

Introduction

To the well-known saying that “dirt is only matter in the wrong place,” may be added another, that disease, and death itself, is but life in the wrong place.

— *American Architect and Building News*, 1882

Hospital: An institution or establishment for the care of the sick or wounded, or of those who require medical treatment.

— *Oxford English Dictionary*

That a hospital—as an institution providing care to sick and injured persons—should be designed to promote the health of its inhabitants is a foregone conclusion. How, exactly, a building design might be expected to facilitate cure or suppress illness is more elusive, and it is the focus of this book.

From the mid-nineteenth to the mid-twentieth century, American hospital designers experimented with a number of competing strategies for the role the building design was to play in the health of its occupants. Designers debated whether the hospital building was a therapy in itself, providing a surrounding that would somehow keep persons in close proximity from sharing their ailments and perhaps even actively instill greater health in its occupants, or whether it was a tool that would organize the activities, materials, and events within the building into an efficient, controlled, therapeutic process.

Over time the questions and the preferred answers changed, reflecting altered medical, social, urban, and architectural circumstances. Mid-nineteenth-century hospital designers overwhelmingly privileged the building’s therapeutic potential over its ability to facilitate medical treatments. Mid-twentieth-century hospital designers overwhelmingly privileged the building’s potential to facilitate medical actions and interactions over its intrinsic healthiness. This shift from considering the hospital as a therapy to considering it as a tool accompanied drastic institutional transformations. From the last resort of the impoverished urban unwell, hospitals became the first resort of all classes of ailing citizens. From neutral containers of general care, they became active locations in the development of specialized scientific medicine. From charitable institutions organized on

an almost familial structure, they became complex organizations modeled on current business structures. From closed institutions into which sick people flowed, they became open institutions out of which health flowed. These multiple, complicated transformations were built into American hospitals as their facilities shifted from low-rise, decentralized pavilion wards to centralized, “modern” high-rises.¹

Architectural decisions also influenced these transformations. Where a hospital was located in relation to the city, to other hospitals, and to specific neighborhoods affected its patient load and characteristics as directly as the composition of its medical staff. What facilities a hospital contained and how they were arranged could turn it from a warehouse for the sick poor into a location for cutting-edge medicine attracting all classes. The sizes of its inpatient rooms—whether wards (large rooms that housed a number of patients) or single-patient rooms—determined the number of people that could be treated and the extent to which each patient could be isolated from the others, and even delineated who paid for care.

These transformations are relevant today as designers struggle to develop new hospital buildings that are efficient and attractive, and decide which buildings from earlier time periods are worth saving and which are destined only for demolition. The truth is, however, that we know very little in detail about how and why American hospitals shifted from pavilions to high-rises in the crucial period between the end of the Civil War and the beginning of World War II.² Many historians of hospital design intentionally avoid this difficult period, ending their discussion at the mid-nineteenth century or beginning it after the mid-twentieth century.³

Works that do cover the decades between the 1870s and 1940s often do so in a few pages (or even just a few paragraphs), and touch on the same sequence of examples, moving directly from the internationally famous pavilions of the Johns Hopkins Hospital in Baltimore (1875–1885) to the mature high-rises of the 1930s such as the Columbia-Presbyterian Medical Center in New York City by James Gamble Rogers (1929), the New York Hospital–Cornell Medical Center in New York City by Coolidge Shepley Bulfinch and Abbott (1932), or the Beaujon Hospital in Clichy, France, by Jean Walter (1935). In between these two extremes are given at best a handful of intermediate examples, such as Albert J. Ochsner’s 1905 call for vertical hospital design, Arnold Brunner’s collaboration with S. S. Goldwater on the new Mount Sinai Hospital in New York City (1901), Goldwater’s ideal ward design for cities (1910), or William Henman’s Royal Victoria Hospital in Belfast (1903). The detailed sequence of transformation of hospital design between the 1870s and 1930s has become so lost to history that in 1976 Peter Stone could confidently (if erroneously) state that “there had been



little literature on the general problem of hospital design since Florence Nightingale's 1863 book *Notes on Hospitals*.⁴

A few recent works have begun to fill this gap, but each still reveals only a small piece of a much larger story. Jeremy Taylor examines hospital design up to 1914, but he focuses on the transformation of the pavilion-ward type in Britain, not on the development of high-rise, centralized, modern hospital structures. Sven-Olov Wallenstein presents a number of hospitals between the 1900s to the 1930s, but his examples are mostly sanatoria (a specialized type of hospital with design requirements that reduced their height and their centralization) and are chosen for their “modernist” design and designers rather than for their representation as epitomes of hospital planning and function. David Charles Sloane and Beverlie Conant Sloane correlate shifts in the practices and experiences of patients, doctors, and benefactors to the architectural shifts of hospitals from a “home” to a medical workshop to a vertical hospital, but only as a brief prelude to an extended discussion of the transformations of the last half of the twentieth century. In numerous publications, Annmarie Adams has focused on hospital design in the decades between the 1900s and 1940s, but in order “to understand hospital buildings as artifacts of material culture” she has structured her work as a series of thematic essays “rather than a chronology of hospital design.” This approach, which studies buildings as historical records in and of themselves, has allowed her to develop a deep knowledge of the social, cultural, and political issues enmeshed in a few hospital designs, but not a broad overview of hospital design in these transitional decades.⁵ Her focus on works by hospital architect Edward F. Stevens also limits the story she tells. Stevens was an influential and gifted designer who worked on hospital projects across the globe, but his body of work remained consistently low-rise in comparison to other contemporary practitioners like York and Sawyer or James Gamble Rogers, who pioneered in high-rise hospital designs.

This dearth of a basic historical examination of a crucial developmental period in hospital design inevitably leads to distortions, even misunderstandings of relevant influences, essential chronologies, and critical sequences of change. The architectural history of “aseptic” finishes provides a graphic example. It is typical for modern historians (and practitioners) to assume that “hospital” finishes—hard, impermeable surfaces in hospital white, with rounded corners, no cracks, and no projections—developed in the 1890s and 1900s as a consequence of new aseptic goals of creating germ-free conditions. It is not so straightforward. Hospital finishes were well-established by the first half of the nineteenth century. The materials of choice, however, changed over the years. In the 1850s hard-polished, seam-



lessly joined varnished wood (which could be intentionally destroyed and replaced for ultimate purification) was popular; in the “antiseptic” designs of the 1880s marble, marble mosaics, and enameled plaster were popular; and in the “aseptic” designs of the 1900s glass, ceramic tile, and metal were popular. Clearly, hospital finishes were not a consequence of asepsis; they were an exaggeration, even a refinement, of an already existing spatial strategy. There is as much evidence to support the argument that these preexisting hygienic hospital finishes influenced the development of germ theory and antiseptic and aseptic practices as there is to support the reverse. This reveals a historical dilemma—a vacillation between whether to consider medicine and culture as an influence on hospital design or hospital design as an influence on medicine and culture.

Many historians have explained the physical transformation of the hospital by treating building form as the consequence of social and medical transformation. John D. Thompson and Grace Goldin, who wrote the most comprehensive available history of hospital design, examine hospitals from antiquity to the twentieth century as a record of social change; they focus on the design of patient spaces as a representation of “the way people were thinking about group housing for the sick at that time and place.” More focused considerations of the hospital between the nineteenth and twentieth centuries have emphasized the correlation of medical change to architectural change. According to Henry E. Sigerist regarding the late nineteenth-century hospital, “while the driving forces in the previous periods were social forces, it was the progress of medicine and surgery which now called for a new type of hospital.” Lindsay Prior even goes so far as to describe hospital plans as “archaeological records which encapsulate and imprison within themselves a genealogy of medical knowledge.” Following this approach, the late nineteenth-century developments of germ theory, antiseptis, and asepsis are frequently posed as critical influences on the early twentieth-century transformations of hospital design.⁶

Other historians have reversed that explanation and examined the consequences of changing hospital design on medical practices. Michel Foucault, for example, discusses how the arrangement of patients into a “clinic” altered the eighteenth-century French doctor’s understanding of disease. In her own work and in collaborative work with historians of technology and medical practitioners, Adams traces “the dynamic relationship of architecture and medicine,” concluding that at times hospital design “actually slowed medical innovation.”⁷

Should architecture be studied as a reflection of sociocultural transformations and aspirations? As a tool? Or as a force in molding and shaping it? As a therapy? At stake in the response to this question is not only what



stories can be told of past buildings but how practitioners can understand their role in designing new buildings.

Many studies examine the history of building designs biographically, as the products of the designer's aspirations. This approach illuminates the intentions of designers (whether architects, clients, contractors, or political agencies) and demonstrates design as a conscious action with sociocultural as well as physical consequences. Many of these stories are triumphant tales of progress that create a sense of professional optimism: Designers create the buildings; the buildings shape the society. By studying what has been built, designers create better designs and better designs create better societies. This progression did not (and has not) happened. In fact, the second half of the twentieth century witnessed severe and disillusioning rifts between design intentions and lived realities.

Within the last few decades, buildings have been increasingly studied with the goal of tracing the hidden sociocultural influence of buildings on inhabitants, particularly in terms of "control." Wallenstein, like Foucault before him, looks to hospitals of the past as revelatory of biopolitics—which considers buildings active expressions of (increasingly medicalized) political power structures and controls. Adams examines the gendered nature of designs for the housing of nurses and medical interns and considers the ways in which social categories are reiterated in building partitions (e.g., private patients on upper floors and charity patients on lower floors). Thomas Schlich looks at modern operating room design as revelatory of the culture of control deployed in and by scientific modernity. J. T. H. Connor promotes the study of buildings as material culture, looking at the object itself to tell its history and its importance.⁸ These approaches—which look to mute buildings as active influences in shaping actions and society—give voice to the physical artifact. The implicit expectation is that these studies will also empower socially self-aware and culturally critical designers to make informed choices about what to design and how to live in what is designed.

Examining buildings as reflections of personal intentions assigns to the designer the power to shape society without offering any strategies for assessing the actual results of design. Examining buildings as influential artifacts in themselves considers buildings as mechanisms for social suasion, but renders the process of their design mute, almost purposeless, making designers into powerless tools of hidden agendas beyond their control.

I believe that intentions matter. I also believe that design success has to be measured by real consequences, intended and unintended. Every design choice reflects a moment of human existence but it also alters human existence. To reveal this interaction, I examine the history of hospital design in





Figure I.1. “The Hospital of the Twentieth Century.” This image depicts the optimism of the 1930s, when a visit to the modern hospital offered a voyage from darkness to light. The patients, in rags and ethnic clothing, crawl, hobble, and are carried into the hospital; they leave upright, vigorous, and dressed in modern middle-class American outfits.

the United States between the Civil War and World War II as both a reflection of its sociocultural milieu and a shape-giving force on its inhabitants. I examine how designer intentions structured a specific building type (one related to health), and at the same time how the resultant experiences in those buildings influenced later choices and possibilities of what occurred within them.

To the extent that I can, I use the concerns and goals of the designers of the time to establish the topics for discussion and the criteria for evaluating the resultant performance and influence of the buildings constructed. Discussions of hospital design deviated in a number of ways from mainstream architectural debates. While nineteenth-century and early twentieth-century architects and architectural publications focused on the various historic styles, contemporary discourses on hospital design downgraded the role of ornament and style to an unnecessary, perhaps even unhygienic addition. Hospital designers emphasized the plan over the facade and developed designs based on massing and circulation rather than decoration



and materials.⁹ Air flow and air quality were critical aspects of hospital design; this made ventilation and the designed voids (not just the layout of the walls) topics of primary concern. Hospital design also required more than basic architectural expertise—and doctors, lay governors, and consultants as well as architects actively participated in hospital designs. Accordingly, this book presents a history of architecture that focuses on plans; examines ventilation, plumbing, and open spaces in extensive detail; and considers a variety of persons (not just architects) influential in design.

By examining hospital architecture as a “hygienic” rather than “aesthetic” object, this work reveals a fundamental shift not just in the physical form of the hospital buildings but in the basic understanding the designers had of the role the hospital environment would play in health and healing. Up to the late nineteenth century, persons involved in hospital design expected the hospital building, in itself, to participate in the social, moral, and even physiological cure of the inhabitants.¹⁰ In the best light, this therapeutic design provided an orderly, sunlit, well-aired place in which the urban poor could be restored to health (and moral behavior); at worst it provided a relentlessly hygienic space that influenced nonconformist patients to obey new social and medical norms. By the early twentieth century hospital designers increasingly treated the hospital building as a functional backdrop to active medical interventions that were expected to generate a “normal” or healthy physiological condition in the patient. At best, this “modern” hospital design proved an efficient tool for facilitating current medical behaviors and practices; at worst, it provided a cold, off-putting, chaotic space that aggrandized doctors and procedures, fetishized germs, and dehumanized patients. The history of hospital design from the 1870s to the 1940s makes it clear that if the goal is to “design for health,” then it is crucial to understand what kind of health is sought, and what role the physical surroundings are expected to play in its acquisition.

Structure and Limitations of This Book

This book is not a comprehensive survey of all hospital buildings in the United States; it is a first attempt to examine a broad variety of selected hospital structures across the United States up to the 1940s and see what conclusions can be drawn from them. I base my analysis and discussion on hospitals that were singled out in the literature of the time as models (whether negative or positive). This selectivity has inevitably left out many worthy hospitals and included many derivative ones. My focus is on new designs of entire hospital facilities and of critical new additions to existing facility designs. While many institutions began in preexisting buildings



converted to hospital use, the issues encountered in adapting houses or other building types to hospital use were far different from those encountered when designing a hospital from the ground up.

I have tried to develop a “national” coverage in that I examine hospitals from all states, but larger cities held far more hospitals than did smaller cities, so it is inevitably skewed toward greater representation of hospitals from urban areas of the country. The book has also been deeply influenced by the course of my research. In the early 1990s I set out to write my dissertation on the architectural history of American hospitals (all places, all times). Within a year I reduced the topic to hospitals in New York City, and soon thereafter, to the history of the buildings of the New York Hospital. In 2007 I began work on an architectural history of hospitals in New York City. In 2010, well into the work, I revised the scope to include American hospitals of all states. The project has thus come full circle, but its trajectory is influential. I know a lot about hospital buildings in America; I know the most about hospitals in New York City. I have tried to use the depth of the knowledge I have acquired about hospitals in one particular city as a means of illuminating what happened in other cities, but I have also struggled to keep the New York history from dominating the examples.

While hospitals were a European institution imported to America, this book is almost obsessively about American hospitals. Available histories of hospital design in Europe between the eighteenth and twentieth centuries reveal that the transformation of European hospital design occurred at a different pace and along a different formal trajectory than did the transformation of American hospital design. European hospitals stayed pavilion-ward longer; they also remained charitable in emphasis longer. At the same time, American hospitals underwent extensive transformations that were then exported to other areas of the globe. The goal of this book is to reveal the as yet unwritten history of hospitals in North America during a period of rapid and multiple transformations of the institution, the country, and medicine. Discussions of international hospital designs and issues that were influential on American design are included, as is a minimal discussion of the exportation of American plan hospital designs (particularly in the twentieth century) to other parts of the world. The study of the dissemination of hospital designs between various locales in the nineteenth and twentieth centuries would be the subject of a separate book.

I have limited my focused attention to the period between the 1870s and the 1940s, before the US involvement in World War II. This period saw an epochal shift in hospitals and hospital design. The period between the 1940s and the 1960s saw another sweeping shift, but along a different trajectory—it would require a separate focused study to do it justice. Each



chapter covers a different chronological period in American hospital design. Chapter 1 examines the initial cast of American hospitals to 1873, as hospital designers adopted European traditions and embraced the pavilion-ward standards of hospital design, but then struggled to adapt them to local conditions and necessities. After the economic panic of 1873, hospital construction slowed to a trickle, but as chapter 2 reveals, hospital designers then began to examine the possible implications of germ theory on hospital design. From the return of prosperity in 1878 to the next panic of 1897, chapter 3 examines the dilemma American hospital designers faced, between remaining faithful to the established pavilion-ward standard and adapting hospital buildings to the new requirements of asepsis, medical specialization, institutional efficiency, and urban integration. Between 1897 and 1917, the period discussed in chapter 4, intense reconsiderations of the urban and medical role of a hospital and its buildings supported an extensive range of hospital facility designs, from traditional, charitable pavilions to medicalized general hospitals in “stacked” pavilions to medical specialties housed in high-rise structures. Chapter 5 discusses how World War I hospital experiences merged with the new urban postwar culture and established efficient, “vertical” hospital design as the new ideal structure to house a new kind of hospital—a medical rather than a charitable institution. Chapter 6 reveals how, from the Great Depression to the beginning of World War II, economic challenges promoted efficient, economic, and flexible service over “healthy” design. The book concludes with a bibliographic essay, which serves as a broad guide to the secondary literature. The footnotes in the chapters provide the detailed primary and secondary bibliographic sources in support of specific points, topics, or issues, and should be used as a guide to more focused historical inquiries.



CHAPTER 1

The Hospital Building as a Means of Disease Prevention, 1700–1873

“For sixty years the abiding-place of every form of disease and injury to which human flesh is heir, Bellevue Hospital has reached a period of its existence when, in the words of Billroth, the building is a mere slaughter-pen of the wounded. . . . Medical men take long to learn that plaster, stone, and mortar hold seeds of death most pertinaciously.”

— Thomas K. Cruse, 1872

The greater number of diseases are . . . more or less preventable. When a preventable disease occurs, some one is to blame—either the subject of it or those who are charged with the duty of providing for his well-being.”

— William Hammond, 1863

Hospitals are conundrums. Unless practitioners are certain about what causes and spreads disease (and how to prevent it), gathering a number of persons suffering from a variety of ailments into a single building is more likely to breed disease than cure it. In the history of hospital design, certainty about what causes disease has not always correlated with accuracy. American hospital designers of all ages have strongly believed they were designing hospital buildings to participate in the production of health rather than disease; results have not always been consistent with intentions.

In the twenty-first century, medical practitioners are certain that micro-organisms cause infectious disease and that they are transferred from a sick individual to a well individual primarily by direct physical contact. More than a century of scientific research and observation supports the accuracy of this understanding, and disease-preventive behaviors based on it have strongly reduced the incidence of contagious diseases but not eliminated it.

Before the development and adoption of germ theory, a majority of Western medical practitioners were certain that sickness was either spread or caused by “corrupted” (dirty, odorous, confined, damp) physical surroundings. That this correlation between environmental quality and sickness was not entirely accurate does not invalidate the doctors’ belief in it, nor the actions they took to prevent disease based on their understanding. More than two thousand years of observation and medical writings supported this correlation. Hippocrates wrote about epidemic “airs.” Many observed that disease always struck harder in impoverished neighborhoods. Others noticed that sickness spread to persons who came near, but did not touch, other sick persons. Centuries of observations of disease incidence thus pointed to the air as the means of spreading and even causing infectious disease. Given a strong enough concentration of bad air, as occurred in hospitals with their aggregation of sick persons, even building materials could “hold seeds of death most pertinaciously.”¹

In this view, hospitals were inherently unhealthy, even dangerous places that could function as a source of contamination to patients, visitors, practitioners, even to the larger surroundings. Hospital experience supported this fear. A number of dangerous infections (including erysipelas, typhus, hospital gangrene, and other infections) were so much more prevalent in hospitals that they were categorized as “hospital diseases”—ailments generated by the building. An internal outbreak of erysipelas and “hospital gangrene” in more than a dozen patients in the Massachusetts General Hospital in the winter of 1826–1827 provides a graphic example. Attending surgeon George Hayward performed an extensive investigation into the outbreak and concluded that it did not “seem possible in any case to trace it from one patient to another.” A month had passed between the initial cases and the next incidence and there was no direct contact between the various patients who contracted it. According to William Hammond, a military surgeon who would become the eleventh surgeon general of the United States, patients gave off foul exhalations that could “cling to the clothing, the furniture, the walls, and especially the bedding.” Hayward concluded that the outbreak had been caused and spread by an accumulation of “an atmosphere, capable of producing erysipelas in those predisposed to it . . . [that] was never entirely removed, from the want of sufficient ventilation.”²

This experience was hardly an isolated incident. In the eighteenth and nineteenth centuries, hospital diseases occurred with a regularity and a severity that is now difficult to comprehend. European and American hospital annual reports regularly counted as many cases of these secondary infections as there were primary ailments. During severe outbreaks, 20 to 40 percent of patients in a hospital might die from diseases they caught *after* admission.



In each incidence, the building itself—its somehow flawed design—was considered the immediate and direct cause of the hospital disease.³

Despite this danger, doctors and philanthropists in American and European cities regularly promoted hospitals as a means of dealing with the growing number of sick poor persons. Prospective patients were not as enamored of the idea. According to Paul Starr, “almost no one who had a choice sought hospital care.” John Duffy observed that “even as late as 1900 most so-called decent, respectable people expected to be treated at home,” whether by family or by medical practitioners. Industrialization and urbanization were rapidly reducing the size of homes, however, making home care burdensome and increasing the number of persons living on the economic edge, without the reserves to afford treatment or even housing through a sickness. In contrast to the poorhouse or almshouse, hospitals offered a temporary way station that would enable the worthy poor incapacitated by sickness to recover health and return to self-sufficiency.⁴ But for hospitals to be useful institutions the problem of hospital diseases had to be addressed.

Early American hospital practitioners considered hospital disease to be an Old World problem (the result of crowded chaotic cities) and assumed that it would not occur in New World hospitals. Experience quickly proved them wrong. Not all hospitals were equally affected. Extensive statistical and experiential evidence amassed by European hospital practitioners proved that hospitals on congested urban sites in large cities with hundreds of patients crowded together had the highest rates of hospital disease, while smaller hospitals in natural surroundings with fewer patients had the lowest rates.⁵ For European and American practitioners, the conclusion to be drawn seemed obvious: the conditions of the hospital’s buildings caused hospital disease.

