Current Trends in American Healthcare Architecture

Abstract

Healthcare architecture in the United States is currently experiencing a period of considerable uncertainty. National healthcare reform legislation, to take full effect in 2014, will have certain unforeseen consequences. Many hospitals and clinics will see a surge in new patients while others will likely see a decline. Ten trends are outlined that are currently shaping healthcare facilities.

Key words

Current trends, Healthcare facilities, Sustainability, Ecological design, United States

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一、现代主义风格医院、诊所的消失

数以百计建于 20 世纪中期的现代主义风格的美国医院已经或正面临被拆除的威胁。遗憾的是，并没有全国性的数据持续关注这一趋势，这些医院在使用超过 50 年的医院、诊所和疗养院中被拆除。新的医疗设施被大量建造以替换旧址。然而同一时期，人们开始从生态资源保护的角度考虑那些被轻易认为可拆除后，年份久远的现代主义医疗设施能否在更新、改建成适应新的医疗模式。

美国医院协会（American Hospital Association）所列出的美国现有医院总数为 5,754 家。到2020年将会减少 10%，即1,759家左右。2010年美国新建医疗设施的总造价为 625 亿美元，翻新项目总造价为 289 亿美元。经过对新建工程的研究发现，医院工程数量总计比其他医疗建筑类型要多 22%。未来 3 年内，将增加 23% 的急诊科、20% 的影像部分、外科手术部门也将有 15% 的新建设量。

一个令人遗憾的案例是，新奥尔良卡特里娜飓风（Hurricane Katrina）后，在历史保护者和医院管理层之间出现了一场为挽救当地历史悠久的慈善医院的激烈斗争。路易斯安那州立大学健康科学中心（LUSHSI）决定启用位于市中心商业区，建于 1938 年，带有装饰艺术风格的 900 床的老医院，而在旧城旁建立一个全新的 340 床的医院。医院官方声称这座建于 1938 年，建筑风格为新艺术运动的单层医院将耗资 6000 万美元。但被认定为这座历史遗迹的修复进行可行性研究，以确定能否重新投入使用。位于费城的 RMJM Hillier 建筑设计公司主持了这次预可行性研究。在其 2006 年 5 月提交的长达 200 页的报告中论述了如能利用慈善医院则可比现在更好地运行而不需要花费 LSUSHC 提议的在市中心之外重建医院一半造价的方案。这番围绕着这座医院命运的争议继续在之后的一年中未间断，重建新医院的主张一直压制着历史保护主义者的主张，最终，来自西雅图的 NBUBJ建筑事务所设计的医院于 2014 年建成并对外开放。最终，虽然重新使用老医院应该可以在 LEED 认证医院项目的要求下实现远低于新建工程造价，同时实现保护历史的价值目标。但事实未能如愿，这座建于 20 世纪中期的医院将被废弃。这次灾难意味着城市失去了第一次在文化史和建筑史上实现价值保护的机会，失去了这个新奥尔良几代人喜爱的公众标志。

二、门诊设施日渐增长的需求

1983 年后，随着“税收公平和财政政策法”（Tax Equity and Fiscal Responsibility Act，TEFRA）和“诊断相关组”（diagnosis-related group，DRG）医疗改革法案的制定，美国医院开始从昂贵的住院治疗向相对低廉的门诊护理和治疗的模式转变，门诊医疗设备得到快速发展，转型的目标在建设可行的，以预防为主的诊断和治疗方法，同时显著减少住院时间（average length of inpatient stay, ALOS），自 1983 年大幅度调整以后，全美范围内的住院平均时间大幅下降，门诊服务转移进程中，一系列全新的独立社区诊所涌现出来。大多数这样的诊所单层楼面积不超过 10,000 平方英尺（929m²），很少散布于城郊社区内。2008 年以来美国经济的
1. 位于林肯大道的橡树庄园（Oak Tree）项目
2. 格雷厄姆-史密斯-帕金斯律师事务所的律师
3. 2010年林肯大道的橡树庄园
4. 格雷厄姆·史密斯·弗兰代尔律师事务所

