

ASSESSMENT OF HEALTH CENTER PERFORMANCE: TOWARD THE DEVELOPMENT OF DESIGN GUIDELINES

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Abstract

In the United States, primary care has emerged as an increasingly effective alternative to costly inpatient emergency care and hospitalization. Thousands of outpatient community-based clinics have been built in the past decade, in rural, suburban and urban contexts. The majority focus on the provision of preventative and public health care for medically underserved and/or uninsured patient populations. As this facility type has flourished, there remains a paucity of empirical research on the architectural performance of these ambulatory care environments. In response, an empirical investigation was developed. A post-occupancy evaluation was conducted on five community health centers in Cincinnati, Ohio, all of which were located in urban settings. Among the findings, a set of planning and design provisions were articulated on issues centered on site planning, way-finding, amenities, and the internal deployment of diagnostic and treatment functions, with the principal focus on the design of highly patient-centered care environments. The findings are discussed in relation to this healthcare building type and are likely of significant interest to primary care providers, architects, and allied design professionals, both in the US and internationally. An innovative feature and outcome of this project was the comparison of square footages of the 5 community health centers, divided by the number of annual patient encounters, number of staff, as well as energy consumption. This resulted in

the establishment of objective efficiency ratings, thus permitting the development of corrective measures and interventions.

Keywords

Health center, building performance, design guidelines, post occupancy evaluation.

Introduction

This article applies the “Post Occupancy Evaluation” methodology (Preiser and Vischer, 2005), to assess the performance of outpatient health centers. This methodology was used to evaluate what works and doesn’t work across five different health centers operated by the Cincinnati Health Network. Using a three-phase approach that employed multiple data collection instruments, performance profiles for each of the five centers were generated and a series of design guidelines presented. Taking it one step further, overall objective performance measures were established linking health facility design to various dimensions including patient encounters per year, costs of staffing, space and energy use.

Health centers are community-based organizations often located in inner-city and rural communities that provide medical and behavioral services to populations with limited access to health services. The Health Resources and Services Administration (HRSA), a Federal Agency, is charged with increasing access to healthcare for the medically underserved. In 2007, HRSA operated 7,000 health centers nationwide with an annual budget of approximately \$7 million and provided primary care to 16 million people. Frequent users of the services include “low income populations, the uninsured, those with limited English proficiency, migrant and seasonal farm workers, individuals and families experiencing homelessness, and those living in public housing (HRSA). These health centers were created to “provide a wide range of high-quality ambulatory services in an accessible “single door” facility, involve community residents, coordinate closely with other community resources, and make use of all existing funds, including those on Medicaid and other health programs” (Lefkowitz, 2007: p. 11). The health centers operated by the Cincinnati Health Network are examples of the centers that provide primary care services.

Community health centers have been the safety net for low income and uninsured populations dating back to the 1960s when programs began offering health care services. A review of early health centers reveal the tumultuous path of community health centers, many of which started as demonstration projects to understand the cause of diseases (Sardell, 1988). The historical roots and the contemporary context for primary care is explained in detail in the Institute of Medicine’s 1996 book entitled, “Primary Care: America’s Health in a New

Era.” Financial stress, inconsistent political support, inadequate facilities, public policy and controversy in funding services for the poor all became points of contention at some point along the way. Since the beginning, community health centers have been generally under-supported, operating on limited human and financial resources. They have typically been located in re-purposed facilities that were usually dysfunctional and outdated. Nevertheless, health centers have survived over time due to the dedication of community leaders, faith-based organizations, medical schools, settlement houses, and healthcare institutions (Lefkowitz, 2007).

Prior to the establishment of community health centers, charity hospitals served as the primary site offering health services to the destitute and poor. Early health center precedents were evident in poor neighborhoods of New York and Boston in subsidized housing. Endemic to housing tenements were over-crowded conditions and problems associated with poverty, crime, homelessness and drugs. There were also early health center precedents in rural areas as evidenced in farmer workers in colonies in Texas and plantations in Mississippi and South Carolina (Lefkowitz, 2007). In both urban and rural contexts, community leaders often gained strength from the Civil Rights Movement and the War on Poverty (Sardell, 1988).