To prevent disease or to curtail an outbreak in progress, nineteenth-century hospital practitioners ordered architectural alterations and hygienic overhauls of the building. This requires explanation. The word *hygiene*, simply defined, means health-inducing; it encompasses actions and conditions that promote health. In the modern world, in which medicine focuses on germs, *hygiene* has come to evoke ideas of basic cleanliness, both personal and social. In the eighteenth and early nineteenth centuries, in contrast, when health was considered the consequence of orderly, cleanly environments and moral behavior within them, the term evoked a more holistic understanding—inclusive not just of personal habits or predilections but of the conditions of a person’s surroundings. In this framework, architecture was an active influence on the healthiness of its occupants. “Curing” hospital disease required first “curing” the building. For example, in response



to the 1827 outbreak in the Massachusetts General Hospital, the administrators cleared the wards of all patients, fumigated the wards with chlorine gas to decontaminate the walls and surfaces, left the windows open to the purifying influence of fresh air through most of a Boston January, and overhauled the ventilation system to improve air flow and quality.⁶ When the patients were returned to the building, the disease did not (immediately) reappear, and this success was attributed to the architectural renovations.

When it came to new hospital construction, late eighteenth-century hospital designers began to dream of a preventive structure—a building so aerially pure that hospital disease would never develop within its confines. This was a radical departure in hospital design traditions. In many medieval and Renaissance hospitals (like the Ospedale Maggiore in Milan, the Hospital of Santa Maria Nuova in Florence, or Saint John's Hospital in Bruges), cure was as much spiritual as physical, and hospital buildings were designed to allow all the patients to hear religious services from their beds.⁷ Large open wards of varying shape and size accommodated multiple rows of beds and interconnected with other spaces, particularly the chapel. In contrast, the hospital designs of late eighteenth-century Europe (like the Stonehouse Naval Hospital in Plymouth or the proposals for a new Hôtel-Dieu in Paris by Bernard Poyet, Antoine Petit, and Jean-Baptiste Leroy) maximized air flow and quality by structuring the hospital as a collection of small buildings, each filled with a narrow, linear room, disconnected from other spaces and surrounded by open air. Inside, at most two rows of beds—each bed aligned to a window—allowed patients to occupy the same room without breathing the same air, thereby preventing aerial transfer of infection. This turned a hospital into a *machine à guérir*, a healing machine. The healing, or at least the disease prevention, was considered the direct result of the building's success as a self-purifying pneumatic machine.⁸

Adapting European Hospital Ideals to American Requirements

Early American hospital designers borrowed from these European precedents and models, but adapted them to local conditions. The smaller scale of American cities led to hospitals of smaller scale than their European counterparts. As David Charles Sloane and Beverlie Conant Sloane observe, many American hospitals began in or were initially modeled on houses. As American cities increased in size, by the mid-nineteenth century the largest American hospitals had proportions more similar to the grand European institutions. This pushed the limits of the domestic model, and made hospitals far more institutional in scale and appearance.⁹





Figure 1.1. View of Charity Hospital, New Orleans, mid-nineteenth century. By the mid-nineteenth century, Charity Hospital held upward of a thousand beds. A surrounding wall, as is depicted in this view, was a prominent feature of early American hospitals, protecting the patients from publicity but also revealing that the inmates were entering a location of control.

Americans founded hospitals with the expectation that they would provide a cost savings over existing outdoor poor-relief expenses. Benjamin Franklin, a driving force in the establishment of the Pennsylvania Hospital (one of the earliest hospitals in the colonies), reckoned that hospital care cost only one-tenth as much as private home care.¹⁰ To achieve this economy, hospital care had to be highly efficient. Although many early hospitals occupied structures adapted from other purposes, a building designed purposely for hospital use was expected to increase economy and efficiency. For example, a building designed with wards sized to hold the greatest number of patients that one nurse could effectively oversee minimized nurse staffing requirements.

In America, as in Europe, hospitals were medical as well as charitable institutions and American doctors were deeply involved in their founding and funding. Medical requirements did not have an enormous influence on hospital design, however. Before the late nineteenth century, medical



procedures required little in the way of specialized spaces or expensive equipment—the doctor’s black bag still held everything necessary for most treatments. Bleeding and purging remained common treatments for a wide variety of ailments; surgery (done without anesthesia or antiseptics) was a treatment of last resort; and the prescriptive habits of doctors of the time prompted Oliver Wendell Holmes’s firm belief “that if the whole *materia medica, as now used*, could be sunk to the bottom of the sea, it would be better for mankind—and all the worse for the fishes.” Effective medical treatments did exist for some ailments (bone setting, wound care, simple corrective surgeries), but these tasks did not require specialized spaces. As Morris Vogel observes, “hospitals offered patients no medical advantages not available in the home.”¹¹ They did, however, provide basic nursing care, which was an equally effective part of many a hospital cure, particularly with the increasing popularity of “therapeutic nihilism,” which considered the healing power of nature more effective than most medical interventions. This made a hygienically designed hospital—with large windows and open, airy rooms filled with sunlight and fresh air—a treatment in itself, not just a location of care.¹²

The spatial requirements of doctors in hospitals extended beyond the requirements of basic medical care and into the needs of medical education and research. As medical education increasingly emphasized clinical experience (rather than reading lists and attendance at lectures), hospital practice offered doctors and medical students something that could not be gained in private practice and house calls: “a supply of clinical material, adequate for the needs of systematic research in pathology and in therapeutics.” Private patients, whom doctors treated on house calls and who paid for their treatments, did not submit to being used in teaching or in medical “experimentation.” Hospital patients who received medical care at no charge tacitly paid for their care by serving as this “clinical material”—the subject matter of hands-on education and practical medical development. If a hospital building included spaces that could accommodate specialized research and instruction—such as a laboratory, an autopsy space, a pathological museum, or an operating amphitheater—doctors could maximize the medical benefits drawn from this wealth of clinical material.¹³ Such spaces could add extensive, often costly spatial demands to the hospital buildings.

Even without these spaces, hospitals offered doctors clinical control and a spatial structure adapted to focused medical study. According to Judith Leavitt, doctors who treated patients in their homes might have to modify their therapies, while those visiting hospital patients could prescribe treatments without fear of interference from protective family members. Similarly, Starr notes that hospital medical practice made it harder for a patient



to ignore or disobey medical instructions, and Ivan Waddington observes that the hospital “provided the ideal structural situation for minimizing resistance to new forms of treatment.”¹⁴

Hospitals also allowed doctors the possibility of grouping patients based on their ailment, thereby providing a spatial structure that contributed to an ongoing transformation of medical focus from seeing the patient to seeing the disease. According to John Harley Warner, in the early nineteenth century, “treatment was to be sensitively gauged not to a disease entity but to such distinctive features of the patient as age, gender, ethnicity, socioeconomic position, and moral status, and to the attributes of place like climate, topography, and population density.” By the 1860s doctors focused instead on the detailed physiological course of a disease through various individuals. The removal of the patient from their home environment and into standardized institutional surroundings (which grouped patients by ailment) inevitably played a role in this transformation. Michel Foucault and others have described this transformation as the product of the Parisian “clinic,” and have investigated the ways in which hospital ward design supported this new medicine.¹⁵

Hospitals dispensed more than medical treatment, however. According to historian John Duffy, “it was reasoned that sickness, disease, and poverty resulted from immorality; conversely health, wealth, and happiness were proof of one’s adherence to the moral laws.” Many of the early American hospitals were founded as much with the intention of providing moral reform as for medical intervention. The managers of the Jews’ Hospital in New York City noted that a hospital stay had “been the means, in several instances, of bringing our brethren back to their faith, in rescuing them from public charities, from want and misery, and restoring them to health and the abiding force and truth of Judaism.”¹⁶ Practitioners in other denominational institutions expressed similar sentiments. The building design could facilitate this reform by the inclusion of religious worship space or by the creation of an orderly, controlled space that, it was hoped, would itself instill propriety in the inhabitants.

The extent to which hospitals did or did not include these specialized spaces was influenced by local practice but also by institutional specificity. American hospitals were far from standardized institutions; they came in a wide variety, based on their targeted patient clientele, their founding group, and their funding source. General hospitals provided general treatment and care to patients with a wide variety of ailments. Medically specialized hospitals provided care for or by patients with specific ailments. Socially specialized hospitals provided treatments for persons of a specific race, denomination, or nationality.¹⁷





Figure 1.2. Bellevue Hospital, New York City, in 1879. The main building was the product of sequential construction, with added wings and enlargement of the central pavilion. Later additions of separate wards typically housed patient categories requiring isolation (including, at various times, erysipelas, smallpox, contagious, surgical, phthisis, and psychopathic and alcoholic patients). The medical college building is to the left of the central pavilion.

Municipal general hospitals, funded by public monies, accepted patients regardless of background, ailment (except contagious diseases), or ability to pay; they were the largest and the most crowded institutions. A few, like the Pennsylvania Hospital in Philadelphia, Bellevue Hospital in New York City, Massachusetts General Hospital in Boston, or Charity Hospital in New Orleans, approached the vast scale of their Old World counterparts like Saint Bartholomew's in London, the Hôtel-Dieu in Paris, or the Allgemeines Krankenhaus in Vienna.¹⁸ While many of the larger European hospitals occupied monumental facilities designed according to an overarching plan, the largest of American hospitals up to the early nineteenth century occupied buildings that had started small and been enlarged, one wing or building at a time, until the final product was impressive in scale but a hodgepodge of different periods and changing plans.

“Voluntary” general hospitals, founded and funded by private citizens or philanthropic organizations, typically accepted persons regardless of race, creed, color, or economic class but excluded persons with chronic or contagious diseases and tacitly excluded the “morally vicious.” They varied in size (from half a dozen beds to a couple hundred), but were smaller



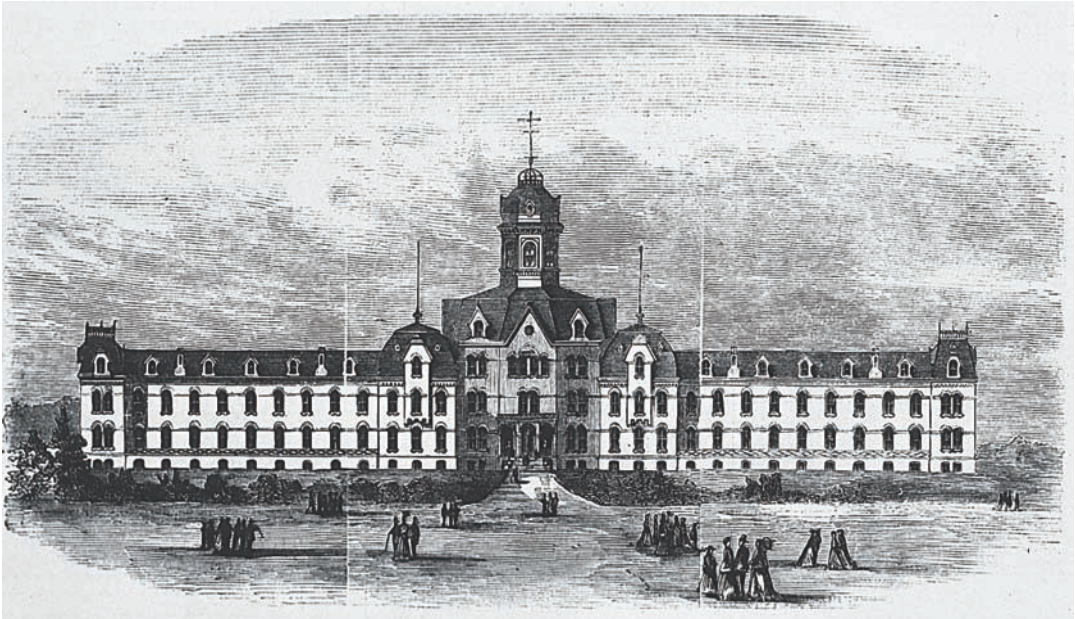


Figure 1.3. German Hospital, New York City, mid-nineteenth century. Designed by German-born architect Carl Pfeiffer and staffed by German doctors, the hospital was both a signpost of the success and a haven for the promotion of German residents of New York City. This image depicts the completed master plan, consisting of four wards and a central administration pavilion, but initially only one ward wing was constructed.

than municipal hospitals.¹⁹ At a time when waves of immigration were turning the largest American cities into socially volatile arenas, hospitals provided a civic presence for their founding group. As Alan M. Kraut has discussed, the conflation of immigration and disease played a tense role in keeping social groups apart and in establishing “healthy,” i.e., American, habits as a means of acculturation. Hospitals served as a vital stage upon which this process was carried out. Hospitals founded by prominent social groups served as points of assimilation and cultural hegemony; those founded by marginalized and minority groups offered a haven for the marginalized sick, but also a place for advancement. In the German Hospital in New York City, German-speaking doctors and nurses were the norm. In Saint Vincent’s Hospital in New York City and in Charity Hospital in New Orleans, Catholic sisters provided the nursing. In Saint Luke’s Hospital in New York City and the Hospital of the Protestant Episcopal Church in Philadelphia, Episcopal sisters did. In the Jews’ Hospital in New York City, Jewish doctors provided the care and Jewish traditions were followed in the wards. Rosner has pointed out that the architecture





Figure 1.4. Wills Eye Hospital, Philadelphia, view in 1881. The building opened with seventy beds and included special equipment (including an ophthalmoscope) for treatment.

of these hospitals was as much an expression of the presence and standing of the founding social group within the community as a civic signpost for the needy.²⁰

Medically specialized hospitals provided care for patients with difficult-to-treat ailments, vulnerable patients, or groups excluded from other hospitals. The earliest specialized hospitals were for lying-in (obstetric) patients, eye and ear patients, and infectious disease patients. They were usually small institutions, and, as described by Lindsay Granshaw, relatively easy to establish. An interested doctor (or doctors) would start with a few beds in rented facilities but soon might be building a special facility of numerous beds. By the 1850s the New York Eye and Ear Hospital held fifty beds, the Wills Eye Hospital in Philadelphia held seventy, and the Marion Street Maternity Hospital held fifty. Many included design refinements and spe-



cialized equipment that tailored the building to the needs of the medical practitioners and practice.²¹

Harriet Richardson, in describing English hospitals of this period, notes that “specialism was the key to the development of hospital architecture, and it is only from an analysis of the different types of hospitals erected that their distinctive appearances can be understood.”²² American hospitals experienced the same forces; their hospital buildings reflected the same differentiations in design.

The Pavilion-Ward Hospital System and Hospital Growth

Given these multiple, at times conflicting, expectations of hospitals, hospital designers struggled to meet design requirements. They had to create a building that was healthy (that would not promote disease), functional (that would provide efficient care, treatment, and reform at a minimum of expense and effort), and suitable for the type of institution it housed (whether general or specialized). In the nineteenth century the first requirement—for a healthy building—eclipsed the other two. Efficiency, economy, and suitability meant little in the face of high rates of cross-infections, hospital diseases, and excess mortality. These dangers played a role in suppressing hospital growth at a time when hospitals could have provided a crucial social safety net in industrializing, urbanizing, and disease-ridden American cities. Waves of epidemics accompanied the waves of immigrants who packed into the tenements and crowded neighborhoods of the seaboard, canal, and railroad cities. Hundreds of accidents occurred in the busy streets and unregulated factories. And yet hospitals remained scarce, marginal institutions within American cities.

This changed after the 1850s, as doctors, philanthropists, and social groups founded dozens of new hospitals in cities across the United States. For example, between 1791 and 1859, seventeen hospital institutions opened in Manhattan while the population increased from 33,131 in 1790 to 813,669 in 1860 (a growth factor of more than 25). Between 1860 and 1870, Manhattan’s population increased to 942,292 persons, a growth rate of 116 percent, while between 1860 and 1873 the number of hospitals doubled. This expansion continued into the twentieth century. In 1873 the US Bureau of Education listed 178 hospitals; by 1909, the US Bureau of the Census counted 4,359 hospitals across the United States.²³ From the viewpoint of hospital architecture this rapid expansion clearly coincided with the establishment, popularization, and broad dissemination of a new model of hospital design—the pavilion-ward system—that guaranteed that well-designed and well-administered facilities would not develop hospital disease.



The pavilion-ward hospital was a product of Britain and its colonial expansion; successful hospitals supported successful colonization. After British military hospitals in the Crimea tallied horrendous mortality rates (from diseases and secondary infections as much as battle wounds), Florence Nightingale and a number of volunteer nurses were dispatched to provide aid. In a few short months, the reported mortality rates dropped from 42 percent to 2 percent. Nightingale and her nurses received the credit for this reported improvement, and Nightingale attributed the transformation to better nursing but also to vastly improved hygienic conditions in the wards. Upon her return to England, Nightingale spent the rest of her life advocating for nursing and hospital reform. According to Louise C. Selanders, like the therapeutic nihilists, “it was [Nightingale’s] contention that the environment could be altered in such a way as to improve conditions so that nature could act to cure the patient.” Nightingale’s book, *Notes on Hospitals*, which became the international bible of late nineteenth-century hospital design, correlated hospital mortality rates to hospital layouts as a means of assessing the healthiness of hospital building design. To Nightingale, hospital disease was preventable—the result of choice, not chances—and building hygiene was the means of prevention.²⁴

As Grace Goldin, Jeremy Taylor, and Anthony King have pointed out, Nightingale’s ideas on hospital design were not original, but they were forcefully and clearly stated and promoted. Pavilion-ward hospital design was not a radical change; it was a systematization of existing strategies. Hospitals before pavilion-ward guidelines had been designed for hygiene—with well-ventilated, easily cleanable spaces—but with varied room sizes, layouts, and functions. The new pavilion-ward design principles transformed those loose guidelines into a quantifiable, standardized, reproducible spatial system. Nightingale’s military experiences influenced her plans—she conceptualized wards as barracks.²⁵

Nightingale’s ideal hospitals comprised a number of separate ward buildings, called pavilions, each functioning independently. Each pavilion took the basic layout developed in the visionary plans of Enlightenment France—one large, narrow ward with windows on all walls and a minimal set of service spaces (in Nightingale’s plan these included kitchen, scullery, nurses’ office, linen storage, and sanitary facilities). Every type of hospital—municipal, voluntary, general, specialized, small, large—was to follow the same design. The only variation was in scale, measured by the number of pavilions. The result was a “universal” hospital architecture—the same building design was recreated in countries, climates, and locales across the world. That this was an effective adjunct to colonial expansion is obvious. That it also made hospital design requirements widely available and



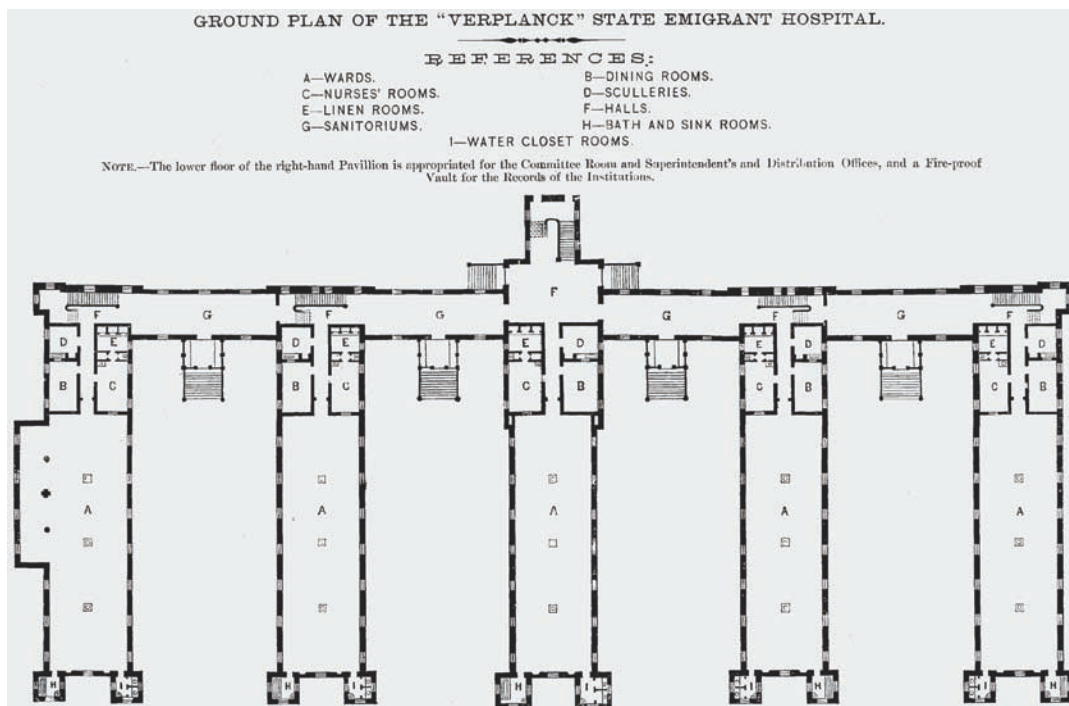


Figure 1.5. “Verplanck” State Emigrant Hospital, Ward’s Island, New York, 1865. John W. Ritch designed this early pavilion-ward plan hospital. The sanitary towers are the protuberances at the southern extremity of the ward. Though at first built with few services, a central kitchen and laundry were soon added as outbuildings.

was adopted by choice is also obvious. Nightingale’s publications, backed by copious statistics and her wealth of hospital experience, functioned as practical how-to manuals, providing a standardized set of design guidelines accessible to anyone who could read. Other texts promoting such improved hospital design soon appeared and further disseminated the information.²⁶ In a few decades, the pavilion-ward system of hospital design was the ideal in Europe, America, Russia, and most of the colonized world.

