *The Sanitarians: A History of American Public Health*. (Urbana: University of Illinois Press, 1990), 130

pollution became almost unbearable with the amount of slaughterhouses, packing plants, tanneries and other businesses that churned out vast amounts of organic waste. Heating boilers run on coal in her downtown buildings had also begun belching out thick black smoke into the city's atmosphere causing men to have crisp white shirts in the morning but returning home in the evening with blackened cuffs and collars.²⁷⁹ Toward the end of the Gilded Age, a group of prominent business owners came together in 1874 to form the Society for the Prevention of Smoke to tackle the air pollution choking Chicago by bringing their political and legal influences to bear upon the worst of the culprits.²⁸⁰ Forcing the city's district attorney through their political connections to prosecute offenders and pooling their private funds in hiring engineers to instruct business owners in the updating and repair of their boilers, the Society for the Prevention of Smoke met with moderate success in convincing about 40% of the owners to maintain cleaner air for the residents of Chicago.²⁸¹

By the late 1880s, the Society for the Prevention of Smoke merged with the larger Citizen's Association, another civic reform group comprised of the aristocracy of Chicago.²⁸² The ideologies of the Association continued that of current social philosophy, holding a generally low opinion of the impoverished and uneducated and the belief that alcoholism, laziness, adultery, and various other vices served as the cause of illness and poverty rather than as symptoms.²⁸³ Subscribing to the belief that a clean city will bring about not just municipal reform but moral reform in the city's impoverished, the Association began its "City Beautiful"

²⁷⁹ Christine Meisner Rosen, "Businessmen Against Pollution in Late Nineteenth-Century Chicago." *The Business History Review* 69, no. 3 (Autumn 1995): 353

²⁸⁰ Christine Meisner Rosen, "Businessmen Against Pollution in Late Nineteenth-Century Chicago." 352

²⁸¹ Christine Meisner Rosen, "Businessmen Against Pollution in Late Nineteenth-Century Chicago." 367, 372

²⁸² David Paul Nord, "The Paradox of Municipal Reform in the Late Nineteenth Century." *The Wisconsin Magazine of History* 66, no. 2 (Winter 1982-83): 129

²⁸³ This combines two sources, that of David Paul Nord in "The Paradox of Municipal Reform in the Late Nineteenth Century" on page 130. The second source of Kevin Siena in his book *Rotten Bodies: Class and Contagion in Eighteenth-Century Britain*. (New Haven: Yale University Press, 2019)

campaign.²⁸⁴ Striving to continue with pollution abatement and improve the city's cleanliness by having nuisances removed from the streets to prevent the spread of disease. During the nineteenth century, nuisance police (usually physicians or engineers) would patrol the streets and homes of poor neighborhoods and make suggestions about how to improve these environments. Suggestions that included creating better ventilation in homes in order to increase air circulation, to the removal of animal dung and carcasses and other putrid matter from the streets' gutters.²⁸⁵

While Sanitarians did not fully accept bacteriology and germ theory, their beliefs centered around personal hygiene and community measures for reducing pollution and decreasing illness and epidemic disease. The *Ohio Farmer* highly recommended a measure of personal responsibility for hygiene in advising its readers that bathing is quintessential to a person's health and a "purifier of the human skin."²⁸⁶ The journal further describes how certain baths affect the body as bathwater below 75° Fahrenheit constricts the organs and blood vessels while water above 93° relaxes the vessels and opens the pores of the skin.²⁸⁷ Historian Kathleen M. Brown describes the efforts put forth to convert women to the Sanitarian movement by publishing not only pamphlets and booklets about proper nutrition for maintaining health but how a good wife should keep her domestic environment free of filth through laundering clothes once per week instead of the customary monthly washing, sweeping, killing vermin, and using soap when bathing themselves and their children.²⁸⁸

While the attempt at abating the problems of nuisances in the urban areas met with moderate success in Britain and the United States, for most physicians and Sanitarians the

²⁸⁴ Adam W. Rome, "Coming to Terms with Pollution: The Language of Environmental Reform, 1865-1915." *Environmental History* 1, no. 3 (July 1996): 19

²⁸⁵ Melanie A. Kiechle, *Smell Detectives*. 167

²⁸⁶ "Medical: Hygiene." *Ohio Farmer* 62, no. 19 (November 1882): 302

²⁸⁷ "Medical: Hygiene." *Ohio Farmer*. 303

²⁸⁸ Kathleen M. Brown, *Foul Bodies: Cleanliness in Early America*. (New Haven: Yale University Press, 2009), 212-213

miasma theory still reigned supreme as borne out by the attempts of the Sanitarians to create a more hygienic city for themselves and raise the morality of the poorer classes through these hygienic measures. *The Philadelphia Medical Journal* published an article in 1884 urging people to take caution against typhoid during their summer travels by “the exclusive use of water from a reliable source... and that ice may be contaminated as well as water.”²⁸⁹

Medical journals of the late nineteenth century also took notice of the work conducted by Sanitarians as they tracked the sanitation of certain occupations and calculated the average life expectancy of those who labored for their wages. The published information for areas of Massachusetts reported that farmers experienced the longest life expectancy at 65.29 years, shop mechanics 47.57 years, and seamen at 46.44 years. The author goes on to agree that “these figures only serve to confirm theories which have heretofore been held by Sanitarians and others regarding the influence of vitiated air.”²⁹⁰ By mentioning numerous observations, the author cites the miasma-based belief that pure air and a moderate amount of exercise and respiratory activity will lead to longer longevity of life.

However, it would seem that in many parts of the United States, certain skeptics remained in powerful positions to agree and disagree with the implementation of Lister’s methods and use of chemicals when cleansing wounds. F. C. Fuller, resident surgeon at Bellevue Hospital seems to provide some back-handed compliments to Lister in his assessment of the antiseptic method. In noting that Lister has modified and improved wound treatment the procedure itself “is cumbersome, expensive, and impracticable in private practice.”²⁹¹ He supports his arguments for mercuric bichloride over Lister’s carbolic acid in taking a somewhat

²⁸⁹ “Editorial: Hygiene of Summer Travel.” *The Philadelphia Medical Journal* 14, no. 20 (June 1884): 717

²⁹⁰ “Hygiene and Occupations.” *The Physicians’ and Surgeons’ Investigator*. (May 1887): 154

²⁹¹ F. C. Fuller, “Modern Antiseptic Surgery, With Cases. Value of Germicides.” *The American Journal of the Medical Sciences* 176 (October 1884): 469

alarmist stance in that no poisonings have occurred with the use of bichloride in adults or children; and that carbolic acid, over time loses its efficacy due to evaporation.²⁹² And while surgical instruments should be sanitized and stored in mercuric bichloride, Fuller haughtily concedes that carbolic acid under Lister's method meets his satisfaction for sterilizing cat gut ligatures and stitches.²⁹³

A contemporary of Lister and Pasteur, and former student of Henle, Robert Koch perhaps made one of the most monumental discoveries in the progress of etiology. Somehow Koch managed to embellish and attempt to ingratiate himself when publicizing his bacteriological discoveries, for the purpose of seeking higher positions in government or academia is mere speculation, but in regards to his career as a researcher he commented that "turning now... to my scientific career and in particular to my work in bacteriology, I should like to begin by mentioning that I did not receive any direct stimulus for my subsequent scientific preoccupations, for the simple reason that bacteriology did not exist at the time."²⁹⁴ Koch's dedication to the improvement of humanity by reducing mortality due to disease remained unquestioned, he did appear to possess a less than humble approach to his work. While the specific term *bacteriology* did not exist during the time of Koch's research and discovery, an intellectual scaffold stood in place to aid him throughout his work; from his former instructor and mentor, to Pasteur and Lister, and various other unmentioned contemporaries and predecessors.

The idea of certain organisms causing certain diseases became a medically political issue and made the rounds in various lectures and journal articles on both sides of the Atlantic. Doctor

²⁹² F. C. Fuller, "Modern Antiseptic Surgery, With Cases. Value of Germicides." 470

²⁹³ F. C. Fuller, "Modern Antiseptic Surgery, With Cases. Value of Germicides." 472-473

²⁹⁴ Christoph Gradmann, *Laboratory Disease: Robert Koch's Medical Bacteriology*. 18

of obstetrics William M. Chamberlain at St. Vincent Charity Hospital in Cleveland, Ohio remarked on the emerging arguments for specific pathogens causing certain diseases as borne out by Pasteur's research. He further elucidates that "The fact that certain diseases have been shown beyond question to depend upon the presence of parasitic organisms in the system, has suggested the inquiry how far disease in general may depend on such a cause."²⁹⁵ While Chamberlain appears to admit that germ theory at the time has yet to gain full approval from the medical community, certain strides in accomplishing that end were making significant headway.