创新 nfl 电力的影响力和门诊的未来发展。
四、验证研究设计和目的陈述

验证研究设计和目的陈述，如EBA (Evidence-Based Practice), EPISO (Evidence-Based Practice for Social Innovation)和Cystoscopy (Cystoscopy for Prostate Cancer)等，旨在提高研究的可靠性和有效性。这些研究设计在临床研究、卫生经济和政策制定等领域具有重要的应用价值。为了确保研究设计的准确性和一致性，研究者通常需要遵循严格的实验设计原则，包括随机分组、双盲和对照实验等。这些原则有助于减少偏倚，提高研究结果的可重复性和科学性。
六、医疗旅游

这一页的文字内容涉及到医疗旅游的相关服务和设施。医疗旅游的概念是近年来逐渐兴起的新型旅游方式，它将医疗与旅游相结合，为患者提供了一个既治疗疾病又能享受旅行的平台。医疗旅游不仅受到了国际旅行者的欢迎，也成为了现代医疗保健服务的一种新型模式。通过医疗旅游，患者可以享受到更优质的医疗服务，同时也能够体验到异国文化，丰富了旅行的内涵。医疗旅游产业的发展不仅有助于促进国际交流，也有助于推动医疗服务业的创新和发展。
Changes are an accepted fact of life in American healthcare. The U.S. population continues to grow and an expanding population exerts new pressures on the nation's healthcare facility infrastructure. Many hospitals and healthcare organizations, and especially those in the private sector, are uncertain at this time as to whether to expand, renovate their existing facilities, or to build completely new facilities. Much of this uncertainty is attributable to coming changes to the healthcare industry in the wake of national healthcare reform legislation. This recent legislation, the federal Health Care Act of 2010, takes full effect in 2014. Healthcare organizations in both the for-profit and the governmental sectors are uncertain as to the full ramifications of this new law. Will this result in an influx of newly insured patients into this system, therefore causing excessive strain on existing facilities? Will these new patients be re-distributed disproportionately from public facilities to private facilities, or will the opposite occur? No one is certain as to what will happen, but regardless, as many as 31 million more Americans will have at least a minimum level of health insurance by 2014 and there are certain to be many unforeseen ramifications. At present, there are more than 48 million Americans without any form of health insurance. Against this flood of change, it is a challenge to attempt to predict with any degree of precision the future beyond 2014. With this disclaimer staked out upfront, the following are front line trends in American healthcare architecture in 2012: 1. The Loss of Modernist Hospitals and Clinics. Hundreds of mid-20th century historic modernist American hospitals have already been demolished, or are under threat of demolition. Unfortunately, no national statistics are kept on this trend. Demolishments of hospitals, clinics, and nursing homes have been occurring nationally for over fifty years as new facilities have been built to replace aged facilities in all fifty states. Yet at the state level, the trend is clearly visible. Hospital Milestones 2009-2010 for New York City, 2011 Edition highlights the continued erosion of the hospital landscape in this major Northeastern city. 2. The Accelerated Demand for Outpatient Care Facilities. Outpatient healthcare facilities in the United States proliferated after 1983, following the enactment of TEFFRA and DRG healthcare reform legislation that shifted U.S. hospitals away from costly inpatient care to less costly outpatient care and treatment. The aim was to establish a sustainable, prevention-based diagnostic and treatment alternative and to do so significantly reduce the average length of inpatient stay (LOS). The result has been that the ALOS in the U.S. decreased sharply, nationally, since 1983 across the spectrum. Along with the shift to outpatient care, a wide array of new healthcare facilities emerged—many of these clinics were one-level in height and less than 10,000 square feet. Many outpatient clinics opened in shopping center and suburban communities. Most recently, the national downturn in the American economy in 2008 resulted in the abandonment of many shopping malls and other commercial facilities. These "dead malls" have proven to be ideally suited for conversion into outpatient care facilities. One Hundred Oaks, in Nashville, was the first enclosed shopping mall built in 1968, a few miles from the business district and Vanderbilt University (Figure 1). Plagued by retail space on a 50-acres, the mall was dead by 2006, yet another cause, and its economically dire condition. Despite naysayer's wisdom of adapting a dead healthcare facility, that is exactly what Health diagnostic and treatment center did. With the help of Smith and Partners, it was converted into a 145,000 square feet building. The 24/7 medical center, with a staff of 100, operates around the clock. The site plans also included a 47,000 square feet of office space. 3. Home-based Care and Rehabilitation. For much of the 20th century, the center of healthcare in the United States was the hospital. Now, the center of the healthcare delivery system has shifted to the home setting. Home care services are now offered by a variety of providers, including traditional home health agencies, home health care companies, and nurse practitioners. In many cases, the services are provided in the home setting. In other cases, the services are provided in a skilled nursing facility or a long-term care facility. The trend towards home-based care has been driven by a number of factors, including the aging population, the high cost of hospital care, and the desire for patients to have more control over their own health care. The shift towards home-based care has also been driven by advances in technology, which have made it possible to provide more medical care in the home setting. For example, telemedicine allows doctors to monitor their patients' health remotely, and home health care agencies can use electronic health records to track patients' progress. The shift towards home-based care has also been driven by changes in the healthcare landscape. In recent years, there has been a move away from hospital-based care towards more outpatient and home-based care. This trend has been driven by a number of factors, including the increasing cost of hospital care, the desire to provide more convenient care for patients, and the development of new technologies that allow care to be provided in the home setting.
encompassed shopping mall built in that city. It opened in 1968, a few miles from the downtown central business district and Vanderbilt University’s main campus (Figure 1). Featuring 660,000 square feet of retail space on a 56-acre site, and 4,000 parking spaces, the mall was declared “dead”, i.e. vacant, by 2006, yet another casualty of the poor economy and its economically diminished surrounding neighbor-