America was one of the first countries to build hospitals according to the new ideal. By the 1860s William Hammond even considered the City Hospital in Boston and the Hospital of the Protestant Episcopal Church in Philadelphia “superior to any which have been constructed in any part of the world.” The managers of the State Emigrant Hospital in New York City boldly (if erroneously) claimed that the United States predated Europe in the construction of pavilion hospitals, and that Americans were “not the tame imitators of Europe, the mere pupils of her teaching, the followers of her light.” During the Civil War, both Union and Confederate armies used Nightin-

gale's publications as a basis for their military hospitals, which were pavilion hospitals on a gargantuan scale. By the early 1870s cities across the United States had new pavilion-ward hospitals; the larger cities had dozens of them.²⁷

The pavilion-ward hospital system required undeviating adherence to standardized designs despite the diversity of American hospitals, some of which included extensive facilities for medical education and advancement and others that included extensive facilities for religious reform. Hospital designers had to confront not only the tension between universal solution and specific institutional requirements but how their decisions colored the nature of the institutions that were built.

The Dilemma of Hospital Site Choice

Inevitably, the first task of a hospital building committee (which typically comprised successful lawyers, businessmen, and philanthropists) was to decide where to locate the hospital. This was an often-contentious decision that had long-lasting repercussions for the nature of service.

Hospitals developed where there was a population large enough to justify their expense; they were urban institutions. The ventilation requirements necessary for preventing hospital disease, however, required open landscaped surroundings as a source of fresh air. As Florence Nightingale put it, "to build a hospital in the midst of a crowded neighborhood of narrow streets and high houses, is to ensure a stagnation of the air without, which no ventilation within, no cubic space, however ample, will be able to remedy." But to put a hospital outside the city was to limit its service. A downtown hospital—near busy streets, industries, bustling ports, railroad depots, and densely packed poor neighborhoods—was almost guaranteed to be full of patients with a wide variety of acute conditions requiring medical treatment. Conversely, a more distant hospital often attracted patients with less acute or chronic ailments, who required basic nursing care more than treatment. Accessibility for hospital doctors, benefactors, and patrons was also an issue. An attempt in the 1850s to remove Bellevue Hospital in New York City to a more distant site failed primarily because the doctors claimed it would be inexpedient for them to visit so remote an institution.²⁸

In actual practice, American hospitals occupied a variety of locations, ranging from large sites on the urban periphery to single lots in the downtown. Different kinds of hospitals gravitated to different kinds of sites. Managers of specialized hospitals often emphasized accessibility over salubrity. They were typically small-scale institutions and could fit on smaller sites nearer the city center. Medically specialized hospitals, like the Hospital for the Ruptured and Crippled in New York City, were founded by doctors and





Figure 1.6. The New York Eye and Ear Infirmary building, New York City, mid-nineteenth century. The building contained a well-equipped operating room and occupied all of its urban site. The corner location was considered a source of light and air.

were typically located at a site convenient to the doctor's home. A few even began as back-office additions. Directors of socially specialized hospitals, like the German Dispensary and Hospital in New York City, selected sites that were near their intended patient clientele. Still, even managers of specialized hospitals experienced the dilemma between a healthy site and an accessible site. Although the directors of Saint Vincent's Hospital in New York City chose a location on the Lower West Side, close to a dense Irish Catholic population, their initial preference was for a large, inexpensive, and well-aired site at distant Turtle Bay.²⁹

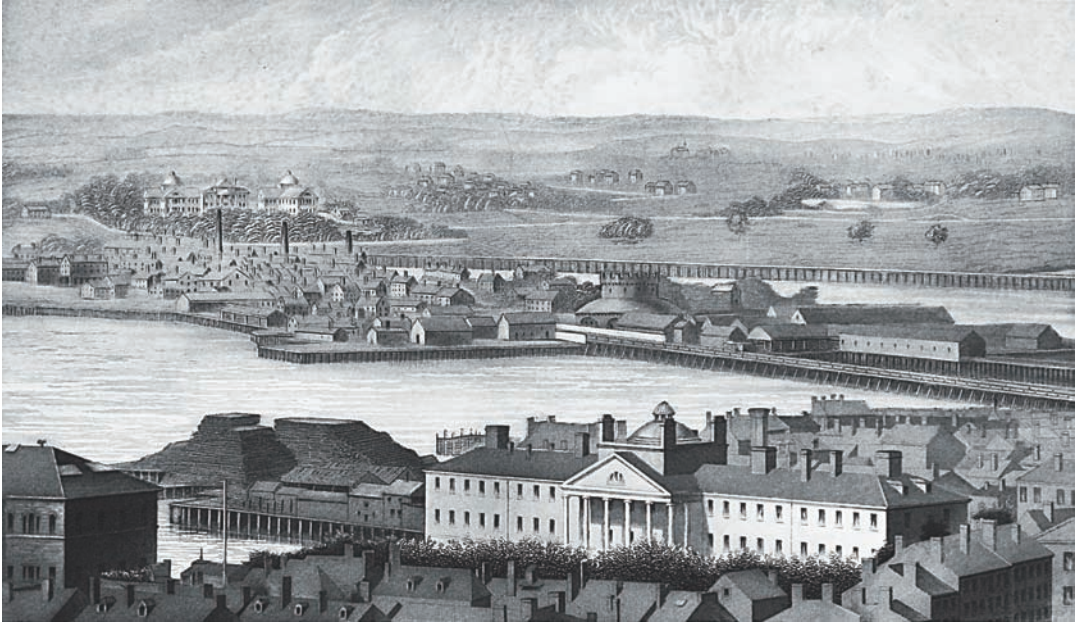


Figure 1.7. Massachusetts General Hospital, Boston, view in 1851. Based on Charles Bulfinch's design, when this municipal hospital was first constructed it was on the city's outskirts. Proximity to the bay allowed for easy delivery of supplies and of patients and an ample supply of water and open air, although it was not always noted for its freshness given the stagnant waters of the bay. The city soon grew to surround the hospital.

When first opened, the large, general municipal hospitals—like the Pennsylvania Hospital in Philadelphia, or Bellevue Hospital in New York City—were regularly located on peripheral sites. These were the largest of American hospitals and required larger sites, which were more available on the periphery. The distance also provided a social buffer between the city and the hospital, which often housed the socially outcast as well as the ill and downtrodden.

Administrators of hospitals that housed vulnerable, persecuted, or contagious patient categories could be sited at quite a distance from the downtown. Contagious disease hospitals, like the Cincinnati Branch Hospital for isolation of contagious cases, were regularly on remote sites, distant from other habitations. Island locations, like the Smallpox Hospital in New York City on Blackwell's Island, were also common in part because they guaranteed a large flow of air to the buildings but also because they provided a form of controlled isolation that could not be defeated by climbing over the hospital wall. Geographical distance could also serve to protect the patients. In 1848 the managers of the Colored Home and Hospital in



New York City located their buildings at Sixty-Fourth to Sixty-Fifth Streets between First Avenue and Avenue A, beyond the easy reach of the persecution that targeted African Americans.

For all kinds of hospitals, larger, newly constructed hospital facilities were almost exclusively undertaken on sites outside the city's developed boundary. This was as much a consequence of urban real estate markets as a positive effort to locate a hospital in open surroundings. Pavilion-ward hospitals required very large sites; downtown sites were expensive, small, and usually already developed. According to the governors of the New York Hospital, "the rapid diminution of large properties under a single ownership in the vicinity of the City" was a hardship for many hospital site searches. To minimize site expenses, hospital building committees often took advantage of municipally donated or leased sites. Such sites were often large (many were full blocks) and were typically on the city's outskirts, but were rarely prime real estate. The municipally acquired site for the Charity Hospital in New Orleans was in a "relatively remote, swampy area at the edge of the city"; for the Woman's Hospital in New York City, it was a former Potter's Field.³⁰

Neighborhood opposition could also push new hospitals to undeveloped and undefended peripheral sites. Vogel concludes that "hospitals located where they encountered the least opposition." In 1860, when the directors of the New York Homeopathic Medical College proposed to build a larger building with a hospital at Third Avenue and Twentieth Street in fashionable Gramercy Park, "the protests of such prominent citizenry were enough so that the plan was condemned and the residential status of this 'sacred soil' remained undisturbed." The opposition could also be more subtle. In 1854 the City of Boston purchased the former Boston Lying-In Hospital building and planned to turn it into a new city hospital. "No sooner had they done so than the neighbors sneaked a bill through the legislature making it illegal to maintain a general hospital within 300 feet of a school house, and the City found itself with a white elephant on its hands, for there was a school house next door."³¹

Peripheral sites were not inherently salubrious. Noxious trades, noisy industries, and squatters' settlements also populated the urban fringes. In the late 1860s, according to Dr. Abraham Jacobi, the blocks surrounding the newly built German Hospital in New York City were "a sea of dirty water" laden with garbage and excrement. On paper, the Boston City Hospital's site was lauded for its "open spaces for light and the free circulation of air from the water," but it was on made land (of uncertain composition) and instead of "fresh air," later reports described the open space as providing "malodorous breezes from the putrid South Bay."³²



Peripheral neighborhoods were also socially volatile, even dangerous. At the Jews' Hospital in New York City, the surrounding tenements created "a neighborhood frequented continually by a number of idle men, women and noisy children, whose disorderly conduct disturbs the rest of our inmates, and often interrupts the solemnity of our devotion and invades the sanctity of our funeral rites." The early days of the Presbyterian Hospital in New York City make the discrepancy between ideal and reality graphically clear. The Presbyterian Hospital's directors lauded the "ample grounds, so near the crowded, bustling city, yet so isolated, retired and accessible as to produce the conviction that a more beautiful and eligible site for the purpose could not have been chosen." In contrast, Dr. David Bryson Delavan, a house doctor at the Presbyterian Hospital in its early years, recalled that "there were no places of respectability anywhere about and the neighborhood was infested with a rough element, lawless under the lack of police protection which had characterized the rule of the Tweed ring."³³

By the 1850s and 1860s, as the number of hospitals in cities increased rapidly, hospital planners had to take into account the proximity of a prospective site to other hospitals or to densely populated neighborhoods. In most cities, uncoordinated site choices created an uneven, inefficient scattering of facilities. As new hospitals were added, institutions located too close together might have an undersupply of patients and empty beds; those located too far apart might have an oversupply of patients and be overcrowded. In 1871 the president of Saint Luke's Hospital in New York City noted that in the near future the Roosevelt Hospital, Presbyterian Hospital, German Hospital, and Mount Sinai Hospital would all open nearby. He asked, "How are all these Hospitals going to be filled?"³⁴

Some believed a more strategic site selection process, one that considered the location of other institutions and population centers, might create a more equitable and efficient distribution of hospitals. In 1870, when considering sites for a new facility for the New York Hospital, the hospital's doctors surveyed the distribution of hospitals across the whole city and concluded that the thickly populated downtown and West Side had few hospitals (1 bed to every 1,800 persons) while the more sparsely populated Upper East Side had many (1 bed to every 284 persons). They argued that any new hospital building should be provided on the West Side, close to downtown, where there was a dearth of beds in relation to the population.³⁵

The idea that every neighborhood should have a proportionally similar number of available hospital beds to population, was a simple view of a complex matter. Even if hospitals were spread equally throughout a city, all



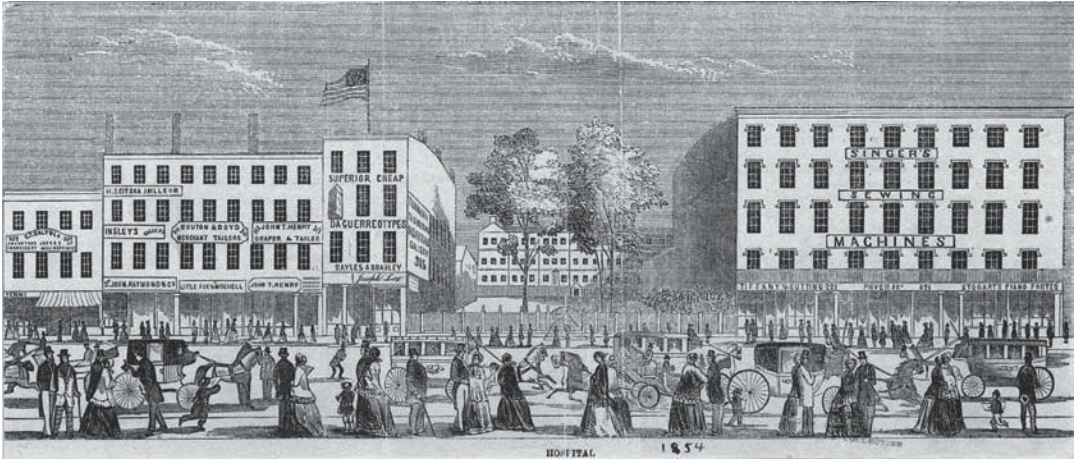


Figure 1.8. View of the New York Hospital from Broadway in 1854. The hospital is behind the trees in the center of the image.

beds were not equal. Eye hospitals and lying-in hospitals might provide a number of hospital beds, but they were available to only a small percentage of prospective patients. Municipal hospitals provided a large number of beds, but there was against them, “whether justly or not, a great prejudice, even among the poorer classes.”³⁶

Many patients voted with their feet—traveling farther to avoid a poorly regarded institution or to reach a more desirable or affordable one. Experiences in the new hospitals in the Upper East Side of New York City demonstrate that factors other than simple geographic proximity influenced a hospital’s service. In their first years of operation, Roosevelt and Saint Luke’s Hospital stood at least half empty. Conversely, Mount Sinai Hospital and the German Hospital, which catered to specific populations and provided a greater proportion of free care, were regularly full. Rapidly improving public transportation—omnibuses, commuter rail lines, streetcars—increased this mobility. A site near a transportation hub could make a distant hospital readily accessible to numerous neighborhoods. The development in the 1860s of specially designed hospital ambulances, “contrived for the purpose of carrying to the hospital, without jar or exposure, patients unable to endure the motion of ordinary vehicles,” further reduced the inconvenience of distant sites. The growth of the city also destabilized site choice. A hospital originally located on the urban periphery, near “salubrious breezes,” could soon find itself encompassed by new developments.³⁷



The Architectural Consequences of a Building Designed around Air

Whether on a downtown site or a pastoral site, the crucial goal of making the building so full of fresh air that disease would not spread within it differentiated hospital design from other building types. Ventilation requirements determined not only who could design the hospital building but what layouts, materials, and structures were allowable.

Designing the Hospital: A Medical as Much as
an Architectural Specialty

Because of the perceived correlation between interior environmental quality and disease incidence in hospital buildings, doctors were as involved in the design of hospital buildings as architects.³⁸ Architects were trained in the planning of structurally, spatially, or aesthetically complex buildings, but hospital design also required expertise in “architectural hygiene”—how building design (particularly ventilation) might influence health. At the time, ventilation was a peripheral topic for architects who regularly sized and located fireplaces, windows, and chimneys to a room’s aesthetic requirements, not according to its heating or ventilating load. Constant client complaints about beautifully designed but uninhabitable rooms and buildings—including smoky chimneys, cold drafts, cold feet, warm heads, and even faintness of breath—reveal the architect’s blind spot.³⁹

Doctors, on the other hand, could claim knowledge of what created and constituted “bad” air, and they used this knowledge to establish expertise in hospital design, often at the expense of architects. According to Dr. John Aikin, architects tried to accommodate “the greatest number of people in the least possible space,” thereby promoting hospital disease. Conversely, medical requirements would “leave as much vacant space, occupied by the fresh air alone circulating freely,” as possible. Doctors (and reformers), not architects, penned the majority of European publications on hospital design. These books, which were the basis for the dissemination of pavilionward design standards, spoke the language of hygiene, not architecture.⁴⁰

In a few early publications, American doctors reiterated the arguments and approaches of their European counterparts. Dr. John Jones described a hospital that was more air than patients. Dr. William Paul Crillon Barton proposed a far more palatial ideal naval hospital (similar to the Royal Military Hospitals in Haslar and Greenwich, England) with numerous ancillary spaces for services, medicine, therapy, and research. His designs limited the number of patients per ward and provided for extensive ventilation



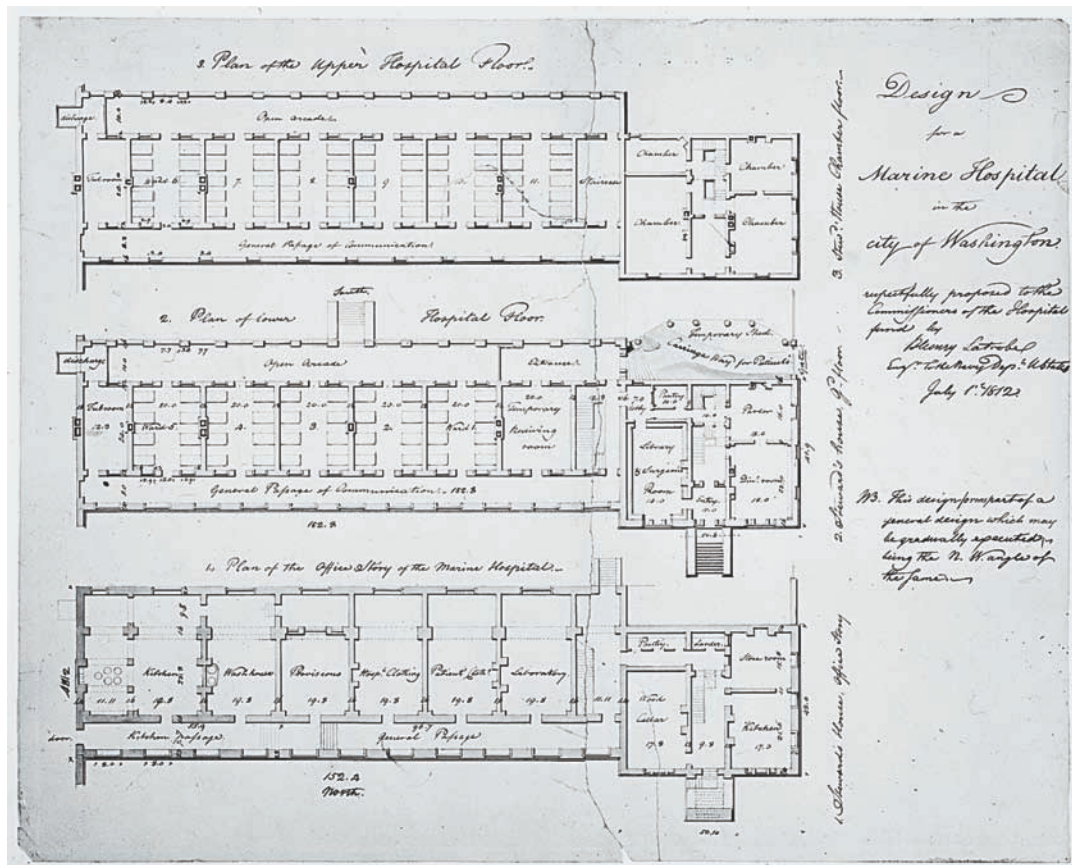


Figure 1.9. Design for a Marine Hospital in the City of Washington, 1821. Benjamin H. Latrobe designed the wards to be small, with windows only on one wall and beds quite close together. The enclosed north passage was intended to protect the patients from the ill influence of cold, damp north-facing walls. The structure was to be vaulted masonry, with pedimented porches and three domes.

by windows, fireplaces, and in-wall air ducts. In contrast, Dr. James Tilton, a military surgeon of the Revolutionary War, proposed an intentionally crude, earth-floored hut of unhewn logs chinked together with clay mortar. It was divided into three small rooms, limiting the numbers of patients in one space, allowing better patient categorization, and controlling air quality by providing abundant window ventilation and fumigation by smoke.⁴¹

The extent to which architects did indeed bring alternate concerns to hospital design is discernible in a brief report on Marine hospitals for sailors by Benjamin Henry Latrobe (known as the first professional American architect). Latrobe acknowledged the importance of architectural hygiene: he emphasized ventilation and buffered the patients from exposure to the

damp cold of north walls, which, in European hospitals, had proven to prolong illness. Instead of a large open ward he advocated smaller wards of six patients (in beds very close together) with windows only on one wall. Latrobe claimed this layout allowed better categorization and isolation of patients, “reduced the amount of foot traffic through any one ward,” and accommodated more patients in less space.⁴² Latrobe also extolled the architectural virtues of the vaulted masonry construction that would have made his hospital virtually fireproof but also monumental in features (and cost).