Yet, while doctors like Chamberlain appeared to advocate for the germ theory of disease, others wished to put it out to pasture. The *Medical Examiner* reprinted an article from the British journal *The Lancet* which poses a strong argument that germ theory could not exist as Pasteur and Lister suggest. In stating that "Bacteria, if not actually to be found in the blood vessels of healthy persons, do never the less habitually exist in so many parts of the body in every human being... as to make it almost inconceivable that these organisms can be causes of disease."²⁹⁶ The author argues that the human body is replete with all manner of bacteria and somehow manages to retain its health; therefore, bacteria could not possibly cause the illnesses that germ theory advocates claim.

A portion of this reluctance to accept germ theory could be attributed to the marriage that medicine enjoyed with the environment. Within this marriage, the environment afforded physicians the ability to escape blame for the cause of disease and the inability to cure some illnesses. By placing the blame on the shoulders of the patient by either having a weakened constitution or an undiagnosed pre-existing condition such as in the case of Robert Dover

²⁹⁵ William M. Chamberlain, "Original Communications: Article I: Lectures Delivered Before House Staff and School of Nurses at Charity Hospital." *The Ohio Medical and Surgical Journal* 2, no. 4 (1877): 292

²⁹⁶ "Gleanings From Our Exchanges." *Medical Examiner* 16, no. 11 (June 1875): 321

mentioned in chapter four. Also, John Erichson (again mentioned in chapter four) protects the medical community and the environment from unfavorable scrutiny by calling increases in hospitalism just a “run of luck” insinuating that the person’s constitution could not handle the current season of the year.

Considered one of the scourges of mankind along with smallpox, tuberculosis (*consumption* as it was termed) ravaged mankind at every level of society. It did not discriminate as consumption claimed its victims from the wealthy down to the lowest street beggar. During the nineteenth century, the tuberculosis rate in the United States reached five cases per 1,000 in population.²⁹⁷ On the eve of the Civil War in 1860, estimates would suggest that out of the approximately 31,440,000 population (including whites, blacks both free and enslaved, and Native Americans) about 157,000 people succumbed to consumption that year.²⁹⁸ Throughout the entire nineteenth century, tuberculosis alone claimed approximately 1,292,000 lives. While not known at the time, the cause of the disease is usually inhaled and nests itself within the lining of the lungs using the tissue as nutrients. Over time, the lining of the lungs become eroded and perforated allowing air and/or fluid to escape the lungs building up pressure in the thoracic cavity giving the sufferer chest pains and difficulty breathing. As the lining of the lungs deteriorate, fluid from the body seeps into the lungs eventually drowning the victim with their own bodily fluids.²⁹⁹ One of the problems encountered with groups of people confined to a particular space was the sharing of exhalations and the diseases (such as consumption) that

²⁹⁷ [A Century of Tuberculosis | American Journal of Respiratory and Critical Care Medicine \(atsjournals.org\)](#) accessed 01/27/2022

²⁹⁸ Joseph C. G. Kennedy (Superintendent of Census), *Population of the United States in 1860: Compiled from the Original Returns of the Eighth Census, Under the Direction of the Secretary of the Interior*. (Washington D.C.: Government Printing Office, 1864), 596

²⁹⁹ [Tuberculosis and lung damage: from epidemiology to pathophysiology \(nih.gov\)](#) accessed 1/27/2022

accompanied respiration. Medical theory of the nineteenth century held to the belief that without proper ventilation or space what one person exhaled another could easily inhale.

One man of note embarked on a mission to prove that the work of Pasteur and Lister were not in vain and that certain organisms could cause certain illnesses. While working for the German Board of Health in Berlin, Koch and his team researched, in almost absolute secrecy, the causal agents of tuberculosis for approximately two years.³⁰⁰ In 1882, Koch published his findings in the *Berliner Klinische Wochenschrift*, and termed his discovery of the consumption bacteria as the *tubercule bacillus* after its tubular shape under the microscope. Building upon the work of his mentor Henle, Koch began his research under the assumption that the etiological origins of consumption lie in the microscopic world and proceeded to study various tissue samples of animals and humans that had succumbed to the disease. As his research progressed, he developed four postulates that allowed him to narrow his scope and conclusively prove that consumption stemmed from an infection of the tubercule bacillus; postulates which remain useful to scientists and physicians in modern times: *1) The microorganism must be found in abundance in all specimens that are suffering from the disease, but absent from those that are healthy. 2) The microorganism must be able to be extracted and isolated from a diseased organism and cultivated in a pure culture. 3) The microorganism that has been grown in a culture should be able to cause disease once introduced into a healthy organism. 4) The same pathogen should be able to be re-isolated from individuals who were inoculated experimentally, and be identical to the pathogen extracted from the first diseased individual to whom it was removed.*³⁰¹

³⁰⁰ Robert Koch. "Koch's Work Upon Tuberculosis, and the Present Condition of the Question." *Science* 4, no. 76 (July 1884): 60

³⁰¹ Robert Koch, "Koch's Work Upon Tuberculosis, and the Present Condition of the Question." 60. And [KOCH'S 4 POSTULATES: WHAT THEY ARE AND WHAT THEY EXPLAIN - PSYCHOLOGY \(warbletoncouncil.org\)](http://warbletoncouncil.org)

Koch's findings and subsequent publications grabbed the medical field in a tight grip as this appeared to serve as one of the final nails in the coffin of miasma theory. Flying in the face of thousands of years of accepted etiological and medical theory, diseases did not grow spontaneously and that even microscopic organisms could find transmission through the air. Ferdinand Hueppe, a member of Koch's research team and later a professor at Charles University in Prague, uses Koch's findings in his practical applications and in tandem with Lister's method of antiseptics. In his 1886 monograph, *The Methods of Bacteriological Investigation*, Hueppe appears to prepare incoming physicians for the handling of instruments and further laboratory research. In relegating miasma theory to annals of history, Hueppe introduces his treatise by stating "even the subject of bacteriology has in this respect passed through an experience too sad to allow us to forget that the observations in natural philosophy can be nothing else than provisional explanations of phenomena not yet fully understood."³⁰²

With the introduction of bacteriology, putrefaction and filth no longer played a significant part as the vectors of disease transmission and creation. The antiseptic view of hygiene combined with the current bacteriological research proved something that appeared clean may in fact be dangerously dirty. Hueppe warns his readers that "previous experience has shown that germs from the air are more seldom the cause of failure than the unintentional infection through unclean or insufficiently sterilized vessels, and the manipulation with hand and instruments not certainly sterilized."³⁰³ In his chapter on *Spontaneous Generation*, he lays out a series of experiments and suggestions for keeping an operating room and laboratory sterilized by

accessed 1/28/2022. This website lists the four postulates of Koch in a rudimentary fashion, Koch's 1884 article goes into further detail in the explanation of his postulates.

³⁰² Ferdinand Hueppe, *The Methods of Bacteriological Investigation*. Trans. by Herman M. Biggs. (New York: D. Appleton & Co., 1886), 13

³⁰³ Ferdinand Hueppe, *The Methods of Bacteriological Investigation*. 27

showing that the work of Pasteur and Lister proved not only correct, but reliable and refutes the previous miasma theory of disease.³⁰⁴ In a gracious nod to the inadequacy of miasma theory, Hueppe does make mention that certain bacterial contaminations, especially by air, during an experiment do present themselves instantly and how this could easily lead some researchers astray into believing that spontaneous generation could occur.³⁰⁵

Based upon the work of Pasteur, Lister, and Koch, the germ theory of disease began to entrench itself within the medical community, even though some controversy still surrounded it into the dawn of the twentieth century. As early as 1885, some journals hailed bacteriology as a saving grace to the healing arts, as borne out by the journal, *Science* “that bacteriology is now a natural science of sufficient importance and completeness to take its proper place in hygiene, etiology, and pathological anatomy, both in theoretical discussions and practical applications.”³⁰⁶ Some moderates did appear in which they make an attempt to stitch miasma and germ theories together by citing that the environment still affects the spread of disease, especially tuberculosis. In citing Koch’s work, the *American Journal of the Medical Sciences* brought to light that “while experimental research brings evidence not easily to be thrust aside to support its claim to have discovered in the bacillus tuberculosis the virus which is essential to the production of this fatal class of maladies.”³⁰⁷ While demonstrating through several experiments upon rabbits, some skepticism remained that the environment may still hold a significant role in the transmission of tuberculosis and that “while valuable work in this direction and the results of their labor alone seem sufficient to establish the fact that environment is a most potent factor in the causation of

³⁰⁴ Ferdinand Hueppe, *The Methods of Bacteriological Investigation*. 25-26

³⁰⁵ Ferdinand Hueppe, *The Methods of Bacteriological Investigation*. 161

³⁰⁶ “Bacteria.” *Science* 6, no. 129 (July 1885): 77

³⁰⁷ E. L. Trudeau, “Environment in its Relation to the Progress of Bacterial Invasion in Tuberculosis.” *American Journal of the Medical Sciences* 94, no. 187 (July 1887): 119

tuberculosis.”³⁰⁸ With the results of these experiments physicians could arrive at the conclusion that unhygienic environments created conditions suitable for the transmission of tuberculosis in rabbits and this factor should not go ignored in further research.³⁰⁹