Despite the most admirable of intentions, the efforts of the most highly qualified and assiduously dedicated community health caregiver is too often thwarted by the architecturally dysfunctional conditions experienced daily in outpatient community care settings. Considerable evidence in the

history of places where healthcare is provided points to the symbiotic relationship between architecture and healthcare, and their interactive influence on a community's well being (Verderber and Fine, 2000). Well-designed care environments have been demonstrated to have a positive role on human health, including in the area of public health disease control. A recent, thorough literature review on this subject concluded that empirical evidence in the emerging field of evidence-base healthcare design points to the significant therapeutic role of architecture in relation to human health and well being (Ulrich, et al, 2008). Research within architecture and its allied environmental design disciplines, however, has generally overlooked the therapeutic and related affordances of the architectural care setting with respect to the milieu of community-based public health and preventive primary care. Meanwhile, the deleterious effects of poorly planned, overcrowded, ill-kept clinical environments for the dissemination of public health and primary care remain largely overlooked or entirely dismissed (The Commonwealth Fund, 1997).

Within the design disciplines there is a growing trend on "therapeutic" and "healing" environments in the healthcare field. Some of the research topics include: patient centered care (Gerteis, Edgman-Levitan, Daley, Delbanco, 1993; Frampton, Gilpin and Charmel, 2003), healing gardens (Cooper Marcus and Barnes 1999), healing environments (Venolia and Dadd 1988), eco-friendly design (Guenther and Vittori, 2008; McDonough and Braungart 2002) and mind, body and spirit connections (Huelat 2003). Likewise, a recent movement called "Evidence-Based Design" has focused on the linking built environment to measurable outcomes as shown

in some recent books (Cama 2009; Hamilton and Watkins, 2008; Malkin, 2008). Most of this work targets the pre-design and schematic design phases of the architectural design process with an emphasis on acute care and tertiary care. There has been very little work in the area of outpatient care.

Meanwhile, the harmful effects of such inadequate conditions upon health and well being remain unattended, and often undetected, often, for many decades. The key role of the healthcare architectural environment, therefore, warrants its systematic appraisal within the community public health and primary care equation. Healthcare organizations in the public sector have, unfortunately, infrequently adopted a leadership position in terms of learning how the physical setting can help them attain their core goals (Becker, 1983). Frequently, architectural variables such as the building's aesthetic and spatial qualities—its composition scale, height, site planning characteristics, daylighting, color palette, indoor air quality, wayfinding amenity, staff and patient circulation patterns, aesthetic ambiance, and overall suitability to the dissemination of healthcare, remain unconsidered. Measures of the quality of care, worker morale, productivity, and the measurement of health outcomes understandably are core concerns, although taking cognizance of the performance of the physical setting in relation to these factors can reinforce both.

In the United States at this time, as well as elsewhere, there appears to be a critical need to reappraise these factors with regard to caring for medically underserved and underrepresented patient populations (American Anthropological

Association, 2000; Day, 2000). The dilemma of disjunctively focusing on the delivery of sciences apart from the physical conditions of the care setting where the services are rendered remains highly problematic. In light of the many studies published in closely related aspects of public health, the relationship between income level and the quality of patient care received in community-based outpatient clinical settings, and issues centered on the growing inaccessibility to health care insurance (47.5 million Americans lack health insurance as of May 2009), more research is needed on the role and function of the architectural environment (Moffat, 2006). Such efforts can extend the social engagement of high quality architecture into communities that previously were not privy to this level of attention (Hatch, 1984; McLarney and Chaff, 1991; Hemmes, 1993; Hill, 1998)

In Louisiana, a program to improve its network of community-based outpatient public health centers has been in operation since 1991. This network is comprised of 84 health centers and support facilities distributed across the State's 64 parishes (counties). This initiative, guided by a protocol known as the Strategic Facility Improvement (SFI) Initiative, has guided the taxpayer investment of nearly \$90 million since its start (Verderber and Refuerzo, 1993; 1999; Verderber, 2005). The SFI consists of the systematic post occupancy evaluation of the network on a periodic basis. This database, at this writing, continues to serve to guide capital improvements and to assess the priority needs of each facility in relation to the overall care network of facilities operated by the agency. To date, 58 facilities have been replaced guided by this process. Specific architectural variables addressed within the SFI protocol include site

selection, historic preservation, site planning, signage, building design and composition, materials, layout, energy conservation, operational efficiency in emergency and post-disaster scenarios, and the incorporation of the latest advancements in community-based care for outpatient patient constituencies.