If both architects and doctors could claim expertise relevant to hospital design, in practice doctors and administrators “designed” many of the earliest American hospitals with limited or no input from architects. Samuel Rhoads, a master builder and hospital manager, consulted the Pennsylvania Hospital’s physicians and surgeons in the design of the Pennsylvania Hospital. In Ohio, Dr. Daniel Drake not only helped establish the Commercial Hospital in Cincinnati, he “personally drew the plans for the first buildings, for which service he was paid ten dollars by the township authorities.”⁴³

Given the scarcity of architects in early American settlements, architectural input, even if desired, was not always to be had. The New York Hospital governors sought design advice as far away as New Haven, Connecticut, from Peter Harrison, a wealthy merchant sailing captain who had received some architectural training in Europe and drawn designs for a number of prominent buildings in Rhode Island. As the number of American architects increased in the nineteenth century, architect involvement in American hospital design also increased. Robert Mills (Latrobe’s protégé) designed a number of Marine hospitals. Gentleman architect Charles Bulfinch was involved with the Massachusetts General Hospital from its planning stages to his winning design submission. Thomas U. Walter designed the Wills Eye Hospital in Philadelphia. A few architects, like John W. Ritch and James Renwick in New York City, designed more than one hospital.⁴⁴

While competitions were a popular, inexpensive means of acquiring a hospital design, they constrained architect involvement. Anyone could submit a design, whether or not they had architectural training. Even if an architect won the competition, winning did not always bring any further commission or involvement in the project. In the 1850s the architect W. W. Gardiner’s drawings won the design competition for a new building for the New York Hospital, but after giving him the prize, the doctors and governors established the building program, traveled to other American hospitals to determine what heating and ventilation system the new building should include, and worked directly with the contractors in constructing the building. The managers of the Hospital of the Protestant Episcopal Church in Philadelphia engaged Samuel Sloan, winner of the design com-



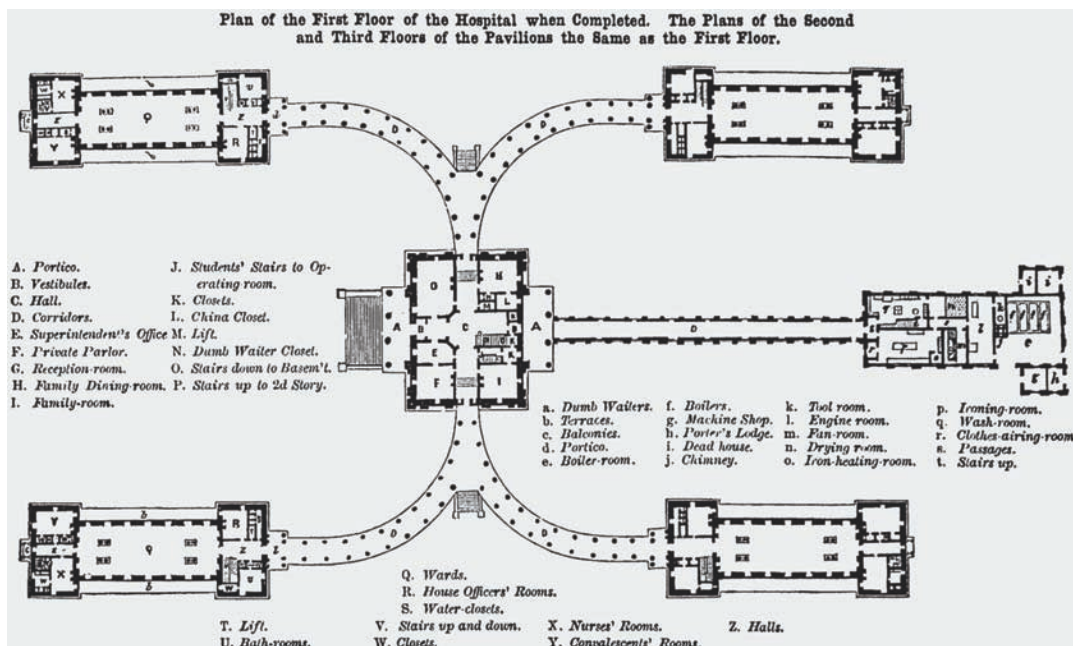


Figure 1.10. City Hospital, Boston, plan, 1865. Gridley Bryant's design was a pavilion plan with widely separated wards connected only by open arcaded walks. The boxes drawn in the ward plans represent risers for heated air. The hospital plan was published and proved influential on a number of other early American hospital designs.

petition, to be the architect of the project only after he offered them “extremely liberal terms” for design development of the plans.⁴⁵

By the 1860s informal collaboration between doctors and architects on a hospital design was common. Mr. Boyington, the architect of the new Mercy Hospital in Chicago, based his plans on “suggestions that were offered by Dr. Edmund Andrews, who has spent much time abroad studying the construction and architecture of the most noted European hospitals.” In the design competition for the Boston Free City Hospital, Mr. Boyden worked with Dr. John C. Green on an honorable mention entry. For his prizewinning entry in that same competition, Gridley Bryant “had extensively availed himself of the suggestions of Dr. Henry Grafton Clark as to the elevation and general disposition of the pavilions and several apartments.” The governors of the Roosevelt Hospital created a more formal collaboration. They hired the architect Carl Pfeiffer to develop the design but also retained local surgeon Dr. Stephen Smith “to study and report to the Board the principles of hospital construction now recognized as most appropriate to the ends to be attained in a public hospital.” Smith provided the medical

guidelines; Pfeiffer interpreted them into an effective building design. The experience proved influential for both. Smith went on to become an important figure in the development of public health, particularly in cleaning up the urban environment. Pfeiffer went on to argue that architects should pay greater attention to the “sanitary” role that building design played in health, even suggesting that an architect’s success should be measured not by the beauty of the buildings but by the health of the occupants.⁴⁶

This emphasis on the hygienic rather than aesthetic influence of buildings made hospitals an atypical architectural problem and offered opportunity for a different kind of practitioner. At a time when American architects were embracing the aesthetic emphasis of France’s Beaux-Arts architectural practices, the architects most successful in gaining hospital commissions were those with an engineering or construction background. John W. Ritch was an engineer as well as an architect and adept at developing detailed ventilation designs and hygienic details. Samuel Sloan designed dozens of asylums and a number of hospitals but began his career as a carpenter. Carl Pfeiffer was educated as an engineer with “a considerable amount of architectural study.”⁴⁷

The Hygienics of Hospital Layouts

The requirements of architectural hygiene also made hospitals different in overall layout from other urban building types. To maximize the use of expensive urban real estate, offices, stores, and tenements were multistory, compact structures that extended to the lot lines. Even on costly downtown sites, hospital buildings were low-rise, complex, rambling structures with setbacks and partial courtyards. These differences were the result of ventilation strategies. Keeping hospital buildings low maximized wind flow and diminished the possible spread of bad air from floor to floor. The low height was also practical—it reduced the work necessary for the daily delivery of meals and supplies to wards, and it reduced the danger (and discomfort) of carrying bedridden patients up and down stairs. Up to the 1850s hospitals rarely exceeded three or four stories; by the 1860s pavilion-ward advocates established that hospital buildings were “never to be over two stories in height.”⁴⁸ One-story buildings—which could take advantage of ceiling (or ridge) ventilation—were even better.

The open space between hospital pavilions or wings was not simply leftover space; it was an integral aspect of hospital ventilation strategies. Open land provided a reservoir of fresh air and acted as a buffer to keep the contaminated air from one part of the building from infiltrating another. Up to the 1850s hospitals often occupied single structures (with complex





Figure 1.11. Mount Sinai Hospital, New York City, view in 1874. This was the second home of the hospital, built to replace an 1855 building that was not considered up to pavilion-ward standards. The widely spaced pavilions, connected only by open arcades, compensated for their four-story height.

footprints) sited in the middle of their lots with extensive setbacks. By the 1860s pavilion-ward guidelines broke the hospital into separate buildings, each of which was to be distant from the other buildings by at least twice their height. The amount of open space on hospital sites became an element of pride and competition; the managers of the Mount Sinai Hospital in New York City boasted that at their second building, Griffeth Thomas's design left 125 feet of open land between its pavilions, while other hospitals only had 75 to 100 feet. The open space made many hospitals green oases within the densely crowded urban context, particularly when the hospital administrators developed the grounds into a garden. Saint Luke's Hospital



Figure 1.12. Saint Luke's Hospital, New York City, view in 1896. The landscaped hospital grounds and the set-back, widely separated buildings created parklike oases within the increasingly built-up urban context.

in New York City was surrounded by trees and a lawn interspersed with flowers. At the original Jews' Hospital in New York City (which occupied only two small urban lots), half of the ground was left open and "laid out in beautiful style, as a garden for the invalids."⁴⁹ This surrounding open space also turned the simply decorated hospitals into aesthetically prominent buildings within the urban context—a fitting monument to the charity, whether public or private.

The design consequences of these ventilation requirements, coupled with functional divisions within the hospital, pushed hospitals into a few basic layouts. Before the 1850s a number of the smaller or more specialized hospitals occupied a single, centralized structure (e.g., the Commercial Hospital in Cincinnati, the Cleveland City Hospital, the first Jews' Hospital building in New York City, and the New York Eye and Ear Hospital in New York). A majority of early American hospital buildings, however, were arranged into a tripartite layout—including a central administrative section and two adjacent ward wings housing patients. This division was



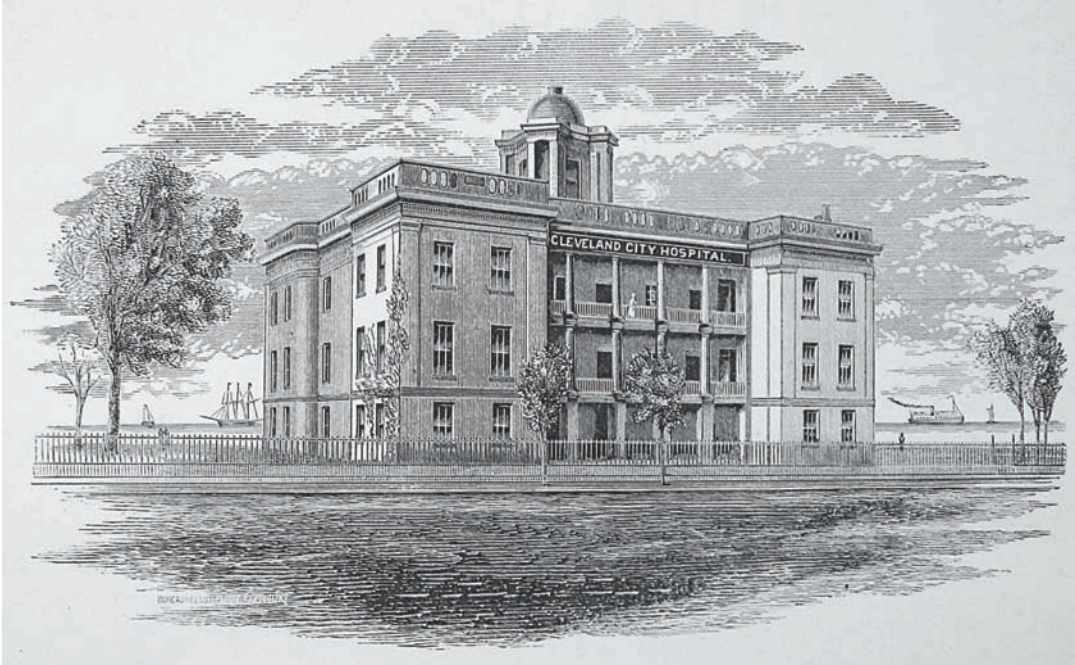


Figure 1.13. Cleveland City Hospital, view in 1876.

a practical expression of the four basic medical categories of hospital patients: male medical, male surgical, female medical, and female surgical. A hospital with a pair of two-story wings had one ward for each of those categories. Other smaller wards, in basements, attics, outbuildings, or ancillary spaces, could serve overflow patients or additional categories. Although in practice the numbers of patients of each group varied, the spatial equalization—one ward to each category—also regulated medical responsibilities in the hospital (each ward was typically under the charge of a single attending doctor).

Until the 1850s the most common arrangement of these three components was either a squat *H*, a *U*, or a single line. By the 1860s pavilion-ward guidelines demanded multiple separate pavilions. While master plans might include between four and a dozen ward pavilions, initial construction often included only two ward pavilions plus the administration building. Hospitals with more than two planned ward pavilions often opted for “serrated” plans, which used a long open corridor to connect a series of wards that all opened off the same side of the corridor (for example, the Roosevelt Hospital and the State Emigrant Hospital in New York City).

Civil War barracks hospitals, which often held dozens of pavilions, came in a variety of arrangements ranging from grids to *en echelon* to radial plans



Table 1.1. American Hospital Layouts, 1700–1859

Hospital Layouts, 1700–1859	Name of Hospital	Year
H- and U-Shaped Hospitals	Pennsylvania Hospital, Philadelphia	1755
	New York Hospital, New York City (original building)	1791
	Charity Hospital, New Orleans	1834
	Maryland Hospital, Baltimore (began as single building, additions made it an “H”)	1798–1819
	New York Nursery and Child’s Hospital, New York City	1858
	Island (City) Hospital, New York City	1858
	St. Luke’s Hospital, New York City	1859
	Colored Home and Hospital, New York City	1849
Center Building and Two Wings in Line	Massachusetts General Hospital, Boston (later added wings to make it a shallow U)	1821
	Island Hospital, New York City	1851
	Marine Hospital, proposed by Benjamin H. Latrobe	1821
	Marine Hospital, Charleston (Robert Mills, Architect)	1834
Rectangular Buildings (with a Central Hallway)	Commercial Hospital, Cincinnati	1821
	Marion Street Maternity Hospital, New York City	1830
	Wills Eye Hospital, Philadelphia	1834
	Jews’ Hospital, New York City	1855
	New York Eye and Ear Infirmary, New York City	1855
	Smallpox Hospital, New York City (later added wings to make an “H”)	1856
	City Hospital, St. Louis	1845
Multiple Separate Buildings	Bellevue (original location in two outbuildings behind almshouse)	1816
	New York Hospital (after additions)	1835–1859

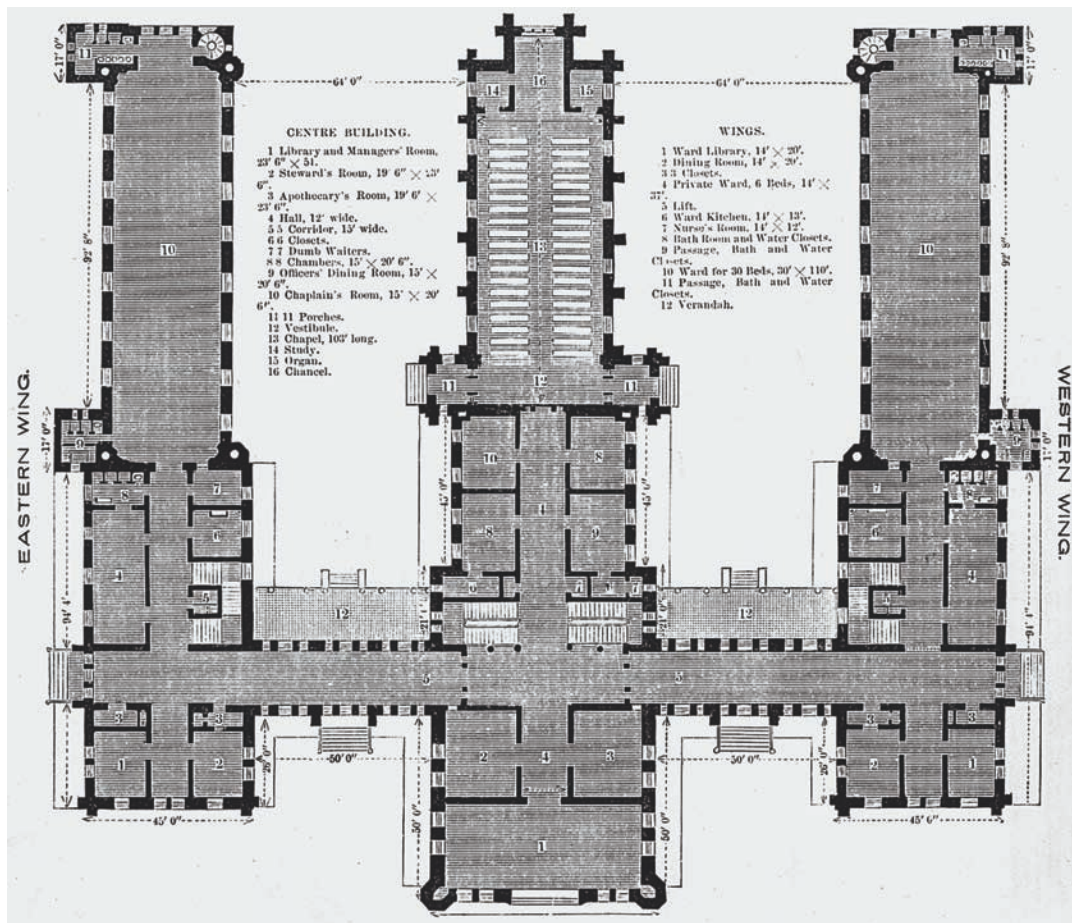


Figure 1.14. Hospital of the Protestant Episcopal Church in Philadelphia, plan in 1859. Initially only one ward wing and the administration wing of Samuel Sloan's master plan were constructed. The wards, which held thirty beds, included corner fireplaces to induce constant air flow up the chimney. The chapel was large, but did not have a direct connection with the wards. Each wing held a small (six-bed) private ward off the hallway, as well as the usual accessory service spaces. The dining room and library across the hall from each ward were for convalescent patients.

(which facilitated distribution of supplies on small railways). Hollow squares (with open corners for air flow) were another common arrangement, as evidenced by the Presbyterian Hospital in New York City, the proposed second building of the Saint Louis City Hospital, the Alexian Brothers Hospital in Chicago, and the Cincinnati General Hospital. Richard Morris Hunt, architect for the Presbyterian Hospital in New York City, promoted the open courtyard layout because it minimized exposure to the cold northerly winds and maximized the southern sunlight.⁵⁰ A number of hospitals, in-

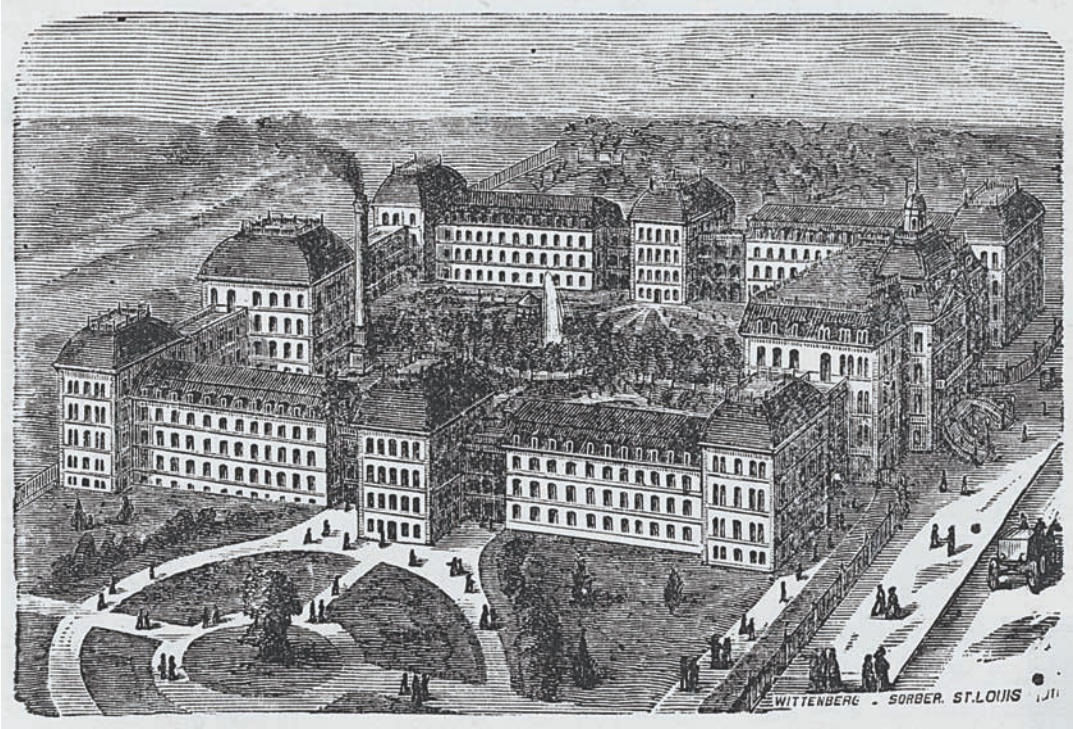


Figure 1.15. New Saint Louis City Hospital, Bird's-Eye View in 1874. Though the buildings were still separated by open air corridors, the aerial separation occurred in the middle of the quadrangle, risking the danger of “stagnant” corners decried by Florence Nightingale.

cluding the German Hospital and Woman's Hospital in New York City and the Rhode Island Hospital in Providence followed the example of the published plan for the Boston Free City Hospital—a grid of four pavilions with an administrative building centered in the space between them.

Though structured for ventilation, a hospital's facility layout had functional consequences for administrative practices and for what activities a hospital could support. Hospitals built before the 1850s—with multiple ward wings directly connected to a central administrative building—functioned as a single coordinated institution. After the 1850s, according to W. Gill Wylie, “the essential feature of the pavilion construction is that of breaking up hospitals of any size into a number of separate detached parts, having a common administration, but nothing else in common.” Each pavilion was, in essence, a complete and independent hospital with its own separate staff, patients, doctors, and nurses.⁵¹ The difference was subtle, but consequential.

The Pneumatic Structure of the Hospital Ward



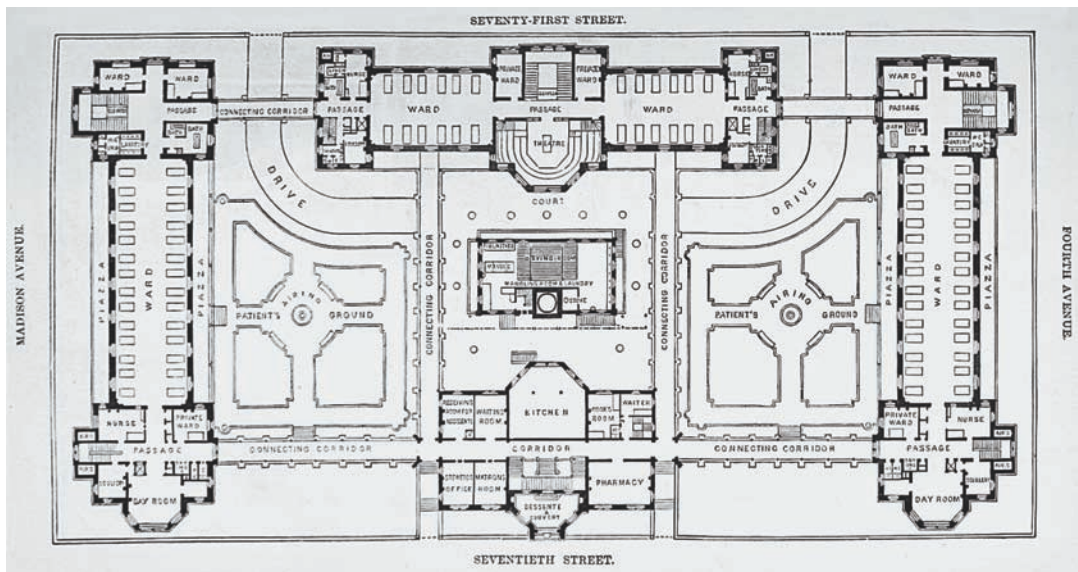


Figure 1.16. Presbyterian Hospital, New York City, first-floor plan, 1872. In Richard M. Hunt's design, the pavilion along Seventy-First Street held the surgical wards, with twelve-bed wards and an integrated amphitheater. The other pavilions were medical wards, each holding one large twenty-eight-bed ward, several smaller separation wards (for ward patients requiring seclusion) and one private ward (for paying patients).