Bacteriology and germ theory did have its detractors though. An 1888 article also by the journal *Science* demonstrates the trepidation and sometimes outright incredulity some physicians harbored toward these emerging scientific studies. The journal sent out a questionnaire to medical schools around the United States and published about one quarter of the respondents which represented approximately one half of the medical school student population.³¹⁰ Question 1 asked: *Is the theory that most, if not all, infectious diseases are caused by the growth of microscopic organisms, accepted by the members of your faculty and the physicians in your vicinity?* While the responses appear to be mostly in the affirmative, some did answer negatively. For example, Rush Medical College in Chicago answered “No”, Hospital College in Louisville, Kentucky responded “Some absolutely, some *cum grano salis* (with a grain of salt), and the Minnesota College of Physicians and Surgeons responded with “Opinions still divided, a majority of the more modern thinkers falling in with that view.”³¹¹

Question two of the questionnaire reads “*Do you regard the theory as of as much importance as is claimed for it by the various doctors and scientists who advocate it?*” The Chicago Medical College (separate from the previously mentioned Chicago medical school) answered “I do not. The adoption of the mere theory as a general proposition does not add

³⁰⁸ E. L. Trudeau, “Environment in its Relation to the Progress of Bacterial Invasion in Tuberculosis.” 119

³⁰⁹ E. L. Trudeau, “Environment in its Relation to the Progress of Bacterial Invasion in Tuberculosis.” 123

³¹⁰ H. W. Conn, “Bacteriology in Our Medical Schools.” *Science* 11, no. 267 (March 1888): 123

³¹¹ H. W. Conn, “Bacteriology in Our Medical Schools.” 123

anything to our resources for either curing or preventing disease.” Pulte Medical College in Cincinnati responded “Further investigations very desirable. The facts are not all in yet.”³¹²

In light of the responses to the first four questions, the responses to question five were peculiar. When asked “*To what extent does the subject [bacteriology] receive attention in the medical course of the school with which you are connected?*” even those who answered negatively about the acceptance of germ theory and bacteriology responded overwhelmingly that their institutions approached and studied, in depth, and had appropriated considerable funds to this field of medicine.³¹³ Even Chicago Medical College responded by announcing that “the subject of micro-organisms receives a full share of attention in the practical laboratories of chemistry, histology, pathology, and a well-equipped bacteriological laboratory, as well as in the teaching of every practical department, both didactic and clinical.” The Minnesota College of Physicians and Surgeons responded personally by stating that “the pathology which I give in connection with theory and practice, when dealing with infectious diseases, includes bacteriology; and I am in the habit of urging the students to investigate for themselves, as the branch is not thoroughly developed.” The implication in this response serves to demonstrate that while this professor may hold some skepticism about bacteriology, they remained willing to include it in their curriculum as something worthy of further investigation as the preliminary findings (in their opinion) hold some medical merit.

This article concludes from the information provided by the questionnaire that medicine, and the teaching of medicine, appear to be heading in the direction of the acceptance of bacteriology and a germ theory of disease.³¹⁴ In the four general conclusions drawn by the

³¹² H. W. Conn, “Bacteriology in Our Medical Schools.” 124

³¹³ H. W. Conn, “Bacteriology in Our Medical Schools.” 124

³¹⁴ H. W. Conn, “Bacteriology in Our Medical Schools.” 126

information provided to the journal a larger understanding and acceptance of such a field was gaining popularity. Medical schools with the funds to do so began investing heavily in constructing laboratories for a more scrutinized study of bacteriology. The incorporation of bacteriology and germ theory into the school curriculum rose sharply. And, as an emerging science, both believers and skeptics of bacteriology believed that educating the general public at the primary and secondary school levels should not be done, at least for the time being.³¹⁵

As for the implications of germ theory and bacteriology in relation to hospital construction and protocols, very little changed during these decades. While Lister's method of wound cleansing found a home within hospitals and especially surgical wards, the approach to ventilation, heating and ward design remained the same as in previous decades. *The Phrenological Journal of Science and Health* in 1878 maintained that the more crowded wards (some with as many as thirty beds) the more contaminated the air breathed by its patients. They advocated for a smaller ward design with four beds per ward, each with a central fireplace for heating and ventilation.³¹⁶ At the third annual session of the American Surgical Association held in Philadelphia, the debate over antiseptic measures following surgery found its way to the floor for discussion on the third day of the conference. While many physicians embraced the method introduced by Lister, some physicians also staunchly supported the position that sunlight greatly aided in the rapid healing of surgical wounds.³¹⁷

An 1886 article covering ideal hospital construction still advocates for certain miasma-based precautions when constructing a hospital and the hygienic measures needed for proper sanitation. They argue that "when thus properly constructed the floors do not require to be

³¹⁵ H. W. Conn, "Bacteriology in Our Medical Schools." 125

³¹⁶ "Hospital Construction: Suggestion for the Combination of the Pavilion and Corridor Plans." *The Phrenological Journal of Science and Health* 66, no. 2 (February 1878): 104-105

³¹⁷ "Proceedings of the American Surgical Association." *Medical and Surgical Reporter* 46, no. 23 (June 1882): 635

washed, which is a great advantage, but require to be well polished once a month with wax and turpentine.”³¹⁸ The authors hold on to the miasma theory that if it appeared clean then it must be so. They continued to cite that fluctuations in temperature are required depending upon the condition of the patient as febrile diseases required cooler temperatures as low as 50°Fahrenheit and conditions such as heart disease and lung conditions required warmer and more humid air.³¹⁹ To accomplish this, the author suggested using a ventilation system that would blow air over iron pipes located behind the vents of the ductwork which contained either hot or cold water. To accomplish this, the segregation of patients based upon their outward physical symptoms would be required.

Even as late as 1893, germ theory and bacteriology had yet to make a significant impact on hospital design as one author to the *American Architect and Building News* suggested that hospitals should still be placed in areas with “open surroundings and in a salubrious district” so the fresh air can wash over the recuperating patients.³²⁰ In embracing the Sanitarian methodology of hygiene, hospitals should be built in accordance and within the measures of sanitary science rather than aesthetics. In addition, while the author does not advocate for the smaller wards of only four beds, they did recommend a maximum of sixteen beds per ward and that each ward be fully furnished with hot and cold running water, water closets for both the patients and nurse’s stations, and verandas.³²¹ Even by the closing years of the nineteenth century, many hospitals had yet to implement the proper construction materials or protocols that aligned with bacteriology and the prevention of disease. The old guard of physicians appeared to rebuke and resist this emerging theory that continued to present solid evidence of its validity.

³¹⁸ “Hospital Construction.” *American Architect and Building News* 19. No. 526 (January 1886): 43

³¹⁹ “Hospital Construction.” *American Architect and Building News*. 44

³²⁰ “Hospital Construction.” *American Architect and Building News* 42, no. 939 (December 1893): 147

³²¹ “Hospital Construction.” *American Architect and Building News*. 148

The implementation of bacteriology in medicine and the gradual acceptance of germ theory did not come without certain limitations, such limits that even Koch himself had to admit. By the last decade of the nineteenth century, the development of some serums for rabies and anthrax found their way on to the open market and even Koch developed a controversial serum for tuberculosis (which he labeled *tuberculin*). The treatment became such a controversy due to the fact that Koch wanted to control the rights of production and make significant financial gains by doing so. Therefore, he released a modified list of ingredients which only contained a fraction of the total elements in tuberculin which seemed to chafe his contemporaries. Yet, with medical regulations, both in Europe and the United States still very relaxed, Koch only suffered political, not legal, repercussions.³²² By the dawn of the twentieth century, bacteriology made certain strides in identifying several bacteria-borne diseases, yet chemotherapy lagged in its wake as treatments for such diseases had yet to emerge.

Koch himself admitted that his discoveries could not find a universal application and that especially advanced cases of tuberculosis could find no remediation.³²³ With the acceptance of bacteriology and germ theory each microorganism causes its own disease and therefore would require a specific therapeutic. So instead of a panacea or a particular therapeutic treating several diseases, the role became reversed in that particular therapeutics must now be developed to treat each specific disease. In a moment of humility, Koch admits that “bacteriological research has left us completely in the lurch,” in respects to the treatments of disease.³²⁴ Some diseases in the

³²² Christoph Gradmann, *Laboratory Disease: Robert Koch's Medical Bacteriology*. 120, 123

³²³ “Prof. Koch and His Treatment of Consumption.” *The Phrenological Journal and Science of Health* 91, no. 2 (February 1891): 63,66

³²⁴ Robert Koch, “An Address on Bacteriological Research.” *The British Medical Journal* 2, no. 1546 (August 1890): 382

world appeared just too powerful, too elusive, too complicated for man to cure, diseases such as typhoid, scarlet fever, smallpox, and measles according to Koch.