hood. Despite naysayers who questioned the wisdom of adapting a dead shopping mall into a healthcare facility, that is exactly what Vanderbilt Health did. With the help of architecture firm Gresh-

smith, Smith and Partners the mall was repurposed into a 450,000 square foot medical center, now home to 22 specialty clinics as well as a pharmacy, imaging suites, and labs, all housed within a LEED-
certified enclosure. One-forum parking lots were redesigned and enhanced with new landscaping and walkways. The adaptation of this dead mall also included a 47,000 square-foot office building on the site. These clinics and support spaces straddle an 800-foot long circulation spine (Figure 2). The interior of the mall was gutted and rebuit and its ex-
terior was rebuit and updated. The Vanderbilt Health One Hundred Oaks Outpatient Clinic Mall was com-
pleting in 2006. Many more shopping mall conver-
sions such as this will open in the coming decade.

3. Home-based Care and Virtual Medicine

For much of the 20th century, the hospital was the center of the healthcare universe for Americans. Immense urban medical centers were governed by a vast technocracy. Patients came to rely nearly solely on the hospital as the main source of healing, although this came with one major caveat: hospital-
centered care is the most expensive care. The physi-
cian staff became hospital-dependent during this period, and the International Style modern medical center was designed first and foremost around the needs of the physicians, allied caregivers, and their employer-institutions—not around the needs of pa-
tients or their families.

Home-based healthcare is booming across America. With insurance companies now loath to pay for hospital-based inpatient care, the emphasis is now more than ever on home-based care. It is far less expensive, keeps the patient and family in familiar surroundings, and is accelerated by the Internet: the home-as-clinic. Computers and hand-
held devices make it possible to be in touch with your doctor anytime from virtually anywhere on a 24/7 basis. Home-health agencies, for their part, focus on hospice care, rehabilitation, dietary servic-
is, and daily care needs. The individual, or his or her part, will soon be able to self-monitor his or her own vital signs. Rapid technological advancements are also making it possible for more elderly Ameri-
cans to continue to live independently at home.

Telemedicine embraces medical technologies ranging from electronic health records to streams of emails between patient and doctor. Live, two-way video connections such as SKYPE software now allow for real-time consultations to occur. And more and more Americans are turning to WEB-MD and other online resources for health information. The Medical Lib at MIT in Boston is exploring the use of “virtual” doctors and nurses who can “speak” and “consult” with their patients online. In the very near future, holograms will project on one’s living room or kitchen wall at home, and the patient will be able to see his or her doctor or nurse in virtual 3D-

dimensionality—standing right in front of him or her in the living room or kitchen at home. The upshot of this is that healthcare consumers are now more knowledgeable—and more demanding—than ever before in history. The home-as-clinic metaphor now extends to include the physical attributes of the dwell-
ing itself. Online resources now allow a home dweller to monitor its ambient air quality level.