Other than this statewide initiative, similar efforts to use environmental design research to improve care settings has been very sporadic and have usually consisted of one-off post occupancy evaluations of a single health center, such as an outpatient oncology center for a for-profit care provider or hospital (Farbstein, 1993; Carpman and Grant, 1994). Prior to a book that documented the SFI process in Louisiana (Verderber, 2005), only one prior book entirely devoted to the subject of outpatient centers architectural design had been published in the prior twenty five years (Valins, 1993). This book, however, was not based in empirical research per se but rather, a survey of recently deigned centers without the benefit of any sort of post occupancy evaluation protocol (POE).

Methodology

The applied research reported below aimed at evaluating five community health centers in the City of Cincinnati, OH. It was to assist the client, Cincinnati Health Network, Inc. with decision making and prioritizing as to needed improvements in the five health centers, serving the economically disadvantaged population. The research was carried out in three phases. In Phase I health centers were toured and executive directors interviewed in depth. This was followed by detailed walk-through inspections of the facilities. Still photography

was used to document both positive and negative performance aspects found in the health centers. In a staff and patient survey (Phase II), responses were solicited regarding the performance characteristics of the health centers that should be improved. Phase III involved extensive follow-up including interviews, archival research, and physical measurements, especially in regards to meeting accessibility requirements, following The Americans with Disability (ADA) Guidelines. Beyond that, the spirit of universal design (Preiser and Ostroff, 2001; Preiser 2006) obliges client organizations to provide products and facilities and IT infrastructure that are usable by all, regardless of disability, health, gender or ethnic origin.

Surveys were analyzed and quality profiles constructed for each of the centers and for the network overall, primarily based on consumer feedback and physical data. Findings identified shortcomings, but also a great number of exemplary design features which are to be emulated in future remodel and new construction projects. Recommendations contained in this paper are intended to be implemented on a short, medium, and long-term basis.

The methodology used in this project (Preiser and Vischer, 2005) was predicated on the notion that values held by consumers should educate the client organization on what works and what doesn't in community health centers. Interviews were conducted with the five health center directors, followed by surveys of staff and patient questionnaires. Network-wide, a total of 81 staff filled out the survey questionnaire. When registering in the centers, patients were asked by the registration clerk to fill out the patient questionnaires. A total of 99 patients

responded network-wide. For purposes of this study, both patients and staff are considered consumers.

The survey results need to be qualified in light of the fact that at some centers only a small number of respondents (N) filled out the survey forms. Thus, the percentages given in the center profiles and graphs may not be generalizable.

Walkthrough inspections were conducted in each center and issues recorded by still photography for reporting purposes. Walkthroughs included physical measurements, especially ADA compliance, of doorways, hallways, etc.

Archival research was carried out on documents, statistics, demographic and patient information. Literature research was conducted, including identification and review of articles and books on medical health centers, ADA guidelines and the Life Safety Code, for example.

These, in addition to the cumulative experience of the author (Preiser, 1996) with regard to assessing the performance of health care facilities, served as criteria for evaluating five of seven health centers operated by Cincinnati Health Network. The resulting recommendations form the basis for the programming and design of future health centers in Cincinnati and elsewhere.

Mission

The findings and recommendations of the study reported below are predicated upon the client organization's mission:

"The Cincinnati Health Network is a non-profit

organization which exists to improve access to care and enhance the overall status of the people of the Greater Cincinnati Area, primarily the medically underserved and high risk population. The Network plans, coordinates and provides for the delivery of high quality, cost effective, comprehensive health services."

Findings - Health Center Quality Profiles

Staff Survey Results

Overall, the 81 staff surveys indicate that in most categories of the combined Health Center quality profile, a "good to fair" perception prevails (see

Table 1). Virtually no aspect of the quality profile received a predominantly "excellent" rating. On the other hand, a significant percentage (about 25%) found security, lack of adaptability to changing uses, and lack of views of the exterior to be problematic. The latter was intended to prevent vandalism.