With his hopes that all communicable diseases would be discovered in the foreseeable future,³²⁵ he would not live to see those diseases discovered as he passed in 1910. He would not live to see the scientific advancements of the mid-twentieth century based upon his discoveries that allowed for yet another discovery of a wide variety of diseases and other microscopic organisms and another addition to the branch of etiology: virology. While the technology of the late nineteenth century limited researchers such as Henle, Pasteur, Lister, and Koch, again the scaffold had been built to create such instruments as the scanning electron microscope in 1937. With the ability to magnify objects even smaller than bacteria, physicians and researchers alike discovered the causal agents for the incurable diseases mentioned by Koch. The discovery of the virus in conjunction with advancements in chemistry, the antibiotic revolution that began just nine years prior with the discovery of penicillin by Alexander Fleming aided in the lowering of miasma theory into its grave.

However, one of the positive aspects to emerge from the lives of Henle, Pasteur, Lister, and Koch was that they all lived long enough to see their work vilified by those clinging to what was then orthodox medicine, verified through laboratory research, and finally vindicated. Perhaps with some understanding of where their work would take the medical community on its progressive journey through the ages, not only these four, but the countless other contemporary physicians, biologists, and chemists, it would still be a safe wager that none during the mid to late-nineteenth century could ever imagine that medicine as whole would find itself placed in a position that required it to completely reconceptualize itself and take the natural environment as

³²⁵ Robert Koch, "An Address on Bacteriological Research." 380

a cause of disease almost entirely out of the equation and accept that only portions of the environment created the illnesses that people feared most. Antisepsis and bacteriology now gained the upper hand over the environment, along with advancements in chemistry to the tune of disinfectants and the pollutants in the urban environment could now be the uninvited guest in a person's home to which were quickly shown the door.

Chapter Six: *The Paradigm Shift In Action*

Hospitals during last decade of the nineteenth century and into the first quarter of the twentieth began to undergo a paradigm shift in their construction and internal operation. Largely brought about by emerging technologies and scientific discoveries such as bacteriology and X-ray machines, physicians and hospital architects needed to retrofit or redesign the internal functions of the hospital to suit the advancements in the medical field. Bacteriology during this period seemed to play the part of a double-edged sword in medical science; while this breakthrough in medical diagnosis provided the avenue necessary to identify a plethora of diseases, the therapeutics to treat these diseases remained elusive. This left the medical community in a conundrum of sorts as it needed a stop-gap measure to stand as a proxy until the laboratory scientists could formulate the proper therapeutics. The stop-gap measure that emerged was the prevention rather than the treatment of disease. Therefore, *antiseptic* techniques gave way to *aseptic* protocols and required much more vigilant attention to hygienic procedures, especially within the walls of the hospital.

As Jeanne Kisacky argues in chapter four of her book, *The Rise of the Modern Hospital*, the early twentieth century adopted a “form follows function” attitude toward hospital design in that an argument arose out of the asepsis movement in medicine which allowed for a decentralization in hospital functions.³²⁶ Within the walls of this new aseptic theory of hospital design, the footprint of bacteriology demonstrated the almost abject fear that gripped this time period in relation to disease. The advocacy for and construction of hospital laboratories became standard during the changing from the nineteenth to the twentieth century as Doctor John Chiene, Fellow of the Royal College of Surgeons and professor of surgery at the University of

³²⁶ Jeanne Kisacky, *The Rise of the Modern Hospital: An Architectural History of Health and Healing, 1870-1940*. (Pittsburgh: University of Pittsburgh Press, 2017), 167-171

Edinburgh stated that “laboratories, to be most efficient, should be placed where the micro-organisms occur- namely, in hospitals.”³²⁷ King’s College also announced its medical school and attending physicians accepted the germ theory of disease and incorporated a Department of Bacteriology into the medical school curriculum, a laboratory “on permanent footing”, and providing ample accommodation not just for students but for the scientific community as a whole.³²⁸

Frederic S. Lee, professor of physiology at Columbia University, remarked in 1902 that the advances in medicine for the past fifty years never embarked on such an aggressive path toward the elimination of disease. No longer would medicine be viewed as two pugilists in the ring, one disease and the other the physician as “the doctor a blind man with a club in the mêlée, sometimes hitting the disease and sometimes hitting nature.”³²⁹ He attests that due to the institution of medical laboratories the term “preventive medicine” represents the future of medicine and public health measures.³³⁰ Even though Lee admits to gaps in humanity’s knowledge of therapeutics to accompany bacteriology, he suggests that a portion of this dilemma could lie in the educational field. Lee laid part of the blame for this lag in antitoxin or chemotherapy development at the feet of medical school instructors who divided their time between teaching and private practice. In ameliorating this problem, he suggested that professors become hospital laboratory clinicians working as salaried employees of the hospital in addition to their university instruction so that any income lost by giving up a private practice would be offset by the hospital salary.³³¹ His philosophy on this topic served to show that

³²⁷ John Chiene, “On the Desirability of Establishing Bacteriological Laboratories in Connection with Hospital Wards.” *The British Medical Journal* 2, no. 1240 (October 1884): 653

³²⁸ “The Bacteriological Laboratory, King’s College.” *The British Medical Journal* 2, no. 1400 (October 1887): 953

³²⁹ Frederic S. Lee, “The Scientific Aspect of Modern Medicine.” *American Association for the Advancement of Science* 16, no. 417 (December 1902): 1002-1003

³³⁰ Frederic S. Lee, “The Scientific Aspect of Modern Medicine.” 1009

³³¹ Frederic S. Lee, “The Scientific Aspect of Modern Medicine.” 1015

physicians should spend less time chasing the almighty dollar in private practice and devote their lives to the healing arts as a civic duty.

One of the United States' most prominent surgeons throughout the nineteenth century, William W. Keen, extolled the virtues brought forth by the laboratory study of medical bacteriology. Born in 1837 and native of Philadelphia, Keen served the Union Army during the Civil War as a surgeon and in the later years of his life treated several presidents, including Grover Cleveland when he had a cancerous mass secretly removed from his mouth in 1893. He would go on to author numerous books and articles on surgical techniques and also advocated for vivisection in some of his publications. However, he marveled at the implementation of antiseptic and aseptic techniques used on the battlefield during the First World War. As preventive medicine began to prevail, Keen noted that soldiers only suffered "one case in a thousand of typhoid in comparison to our Spanish-American War where cases were fifteen times greater."³³² Yet, as with any infection or disease, time never adroitly serves man, and Keen took offense and showed his derision for the care of battlefield soldiers and how some suffered amputations and death due to the lack of timely disinfection and treatment.³³³ According to Keen, the reason for the need to treat wounds quickly on the French battlefield is a matter of the soil itself as he stated that "for over two thousand years the bacilli of tetanus, gangrene, and pus-producing bacteria of many kinds have flourished luxuriantly in this soil. The soldier marching in the dust and mud, with his skin begrimed and his clothing bedaubed with this bacteria-infected dirt, therefore has every element for unlimited infection at hand."³³⁴

³³² W. W. Keen, "The Fight Against Infection." *The North American Review* 206, no. 740 (July 1917): 73

³³³ W. W. Keen, "The Fight Against Infection." 75

³³⁴ W. W. Keen, "The Fight Against Infection." 74

The best demonstration for how seriously hospital architects and administrators considered laboratory research, the recommended square footage of suggested and existing laboratories serves this purpose. Hospital laboratories did not remain relegated to a converted janitorial closet or some unused storage space in the basement; they received full honors and attention in their construction. In a 1920 architectural competition for a Milwaukee hospital, the winner suggested that no less than 3,600 square feet of floor space and a minimum of 225,000 cubic feet be allocated to the laboratory research facility.³³⁵ A 1910 architecture thesis from the University of Illinois recommends that laboratories should remain on par with those of Bellevue at 1,020 square feet and St. Luke's at 1,444 square feet.³³⁶ A further suggestion by the author as to the location of the laboratory, it "should be so located as to prevent odors from reaching other parts of the building. The best location is on the top floor."³³⁷

In constructing the laboratories architects, physicians, and administrators required some of the highest and most bacteriologically impervious materials. Famed architect of the time Richard Schmidt (a colleague of Frank Lloyd Wright) and physician John Allan Hornsby listed numerous materials from least expensive to most in their recommendations for flooring in hospitals, including the laboratory. Beginning with wood flooring, Hornsby and Schmidt made the suggestion that oak because of its density, rather than maple or pine, should be used with two coats of varnish to help ensure a measure of impermeability.³³⁸ That these two would suggest wood floors demonstrates that some hospitals run into funding problems and can ill-afford higher quality materials. Appearing higher on their list, terrazzo flooring makes an appearance, a

³³⁵ "Extracts from the Program Architectural Competition for Milwaukee County General Hospital Design." *The American Architect* 118, no. 2343 (November 1920): 635

³³⁶ Warren William Day, "A Design for a General Hospital." (University of Illinois, 1910), 13