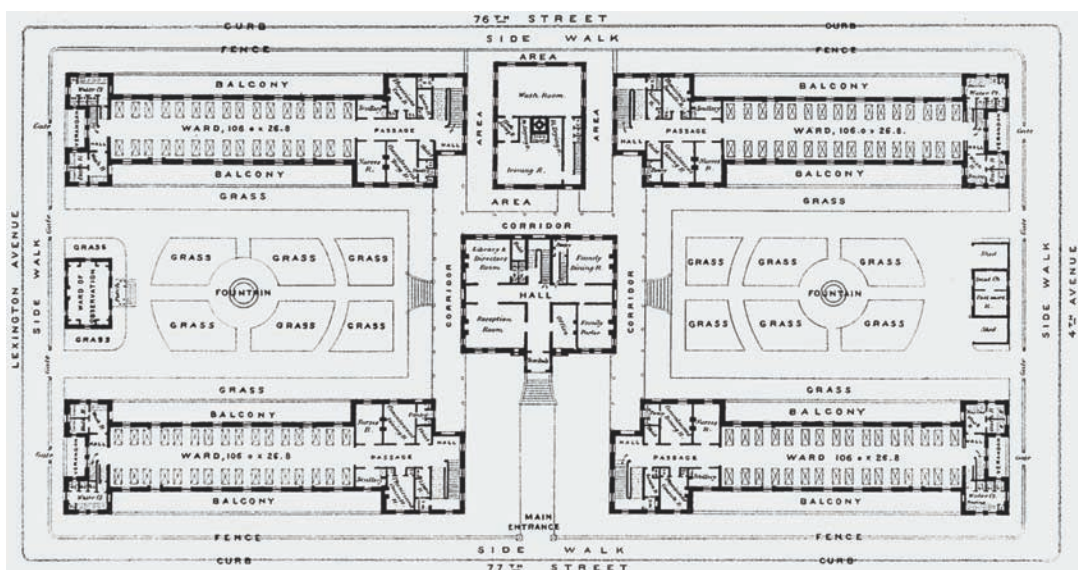


Figure 1.17. German Hospital, New York City, plan, 1866. This hospital plan is one of the few to depict the pathological building (mortuary and dead house) and an observation (isolation) ward separate from the large wards. The extensive gardens were an essential component of the architectural hygiene.

All rooms required ventilation, but in most building types ventilation simply consisted of providing openings (doors or windows) for passive air exchange. In hospital rooms that housed sick persons whose exhalations were believed to cause disease, the ultimate goal of ventilation was to prevent one person from breathing air exhaled by another. At a time when the technologies of air movement were at best unreliable, to achieve this control hospital designers structured the hospital ward for ventilation. The size and shape of wards, the placement of architectural openings, and the inclusion of ventilation technologies promoted specific patterns of air flow.

Increasing the open space in a ward diluted the concentration of bad air. This made room size, in correlation to the number and placement of occupants, critical to a hospital's healthiness. Late eighteenth-century calculations of the minimum safe cubic volume of air in a ward varied from five hundred to two thousand or more cubic feet per occupant. Mid-nineteenth-century American hospital wards typically provided between one thousand and two thousand cubic feet of air per patient.⁵²

For greatest effectiveness, this air space needed to surround the patient. A high ceiling above densely packed patients did little to ameliorate air quality at floor level. By the nineteenth century, the minimum recommended dimensions of open floor space around each patient ranged between 100 and 120 square feet, with a minimum of three feet between beds.⁵³ This put each patient in a separate "room" of air.

In addition to volumetric dilution, ward ventilation required constant air exchange to replace the corrupted air with pure fresh air. There were two available means of promoting air exchange—natural and mechanical. Natural ventilation relied on winds and temperature differentials to induce air flow and architectural openings such as windows, doors, and chimneys to direct that air flow in specific patterns. It was inexpensive and straightforward but inconstant. Mechanical ventilation used machines—fans or blowers—to propel the air into ducts and risers and then into rooms. It was relatively expensive and difficult to operate, but constant.

At a time when medical practitioners as well as laypersons saw nature—in the form of sunlight, fresh air, and greenery—as more than a landscape, as a reservoir of invigorating (even divine) healing influence, natural ventilation was preferred. Fears that air mechanically forced through fans and ducts lost some vital principle or gained some deleterious influence in its passage remained potent well into the second half of the nineteenth century. In this uncertainty, early nineteenth-century hospital designers in Europe and the United States exhibited a preference for natural ventilation,



particularly for supply air.⁵⁴

Windows were the primary mechanism for natural ventilation in the hospital ward, and effective window placement generated the basic pavilion ward dimensions and shape. Maximum cross-ventilation occurred when windows were on opposing walls less than thirty feet apart; pavilions were narrow rooms—typically between twenty and thirty-five feet wide—with windows directly opposite each other on the longer walls. Since contemporary expectations were that air flowed in a direct line from window to window, theoretically, a good wind created a moving “wall” of fresh air across the ward, between beds. Unfortunately, on stagnant days no air flowed at all and on windy days foul air exhaled by one patient might be carried directly across the ward to another. To minimize this danger, American and European hospital designers developed features to induce vertical as well as horizontal air flow around each patient, typically through the use of strategically placed exhaust flues or heat sources (which induced an updraft). At the Hospital of the Protestant Episcopal Church in Philadelphia, ventilation grilles directly above each bed opened into vertical flues with steam coils at the top, creating a constant exhaust flow at the point of greatest contamination (the patient’s breath). This individualized air flow was even further developed in the Roosevelt Hospital in New York City. Supply grilles under each bed provided fresh air; from there, heat sources (including the patient’s own body heat) induced the air to flow upward and then out through individual exhaust ducts located high on the wall above each bed.⁵⁵

Heat sources—fireplaces with chimneys, steam coils, even gas jets—that induced a constant exhaust flow, could be quite dangerous, particularly when installed within the wall or duct. While steam coils were the most common (and relatively safe) heat source, the designers of the New York Nursery and Child’s Hospital in New York City placed gas jets inside the exhaust ducts. Since those ducts and the building’s structure were wood, the open flames created a grave fire danger. To reduce this danger, some hospital designers specified fireproof materials for ducts. At the Hospital of the Protestant Episcopal Church in Philadelphia the ducts were to be smooth-plastered and slate-encased. In many hospitals the in-duct heat source was a backup system, only turned on when the “amount of air carried off at any time falls below what might be considered desirable.”⁵⁶ This minimized but did not prevent the danger.

Ventilation in the hospital ward was regularly in conflict with the requirements of comfort. For constant ventilation, windows were open even in the winter and fires were lit in the fireplaces (which functioned as exhaust ventilators) even in the summer. On the coldest days, patients notoriously





Figure 1.18. Roosevelt Hospital, New York City, view of male ward, 1893. Though a ward was one big open space, the windows determined bed placement both for air flow and maximum sunshine.

closed the windows purposely left open by nurses and doctors. A number of hospital designs included ancillary “natural” ventilators—gratings, siphon ducts, and other contraptions that promoted constant air movement. These were often simply unclosable openings in the building’s walls, floors, or ceiling, which increased the building’s permeability. As early as 1754, the Pennsylvania Hospital incorporated rooftop “ventilators to carry off the foul Air.” The first building of the Jews’ Hospital in New York City (1855) included “openings, covered with metallic gratings, from the outside, so that pure air will always flow in, no matter what the state of the weather may be.”⁵⁷

Window ventilation, in-wall exhaust, and ventilators made each pavilion pneumatically independent—air exchange occurred between inside and outside, not between rooms. But window ventilation required extensive exterior walls, which created costly, rambling footprints. William Strutt and Charles Sylvester at the Derbyshire Infirmary in England developed a centralized furnace-driven ventilation system that used the heat of the furnace to create a temperature differential that drew fresh air into the building through long underground intake ducts. The air, once heated, rose to the various rooms through extensive supply ducts. Separate exhaust ducts,



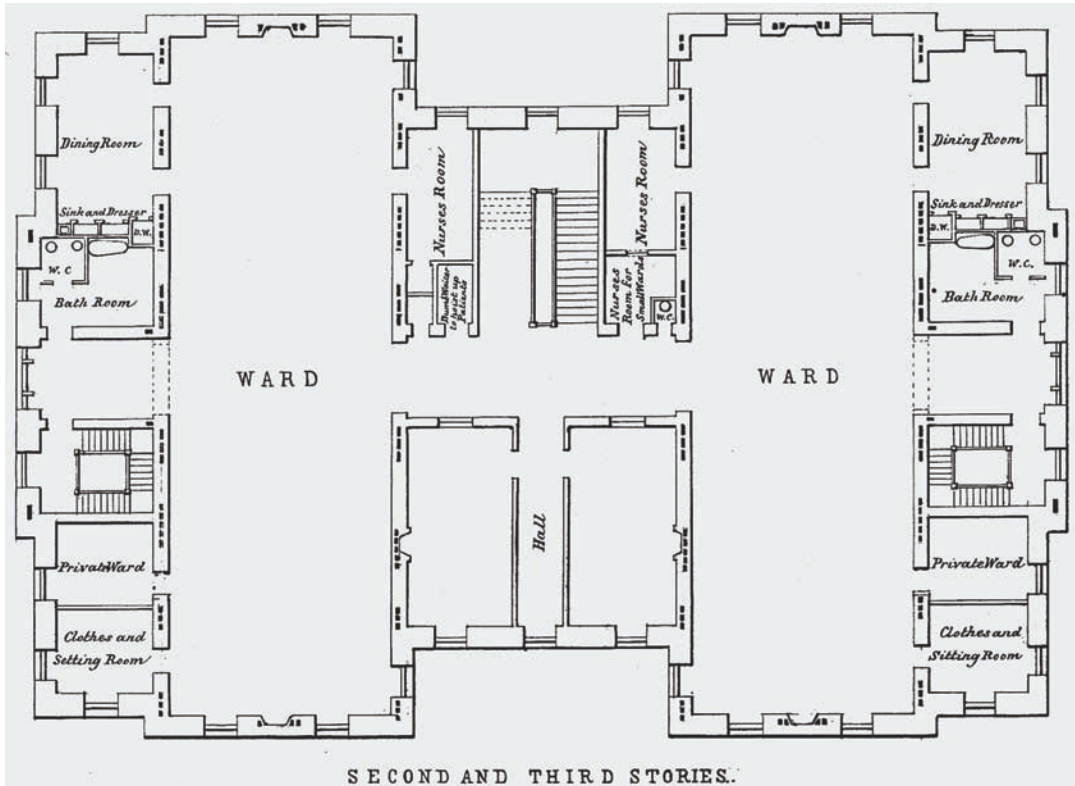


Figure 1.19. New York Hospital, New York City, plan of new South Building, 1855. The ward ventilation was provided by extensive risers and ducts rather than by windows, allowing the services to be within much greater proximity to the wards and allowing a greater centralization of plan. Built just before the blossoming of pavilion-ward guidelines, the building was soon considered obsolete, if not dangerously poorly ventilated.

also heated by the central furnace, drew off expired air. This system was not dependent on windows or window placement, yet it created a constant, controlled movement of air that could keep even physically adjacent rooms aerially independent. As Christine Stevenson points out, this allowed the Derbyshire Infirmary to be constructed in a much more compact and economical (square) plan without fear of compromising the all-essential ventilation.⁵⁸ American hospital designers experimented with this centralized hot-air furnace ventilation between the 1820s and 1850s, with the earliest installation possibly at the Massachusetts General Hospital. The compact plan of the new South Building of the New York Hospital (1855) reveals the more centralized plan that could develop when a hospital ward was planned for ducts, rather than windows, to provide the ventilation.

By the 1860s, with the widespread adoption of the pavilion-ward system,

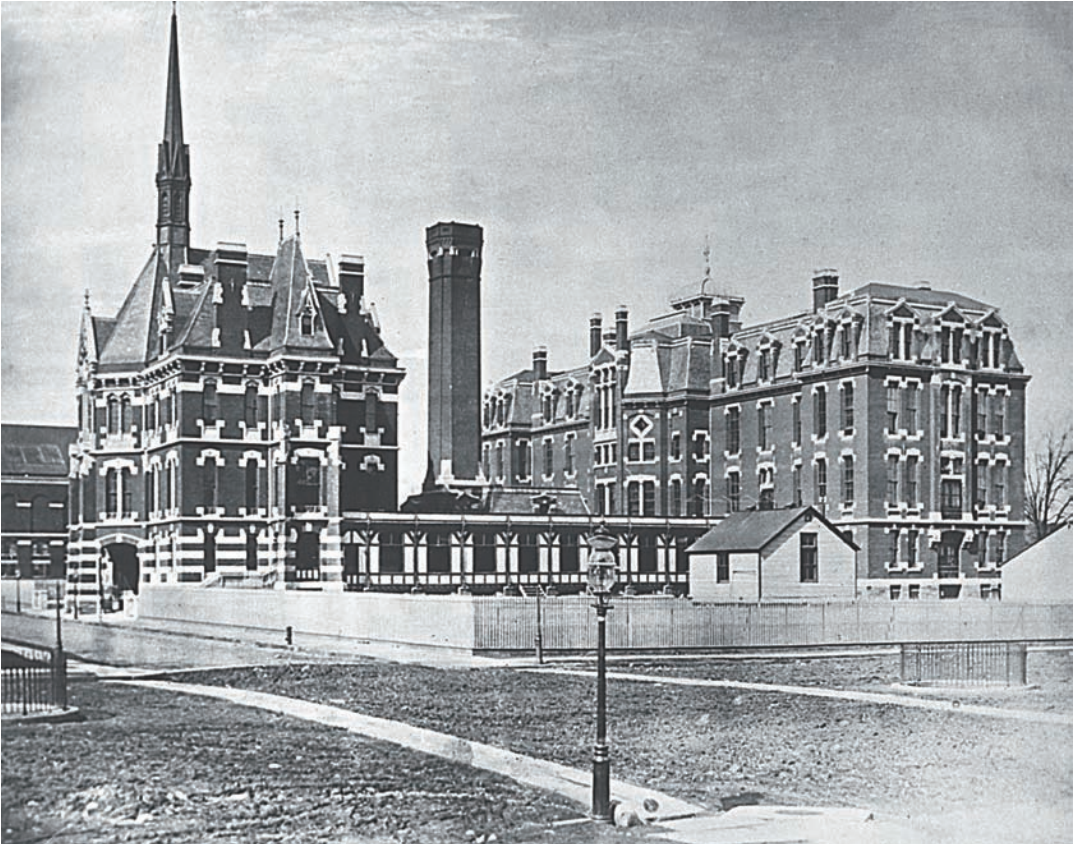


Figure 1.20. Presbyterian Hospital, New York City, view [1876]. The prominent central chimney generated exhaust ventilation for the entire facility. Initial construction included only one out of the three planned ward pavilions.

the distance between pavilions made centralized ventilation systems inefficient. Nevertheless, although windows were the primary source of fresh air supply in the pavilions, a number of American hospital designers continued to use a centralized chimney—usually one fed by the hospital’s boilers—to create a whole-facility exhaust system. Ducts extended underground from the hospital pavilions to vertical risers around the central chimney. The chimney’s heat warmed the surrounding risers and created a suction strong enough to draw the air out forcefully from the distant pavilions. These exhaust-air systems typically provided constant removal of air from the most tainted spaces in the hospital. At the Rhode Island Hospital in Providence, architect A. C. Morse designed “an arrangement by which the draft in the flues of the chimney affords ventilation to the sewers of the establishment.” At the Presbyterian Hospital in New York, Richard Morris Hunt



included a central hundred-foot-high chimney shaft for the boilers with air chambers around it that provided exhaust suction for the water closets, kitchen, laundry, and dead-rooms.⁵⁹

American hospital designers began to incorporate mechanical propulsion systems for air supply by the late 1850s. The City Hospital in Boston and the Charity Hospital in New York City included large fans to push air into underground supply ducts. Carl Pfeiffer specified a ten-foot-diameter ventilation fan for an unbuilt project for the New York Hospital, while the State Emigrant Hospital on Ward's Island included a fourteen-foot-diameter fan "by which a current of air is created which commands the respect of all who approach, as hats are never seen to be worn in its presence." According to the records of the Roosevelt Hospital and Saint Luke's Hospital in New York City, fans were typically run only on still days, when the natural ventilation system needed augmentation.⁶⁰

The more elaborate hospital ventilation systems could provide heating or cooling as well as air flow. At the City Hospital in Boston each duct was divided in half at its delivery point: one half included a steam heating coil, the other did not. By varying the proportion of air that traveled through the hot or the cold half of the duct, the engineer could control the temperature of the air delivered to the room. At other hospitals, long underground supply air ducts tempered the air before delivery. In winter this reduced the heating load; in summer, cooler air could be sent straight to the wards. Some speculated the results might be therapeutic. In 1859, Dr. McKenna in New Orleans suggested that underground chambers beneath wards could create "a supply of air several degrees colder and moister than the outside temperature, by which many an otherwise fatal disease might be effectually checked." At the State Emigrant Hospital in New York City in 1866, one visitor reported an air temperature of seventy degrees in the wards when the outside air was eighty-five degrees in the shade. Not all early combined heating and ventilating systems were as successful. At the Mount Sinai Hospital in New York City only three wards could be kept open in winter because of insufficient heat.⁶¹

These extensive ventilation systems had aesthetic consequences: hospitals had numerous chimneys, towers, and rooftop ventilators. On the earlier American hospitals these features were often utilitarian structures, added to the building as appurtenances and roof projections (as at the Colored Hospital in New York City). By the 1860s architects turned these functional exhaust towers and chimneys into prominent design features. Decorated towers housed the ventilation equipment but also provided a strong vertical counterpoint to the predominantly horizontally arranged hospitals such as the Hospital of the Protestant Episcopal Church in Philadelphia, the Cin-



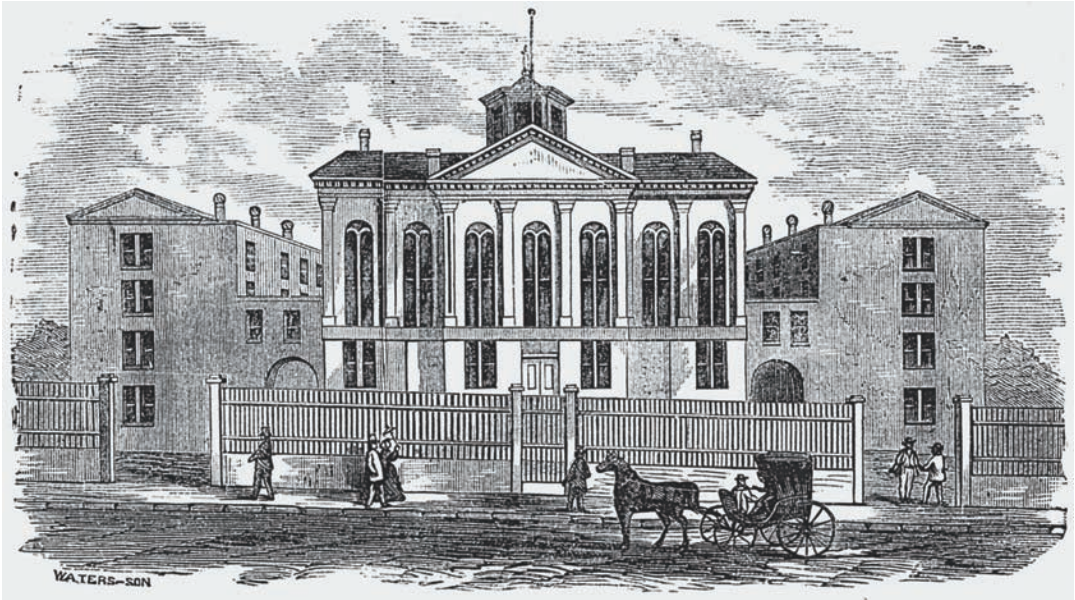


Figure 1.21. Colored Home and Hospital, New York City, view, 1872.