4. The Maturation of Evidence-based Research and Design

The evidence-based research and design (EBRD) movement is premised on three assump-
tions: first, patients should be able to devote their energies to healing and recovery without having to cope with an unsupportive care setting; second, healthcare providers should be able to perform their duties without becoming ill themselves due to being immersed in the course of their daily duties and responsibilities; and third, healthcare facilities that consume inordinate amounts of nonrenewable en-

ergy resources are no longer acceptable. Above all, the EBRD movement aims to reverse the number of medical errors that occur in hospitals. At pres-
ent, more than 98,000 patients die each year in U.S. hospitals due to medical errors and hospital-ac-
quired infection. In response, an accreditation and certification framework was recently established with the goal of building up a cadre of professionals in the industry who can control the prevalence of medical errors. This new credential, known as the Evidence-based Design Accreditation and Certifica-
tion (EDAC) program, was funded with a start up grant from the Robert Wood Johnson Foundation, based in New Jersey, together with The Center for Health Design, based in California. A set of three study guides were published by this organization in late 2008. An introduction to Evidence-based De-

sign: Exploring Healthcare and Design; Building the Evidence Base: Underwriting Research in Health-
care Design; and, Integrating Evidence-based De-

sign: Practicing the Healthcare Design Process. It is an interdisciplinary that draws tougher physicians, nurses, administrators, architects, and national officials. However, critics view this as somewhat premature, arguing that the EBRD database re-

quires time and in need of verification through more re-

searches.

The coalescence of the EBRD movement is perhaps best symbolized in the Fable Hospital 2.0 Project. The “Fable Hospital” is a mythical institution connected to make the business cases for the need for and value of EBRD in hospital architecture at this time. It is part of the findings of the Center for Health Design’s FabLab Project, which is a compendium of case studies in American hospi-
tals on the application of EBRD within the indu-

try. Main issues addressed in the Fable Hospital 2.0 include the following: a call for larger single patient rooms, acutely adaptable patient rooms, larger win-
dows, longer patient bathrooms with double door access, ceiling-mounted patient lifts above each bed, and better indoor air quality to reduce the spread of airborne infections, decentralized nursing sta-
tions adjacent to every two inpatient rooms, hand wash sinks near to every patient bed, better lighting options, the reduction of noise on the nursing unit, the need to reduce energy consumption, the impor-
tance of artworks and nature, therapeutic gardens, provisions for family members, and digital technolo-
gies in the total patient experience. Due Saffer, Blair, Barry, Leonard L. Guinther, Robak, Hamilton, D. Kirk, Hesseler, Frederic A., Morritt, Clayton, and Parkes, Derek, “Fable Hospital 2.0: The Busi-
ness Case for Building Better Healthcare Facilities.” February 2011. Online. Available at http://www.thehastingscenter.org/Publications/ICR/Detail. aspx?id=0006.htm. Critics argue that the EBRD and the all-private room hospital does not concludively been proven. Critics argue that too little empirical data exists upon which to make such a sweeping conclusion that would apply to all U.S. hospitals and all types of patient populations. The debate over the all-private room American hospital remains a point of contention due to the cost of building all-private rooms. Verderber, S. and Todd, Lindsey G., “Reconsidering the Semi-

Private Inpatient Room in U.S. Hospitals,” Health Environments Research & Design Journal, 5:2, Win-
ter 2012, pp. 49-63.

5. The Push Toward the Carbon Neutral Hospital

Hospitals in the U.S. have a longstanding reputa-

tion as being among the worst polluters. They generate volumes of toxic waste and then do not take the proper measures to remediate and dispose these materials. Hospitals represent only 4% of the world’s entire building stock but consume 8%of the planet’s entire building stock. Public relations campaigns to play down this problem no longer suffice. It is now possible to apply the Environmen-


tal Protection Agency’s (EPA) online Energy Impact Calculator to ascertain the carbon footprint pdf of each and every zip code in the nation. When the Hackensack University Medical Center in 2008 launched its “greening” campaign, it took out an eight-page advertisement in the New York Times. Healthcare institutions now realize the marketing possibilities through sound practices to reduce a healthcare facility’s carbon footprint.