³³⁷ Warren William Day, "A Design for a General Hospital." 80

³³⁸ John Allan Hornsby and Richard E. Schmidt, *The Modern Hospital: Its Inspiration, Its Architecture, Its Equipment, Its Operation*. (Philadelphia: W.B. Saunders Co., 1913), 60

composite of concrete interspersed with flecks of glass or marble. While Schmidt and Hornsby recommend this material over varnished oak flooring, they also caution their readers that terrazzo eventually erodes when in contact with caustic materials such as disinfectants used in operating rooms, morgues, and laboratories.³³⁹ Topping their list of recommended floor surfacing, and some of the most expensive are what they term “encaustic flooring” or more specifically, ceramic tile and white glass. Schmidt and Hornsby state that these materials remain impervious to water and caustic chemicals over time and rank high as ideal materials for interior hospital construction.³⁴⁰

In addition to research laboratories becoming part of the modern hospital, operating rooms (especially in the United States) came under close attention when undergoing renovation or a new design. Just as in the laboratories, very little expense was spared when it came to these portions of the hospital and utilized the latest and bacteriologically impervious materials. With the rise in surgeries in the United States outpacing that of European hospitals, the number and size of operating wards in American hospitals became larger and more numerous. Architect Edward Fletcher Stevens, a man known to specialize in hospital design and well respected among the medical and architectural communities, noticed that hospitals in Paris and London only housed a maximum of two to four operating suites, whereas the more prominent American hospitals sometimes utilized up to a dozen.³⁴¹

Additionally, since the operating theater no longer required vast amounts of natural light due to electrification, greenhouse-type operating rooms with large pane windows and ceilings

³³⁹ John Allan Hornsby and Richard E. Schmidt, *The Modern Hospital: Its Inspiration, Its Architecture, Its Equipment, Its Operation*. 64

³⁴⁰ John Allan Hornsby and Richard E. Schmidt. *The Modern Hospital: Its Inspiration, Its Architecture, Its Equipment, Its Operation*. 65

³⁴¹ Edward F. Stevens et. al, *Modern Hospitals: A Series of Authoritative Articles on Planning Details and Equipment, as Exemplified by the Best Practice in This Country and Europe*. (New York: The American Architect, 1912), 7

were no longer required. Yet, in keeping with the asepsis motif of hospitals, these institutions on both sides of the Atlantic employed ceramic tile flooring, enamel painted walls or marble in the better funded hospitals, and glass, steel, or porcelain surfaces for patients and instruments.³⁴² In order to help maintain this sterile environment, additional preparatory rooms for doctors, nurses, and patients also crept into the plans of the operating ward. Segregated changing rooms for men and women (doctors and nurses) where they would usually bathe and don surgical gowns, sterilization rooms where surgical instruments would be cleaned and where doctors and nurses would scrub their hands usually up to the elbow, and finally an entrance into the operating room itself, all of which typically garnered almost 1,000 square feet of floor space.³⁴³ A separate room for the patient to undergo anesthesia was also provided and no longer performed on the operating table itself. Lastly, a recovery room where six to ten patients emerging from the effects of anesthesia could regain their wits before returning to their assigned ward or private room. In total, a single operating room with its periphery could create a footprint approaching 2,000 square feet of hospital space.³⁴⁴ A 1901 article in the *American Journal of Nursing* takes note of the vast changes that were occurring in the field of surgery stating that “the plain operating room, furnished with only hot and cold water and soap for asepsis, proved inadequate to the demands of modern surgery,” and further still that “it must furnish a service adequate to supply the demands of the most daring operator.”³⁴⁵

In addition to anesthesia, new technology which arrived in the form of the Roentgen X-ray machine allowed physicians to literally see deeper into the human body, but this time without

³⁴² Edward F. Stevens et. al, *Modern Hospitals*. 7, 16, 40

³⁴³ Warren William Day, “A Design for a General Hospital.” 5 (This citation comes from an amalgamation of Day’s research into existing and suggested square footage of operating spaces and Jeanne Kisacky’s work which appears to coincide with Day.)

³⁴⁴ Alfred Saxon Snell, “Hospitals.” *The Journal of the Society of Architects* 4, no. 44 (June 1911): 295

³⁴⁵ Edward B. Angell, “The Modern Hospital: Its Value to the Patient and to the Physician.” *The American Journal of Nursing* 1, no. 10 (July 1901): 704

having to make a single incision. The X-ray machine and its developing room, fluoroscopy machines (which allow for real-time X-rays), certain types of baths such as sulphur baths and steam baths, along with pneumatic breathing chambers, and ultraviolet heliotherapy machines required specialized spaces and large amounts of square footage in hospitals along with certain building materials for safety. As an example of the sheer size that hospitals devoted to X-ray and imaging departments in the early twentieth century, the Mayo Clinic allocated its entire second floor to these pieces of diagnostic equipment.³⁴⁶

X-ray and fluoroscopy both required large pieces of equipment that, in turn, required large amounts of floor space in addition to specialized staff to operate them. Roentgenologists as they were termed, these specialized staff members oversaw the operation and maintenance of the equipment as well as the development of X-ray photographs. Joel Howell notes in his monograph, *Technology in the Hospital*, as the use of this technology increased employment positions these required specialized training and roentgenologists assumed the multi-faceted role of anatomist, technician, and photographer.³⁴⁷ The role of a roentgenologist also required a certain intestinal fortitude or perhaps disregard for personal safety since exposure to X-rays on a perpetual basis could prove extremely harmful to the human body. Certain precautions arrived in the form of construction materials for the rooms themselves: lead screens and lead-lined aprons, walls lined with lead at least 1/8 of an inch thick, and leaded glass to protect one's vision.³⁴⁸ In a strange twist of fate, the modern hospital in comparison to the antebellum now became more dangerous for the doctor than the patient.

³⁴⁶ Edward F. Stevens, *The American Hospital of the Twentieth Century: A Treatise on the Development of Medical Institutions, Both in Europe and in America, Since the Beginning of the Present Century*. (New York: Architectural Record Publishing, 1918), 145

³⁴⁷ Joel D Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century*. (Baltimore: Johns Hopkins University Press, 1995), 119

³⁴⁸ Edward F. Stevens, *The American Hospital of the Twentieth Century*. 143

This new equipment such as the fluoroscopy, X-ray, and heliopathy machines became standard in the more highly funded hospitals of larger cities, they would stand inert and inoperable had it not been for the introduction of electricity into the hospital. Some cities had yet to create a city-wide electrical grid leaving some hospitals to retrofit their institutions with a private power plant typically located in the basement.³⁴⁹ Tungsten filament light bulbs eventually replaced candles and lamp oil and dark corridors could now be lighted for the safety of everyone traversing them. In urban areas, these power plants also operated elevators for hospitals that exceeded the traditional three floor height limit saving on the amount of labor needed to move a bed-ridden patient from floor to floor. In addition to powering therapeutic and diagnostic equipment, light bulbs, and elevators, the diet of the patient also improved with the introduction of electricity into hospitals. Electrically-powered refrigerators in hospital kitchens could store perishable food products for a much longer time period and allowed for the patient to have a wider variety of items upon which to dine.³⁵⁰ Fresh meats and vegetables could be stored at a safe temperature that prohibited the growth of bacteria and slowed the rate of spoilage.

Not only did architects embrace the harnessing and recreation of a powerful natural force, but physicians as well experimented with electricity in their search for better and more effective therapeutics. One gynecologist advocated the use of electrical currents while treating his patients for various chronic conditions such as “imperfect development of the uterus and ovaries, superinvolution, subinvolution, amenorrhoea, uterine displacements, and interstitial fibroids.”³⁵¹ Even with the use of opium and other pain relievers available during the late Victorian Era, some

³⁴⁹ Richard Schmit and Martin Garden, “New Psychopathic Hospital for Cook County, Illinois.” *The American Architect* 108, no. 1877 (October 1915): 252

³⁵⁰ R. E. Argersinger, “Electrification of Buildings.” *The American Architect and Architectural Review* 125, no. 2348 (January 1924): 107

³⁵¹ William R. D. Blackwood, “Review of the Progress of Medical and Surgical Electricity.” *Philadelphia Medical Times* 16, no. 12 (March 1886): 416

women claimed that the pain of these disorders became too intense, something that doctors claimed electricity could alleviate when other treatments failed.³⁵²

Electro therapeutics also became involved in labor and delivery to aid in the recovery of the mother. The procedure involving electric current began just after delivery or abortion of the infant where over a six day period a woman's uterus would be given electric pulses eight to ten times per day for the purpose of warding off "all the complications which arise from arrested or retarded involution [shrinking of the uterus to normal pre-pregnancy size]."³⁵³ Seeking to reduce blood loss by reducing the engorged uterus as quickly and safely as possible, physicians began to employ electricity as a method to safeguard the life of the mother.