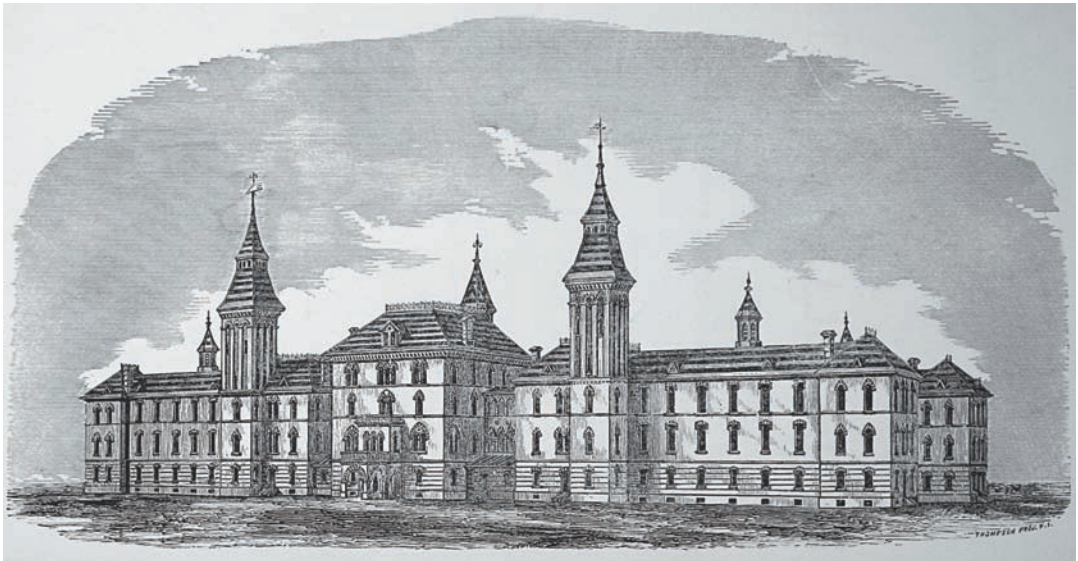


Figure 1.22. Rhode Island Hospital, Providence, exterior, 1868. The prominent towers held risers to ventilate the ward service rooms; the ward was further ventilated by fireplaces in each corner of the ward (marked by the smaller chimneys).

cinnati General Hospital, the Rhode Island Hospital in Providence, and the State Emigrant Hospital, Saint Luke's Hospital and the Roosevelt Hospital in New York City.

The Hygienic Requirements of Hospital
Materials, Details, and Construction

To meet the requirements of architectural hygiene and efficient care, hospital administrators were early adopters of internal plumbing systems and other efficient building technologies. Hospital designers typically specified hard, nonporous, easily cleaned materials and kept architectural decoration or detail to a minimum. This was a striking contrast to other types of interior spaces such as offices, hotels, and even residences, which were often lavishly decorated and furnished.

Plumbing and Building Technologies

An abundant water supply was critical to a healthy hospital—water was used for bathing patients; cleaning rooms, bedding, and instruments; and removing wastes. The earliest American hospitals occupied sites near a river, stream, pond, or lake; staff at the Smallpox Hospital in New York City were still fetching water by pail from the East River in 1853. Waste disposal before indoor plumbing was usually handled in privies, which were most often located a slight distance from the building but could also be attached to the ward as a means of improving access for nonambulant patients. For his proposed Marine hospital design, Latrobe recommended a “tub room”—a small room with a large vessel that collected the wastes from ambulant and bedridden patients. Once or twice a day the vessel was to be lowered to the ground, carted to a distant corner of the site, emptied, and then returned.⁶² All of these approaches were problematic, creating a source of aerial corruption believed to be almost as potent in causing disease as the sick patients themselves.

The installation of indoor plumbing offered drastic improvements to hospital sanitary conditions. It was added to existing buildings and included in the original construction of new hospitals as early as the 1820s and 1830s. An 1821 plan of the Massachusetts General Hospital included cubicles that resembled the self-flushing toilets promoted by Charles Sylvester at the Derbyshire Infirmary in England. In 1837 a new building at the New York Hospital included “a powerful forcing pump in the cellar” to fill four rooftop reservoirs, which in turn supplied gravity-fed water to eighteen water closets and ten bathing rooms. As urban piped water supplies became



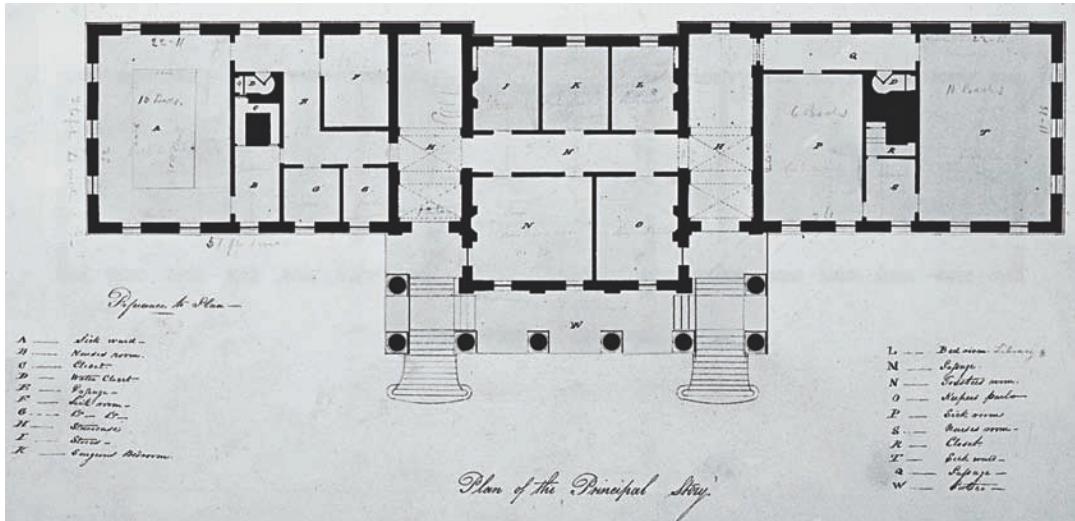


Figure 1.23. Massachusetts General Hospital, Boston, plan of first story, 1821. Bulfinch's interest in accommodating persons from various economic classes led to a design that included a number of smaller wards rather than one large ward.

available, hospitals were quick to connect to them. The New York Hospital governors connected the hospital buildings to the new municipal water supply as soon as the pipelines from the Croton reservoir reached their vicinity, in early 1844.⁶³

Internal plumbing and piped water supplies in these early years was a mixed blessing, often contributing to new forms of unsanitary conditions. By May of 1845, shortly after installing Croton water, the governors of the New York Hospital had to order a trench to be dug to relieve their overflowing cesspool. Inside the hospital, imperfect trap designs allowed sewer gas to travel back up through the pipes and imperfect fixture designs did not always completely flush away the wastes from the hopper. Because of the dangers, by the 1860s European pavilion-ward promoters isolated the sanitary fixtures—toilets, baths, sinks, and pipes—in separate sanitary “towers.” These structures often included strategically placed windows and air ducts to ensure “a current of air being constantly kept up between the wards and water-closets.”⁶⁴

Where to locate the towers in relation to the ward was an unsettled problem. Nightingale's ideal ward designs had located these sanitary towers at the far end of the ward from the nurse's office. This created long travel routes for nurses and ambulatory patients. European pavilion-ward hospital designers typically followed Nightingale's precedent, as did the designers of many postbellum American hospitals (including the Rhode Island Hospi-



tal in Providence, and the State Emigrant Hospital and German Hospital in New York City). The designers of the Hospital of the Protestant Episcopal Church in Philadelphia included sanitary “towers” at both ends of the large ward, effectively halving the distance nurses and patients had to travel to use the facilities, though doubling the potential sources of contamination. The Roosevelt Hospital in New York City had the most unusual lavatory arrangement; “instead of placing them against the walls they are placed in the centre of the room and grouped around a shaft” that exhausted the air through all the floors to the roof. Astonishingly complicated hygienic precautions—including steam-injected toilets for disinfection—offset the danger of contamination.⁶⁵

In addition to plumbing, hospital buildings were filled with labor-saving technologies. Civil War barracks hospitals and several postbellum civil hospitals (including the Presbyterian Hospital and German Hospital in New York City and the Hospital of the Protestant Episcopal Church in Philadelphia) made extensive use of small “truck” railways for transporting goods between pavilions. Small utility lifts and dumbwaiters delivered the goods from the lower, service floor to the upper ward floor or floors. At the Roosevelt Hospital, dirty linen chutes delivered soiled bedding to a convenient location and dumbwaiters from the basement delivered the clean linen to the ward linen closet. A glazed pipe flue, with its opening flush with the floor, allowed dust and debris to be swept into the chute, where it landed in an “iron receptacle, whence all can be removed readily to the boiler furnace and burned.” In a few facilities, the installation of elevators, even in the low-rise pavilions, eased the movement of bedridden patients between floors. Speaking tubes and call systems facilitated communication, particularly between the wards and the house doctors’ rooms. As early as 1858 the City Hospital on Blackwell’s Island, designed by James Renwick, incorporated a system of bells and speaking tubes for prompt communication between the wards, doctors’ rooms, and main offices.⁶⁶ These technologies made the provision of services easier, but at the danger of compromising hygiene. The dangers of contaminated pipes, ducts, and tubes were frequently reported and debated.

Lessons from the Civil War: Temporary vs. Permanent Construction

Fears that years of constant exposure to the aerial poisons emanating from sick patients would saturate the hospital’s building materials also promoted an intense American interest in what Dr. John Maynard Woodworth, the first surgeon general of the United States, termed “the simple pavilion of indefinite existence.” Woodworth recommended hospital pavilions be “con-



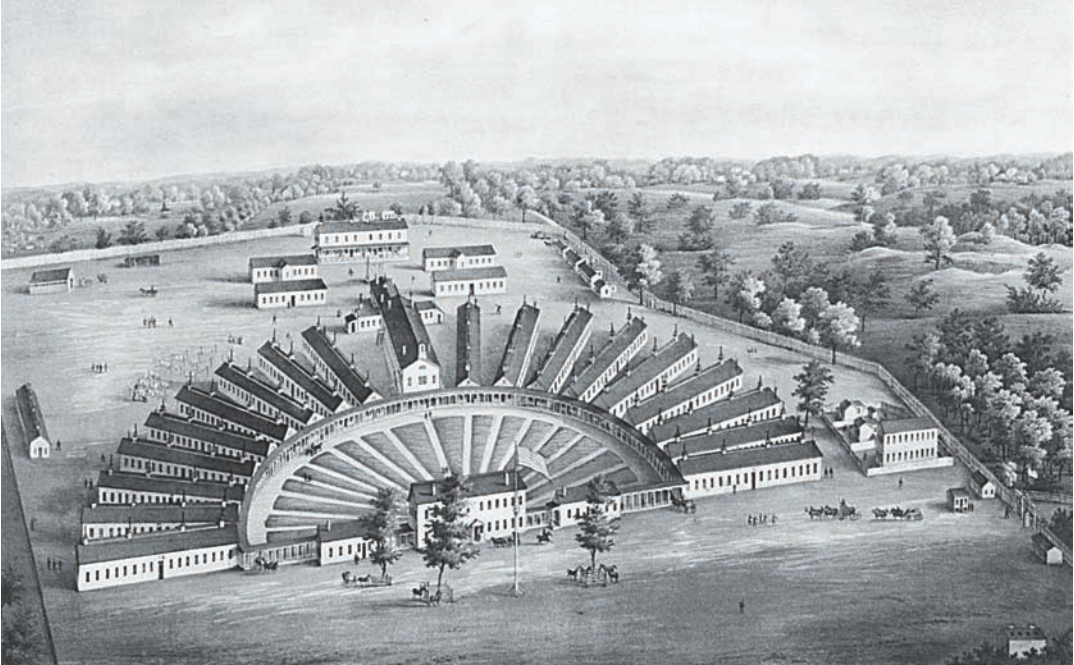


Figure 1.24. Hicks US General Hospital, 1860s. The one-story “barracks” wards, of simple wood construction, were typically arrayed in a layout that allowed simple delivery of goods along a central drive or by a small handtruck.

structed with the view of destroying them [as] soon as the peculiar hospital diseases, such as erysipelas, pyaemia, gangrene, &c., are engendered by the cumulated miasma of the buildings.” He estimated replacement every ten or fifteen years. A leading surgeon at Bellevue Hospital recommended wooden wards that could be destroyed and rebuilt every five years “or as soon as it was felt that the air in them was becoming poisonous.”⁶⁷

Civil War hospital experiences provided corroborating evidence that temporary construction was healthier. A majority of field hospitals for the emergency treatment of injured soldiers had appalling mortality, particularly from “hospital diseases” such as hospital gangrene, septicemia, and other infections. The discussions also revealed that wounded soldiers in drafty barns, shacks, huts, and tents improved in greater numbers and at faster rates than did wounded soldiers in the more permanent commandeered structures such as churches, courthouses, and even hospitals.⁶⁸

By the later years of the Civil War, the idea that cheap, temporary construction might be the best approach to hospital buildings gained wide circulation. The clearest examples were the “barracks” hospitals—an American variant of pavilion-ward hospital design that kept Nightingale’s



basic ward layout but included one-story, isolated wooden pavilions or even simple tents, capable of being destroyed at need. The Mower General Hospital outside Philadelphia and the Hicks US General Hospital near Baltimore contained more than a dozen barracks pavilions.

Discussion of the benefits of temporary ward construction continued in publications well into the 1890s. Immediately after the war a few hospitals, like the Presbyterian Hospital in Philadelphia and the Lakeside Hospital in Cleveland, experimented with wards of temporary construction. Though built to be destroyed, most such “temporary” hospital pavilions were in service for decades. American hospitals rarely used such temporary construction for the primary ward structures. The danger of fire was a harsh reality that counteracted the hygienic benefits of the impermanent structures. A competing desire for hospitals, as public institutions, to be built to last and to express their civic presence architecturally led to the creation of durable structures. Temporary structures—tents and cheap wooden pavilions—were most often used to house overflow patients and specific vulnerable patient categories.

The American Civil War hospitals and their barracks construction impressed European observers. By the early 1870s during the Siege of Paris in the Franco-Prussian war, the French (who were losing enormous numbers of soldiers to hospital diseases in permanent buildings) resorted to “putting up tents after the American model, for it is proved beyond a doubt that they are the only safeguard against what is termed hospital rot or gangrene.” Rudolf Virchow praised the American Civil War hospitals, and the City Hospital in Moabit, Berlin, was patterned after the Civil War Mower General Hospital outside of Philadelphia. It was “built of inexpensive materials as a temporary hospital for infectious diseases” although in nonepidemic times it would serve as a general hospital for the city. Designers of German hospitals continued to build hospitals reminiscent of this barracks style throughout the nineteenth century, though constructed of stone rather than wood.⁶⁹

The Establishment of Hospital Finishes

The requirements of architectural hygiene also differentiated hospitals aesthetically from other building types. Hospital buildings were designed for cure and reform, and only contingently for beauty. At a time when public and civic buildings were encrusted with stylistic historical ornament, hospital practitioners looked on ornament as a dirt-trap, a hindrance to air flow, an unnecessary expense, and a moral pitfall for an institution that had to model restraint. According to James Beekman, “architectural display in



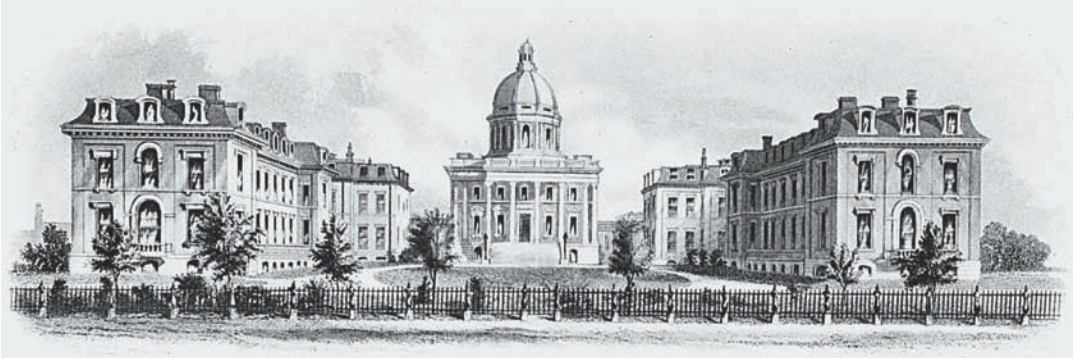


Figure 1.25. City Hospital, Boston, view. Though the hospital as built included far less classical detail than was depicted in Gridley Bryant’s competition-winning drawings (or included on other contemporaneous public buildings), the hospital buildings received criticism for aesthetic extravagance.

a hospital [was] a crime.” Stephen Smith criticized several hospitals, including Gridley Bryant’s neoclassical design for the Boston City Hospital and John W. Ritch’s design for the State Emigrant Hospital in New York City for the use of expensive “architectural accessories, most of which are positively injurious.”⁷⁰

On the other hand, as the visible symbol of philanthropy a hospital needed to be respectable and create a civic presence. Rosner notes that hospitals “resembled a home, a church, or a prison, depending upon the underlying purposes of those organizing the facility.” For most kinds of hospitals, a subdued exterior architectural aesthetic, the result of massing and proportion, not stylistic details, was considered appropriate. A writer for the *New York Times* lauded Saint Luke’s Hospital, which had “gone to no outlay in mere architectural ornament—relying for any beauty of structure on symmetry and proportion.” Beaux-Arts-trained architect Richard Morris Hunt stated that for hospitals the best approach was one that obtained architectural effect “by accentuating certain prominent features existing in the plan, in a quiet, unpretending manner.”⁷¹ His design for the Presbyterian Hospital in New York was decorated, but more by material patterns and massing than by the layered excess of historic ornament common to his other buildings. In comparison to their other designs, Frank Furness and George E. Hewitt’s design for the Jewish Hospital in Philadelphia was bare of ornament.

This austerity continued on the interior of hospitals, primarily as a result of hygienic necessity. At the New England Hospital for Women and Children in Roxbury, Massachusetts, there were “no cornices or ornaments to hold dust or bad air.” Corners were rounded to facilitate air flow and





Figure 1.26. Hospital of the Protestant Episcopal Church in Philadelphia, view of male ward, 1869. Exhaust registers are visible on the wall just below the large pictures and close to the ceiling. There were also floor registers under the beds. All corners are rounded, all surfaces undecorated and seamless. The decorative treatment of the south-facing windows would have given the ward the ambience of a chapel, appropriate to the spiritual as well as physiological healing the founders intended to impart. The picture is posed to suggest that religious services are just about to start, the table in the middle of the ward serving as a makeshift altar.

cleaning. Cracks, where dirt could hide, were likewise minimized, and materials were joined as seamlessly as possible. Ward finishes and furnishings were white: colors hid dirt. Woodwork was typically natural or light-finished. There was no superfluous ornament, few furnishings, no knick-knacks, minimal materials, and an abundance of sunlight and fresh air.⁷²

Because of universal fears “that the miasms of hospitals would cling to the walls if they were composed of permeable material,” hospital floors, walls, and ceilings had to be “incapable of absorbing the exhalations of the sick.” Opinion as to what constituted the best impermeable material varied. Parian cement, glazed tile, stucco, and materials “like glass” all had their champions. If properly sealed, however, common but permeable building



materials like hard-finished plaster or wood were acceptable and far more affordable. The designers of the Roosevelt Hospital gave their walls and floors four coats of oil paint before opening “so as to present a surface which cannot absorb impurities and which can be washed with soap and water.” Hunt’s design of the Presbyterian Hospital in New York City used wood hard-sanded to a perfect finish and then waxed “to prevent the absorption of elements inseparable from hospitals, and which, otherwise, render them unhealthy.”⁷³

Though impermeable, hospital materials were rarely wet-washed. Concurrent fears that “vapor in a ward tends to suspend the miasmatic emanations and diffuse them more widely” led to the development of unusual cleaning strategies for hospitals. Dry-rubbing (what Nightingale called *frottage*) was preferable to wet-washing, because it did not dampen the ward surfaces. The rules of operation of the Mower United States Army General Hospital in Chestnut Hill, Pennsylvania, required orderlies to request permission from the chief executive officer to wet-scrub a floor and ordered surgeons “to see that water is not thrown on the ward floors.”⁷⁴

The hospital ward was a stark, almost abstract space. The white walls and ceiling, often joined by a rounded or coved intersection that effaced any sense of a corner, appeared almost immaterial; the monolithic floor appeared like an abstract plane. Within this featureless architecture, the patients, a few wall-hung paintings, and the building technologies (ventilation grilles, lighting fixtures) stood out in stark contrast.

Fitting Function into a Pneumatic Machine

In 1866 Dr. Stephen Smith stated that there were only two kinds of hospital pavilions—administration and wards.⁷⁵ The necessity of all other spaces was debatable and their inclusion in hospital buildings was largely outside the pavilion-ward guidelines. How spaces devoted to religion or to medical practice, research, or education were inserted into hospital buildings thus reveals much about the limits of pavilions and the forces competing for a stake in hospital work.

Medical Spaces in the Hospital

Spaces devoted to specific medical procedures were minimal in early American hospitals. The most common early nineteenth-century medical treatments (bloodletting, purging, wound care, dosing, and basic nursing) required little equipment. In most hospitals, examinations, treatments and care occurred within the ward itself, regardless of the effect on other pa-



tients.⁷⁶ In the first decades of the nineteenth century, as American medical practices began to alter (with the adoption of the European “clinical” medicine, the integration of dispensaries and hospitals, and the transformation of surgery resulting from the use of anesthesia), the inclusion of medical spaces within the hospital increased.

Examination Rooms, Operating Rooms, and Amphitheaters

The hospital was a public institution; the provision of “privacy” for medical examination of a patient was a luxury, not a necessity. Rosenberg considers the lack of separate rooms for medical examinations in early American hospitals a reflection of the admission process for hospital patients, which involved social as much as medical scrutiny. Indeed, admission to a hospital often required a letter of application, the provision of letters or notes of recommendation, and an interview with the governors to establish “worthiness.” After passing this assessment, the patient might have to undergo a medical examination by hospital doctors somewhere in the hospital (for example, the board room, a “receiving” room, or an office) before final admission to a ward. Alternatively, the patient might be admitted directly to a ward bed where the hospital doctors would perform the examination.⁷⁷

The distress caused to other patients by medical actions occurring in the wards was regularly mentioned by hospital practitioners but rarely addressed by the creation of separate spaces. Rooms devoted to medical examinations did begin to show up in hospital plans in the mid-nineteenth century. When located near the hospital entrance (as in the Massachusetts General Hospital or the New York Hospital), these rooms functioned as part of the admission process. When located adjacent to the wards (as in the City Hospital in Boston and the German Hospital in New York City), these rooms offered privacy, for examinations but also potentially for simple medical treatments, saving the ward from the disruptions. Saint Luke’s Hospital in New York City included examination rooms at the entrance and off each ward. Many hospitals included no such spaces.