In the U.S., LEED (Leadership in Energy Ef-

cient Environmental Design) is a program that
is sponsored by the U.S. Green Building Council (USGBC). LEED employs a point-based metric tool to guide best practices in sustainable design and construction across the entire country. It functions as a third party certification system that provides verification that a given healthcare facility meets required criteria for LEED certification. A rigorous registration, documentation, and review process is prerequisite to any facility awarded a rating at one of four levels: certified, silver, gold, or platinum. By 2009, 81,155 professionals in the U.S. and Canada had obtained LEED accreditation professional status (LEED-AP). For healthcare facilities, and back in 2003 the LEED-affiliated Green Guide for Healthcare program began. A self-certification method was developed that closely paralleled mainstream LEED certification criteria as pertaining to acute care hospitals. Since 2007 the GGHHC has registered construction projects in 115 countries globally, and is now even more prevalent than the core LEED certification program. In April of 2011 an official LEED for Healthcare certifying process was created. It is based on a total of 110 possible “points”—15 points for site planning, 9 points for water efficiency, 39 points pertaining to energy and atmospheric issues, 16 points for building materials and the conservation of natural resources, and 18 points related to indoor environmental quality factors. A certified level requires 40+ points, a silver rating requires 50+ points, a gold rating requires 60+ points, and a platinum rating for a healthcare facility requires 80+ points (see Ashley, K. “LEED for Healthcare: Human Health and the Built Environment,” July 2009, Environmental Design Construction, 12:7, p. 46).

As of October 2011, overall, 8,391 LEED projects have been certified, while the number is far smaller for healthcare facilities, with only 298 LEED certified healthcare facilities (less than 4% of the total) in the U.S. as of that date. The Dell Children’s Medical Center, in Austin Texas, became the world’s first LEED Platinum hospital (in 2009). It features landscaped courtyards, 92% of all construction waste was recycled on-site, rainwater is reclaimed, an on-site natural gas turbine supplies all electricity (which is 75% more efficient than coal-fired plants), converted steam energy is supplied from the heating/cooling plant for all chilled water needs, and parking lots and all outdoor spaces are designed and landscaped to minimize the urban heat island effect (see Ferenc, J. “LEED for Healthcare to Help Drive Sustainable Design,” Health Facilities Management, 24:1, p. 3-6). A fear exists in that a social class disparity will emerge between LEED and non-LEED buildings. Regardless, the LEED rating system has pushed forward a new standard where hospitals are now expected to feature zero waste design strategies, green roofs, therapeutic gardens that double function as rainwater retention reservoirs, geothermal systems, passive solar design strategies, recycled construction materials and products, locations on public transit routes, and cycling amenities (Figure 3).

6. The Competition for Patients and Medical Tourism

A recent article in the New York Times underscored the pressures on hospitals to compete for patients by offering all types of amenities such as five-star cuisine, expensive bed sheets, lavish patient rooms with marble baths and sinks, private kitchens, and generous sleepover accommodations for family members. At the New York-Presbyterian/ Weill Cornell Hospital in New York City, the pampering and décor rival a grand hotel, and is part of a competitive trend rapidly escalating across the U.S. This is actually nothing new in America, as VIP patient rooms have been available for the privileged classes since at least the opening of the Johns Hopkins Hospital in Baltimore in 1874. There, specially appointed VIP inpatient rooms featured hand carved beds and dressers, rocking chairs, art works on the walls, and hand-woven tapestry rugs. This is part of a national (and international) competition for wealthy patients willing to pay extra, while at the same time the U.S. federal government cuts back on its reimbursement rates to hospitals. Worse, growing evidence suggests that more patients who do not happen to be wealthy are being subjected to long waits and wholly substandard care in American hospitals (see Bernstein, Nina. “Chefs, Butlers, Marble Baths: Hospitals Vie for the Affluent” Online. Available at http://www.nytimes.com/2012/01/22/nyregion/myregion/chefs-butlers-and-marble-baths.html).