Cancer remained one of the diseases that paralyzed the medical community since no cure existed and the measures implemented to remove tumors included surgically removing cancerous tumors and the use of caustic chemicals. However, surgery often failed to remove the entirety of the cancerous material leaving a pathway for resurgence and caustic chemicals often created significant damage to the surrounding tissues, blood vessels, nerve endings, and organs. Some physicians did hold out some hope in that electricity could bring relief to their patients though. In hoping to electrocute the cancerous tumor, doctors coined the term "electro-necrosis". In lieu of using the knife and caustics, doctors experimented with using a small steel rod to puncture the skin and subdermal tumor. This procedure was supposed to alleviate the need for an incision and then pouring caustic chemicals into the body. Additionally electro-necrosis would also safeguard the surrounding nerves and blood vessels from the caustic agents.³⁵⁴

³⁵² William R. D. Blackwood, "Review of the Progress of Medical and Surgical Electricity." 417

³⁵³ "Special Reports: Midwifery." *Medical and Surgical Reporter* 45, no. 11 (September 1881): 304-305

³⁵⁴ William H. Walling, "Cancer Treated by Electricity: Electro-Necrosis." *Times and Register* 20, no. 599 (March 1890): 228

While doctors also used electricity as possible therapeutics and substitutes for surgery, they also realized they were no longer beholden to the rotation of the earth when it came to actually performing surgery. Artificial light allowed for surgeons to perform operations any time of the day or night. The *Medical and Surgical Reporter* published an article in 1897 on a Dr. Nevins from Chicago that invented a lighted head-gear for surgeons. A headband worn by the surgeon contained an operational switch on the right side and illuminated a light bulb in front of a reflector capable of producing up to fifty candle-power.³⁵⁵ The headband could be connected by a cord to an electrical outlet in the wall or a fifteen-pound battery that could provide power for up to fifty hours. By using technology from coal mining, surgeons could now have uninterrupted light when operating on a patient and not have to worry about either themselves or their assistants blocking the light cast from an overhead lamp.

As nurses and physicians headed full bore into aseptic practices, their approach to ventilation also underwent certain changes, much to the greater comfort of the patient. With the acceptance of medical bacteriology and germ theory, physicians and architects understood that putrid air alone no longer served as the vectors for some diseases, but now air in general, through the proof of fermentation that Pasteur offered in his experiments, served as the vector for some disease elements. Circulating and changing the air breathed by patients still remained important to disease prevention since bacteria contained within the air itself needed a method of removal from the hospital wards. Allowing fresh air into the hospital wards opened the proverbial window as well as the literal for the contamination of these wards and their patients. The *American Architect and Building News* recommended in 1900 supplying at least 4,000 cubic feet of ventilated air per bed per hour. Taken in conjunction with the ceiling height of the ward itself,

³⁵⁵ "Society Reports: Philadelphia Medical Society." *Medical and Surgical Reporter* 76, no. 6 (February 1897): 184

the circulation of air should remain closely monitored. American and German hospitals recommend a ceiling height of thirteen feet because the French system of twenty-five feet is “undoubtedly unjustifiable, excessive, and impractical. It reflects on the megalomania characteristic of Latin races since the existence of the Roman Empire.”³⁵⁶

Instead of ushering in fresh, clean, country air, hospitals now endeavored to flush away any bacteria-laden air in their buildings. Using propulsion-driven systems of ventilation, intake, exhaust flues, fans, and ductwork now began to run throughout the twentieth century hospital. While a wide variety of designs existed during this time, physicians debated which served the patient best, but they could agree that the most comfortable temperature for a convalescing patient should hover around 70°F. To accomplish this feat during the summer months, Edward F. Stevens suggested blowing the air over blocks of ice before its delivery into the ward rooms.³⁵⁷ Heating hospitals during the winter relied on older ideas such as the steam driven heating system, which employed boilers located in the basement that propelled steam through a closed circuit of piping which ran throughout the walls and floors of the hospital along with floorboard mounted steel radiators in some of the wards.³⁵⁸ One of the main differences between the steam systems of the nineteenth century and those of the twentieth, electricity now powered the heating of the boilers rather than open fires that needed constant maintenance and a piston driven pump maintained a stable pressure in the pipes and distributed the heat more evenly throughout the building.³⁵⁹ In addition to more stable temperatures throughout the year, during

³⁵⁶ “Axioms and Principles of Modern Hospital Construction.” *American Architect and Building News* 67, no. 1263 (March 1900): 76

³⁵⁷ Edward F. Stevens, *The American Hospital of the Twentieth Century*. 198

³⁵⁸ Edward F. Stevens, *The American Hospital of the Twentieth Century*. 196-197

³⁵⁹ Edward F. Stevens et. al, *Modern Hospitals*. 13

the winter, these advancements alleviated the need for fireplaces as functional items and became more decorative in purpose and reduced the chances for the hospital itself to catch fire.

These closed-circuit systems also created a redesign of the windows themselves as the need to keep polluted air out of the hospital aligned with the aseptic philosophy. *The British Architect* took time in one of its articles to note that “the sash panes should open inwards to facilitate cleaning, and should be double-glazed, with space of half an inch between inner and outer panes.”³⁶⁰ In keeping with non-porous materials, they also suggested that the sills of the windows be constructed of plate glass slabs also for ease of cleaning. The opening and closing of windows to flush out effluvia no longer became necessary as a therapeutic along with using verandas so that patients could adhere to the heliopathic treatments required by their physicians. Windows to let in sunlight and verandas used to treat patients now served more psychological purposes rather than physiological.³⁶¹

Just as with the shift from miasma to germ theory, a period of transition also occurred in relation to the location of new hospitals. The interior transformation in hospitals from antisepsis to asepsis became part of every new hospital design and retrofit of existing hospitals, but physicians and architects still held to the old belief that fresh air, even though the hospital environment itself could exist in a relatively self-contained manner, served the patient physically through a reduction in the amount of contaminated bacteria entering the hospital. The primary argument circulated around air itself in relation to the physical locations of hospitals; once the demarcation between urban and rural regions, germ theory provided physicians and architects with permission to establish hospitals in urban areas but with a few caveats.

³⁶⁰ “Items of Hospital Design.” *The British Architect*. (March 1916): 128

³⁶¹ Annmarie Adams, *Medicine by Design: The Architect and the Modern Hospital, 1893-1943*. (Minneapolis: University of Minnesota Press, 2008), 106

Many architects still believed in a decentralized ward-pavilion style of organization where detached buildings housed similar illnesses or injuries which surrounded a courtyard. The *American Architect and Building News* recommended to its readers that “there can be no departure from the general arrangement of placing the wards north and south and parallel to each other in two wings surrounding a central courtyard.”³⁶² They decided to keep with the original U or H-shape design of hospitals that remained prevalent throughout the nineteenth century. And while they agree that hospitals should remain accessible to the urban population that would utilize them, they needed to remain on the periphery of these areas.³⁶³

Alfred Saxon Snell, British architect and son to Henry Saxon Snell, both gained notoriety around the Atlantic for their prowess in their specialization of hospital design. Henry became known for his 1893 design of the Royal Victoria Hospital in Montreal, and his son Alfred contributed greatly to Poor Law infirmaries in Britain. Alfred tended to take a more moderate stance on his opinions of hospital location almost to the point of ambiguity in stating that “the only general rules we can make is that the ward blocks should be so placed as to be free from the traffic of the other buildings, and the noise and dust of a public highway, should not be shadowed by other buildings, and should have uninterrupted light and air.”³⁶⁴ Yet, in the same breath where he appears to suggest, at the very least, a suburban setting, he goes on to say “In this country [England], we do not appear to be able to allow ourselves the luxury of spaciousness and magnificence.” Perhaps Alfred Snell intended to say more, but chose a more diplomatic stance so as to keep his existing clients and attract new ones to his firm.

³⁶² “Axioms and Principles of Modern Hospital Construction.” *American Architect and Building News*. 78

³⁶³ “Axioms and Principles of Modern Hospital Construction.” *American Architect and Building News*. 78

³⁶⁴ A. Saxon Snell, “Hospitals.” *Journal of the Society of Architects* 4, no. 44 (June 1911): 291

Several years later, in 1918, Edward F. Stevens apparently concurred with Snell as he made mention of choosing an appropriate hospital site. Perhaps the country would be best, but architects should not overlook the urban areas as well because they also provided certain attributes to hospital locations. Stevens remarked “location is here most important, an environment that will be an uplift to the patient; an outlook that while distant from industries may still remind the patient that he is a part of the world’s life and activity.”³⁶⁵ Maintaining a distance from industrial areas ranked high on the list of criteria for site locations due to their high air pollution content, but also their noisy operations which would detract from a patient’s recovery. Stevens also seems to believe that a patient should face certain reminders that when they heal they will re-enter the very environment that could have caused their illness or injury.

Some of the recommendations for a less urban site for hospitals may have evolved out of the aseptic movement itself. Unadorned hospital wards with hard and glistening reflective tile, white enamel paint, white walls, white floors, mono-color materials that would easily show dirt and require a thorough scrubbing, asepsis may have become an eyesore for the patient. Physician and contributing author to the *American Journal of Nursing*, Edwin McDonald Stanton, stated in jest that he “would like to run out and get a bucket of red paint and relieve the institutional atmosphere by a few of my own crude attempts at decorating.”³⁶⁶ *The American Magazine of Art* suggested in 1916 that the hospital may have gone overboard with asepsis and created a monster that made the patient feel they were entering a factory rather than a place to heal. Institutionalization of the hospital’s interior served very little psychologically to the

³⁶⁵ Edward F. Stevens, *The American Hospital of the Twentieth Century*. 2

³⁶⁶ Edwin M. Stanton, “One Factor in the Hospital Life of the Private Patient.” *American Journal of Nursing* 10, no. 8 (May 1910): 571

patient's convalescence.³⁶⁷ They suggest a more "cheerful environment" and that an "aesthetic environment be added to the materia medica."³⁶⁸ Having a courtyard with a fountain, trees that changed color with seasons, shrubbery, and green grass to break up the monotony of the hospital's interior could serve the patient profoundly as they recover.