There is significant variation among the centers, with the newest center generally scoring highest. As such, the newest center may constitute the quality benchmark for the other Network Health Centers.



Figure 1: Newest center scoring High:--benchmarks for other health centers (Source: Authors).

| QUALITIES | Excellent | Good | Fair | Poor |
|--|-----------|------|------|------|
| <i>Overall Site Design</i> | 9 | 41 | 25 | 25 |
| <i>Adequate Space</i> | 5 | 37 | 32 | 26 |
| <i>Layout of Building</i> | 1 | 37 | 39 | 23 |
| <i>Aesthetic Quality of Exterior</i> | 3 | 35 | 33 | 24 |
| <i>Aesthetic Quality of Interior</i> | 7 | 35 | 33 | 25 |
| <i>Patient Flow</i> | 7 | 33 | 36 | 24 |
| <i>Environmental Quality</i> | 4 | 24 | 49 | 23 |
| <i>Proximity to Views</i> | 5 | 17 | 28 | 50 |
| <i>Adaptability to Changing Uses</i> | 4 | 36 | 30 | 30 |
| <i>Security</i> | 6 | 34 | 33 | 27 |
| <i>Maintenance</i> | 14 | 49 | 32 | 4 |
| <i>Quality of Materials – Floors</i> | 8 | 38 | 40 | 14 |
| <i>Quality of Materials – Walls</i> | 8 | 31 | 41 | 20 |
| <i>Quality of Materials – Ceilings</i> | 9 | 30 | 36 | 25 |
| <i>Disability Access</i> | 5 | 30 | 29 | 36 |

Table 1: Staff Survey Results (Source: Authors).

Patient Survey Results

Patient surveys were intended to yield pointers to perceived problems and/or items which were liked. Therefore, the 99 responses were more qualitative in nature when compared to the quality profiles, which attempted to assess staff responses. Major, most frequently mentioned items were the slow rate of patient flow, the cleanliness of the centers, and the friendly atmosphere.

Health Center Statistical Comparison

The attempt was made to analyze the five Health Centers in terms of their use of space, energy and FTEs (full-time equivalent positions) in relationship to number of on-site patients, and patient medical and dental encounters on a per

annum basis. The numbers used were prior year numbers for on-site encounters. Again, and as expected, a great disparity exists among the centers (see Table 2):

- Number of Users per Gross Square Feet: This comparison of users per square foot is the average number of patients in relation to floor area. The range is from 2.28 at East End to 5.28 at West End, suggesting that the West End Health is most used by patients.
- Number of Encounters per Gross Square Feet: The range is from 0.78 at East End to 1.25 at Mt. Auburn, suggesting that on a comparative basis, the East End Health Center produces the most encounters and Mt. Auburn the least, with

most other centers following closely. This could be interpreted such that East End suffers from overcrowded facilities.

- Number of Gross Square Feet Related to Number of FTE: The range is from 219 square feet per FTE at West End to 687 square feet at Lincoln Heights.

This suggests that while the West End Health Center has the highest number of users per square foot, it also manages this patient load with the lowest number of square feet per FTE; i.e., while its productivity is highest, there may be overcrowded conditions at times.

- Number of Encounters Related to FTE: The range is from 402 encounters per FTE at Walnut Hills to 720 at Lincoln Heights.
- Number of Users Related to FTE: The range is from 129 users per FTE at Walnut Hills to 213 at Lincoln Heights, which is consistent with item 4 (above).
- Utility Costs Related to (Gross Sq.Ft.) Space: The range is from \$0.77/sq.ft./year at Mt. Auburn to \$5.45/sq.ft./year at West End, and \$2.75/sq.ft./year at Lincoln Heights. The major reason

for these discrepancies and energy waste are poor construction methods and lack of proper insulation.

Prioritized Recommendations

The recommendations for the client organization that are presented below should be addressed in order of priority at all Health Centers, where applicable. They are outlined in more detail in the individual Center evaluation reports.