The rapid growth in medical tourism is closely related to the intense competition for patients. For decades, American hospitals have sought to broaden their geographic reach by marketing their services far and wide beyond their home market. Well-known examples include the M.D. Anderson Cancer Institute in Houston, New York City’s Sinai Medical Center, and the Mayo Clinic in Rochester, Minnesota. This trend has gained broad acceptance in the past decade and shows no signs of slowing down anytime soon. Many financially strapped smaller market specialty hospitals are also entering the practice of marketing their services regionally because it can be an excellent way to expand revenue. The renowned Cleveland Clinic recently opened a gleaming new medical center in Abu Dhabi, in the Middle East, designed by HDR of San Francisco. This is but one high profile example of exporting a proven brand name to a region that rapidly seeks to move up in prestige in terms of attracting world-class stature in its healthcare system. More patients are willing to travel farther than ever before in history to consult and be cared for by renowned neurological, cardiovascular, rehabilitation, and cancer treatment specialists.

7. Critical Regionalism

Postmodernism had opened by 1990 new possibilities for the site planning, compositional massing, and narrative aesthetic of healthcare facilities. The International Style previously had placed strict limits on what a healthcare facility could look like. The result was usually an austere box with flat roofs, lacking in ornamentation, without conscious references to local building technologies or aesthetic traditions. Now, innovative materials, construction techniques, and local cultural traditions are now legitimized architectural influences—design determinants in the formal organization, construction, and aesthetic language of healthcare architecture in the U.S. This movement is referred to as critical regionalism. Critical regionalism draws its inspiration from the uniqueness of local places, people, and regional culture.

The Grand Tasca Clinic (2005) in Michigan, by Kahler Slater Architects, of Milwaukee, expresses the Midwestern Prairie School architectural language of the great American architect Frank Lloyd Wright (1872-1959). Extended overhands, exterior wood cladding, and fenestration provide a striking silhouette set against its open, flat prairie site context. Another recent example is the 80,000 square foot St. Anthony’s Hospital, in Gig Harbor, Washington State, by ZGF Architects. It is a state-of-art facility informed by its local community’s rich building traditions and history and its surrounding natural landscape, a landscape framed and inspired by the surrounding trees and water (Online. Available at http://www.archinnovations.com/featured-projects/health-care-facilities/zgf-architects.html). Also see http://www.healthcaredesignmagazine.com/article/walk-woods.html. Another example is the Ann and Robert H. Lurie Children’s Hospital, at Children’s Memorial, in Chicago. It is successfully woven into an urban context that sharply contrasts the site contexts so common to sprawling suburban hospitals. It is located in a pedestrian scaled neighborhood adjacent to the campus of the Northwestern University Medical Center. Building with locality in mind is now seen as a wise investment, an investment that is yielding positive results in the form of a greater sense of shared purpose and goals between a hospital and its local community.

8. Health Villages in Compact Neighborhood Settings

Cutting-edge hospital architecture in the U.S. rejects the stand-alone isolation of sprawling suburban settings in favor of denser, pedestrian-scaled campus contexts where it is possible to walk to the hospital without always having to arrive by auto. A health village, architecturally, is a concentration of freestanding care providers sited in relatively close geographic proximity to one another. This term is sometimes confused with the term healthy communities. But a “healthy community” is a term that refers instead to the health status of a community—not to any specific healthcare facilities in it. Many community hospitals are now situated within
The need for Care in an Aging Society

In 2016, there were 40 million people in U.S. aged 65 or older (millions of care), more than in 2000. This amounted to 10.5% of the U.S. population in 2010, and the proportion of elderly persons also grew significantly during the last decade. By 2050, it is projected that 305 million people will reside in the U.S. and many assisted living facilities for the aged continue to be built across the country. They are non-institutional alternative to traditional nursing homes. The Sunnyside Bldg assisted living center in Bellwells, Washington is located on a hillock and its site and architectural design make full advantage of 180-degree views of the landscape through its open wrap-around porch and three-season porches. The center's floor plate is complex, with the result a highly efficient building with relatively short corridors. Eight common areas include a bedroom, living room, dining room, library, parlor, bedrooms, dining room and living area are clustered around a main room entry. Each resident's room contains a small tea kitchen with refrigerator, sink, and cabinets. Eighty-five in the 70 private bed rooms are equipped for residents with dementia. These units are the same size as the assisted living bedrooms but have specially adapted bathrooms and showers. Common spaces are clustered on the second level. A walking loop adjacent to the inpatient caregiver staff offices on each floor puts patients in contact with the dining room, an outdoor patio, activity room, kitchen, living room, laundry, and a therapeutic spa.