In the same vein, operating rooms, so crucial to modern hospital practice, were not considered essential spaces in the earliest American hospitals. Doctors performed most surgeries within the wards. Before anesthesia, disruptions were intense but brief. A surgeon’s skill was directly correlated to speed, and operations were timed in minutes. Dr. James Rushmore Wood was even known to have amputated a thigh in nine seconds! More complicated procedures were infrequent. Between 1821 and 1822, the Massachusetts General Hospital’s records show a regular occurrence of minor



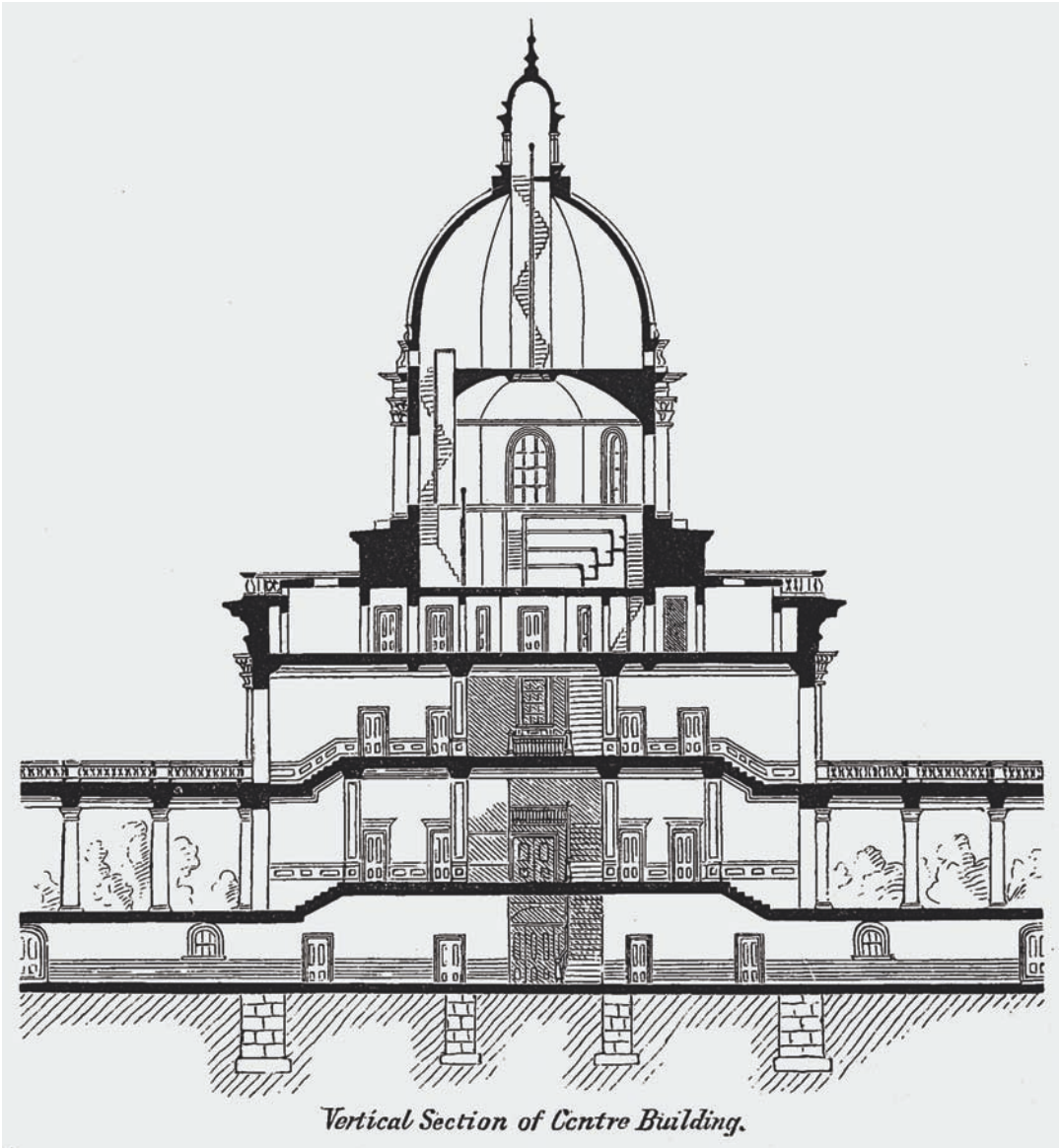


Figure 1.27. City Hospital, Boston, section through surgical theater, 1865.

surgeries, but an average of only four major surgeries undertaken each month.⁷⁸ Such major operations were the procedures of greatest interest to other medical practitioners and of greatest distress to other patients within the ward. A separate space for them thus served two interests—preserving the ward’s order and facilitating medical education.

The inclusion of operating amphitheatres—a separate room for major



surgeries with a number of seats for an audience—was common in hospitals by the early nineteenth century, though by no means universal. The New York Hospital added an amphitheater in 1801; the Pennsylvania Hospital in 1802; and the Massachusetts General Hospital included an amphitheater in its original 1821 building. To accommodate tiers of seating, amphitheaters were frequently double-height spaces. Surgery required copious lighting from above with no cast shadows; before gas light and electric light, that meant daylighting, from large windows and skylights, domes, or cupolas. This put most amphitheaters on the top floor, a location that created some difficulty in transporting bedridden patients to the amphitheater (particularly if the patient had to be carted up winding narrow stairs). The City Hospital in Boston was an early adopter of elevator technologies to solve this problem. It included lifts in each two-story ward, but to get patients from the wards to the operating room, “patients were transported by an elevator from the basement to the third floor, then shifted to another elevator and raised to the operating-room. As both of these elevators were operated by hand power, some idea may be formed as to the great amount of work required to get the patients to and from the cupola.”⁷⁹

The advent of anesthesia in the 1840s transformed surgery and surgical spaces. From a treatment of last resort, surgery became an “elective” procedure—something a person might willingly choose to undergo. Surgeries became more complex, delving into areas of the body that had once been sacrosanct, and of much longer duration—timed in hours rather than minutes. These changes increased the trauma of surgery in the ward for other patients and dramatically increased the demand for separate operating rooms.⁸⁰

Anesthesia also increased demand for pre- and postoperative spaces. Although early hospital practice called for administering the anesthetic to the patient immediately before the procedure in the location of surgery, it was clear that preoperative patients found the presence of medical students and surgical equipment traumatic. By the 1860s and 1870s small separate rooms for administering anesthetics were common. Postoperative recovery rooms, which further improved patient experiences and provided a well-monitored space in which the patient could safely come out from under the anesthetic, also appeared. The Rhode Island Hospital in Providence included a private ward adjacent to the operating room “where patients can be left after undergoing serious operations, until they are able to be removed to the general wards.”⁸¹ At times the same room functioned for both before and after operative care.

By no means did the inclusion of separate operating rooms or am-



phitheatres in some hospitals mean that all surgical procedures were performed in them or that all hospitals included operating rooms. Many procedures were still carried out in the wards. One visitor to Bellevue in 1872 described a ward where “at one cot the surgeon was operating upon a patient whose cries of anguish were distressing, but every one seemed oblivious.” At Saint Mary’s Hospital in Philadelphia, which had no operating room, their “method was simply to surround the patient with one or more screens and operate in the ward.” Charles C. Haight designed the Hospital for the Ruptured and Crippled in New York City with no operating room—its founding doctor believed in mechanical therapy rather than surgical correction.⁸²

Where to locate an operating room within a hospital was a difficult choice. They were inherently unhygienic and believed capable of infecting patients in adjacent wards. There were also worries that the ward “air” would generate hospital disease in the vulnerable surgical patients. By the 1860s and 1870s, at the Woman’s Hospital, Bellevue Hospital, and the City Hospital in New York City, surgery occurred in a tent or a wooden outbuilding.⁸³ Many hospitals located the operating room or theater in the administration building. However, locating the operating room distant from the wards required transporting patients between buildings—a tedious chore that potentially exposed persons of delicate health to weather extremes and jostling. A couple of hospitals reportedly located their operating rooms near the pathological facilities (as at the Mount Sinai and Presbyterian Hospitals in New York City). This supported medical research, but at a time when the surgeon typically washed his hands *after* the operation, this proximity could prove dangerous to the patients.

Inevitably, the increase in surgeries and the changing nature of surgery altered hospital practice. It increased the prominence and prevalence of interventions rather than restorative care, emphasizing the provision of medical rather than social assistance. It also increased the number of patients with open wounds in the hospital, and that increased the problem of hospital diseases.⁸⁴

Space for Clinical Education and Pathological Research

Medical advancement was a valued by-product of philanthropic hospital care, and a hospital that included spaces relevant to medical education had a competitive advantage in attracting the most eminent doctors. Nevertheless, most early American hospitals held few spaces devoted to medical education or research. In the early nineteenth century, formal medical schools were few in the United States, and medical education was largely by person-



al arrangement—an established doctor would take on students as a form of apprenticeship. Medical students attended lectures and completed a series of readings; they might become doctors without ever touching a patient. Many American medical practitioners finished their education in the hospitals of Paris, which practiced “clinical medicine,” whereby the patients were grouped by specific ailment as well as gender and doctors learned through hands-on experience at the bedside and in the morgue. Upon their return to the United States, the young American doctors advocated the adoption of clinical medicine in American hospitals; this presumed the addition of medical research and education facilities to the hospital. Dr. John Watson, a New York surgeon, outlined the necessary conditions for such a medical “clinic”: enough patients (living and dead) to study; convenient apartments for examining and treating those patients; special apartments for conferences, consultations, and operations; and a room for postmortems and pathological investigation.⁸⁵

The wards could readily accommodate bedside instruction, since where there was enough “air space” for patients, there was room for a doctor and a number of medical students around a bed. Spaces for conferences and consultations were less available. The common practice of assigning all the patients in a given ward to one doctor (to minimize the doctor’s travel time on rounds) made hospitals into places where a number of medical practitioners practiced but did not necessarily interact or collaborate. The students’ hospital experience often consisted of watching one doctor treating a number of patients with a wide variety of ailments. It showed medicine as an individual practice. This territoriality was not absolute, and collegial interactions did occur. At the Boston City Hospital, many of the hospital’s doctors met on Sundays and visited the patients together.⁸⁶ Neutral hospital spaces in which doctors could interact without this territoriality were sparse; medical conferences and consultations were at best held in borrowed boardrooms or in the surgical amphitheater (if available).

With the growing demands of clinical medical education, amphitheatres grew much larger and more spatially complex. The Pennsylvania Hospital’s amphitheater could seat more than five hundred; in 1870 the Cincinnati General Hospital’s could seat six hundred; in 1873 the University of Pennsylvania Hospital’s could seat seven hundred. Bellevue Hospital’s new amphitheater in 1871 reportedly provided eight hundred seats and included adjacent rooms for consultation and studies. The administrators of the much smaller Hahnemann Hospital and Medical College of Chicago planned to erect an amphitheater in 1873 that would seat roughly three hundred students and contain “separate ante-rooms, cloak- and dissecting-rooms for male and female students” as well as a laboratory, museum, li-



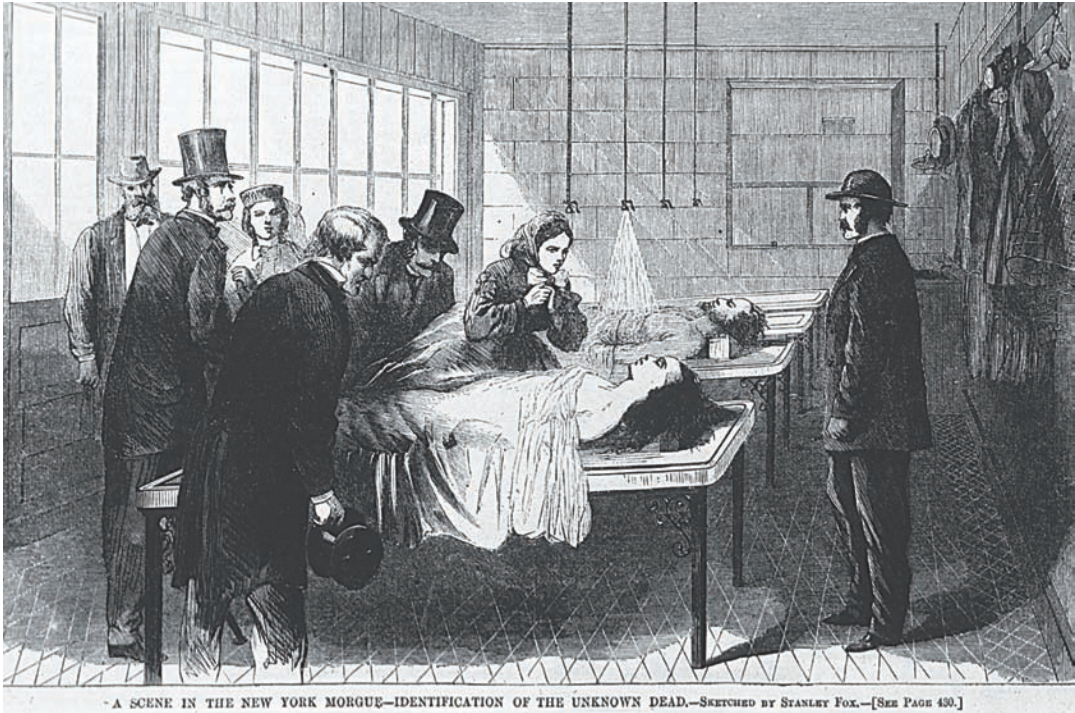


Figure 1.28. Bellevue Hospital, New York City, view of morgue, 1866. The morgue or dead house was a part of every hospital but rarely depicted either on plans or in drawings. In this view, the bodies are arrayed for viewing and identification, but the space would also have served for pathological dissections, and included overhead water fixtures and hygienic materials to facilitate cleaning afterward.

brary, lecture room, and offices.⁸⁷

Clinical medicine also made pathological research a crucial component of medical study and advancement. Hospitals were one of the few places where such study was possible—the unclaimed hospital dead were subjects for dissection. Given the strong public antipathy to dissection (and the graverobbing with which it was associated), a dedicated space for pathological examination was a rarity for the earliest American hospitals. Most hospitals did contain a “dead” house for the temporary storage of bodies (claimed and unclaimed). In the earliest American hospitals these were cramped facilities, usually outbuildings of rough structure and few amenities. They were not conducive to the pathological research suggested by clinical medicine.

After regular pressure from the doctors, hospital administrators did begin to build more elaborate pathological facilities—morgues, autopsy rooms, pathological museums, and laboratories—for research. The New York Hospital’s governors added a separate dead house with pathological



facilities in 1840, and Bellevue Hospital's directors added a separate structure to house Dr. James Rushmore Wood's pathological museum as well as pathological facilities. These were still typically separate outbuildings, but they could include airtight cooled storage space, extensive ventilation, easily cleaned and waterproof finishes, dissection tables, pathological museums, and laboratory research space. Most hospitals added such pathological facilities in separate structures, unattached to a ward.⁸⁸ Even when included in hospital buildings, these spaces for medical education and research remained a minor spatial component of the hospital. Wards still constituted the majority of a hospital's floor area.

Dispensaries

Dispensaries, which provided routine "outpatient" medical care at minimal cost, first appeared as standalone institutions, an alternative to hospitals. The most successful dispensaries served hundreds of patients per day, and inevitably many dispensary patients presented ailments that were not routine or that required more extensive or more elaborate treatments than could be provided by outpatient visits. These patients were ideal candidates for hospital treatment. Many dispensaries, however, had no space for beds. In those cases, the dispensary physicians (often volunteers and medical students) might refer the nonroutine patient to a nearby hospital. After sufficient interaction, that practice might become a formal affiliation between the institutions. As the benefits of a steady supply of preselected medically appropriate patients became obvious, dispensaries became integral components of hospital practice by the mid-nineteenth century.⁸⁹ The attachment of dispensaries to hospitals also altered the admission practices of many hospitals—placing greater emphasis on the applicant's medical conditions and reducing the influence of personal interviews with administrators.

Dispensaries had minimal interior spatial requirements—a large waiting room, perhaps a few consulting and examination rooms opening from it.⁹⁰ Clearly, a small nearby operating or procedure room was beneficial, but in many dispensaries small partitions within a single large space were all that separated the patient undergoing examination and treatment from the rest of the patients waiting their turn.

Where to locate a dispensary in the hospital facility was complicated. By their very nature, dispensaries attracted large numbers of persons with a wide variety of ailments. This constituted a real danger of infection for the hospital's patients and meant that dispensaries could not simply be inserted in one of the ward pavilions. The volume of traffic to and from the dispensary, as well as its role in generating patients for admission to the hospital,





Figure 1.29. New York Eye and Ear Infirmary, New York City, dispensary waiting room, 1875. The dispensary was waiting room, examination room, and treatment room all in one.

also made a location near the entrance, and if possible, just outside the hospital's walls, desirable.⁹¹

Spaces of Religion and Reform

At a time when a hospital's charitable role in providing moral reform to its patients was as important as its role in physiological healing, religious spaces in hospitals could be as elaborate and prominent as medical spaces. In the 1860s Saint Vincent's Hospital in New York City had no operating room or pathological research facility, but even its severely overcrowded facilities held a small chapel. Saint Luke's Hospital in New York City initially included two hundred beds, but no operating rooms, amphitheater, or pathological space. Its chapel, on the other hand, could accommodate 350 persons. While denominational hospitals were the most likely to include religious facilities, even municipal hospitals made space for religion—Bellevue Hospital in New York City and Charity Hospital in New Orleans had chapels, for example.

The wards themselves were, to a certain extent, conceived as “religious”



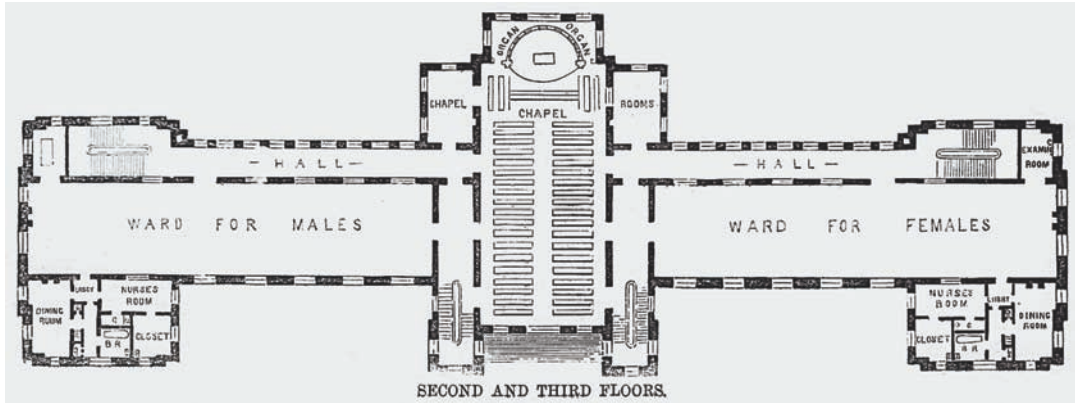


Figure 1.30. Saint Luke's Hospital, New York City, third-floor plan, 1860. The enclosed halls that led from the chapel to the wards allowed patients in bed to hear the services, but were later criticized for their interference with natural ventilation.

locations, where reform was as likely to happen as cure. The founders of the Hospital of the Protestant Episcopal Church in Philadelphia hoped that the hospital would be remembered not just for bodily relief “and a record of ‘discharged cured[.]’ in the common phrase,” but also for sending patients home with religion, virtue, and an awareness of the value of health. At Saint Luke's Hospital in New York City, reading of scriptures occurred in the wards every morning and, in a flashback to medieval and Renaissance hospital designs, the building was “so arranged that the wards could open, by means of doors or windows at their termination, into the chapel” so that all patients could hear the service from their beds.⁹²

Not all of the hospital's potential for reform was didactic; some was built into the hospital environment. A common assumption of the time was that the quality of an inhabited space and the health of its inhabitants were linked. Poor neighborhoods, where the inhabitants lived in dark, crowded, and often dirty or rundown dwellings, often experienced the greatest incidence of illness in the waves of early nineteenth-century epidemics—yellow fever, cholera, typhus, typhoid fever. The wealthier neighborhoods, with sparsely inhabited buildings on large landscaped lots, were less often overtaken by illness. The hope, at least for hospital founders and designers, was that removing the sick poor from their impoverished (cramped, chaotic, dirty) surroundings and placing them in a well-designed (spacious, orderly, clean) hospital ward, would itself be an active reformative influence.

One observer's description of Roosevelt Hospital is telling:

When we speak of cleanliness, we do not mean that order of cleanliness which satisfies us in a well-kept house, but that peculiar kind which never rests, where floors are polished, as if waxed, walls without a fly-speck, windows which look as if they were paneless, from the perfect transparency of the glass, where the sunbeams slant toward the floor in long bars of light through an atmosphere too pure to contribute gyrating atoms of floating matter large enough to catch the eye—a painful sort of cleanliness, which makes a visitor feel uncomfortable, regret that he didn’t rub his boots better on the mat, that there should be dust on his hat and coat, and which makes him walk daintily and noiselessly, as if he were in a church and knew how to behave himself there, as a great many people don’t.⁹³

This complex interweaving of architecture, faith, and health defined the nature of the ward.

The Social and Medical Shape of Patient Spaces

The hospital ward was the most distinctive space within any early American hospital. It was also the most standardized. From the eighteenth century to the mid-twentieth century, whether in a hospital of ten beds or a thousand, a ward was a narrow, rectilinear, well-ventilated room with lots of windows and two rows of widely separated beds facing each other across a central aisle. Up to the 1850s ward shape could vary from square to exceedingly narrow rectangles. By the 1860s, with the solidification of pavilion-ward standards, variations diminished and the difference between a ward in a large municipal hospital and one in a small, voluntary hospital might be perceptible only in ceiling treatment or light fixture design.