- Health/Safety/Security: Fix roof leaks; install surveillance cameras in parking lots; improve parking lot lighting and surfaces; remove hallway obstructions.
- Functionality/Efficiency: Install front lighted signage outside and graphic schematic directories inside Health Centers; organize storage systems into short, medium, and long term storage, including off-site; e.g., for inactive medical records, unused equipment and furniture, etc.
- Psychological Comfort and Satisfaction: Update professional image of Centers on the building facades; update image of Centers' interior through light and pleasant colorschemes,

| | M.A. | E.E. | W.E. | W.H. | L.H. |
|--|--------|--------|--------|--------|--------|
| Users per square foot | 3.62 | 2.28 | 5.28 | 3.84 | 3.13 |
| Encounters per sq ft | 1.25 | 0.78 | 1.20 | 0.91 | 1.15 |
| Sq. ft. per FTE | 472.60 | 394.90 | 219.12 | 568.45 | 687.17 |
| Encounters per FTE | 472.34 | 504.50 | 486.62 | 402.24 | 720.67 |
| Users per FTE | 169.60 | 173.12 | 141.51 | 129.85 | 213.63 |
| Utility Cost (\$) Per sq. ft. per year | 0.77 | 1.53 | 5.45 | 4.96 | 2.75 |

Table 2: Health Center Statistical Comparison (Source: Authors).

improved lighting, artwork and plant materials; improve privacy of patients at registration and in patient areas.

ADA: Make improvements as noted in individual Center evaluations.

- Life Safety Code: With furniture and improvised workstations in the hallways, the potential exists for slowing the evacuation of building occupants in case of fire.

Evaluation Criteria

The following evaluation criteria were derived from the state-of-the-art literature and the author's experience with previous Medical Health Center evaluations.

Site Access

- A central and convenient location of the Medical Health Center is very important to the clientele that will take advantage of the services. Signage is important in informing the public of the location of the Center. A vandal-proof sign, preferably freestanding that is visible from the street and that is front or backlit, provides visibility to the community at large. Letters should be large and of a high contrasting color.

- Most community health centers are located in neighborhoods so that they are easily accessible by walking, taking the public transportation system, or by car. A preferred location would be in the vicinity of all those activities and services that a small town center would offer.

Parking

- Parking must provide an adequate ratio of spaces to accommodate the patient load during the busiest day of the year. A good

estimation is three parking spaces per medical or dental exam room; this allows patients and staff enough parking.

- Parking should be safe and secure at all times and should be located close to the main entrance of the facility.
- Lighting is very important in the parking area, especially in winter months. It should be designated to aid safety and visibility, and help prevent vandalism and theft.



Figure 2: The importance of signage (Source: Authors).

- One recommended parking situation is to have a sidewalk between two rows of parked vehicles facing each other. Coupled with a convenient drop off area, this allows a safe circulation path for pedestrians away from traffic.

- ADA: Two parking spaces, 12 ft. x 20 ft., well marked and located closest to the building entrance, are required per Health Center. These spaces are to be marked with the international symbol for disabled people.

Building Overall

- The image of the building should be that of care and security. Modern technology and convenience illustrates to the patient that the Health Center is offering the best possible, professional care to its users. By upgrading the furnishings, paint, mechanical equipment, exterior facades, and landscaping, this modern health care image can be conveyed.

- By providing access to people of all ages and levels of ability, the positive image that each facility aims to achieve is reinforced through true "universal design." This can be done by incorporating the ADA requirements for making buildings accessible to all persons.

• Acoustic Performance

Recommended decibel levels:

Open office: 33 DB@8 kHz to

Computer room: 70 DB@31.5 Hz.

Private office: 23 DB@8 kHz to

Lounge: 64 DB@31.5 Hz.

Conference, lobby: 23 DB@8 kHz to

Exam rooms: 63 DB@31.5 kHz.

A back-up power source, i.e., emergency generator, is recommended, providing 60-minute back-up lighting.

Entry and Waiting Area

- Good signage is important in identifying the entry door location.

- An automatic door opener helps the ease of operation by all people. If this is economically unfeasible, a call button can be installed for patients in need of assistance.

- The building entry should be clean and well maintained with a protective awning to prevent slipping of staff and patients when entering and exiting the building in inclement weather.