With physicians and architects still debating the merits of hospital sites, an analysis of each side of the argument provided each with their own significant advantages and drawbacks. Real estate costs dropped significantly the further one moved away from the city center and with the rising costs of equipping a hospital some measure of financial control was needed. Lower real estate costs also operated in tandem and with lower land values, hospital donors and state governments could acquire larger plots of land as well and maintain the decentralized, low rise, ward-pavilion style hospital. Landscaping also came at a reduced cost for land outside of a city's border since most of the trees remained standing and other natural vegetation could be incorporated at a minimal cost.

Sites for hospitals outside of the city limits did pose some considerable drawbacks. Such drawbacks became the focal point of the debate as the Atlantic world became more industrialized and populations began migrating towards urban areas. Manhattan in 1850 boasted a population of 515,547 people, and in 1910, that population had exploded to over 2.3million.³⁶⁹ With a hospital on the periphery of this urban population, attracting patients to such a facility would prove difficult without reliable systems of public transportation. Charity patients would find the trek to such a distant hospital deleterious and could cause them more harm due to the distance

³⁶⁷ Grosvenor Atterbury, "Hospitals and Esthetics: The Architectural Problem, with Particular Reference to Esthetics and the Art of Architecture." *The American Magazine of Art* 7, no. 11 (September 1916): 444-445

³⁶⁸ Grosvenor Atterbury, "Hospitals and Esthetics." 442

³⁶⁹ [Bulletin 374. Population : New York City. Number of Inhabitants, by Enumeration Districts. \(census.gov\), The Seventh Census of the United States: 1850 - New York](https://www.census.gov/historic/totals/population/new-york-city) accessed 2/15/2022.

required of them to travel. Paying patients could save the fare of transportation and have a physician treat them in their homes if the illness or injury were not life-threatening. As with hospitals of the nineteenth century, the distance one traveled for medical care often dictated where they sought such medical care.

As people became more densely packed into urban areas such as Manhattan, Chicago, Philadelphia, and Baltimore, spreading out became less of an option for real estate developers since most working-class people still walked to work. Therefore, instead of building horizontally, architects began to build vertically. Improved building materials such as steel produced by the Bessemer process allowed for the production of larger amounts in a fraction of the time required by the previous smelting process of mid-nineteenth century. Steel-frame buildings allowed architects to move ever upward and create what became known as the skyscraper, but this also allowed for the creation of urban hospitals on smaller plots of land. Without the medical restriction of two to three story buildings that regulated the height of the earlier nineteenth century hospitals, they could now soar to six and even ten stories by the First World War.³⁷⁰

Larger urban populations combined with more services that a hospital could offer its patients also greatly increased the number of staff on hand to care for such patients and tend to the administration of the hospital. Physicians, nurses, janitors, accountants, roentgenologists, cooks, and orderlies all occupied the hospital space, scurrying from ward to ward and office to office. By 1901, Boston General Hospital reported that it employed 349 employees, Massachusetts General boasted 240, Johns Hopkins reported a nursing staff of 89, and Presbyterian Hospital in New York counted their nursing staff at 85.³⁷¹ During the early

³⁷⁰ Jeanne Kisacky, *The Rise of the Modern Hospital*. 248-249

³⁷¹ Edward B. Angell, "The Modern Hospital." 705

twentieth century, hospitals became beacons for employment of almost all trades and medical specializations seeing how the asepsis approach to preventive medicine required a near battalion of people dedicated to the cleanliness of the hospital: people to sweep, mop, and scrub walls, as well as those in laundry, cooks to provide general as well as specialized meals to patients and staff, those to serve such meals in the various wards and pavilions; the support staff needed for the recovery of an ill or injured patient grew exponentially during this period.

With an army of people tending to the needs of the patients, the cost of constructing and operating a hospital began to soar stretching the budgets of state governments as well as those willing to donate privately. This era brought about the decline of the free/deserving patient and gave rise to the private pay, or partial pay, patient. As with the rise of any out-of-pocket cost to an individual, the treatment and service expected also rose. Between the years 1850 and 1901, inflation created about a 9% increase in products and services meaning that an item costing \$1.00 in 1850 would only cost someone \$1.09 in 1901.³⁷² As a hospital stay in 1850 typically cost the administration about \$5.25 per week per patient, due to the implementation of new technology and overall operating costs, the price on patient care had more than doubled during the dawn of the twentieth century. The University Hospital of Philadelphia in 1901 submitted their per patient cost at \$12.97 per week with only \$2.34 going toward food. Massachusetts General in Boston reported their per patient cost at \$13.74 per week with only \$2.03 for food.³⁷³

Hospitals needed to recoup some of these costs and attracting more private pay and partial pay patients became their solution. The increase in private and semi-private rooms created a veritable tug-of-war between those with the means to pay for their treatment and those relying on charity as bedspace became prime real estate inside a hospital. Architectural historian

³⁷² [\\$0.75 in 1850 → 1901 | Inflation Calculator \(in2013dollars.com\)](#) accessed 2/15/2022

³⁷³ Edward B. Angell, "The Modern Hospital." 706

Annmarie Adams describes the updates as posh and a change from the nineteenth century paying patients who would often bring their own furniture and beds, paying patients would now find such items provided for them.³⁷⁴ She also describes community areas where patients could find some recreation, usually a room off the solarium, where billiard tables, magazines, and other sundries could be found. These solariums and verandas, once seen as integral to a patient's recovery because of the belief in sunlight as a physical therapeutic, now served patients in a psychological sense. The ability to sit in the sun and take in some fresh air on these rooftop solariums and verandas helped the patient escape the monotony and mono-color regimen of the modern hospital. Some hospitals such as the Royal Victoria Hospital would place advertisements in local newspapers to help attract the potential patient with financial means.³⁷⁵

Increased operating costs, increased start-up costs, real estate prices, and the implementation of new technology all contributed to the need for efficiency which brings about the largest argument architects, physicians, and especially administrators posed for more urban and vertical hospitals. Hospitals, with their increasing patient numbers now needed the aid of the business world in their accounting practices and cost control. Historian Joel Howell further explains that the need for efficiency-guided medical protocols and shaped the activity within the hospital in his work *Technology in the Hospital*. Items such as standardized forms for doctors and administrators and the typewriter created a greater level of efficiency in the hospital and allowed for the treatment of a greater number of patients with little undue burden on the staff.³⁷⁶

Large, bulky, and immovable pieces of diagnostic equipment, rooms designed specifically for a single method of treatment or diagnosis, surgical suites that incorporated

³⁷⁴ Annmarie Adams, *Medicine by Design: The Architect and the Modern Hospital, 1893-1943*. (Minneapolis: University of Minnesota Press, 2008), 39

³⁷⁵ Annmarie Adams, *Medicine by Design*. 88

³⁷⁶ Joel D Howell, *Technology in the Hospital*. 66

multiple rooms, an expanded administrative staff, community rooms and solariums for patient comfort became increasingly difficult to achieve with the ward-pavilion style hospital. The hospital began to transform into a less static environment where nurses and physicians catered to patients in their respective wards or private rooms and now became an environment of bodies in motion, patients moving (or being moved) from one part of the hospital to another based upon their diagnostic and therapeutic needs.

With the introduction of business practices within the hospital, the environment now appeared to take on an industrial hue. Shuttled from room to room, the patient became the product of the hospital. When a broken individual entered, the hospital endeavored to create a whole individual free of defects; the patient upon intake became the raw materials, and the cured patient at the time of discharge was the finished product free of disease or injury. However, Edwin Stanton cautioned against hospital staff losing their humanity in the face of medical industrialization. He stated, “one of the most fundamental facts, namely, that a patient is not simply a pathological entity, but on the contrary a delicately constituted human being, with fancies and whims, likes and dislikes, all of which are far more real to the patient than any of the details of asepsis or the technical points in nursing.”³⁷⁷

Within a few short decades, bacteriology appeared to have forced the divorce between miasma theory and physicians. No longer did doctors depend upon the natural environment in its unaltered state as a therapeutic for their patients. It could now be manipulated through chemistry in the form of disinfectants that actually prevented the growth of disease-causing microorganisms rather than just creating a more pleasing aroma. These new technologies in conjunction with bacteriology also allowed for the control of the environment in the form of

³⁷⁷ Edwin M. Stanton, “One Factor in the Hospital Life of the Private Patient.” 572

advances such as the X-ray machine, closed circuit ventilation and heating systems, and artificial light (not only white light but ultraviolet light used in heliotherapy). The adoption of asepsis in medicine brought along with it an entourage of building materials and new operations procedures designed to keep this microscopic universe from saturating the once welcoming hospital environment. A 1910 textbook on bacteriology for medical students explains the depth and breadth of knowledge gained during those previous few decades in its 775 pages and thoroughly explains the various categories and subcategories of bacteria and how a careful control and maintenance of the hospital environment becomes a priority for any physician since even a gentle breeze from a polluted section of town could bring about the death of a patient.³⁷⁸

With a new scientific approach to medicine, rather than the antiquated philosophical approach, again the hospital became the physical embodiment of current medical theory. Even though rising costs forced many hospitals to admit less charity cases and adopt a schedule of fees for the services they provided, by the early twentieth century the public view of the hospital had successfully severed all ties it had with its almshouse predecessor in the area of medical care. The general public now viewed the hospital as a place in which to seek medical treatment rather than an option of last resort and desperation. The hospital became a place where all manner of people were welcome, not just the poor. People did not come to the hospital with the forethought of balancing the odds of their survival once admitted, and it would seem that through the control of the environment hospitals gained the reputation they sought as a place to heal rather as a place to die.