The standardized ward was the result of architectural hygiene but also of efficient “moral” nursing care. The large open room provided the necessary cubic air volume and free flow of air but also allowed direct nurse oversight of each patient. The narrow width and long walls full of windows maximized natural architectural ventilation and left no dark corners where patients could hide illicit behaviors. Having the patients face into the ward put the patient’s head adjacent to the supply of fresh air but also facilitated nurse supervision, allowed direct physical access to the patient on both sides for examination or treatment, and prevented the patient’s exhalations and excretions from coating the adjacent walls. To minimize the chance of one ward sharing air with other rooms in the hospital, there was only one entrance into the ward; this typically passed by the nursing service rooms





Figure 1.31. Bellevue Hospital, New York City, ward interior of Sturges Pavilion, 1893.

(scullery, office, diet kitchen, etc.), giving the nurse immediate awareness of the comings and goings on the ward.⁹⁴

A ward designed for efficient nursing was not always efficient for the hospital's social or medical structure. Optimum ward size was determined by the number of patients one nurse could oversee—in the mid-nineteenth century that was roughly twenty to thirty. These large wards were inefficiently sized for medical and social categorization. The ideal was to house one patient category per ward, but it was rare for any hospital to have twenty or thirty patients of exactly the same category at any given time. Empty beds were inefficient and costly and many hospital administrators regularly assigned patients to beds based on availability rather than ward categories. "Mixing" patients of different categories in one ward created social disorganization, complicated medical assignments, and increased the likelihood of cross-infections.⁹⁵

Compounding the problem, hospital patient categories grew increasingly numerous and specific. According to John Green in 1861, in addition to the four primary patient categories (male medical, male surgical, female



medical, female surgical), hospitals also required wards for infectious diseases, venereal diseases, ophthalmic cases, ward patients requiring exclusion (delirious or dying patients), “foul” wards (for patients with unsavory symptoms), and wards for lying-in women.⁹⁶ Wards for burn victims, syphilitics, delirium tremens sufferers, accident (emergency) cases, dermatology sufferers, and convalescents also occurred. Many of these new categories were for patients with socially stigmatized ailments (venereal diseases) or medically unpalatable ailments (skin diseases); putting these patients in separate wards served to maintain the moral tenor of the large ward. Only the largest hospitals, typically the municipal hospitals, included enough large wards to accommodate such extensive categorization.

Hospitals of all sizes could accommodate more numerous patient categories, however, if the wards were smaller. Nightingale had promoted the provision of a small room adjacent to a large ward that could house dying or disruptive patients. By the 1860s most American general hospitals included, in addition to such accessory wards, at least a few small wards; specialized hospitals might include mostly smaller wards. The Presbyterian Hospital in New York City included a mixture of ward sizes, including twenty-eight-bed wards, twelve-bed wards, two-bed wards, and one-bed rooms. The New York Eye Infirmary in 1856 held a mix of twelve- and four-bed wards.

In smaller wards the ward design could be tailored to the needs of the specific patients. In this way, smaller wards often deviated slightly from the standardized rules of pavilion-ward design. For example, children benefited from the provision of play space and more cheerful ward finishes than the omnipresent white, while eye patients needed “to be kept in a darkened room.” These “special” wards could also accommodate special accessory spaces. At the City Hospital in Boston, the eye ward had an ophthalmoscope room, physicians’ examining room, and several “private” rooms and wards adjacent. These special wards were also valuable for nosological studies and the advancement of medical specialties—they created an opportunity for the doctors and nurses to study a single ailment as it occurred in a number of patients and to provide more disease-specific care and treatment.⁹⁷

Which categories of patients occupied exactly which wards within any given hospital was the result of a complex social and medical spatial calculus. Typically, the larger, more general categories occupied the large wards; smaller, more specialized categories occupied the smaller wards. Accident wards were typically on the ground floor, near the hospital’s entrance, for ease of emergency patient delivery. Ophthalmic cases in general hospitals often occupied a basement ward because the rooms were easier to darken. Socially marginal patient categories frequently occupied spatially marginal wards within the hospital. Delirium tremens or “insane” cases often occu-



pied basements, as the solid foundation walls blocked the sounds of agitated patients and the remote location minimized others' awareness of their disturbing behaviors. Patients of color, if admitted to a hospital, were typically assigned to the most remote or least desirable ward space in a facility. All of these ward categories were typically interchangeable. The New York Hospital regularly reassigned wards to different services based on the number of patients admitted and the number of doctors requiring a ward of their own. As early as the late eighteenth century, however, two categories of patients—those requiring isolation and those paying for all or part of their stay—were regularly assigned to separate, specially designed wards that could not be reassigned to other patient categories.

Isolation Wards

Isolation wards served two different purposes—to protect vulnerable patients from the hospital diseases of the general wards and to separate patients with infectious diseases from the rest of the hospital. Removing the patients most prone to hospital diseases (lying-in patients, surgical patients, fracture victims, and amputees) from the suspected infectious air of the main hospitals was a preventive strategy. Wards for these patients ranged from the “maternity cottage” at the New England Hospital for Women and Children in Boston to the Osborne Pavilion at Bellevue Hospital—an elaborately ventilated, one-story isolation ward for “cases in danger of septic poisoning or infection.”⁹⁸ These separate pavilions were typically of traditional pavilion-ward layout, but built with extra ventilation technologies or features that maximized the inflow of fresh air.

The removal of patients with known infectious diseases from the general wards into separate infectious wards was crucial to limiting disease within the main building. Because most voluntary general hospitals had rules excluding patients suffering from infectious diseases, a majority of hospital facility plans included no initial provision for separate infectious disease wards. In practice, patients often entered the hospital with latent infectious diseases that manifested only after admission, or acquired an infectious disease during their stay. If left in the general wards, these patients could infect the entire building and its occupants.

Typically, soon after the opening of a new hospital facility, ad hoc “isolation” facilities—tents, huts, shacks, and simple outbuildings—were added to the grounds. These structures could be surprisingly complex. In 1876, the directors of the Presbyterian Hospital in New York City built a one-room, twenty-foot-square structure that came to be called the “Hut.” It had room for two patients and a nurse but had an elaborate structure consisting of a

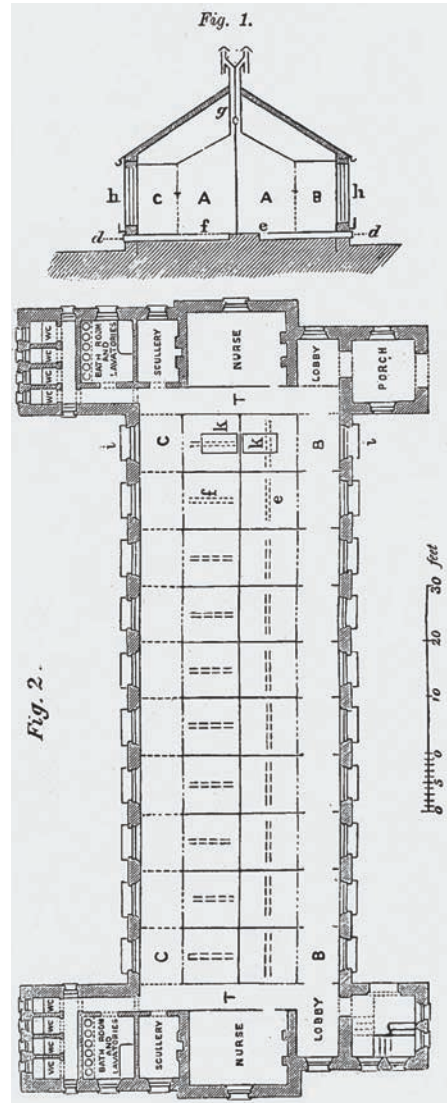


Figure 1.32. Isolation Ward, Henry Greenaway, 1875. The section shows the underfloor supply ducts to the individual cubicles and the individual exhaust ducts from the ceiling. The shared bathrooms and common sculleries reveal the minimal concern about daily physical objects (plates, utensils, linens) as carriers of disease.

double wooden wall, an air space between the floor and the ground, and air ducts running beneath the floor.⁹⁹

Within these isolation facilities, patients with various infectious ailments might be intermixed. This was a known problem, but typically isolation structures were built with extra ventilation that was expected to dilute the air sufficiently to prevent cross-infections. In 1872 Henry Greenway proposed an alternate isolation ward design to eliminate this danger. In plan, his ward appears startlingly modern—it comprises numerous separate glass cubicles within a large, traditional pavilion ward. Greenway, however, intended the cubicles to maintain aerial (rather than physical) isolation between patients. Individual supply and exhaust ducts to each cubicle ensured that there would be no sharing of air.¹⁰⁰ The patients would even be allowed visitors, as they could remain in the hallway and see and talk to the patient without breathing the same air.

Sufferers of the most feared infectious diseases (e.g., smallpox or cholera) often were sent to separate, disease-specific “isolation” hospitals. Cholera hospitals were linked to the incidence of the disease; they appeared during epidemics and disappeared as incidence waned. Smallpox had a more constant rate of incidence, and consequently smallpox hospitals were often permanent institutions. These isolation hospitals could include complex precautions to keep the disease from escaping. In New York City, worries that “the hot and poisoned air” of the Reception Hospital for smallpox victims (which was in the densely inhabited Lower East Side) “passed away unrefined and deadly, endangering any citizen who might inhale it,” prompted the city to construct a new facility that included extensive aerial



containment and purification mechanisms. Sealed wagons drove directly into the building's hallway, where the smallpox victim could be unloaded behind closed doors with no escape of air. In the wards, the windows remained closed and "air-tight"; yet each patient received 1,800 cubic feet of fresh air hourly through "holes in the wainscoting near the floor" next to each bed. The air was then drawn into a huge central furnace set on perforated iron plates above the floor, where it was "burnt up and purified, and once more enters the general atmosphere, perfectly harmless and uninfec-tious."¹⁰¹ This system controlled not only the flow of the air within the room but the quality of the air returned to the larger environment as well.

Housing Paying Patients in a Charitable Institution

If the separation of patients into various medical categories supported variant ward designs, the admission of paying patients (a distinctively American innovation in hospital practice) created a whole new set of spatial problems. While European hospitals were almost entirely charitable institutions, the founders of even the earliest eighteenth-century American hospitals conceived of them as flexible aid institutions, not full charities. Every patient was expected to pay what he or she could afford, and noncharity patients were welcome to apply for admission. Even as early as 1754, the organizers of the Pennsylvania Hospital noted that after the hospital had accommodated all the charity patients it could afford, "the Managers shall have the Liberty of taking in other Patients, at such reasonable Rates as they can agree for."¹⁰² The admission of part-charity patients and "private" patients (those who paid the full cost of their care and at times more for luxuries) altered the very nature of the institution, and accordingly its architecture.

In a study on hospital design commissioned by the managers of the Massachusetts General Hospital, Charles Bulfinch commented that hospitals might attract not just the poor or those without families but also "persons from the country who are able to pay, and who are afflicted with maladies which require the attention of the best medical or surgical practitioner and such advice as cannot be obtained at their homes." In 1865 the directors of the Jews' Hospital in New York City similarly observed that their paying patients were "induced to enter the Hospital by the desire of being treated by the medical and surgical staff of the Institution."¹⁰³ This foregrounded the hospital as a location of expert medical treatment, not just philanthropic care.

Starr has observed that the location of medical care influenced the relative power of patient, doctor, and other parties. In the late eighteenth and early nineteenth centuries, the norm was for doctors to make house calls



to their “private” patients. The doctor was a service provider, performing his examinations in an environment completely controlled by the patient. The provision of medical care in the hospital, however, made the patient a seeker of, or even applicant for, a doctor’s attention in an environment controlled by the doctor.¹⁰⁴ This shift has been much discussed in modern times as a factor in the medicalization of society, but in the mid-nineteenth century the question this change raised for hospital designers was how to house “private” patients in a charitable institution.

European hospital design precedents were predicated on housing poor sick persons. The light, clean, spacious, orderly ward was a class-specific design; it offered the architectural antidote to the dark, dirty, crowded, disorderly tenements. With Nightingale’s addition of a respectable professional “lady” nurse in charge, the charity ward became a premier location of moral, social, and religious as well as physiological improvement. The administrators of Saint Luke’s Hospital in New York City noted how “an atmosphere of propriety settles on a man after he has received his first dose of medicine from the hand of a lady, which does not come before, nor leave him while there. Men bring to light the tatters and shreds of a gentility almost lost. Those who were filthy, somehow become neat; those who were boorish, acquire a tinge of the gentleman.” Martin Pernick points out that this expectation of “environmental-moral therapy also played a major role in promoting the growth of hospital care, especially for those patients judged to be medically, economically, or morally incapable of improving their living conditions themselves.” The large ward was thus an environment meant to promote the adoption of specific socio-moral habits—cleanliness, order, respectability, and obedience—by the poor, unfortunate, or dissipated.¹⁰⁵ Reform-minded visitors (clergy, society ladies, philanthropic individuals) regularly mined the patients for possible listeners and converts. This made the large ward a socially inappropriate space for the care of people of means.

Bringing private patients into the hospital entailed developing a new patient space. If private patients were “unwilling to be associated with the promiscuous classes, that are found in the Public Ward” they were “willing to pay a higher rate of board for the privilege of entering” smaller rooms or wards. Charles Bulfinch’s plans for the Massachusetts General Hospital included just such a number of smaller wards.¹⁰⁶

Private rooms quickly proved even more appealing than small wards. By 1843 the Pennsylvania Hospital had twenty-six private rooms and several larger apartments in a separate wing. By 1851 the Massachusetts General Hospital’s governors were contemplating adding a new wing exclusively for paying patients with separate rooms rather than wards. In 1859 the administrators of Saint Vincent’s Hospital in New York City, in debt





Figure 1.33. Bible and Fruit Mission to the Public Hospitals, New York City, 1879.

from recent building alterations and enlargements, provided a number of private rooms in some nearby recently purchased houses as a means of generating some income. Private patients flocked to Saint Vincent's houses, and the hospital managers soon found themselves solvent. The success was at least partially due to the unusual physical arrangement. The separate private patient houses meant that the wealthier patients did not have to endure the "social odium" that "ever attaches itself to the beneficiaries of such an institution, however virtuous and estimable the afflicted may be."¹⁰⁷ It also put them in surroundings of domestic scale and detail, making the private hospital patient's experiences a closer approximation to home care.

The financial success of Saint Vincent's private patient rooms was widely known in hospital circles, and widely coveted. In the 1860s administrators of existing hospitals without private patient rooms struggled to find space for them; administrators of hospitals with private rooms struggled to make them more attractive. A majority of the newly built American voluntary hospitals in the 1860s and 1870s included facilities specifically designed for private patients. Some were luxurious. The new Mount Sinai Hospital in New York City included nine private wards with "closets, bath-rooms, lavatories and nurses rooms" and four private wards with bathrooms. Even municipal hospitals, such as the City Hospital in

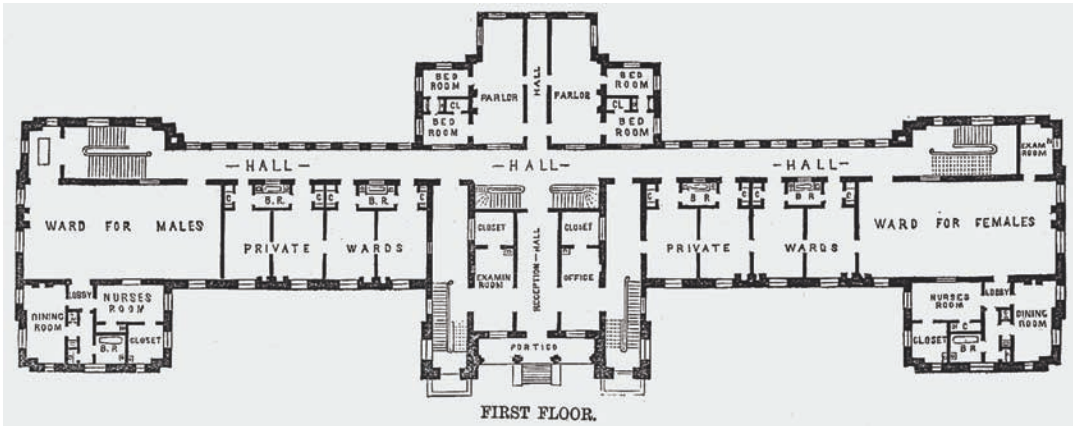


Figure 1.34. Saint Luke's Hospital, New York City, first-floor plan, 1860. The varying ward sizes—private rooms (with private bathrooms) and small wards on the first floor and large wards on the upper floor—provided a range of spaces to correspond with the ability of the patients to pay for all or part of their stay. This plan also reveals the two kinds of examining room—one immediately off the ward to provide privacy and one off the main entrance to accommodate the interviews and diagnostic exams necessary for applicants to prove worthiness for admission.

Boston and the Cincinnati General Hospital, included separate rooms for paying patients.¹⁰⁸

A number of hospitals even developed a three-tier sociospatial division of patient rooms. At the Cincinnati General Hospital, the paying rooms were divided into large wards for the poor, a few smaller wards for the moderately wealthy, and private rooms for those “who may prefer to be entirely isolated from all other patients, and who are able to pay for the extra accommodation.” Carl Pfeiffer’s design for the Roosevelt Hospital and German Hospital in New York City and Otto H. Matz’s design for the Alexian Brothers Hospital in Chicago included a similar three-tier system. At the Woman’s Hospital in New York City, free patients occupied the fourth floor, part-pay patients the second and third floors, and full-pay patients the first floor.¹⁰⁹

Ongoing large-scale urban transformations fueled this rapid increase in private patient facilities. The general economic prosperity of the 1860s gave more people the ability to pay for a hospital stay. Urban growth and density made for smaller houses and an increasing proportion of renters rather than owners; this left little room for home care for the sick, and some uncertainty of tenure for tenants with long illnesses. Diminishing household size left fewer available family members or servants to provide the necessary home care. At the same time, hospitals were gaining a reputation as an “af-



fordable” location for getting top-shelf medical care, since doctors did not charge medical fees to hospital patients.¹¹⁰

Hospital historians such as Charles Rosenberg, Annmarie Adams, and David Rosner have emphasized the early twentieth century as the turning point in the private patient revolution and the transformation of hospitals into all-class institutions. While private patient service clearly constituted a very small proportion of hospital care in the early to mid-nineteenth century, the architectural record of the availability and growth of such private patient facilities in hospitals indicates that the timing of the transformation might be more complex. Whether these private patient facilities were built to meet demand or to create demand is unclear. Similarly, the availability of private patient facilities did not guarantee use by paying patients. In Saint Luke’s Hospital, the first-floor private patient rooms remained empty and were quickly turned over to house the sisters who provided the nursing in the hospital. In general, evidence indicates that private rooms in hospitals in the 1860s were well used. The private rooms in the Cincinnati General Hospital were in such demand that in 1871 the hospital directors turned two large wards into twenty-four private rooms and by 1873 had opened an entire pay department of thirty rooms “comfortably and neatly furnished” in which “each patient is at liberty to employ any physician he or she may choose.”¹¹¹

Private patient facilities were always an economic gamble. Even with the common expectation that paying patients provided income that could subsidize charitable care, for a charitable institution to spend its limited funds on facilities for the well-off was risky. Saint Vincent’s Hospital’s initial success was the shining example, but it was a fleeting success. The supply of private patient rooms soon outpaced demand. After the economic panic of 1873, fewer people had disposable income—Bellevue was full to the brim with charity patients while private patient rooms and voluntary hospitals that required all patients to pay something for their stay had empty beds.¹¹²

Given the common belief that bad air caused disease, early American hospital building designs emphasized ventilation and air space over functional adjacencies and patient density. The earliest of American hospitals occupied facilities with multiple, interconnected wings that housed a variety of spaces in a variety of arrangements. By 1861 Thomas C. Amory, the chairman of the committee of the City Council on the Free City Hospital of Boston, could state that the pavilion-ward plan was “universally conceded to be the true basis of a successful arrangement of any large or general hospital.”¹¹³ Thousands of Americans of all classes experienced hospital care for the first time in Civil War military hospitals, which were pavilion-ward



plans. After the war, pavilion-ward hospitals were founded, built, and operated in cities across America even though the distance between pavilions caused exorbitant construction costs, made it difficult to deliver warm food to the patients, reduced the chance of informal medical interactions, and forced staff to walk miles each day. Hospital administrators and medical practitioners tolerated these difficulties because they believed that the open space between pavilions was crucial to reducing the spread and incidence of airborne hospital diseases. The building itself was understood to be therapeutic.

The mid-nineteenth-century American pavilion-ward hospital facility enclosed an unresolved conflict. Whether a hospital was a philanthropic, reformative institution or a pay-what-you-can medical institution was legible in the extent to which its buildings did or did not include non-ward spaces. A hospital comprising large wards and little else was an efficient location of charitable, reformative, and medical care. A hospital with private patient rooms and facilities for medical education and practice had the potential to become an all-class location for the efficient practice of elite medicine.

Most mid-nineteenth-century hospital designers initially planned facilities with an administration building and several large ward pavilions. The architecture of the wards was an established certainty, a standardized structure determined by hygienic necessity. A ward in New York City might be nearly indistinguishable in interior plan and details from one in Cincinnati. Soon after construction, however, hospital administrators often acceded to the demands of their medical practitioners, nurses, and prospective private patients and added non-ward spaces in unplanned wings, additional stories, or separate pavilions. The location and design of these ancillary spaces was an open question, requiring constant innovation. That innovation occurred in the shadow of fears that poor design decisions would increase disease rates, and had to fit within the physical limitations of the pavilion-ward envelope of low-rise, narrow, widely separated buildings.