The Heron Manor Assisted Living Center, in Grand Rapids, Michigan, is certified LEED Platinum. The center's site is within walking distance of downtown and is surrounded by private woods with a paved walking trail that encourages residents to experience the outdoors. All 72 apartments are equipped with barrier-free bathrooms, with shower stalls that easily accommodate wheelchairs. Each apartment has a full kitchen on each floor, an accessible restroom independently if they so desire to do so. A limited number of 2-bedroom apartments are available for residents. Heron Manor earned LEED credits for its connection to local public transit services. And creation of a natural re-wetland retention pond adjacent to the wetlands that were preserved immediately in front of the site. A geothermal heating and cooling system was installed. The 59,000 square-foot facility was certified at the LEED platinum level.

10. Nature as a Therapeutic Modality: Real and Artificial

Therapeutic gardens are a continuing trend in American hospitals and at many outpatient clinics. A well-designed and dynamically responsive garden empowers the patient as well as the patient's family (and also staff personnel). It can help to regenerate the human spirit. This is especially the case in dense, urban settings, where a therapeutic garden must be far more than a static space devoid of character. A well-designed therapeutic garden provides spaces for personal repose and contemplation outdoors, while remaining in close contact with nature in the form of shade trees, fountains, or a small pond. The top health-care facilities in the U.S. now and in the next decade will continue to feature prominent therapeutic healing gardens with the aim of de-institutionalizing and eliminating the physical corridors that typically separate the indoor realm from the outdoor realm. A spa/wellness center designed by this author and Tavv R. 986 at Clennon University in 2010 features this type of seamless connection between the indoors and the outdoors(Figure 4). The breaking down of the traditional spatial and visual barriers is designed as deinstitutionalization, and is the continuum of layered transparency combined with the design strategy of superimposing transparent and opaque features such as patios, sliding glass doors, extended overhangs, trellises, and trees for protective screening from the elements. These design features create hierarchical soft zones of transition between the indoors and the outdoors, such as what was achieved at the Bon Secours St. Francis Medical Center in Charleston, South Carolina, by Oldfield Architects, of Richmond, Virginia, at the Bon Secours Medical Center, in Phoenix, Arizona, and at the Geisinger Children's Hospital, in Greer, by NCBI Architects. Therapeutic gardens assist in helping the patient (and family member) reduce stress and achieve a more balanced physiological and psychological state, and can help in one's summing up of the inner strength to overcome his or her disease. These places are restorative, restorative, and biophysical. A therapeutic healing garden can be designed to be diverse (purely aesthetic) or active (a place to play sports or have a picnic).

The total therapeutic potential of natural environments is also gaining in popularity. Many hospitals are featuring surrogate (natural) views in rooms that would otherwise be architectural windowless. Recent research at the University in the U.S. explored the usefulness of a pina panel rear-projected view grid that allows the patient from one's bed to self-control the view contact of any of many individual view panels projected on the wall facing the patient's bed. Also, ceiling views of nature are being installed in many leading hospitals, such as the atmospheric ceiling prototype installed in the patient room above each patient's bed at the University of Minnesota Children's Hospital, in Minneapolis. A circular recess in the ceiling above the patient bed is capable of digitally projecting a nighttime sky scene, the changing colors of the four seasons, or representational views of forests, rivers and streams or the oceans.

Summary

This brief overview is no means an exhaustive list of useful trends that are influencing healthcare architecture in the U.S. at the time. But it does represent an overview of what is happening now. Any comprehensive library would require more space than is available here. But these ten trends do share one thing in common—all are centered on the precepts of an emerging movement toward ecocentric healthcare architecture. For architects, this paradigm fuse together in a single framework the highest priorities of ecological sustainability. The need is urgent to protect the world's disappearing non-renewable resources, and to apply the precepts of humanism and compassion in architecture in support of both human and ecological health. In conclusion, one thing is certain in 2012—the current economic situation in the U.S. remains fluid and other unpredictable in light of the ongoing national healthcare reform legislation in 2014.