³⁷⁸ Philip Hanson Hiss and Hans Zinsser, *A Textbook of Bacteriology: A Practical Treatise for Students and Practitioners of Medicine*. (New York: D. Appleton & Co., 1910), 181-182

Conclusion:

Medical theory prior to the late nineteenth and early twentieth century shared a rather comfortable relationship with the natural environment. Medical treatments depended heavily upon the products that the environment provided and in the quantities that appeared readily available. This, put more simply, meant that stronger dosages came in the form of larger quantities, unlike modern medicine where the same size pill can possess varying strengths of its active ingredients. Refinement of medicinals into more powerful dosages remained out of the grasp of apothecaries and physicians during this period. The medical theory of the time, zymotic/miasma theory, entered into a comfortable marriage with the natural environment as the cause for disease and as a provider of therapeutics for such diseases.

Communication within the medical community through university lectures, journals, and treatises served as a means to share this environmental therapeutic information and to openly explore ideas about emerging treatments and theories. This, in and of itself, included the environment since treatises and journals often included paper made from linen rags and along with the medicinals implemented by physicians, were carted around the world for doctors to peruse and utilize in their patients' treatment regimens.

One of the most prominent methods to demonstrate how medical theory heavily relied on the environment could be found in the construction of charity hospitals. Initially constructed along the boundary line between the rural and urban settings, hospitals took advantage of the clean air, fresh water, and calming surroundings of such locations. Believing whole-heartedly that miasmas from polluted air and foul water caused disease, physicians, architects, and philanthropists attempted to minimize the amount of miasmas entering a hospital by situating hospitals in these particular locations.

Patient density within hospital wards also factored into the zymotic theory since the exhalations of a sick patient could contribute to surrounding patients falling ill as well. Calculating the physical dimensions of a ward became widely studied subject in hospital construction; a certain amount of cubic feet per patient would be needed to dissipate the exhalations of a sick patient or for open windows to flush out the putrid air and replace with the unpolluted air of the countryside. Studies such as these created restrictions as to the number of patients that could be housed in each ward and in turn created tension between physicians, architects, and philanthropists funding such projects. While physicians wanted to treat patients in a space that facilitated their healing, the wealthy donors desired to leave their legacy on society through their charitable contributions but at a minimal cost. As a result of this, architects found themselves caught in the crossfire of this dispute between donors and doctors and attempted to find the middle ground by designing hospitals that provided both parties with what they desired.

With miasma theory heavily based in the senses of taste and smell, sanitation within hospitals of the early to mid-nineteenth century became side notes to hospital function. If it looked clean and smelled clean then it was so, which led to linens, clothes, dishes, and surgical utensils being cleaned infrequently. This allowed for increased infections such as conjunctivitis and other post-operative infections known as hospitalism. Physicians attributed occurrences such as these to the physical constitution of the patient, poorly designed hospital wards, or the living conditions of the patient prior to their admittance to the hospital, diagnoses supported by the miasma theory of the time. Within this marriage of medicine and the environment, people bore the blame for illness by their corruption of the environment in which they lived or the

corruption of their body through behaviors such as alcoholism, contracting venereal diseases, and poor diet.

With the research of Pasteur, Lister, and Koch, a paradigm shift occurred in medicine and how physicians approached illness. During the late nineteenth century and into the early twentieth, research demonstrated that malodorous emanations or foul-tasting water or food did not serve as the vectors for disease, but individual microorganisms. The impact this discovery had on the medical community and the treatment regimens of patients was far reaching and contentious for several decades. Few changes in hospital construction occurred during the closing decade of the nineteenth century, but as newly graduated physicians began to accept germ theory, the changes in hospital architecture, location, and internal functions became drastic compared to the previous century.

Germ theory drove a wedge between medical theory and the environment. Medicine no longer needed to depend upon the natural environment as a physical therapeutic but relied on it as a psychological aid during convalescence. Verandas, solariums, and courtyards allowed patients to have the fresh air, sunlight, and greenery as a distraction from their illness rather than as a vital course of treatment.

Along with psychological improvements for convalescing patients, hospitals also improved their approach to sanitation and the design and building materials implemented followed suit. Right angles, wooden floors, and fireplaces started to be phased out of architect's designs since these now became the receptacles for pathogens that could cause further illness to patients. Refrigeration, electricity, and improved water treatment and sewerage allowed for a plethora of upgrades to the care patients received in the hospital. Refrigeration allowed for the improvement of patient nutrition by allowing perishable foods to be stored at a safe temperature

for longer periods of time. Electricity meant that windows could now be closed and the seasons no longer dictated patient comfort as environmental controls could be installed. Water filtration and city-wide sewerage systems were installed and hospitals connected their sewage lines to the city in order to remove waste and other contaminants that could affect patient health.

Germ theory also changed the approach that physicians took in relation to the location of hospitals. Adapting to population growth, charity hospitals could no longer be located on the outskirts of cities since these locations were now too far for poor patients to travel. With miasma theory waning, hospitals could now find homes among, or next to, the more industrial sections of a city since the foul air itself no longer caused illness. And with improvements in building materials such as steel and iron, hospitals could also be built on smaller plots of land since their construction could go vertical rather than horizontal.

Bacteriology and germ theory created a shift in medical theory that no longer placed the blame for illness on the person corrupting the natural environment or the ecosystem within their own bodies. Instead, and in a final act of divorce, medicine shifted the blame for illness onto the environment, specifically the microscopic environment. A person's lifestyle and living conditions were no longer factors that caused their illness in the sense that alcoholism and adultery itself did not cause disease; filth and uncleanness itself did not cause a person to become ill. These addictions and lifestyle choices now served as the vectors for the transmission of disease and not the cause of disease, and this became reflected in the physical manifestations of medical theory through the design of hospitals.

As research for this discourse concluded some interesting and latent issues arose that could warrant further research and inquiry if this has not already been attempted. Through the course of this research, two issues arose that prompted some curiosity, one for its blatant absence

in the primary sources, and the other issue for its continual appearance throughout the primary and secondary sources. The issue of pediatrics in nineteenth century medicine appears absent in that physicians appeared to treat children in the same manner in which they treated adults. No medical separation between children and adults appeared in the primary sources in the manner that exists in modern medicine. Infants, however, did seem to be the exception to the rule, but the mention of children in the acquired primary sources seemed conspicuously absent. This raised several questions that could prompt some further research: Were children seen in the eyes of medical theory as just smaller adults and therefore could receive similar treatment regimens? Other than foundling hospitals, no mention of children being treated at charity hospitals appeared, so were children (even poor children) treated in the domestic sphere rather than a hospital? Finally, how much scientific investigation was conducted on child development during the nineteenth century, and did the acceptance of germ theory have a role in the rise of pediatrics during the twentieth century?

The second curiosity that arose from this research was the issue of control, or more specifically, the desire for control over others. Physicians separated people at the door of a hospital into the deserving and undeserving poor, admitting the former and sending the latter on to the almshouse for treatment. Only those with verifiable moral righteousness could enter a hospital. Once inside the hospital and under the care of physician, their control over the patient seemed almost beyond reproach by nurses, administration, and even the patient. Physicians controlled how patients were treated, when they were treated, and what they ate. In response to this, were the filing of malpractice lawsuits a measure that patients used to reclaim some of that control and decide the course of their treatment?

Physicians also attempted to control each other with the establishment of the American Medical Association and the Royal Society as tools. Unorthodox physicians often garnered the ire of those who immersed themselves in Galenic medicine. Physicians who dared to experiment with alternative treatment methods that stepped outside of the university's teachings were often treated in the medical community as pariahs and denied acceptance into medical associations and scientific societies, acceptance that would profit them substantially in certain socio-economic circles. How did unorthodox physicians, who earnestly worked in the best interest of their patients, fair once miasma theory became replaced with germ theory? What holdovers from this conflict existed once germ theory established itself? While these observations are tangential to the research conducted, they do present themselves through the research itself and should be worthy of further inquiry.

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