- To keep down noise and disturbances, waiting areas should provide a view out where possible, books and other reading materials, toys for children, television, and other forms of entertainment.

- While carpeting or other soft materials provide a high quality of comfort and acoustics, they are more difficult to clean than other materials. Thus, rolled linoleum or stone floor surfaces are recommended.

- Natural, as well as artificial lighting will provide a good mixture of light required for this space.

- Seating should be provided with a choice of individual chairs with hard, straight backs and armrests (for elderly and frail persons), as well as bench-type softer seating for groups.

- ADA: Door pull shall not exceed five (5) pounds. Threshold shall not exceed 1/4 inches and door clearance must be 36 inches at minimum in width; water fountain spouts shall be no more than 36 inches from floor. If moving water fountain is not feasible, water cups should be supplied as an interim solution.

Registration

- Acoustical privacy is very important in this area, which is usually one of high traffic and patient flow. A private cubicle or acoustically treated area will allow for better patient confidentiality.



Figure 3: Check in Counter (Source: Authors).

- ADA: For access by the disabled writing surfaces shall be no more than 32 inches from the finished floor surface. An interim solution would be to provide clipboards or other type of individual writing surface for those confined to wheelchairs.

Patient Flow

- One recommended floor plan used in health care design that provides for efficient, uni-directional patient flow is configured as a "U" or "O" shaped layout, with patients entering through one side, circling through the Health Center, and then exiting back into the waiting area near the entry door. This plan provides for ease of mobility, prevents bottlenecks and congestion, and prevents patients from backtracking.

Combination locks on all unauthorized patient areas are recommended to prevent patients from wandering throughout the Health Center, while allowing staff to circulate easily.

Hallways

- Equipment such as crash carts, wheelchairs, walkers, furniture, waste disposal containers, water fountains, and other large items should be stored in such a way as to not encumber hallway widths.



Figure 4: Storage Alcove (Source: Authors).

- A separate alcove or “storage zone” should be devised to store all required medical equipment immediately adjacent to circulation areas.
- Doors should not swing into the hallway area if at all possible, as this could cause accidents.
- ADA: Corridors should be a recommended width of 5’-0” in public primary hallway areas, and 36” in secondary hallway areas. These widths comply with ADA requirements.
- Life Safety Code: Hallway widths should not be obstructed by receptacles, equipment, or improvised workstations as to facilitate efficient fire egress.

Patient Areas

- Lighting: All patient areas should have high-quality lighting, achieved by balancing artificial and natural light, and by avoiding extreme differences in lighting levels using the following averages as a guide:

| | |
|-----------------------|-----------------|
| Circulation | 14 footcandles |
| Casual work | 19 footcandles |
| Routine | 28 footcandles |
| Routine office work | 47 footcandles |
| Demanding office work | 70 footcandles |
| Fine work | 93 footcandles |
| Very fine work | 140 footcandles |

- Ventilation: Ventilation in Health Centers should provide for an appropriate rate of air change essential for hygienic purposes, such as odor removal.
- Temperature: The temperature should be determined by the occupants and their level of activity, clothing worn, air movement, and humidity. It is generally recommended that a

temperature range between 68 and 72 degrees will provide adequate comfort. In exam rooms where patients may be disrobing, a warmer setting will be more comfortable, especially for elderly patients.

- Based on research findings, windows in patient areas are recommended, as they provide a visual stimulation and a view of the natural environment. This will improve psychological comfort in a medical health care setting.

Exam Rooms

- This area should contain a sink, counter space, writing surface with seat height, disrobing area, and all the necessary medical equipment stored away neatly.
- It is recommended that a chair rail be placed around the wall surface at such a height that equipment and chairs may not scratch the wall surface; i.e., at 30 inches in height from the floor.
- Floor materials that are easily and frequently cleaned and maintained are recommended for exam rooms; i.e., not carpet. This material should have a smooth surface in order to aid in the prevention of collecting dirt and bacteria.
- By providing privacy screens and/or strategically placed doorways, visual privacy can be achieved.



Figure 5: Poor air circulation (Source: Authors).

Sub-Waiting Areas

- Many Health Centers provide separate waiting areas for a designated service, such as pediatrics or dental. This helps reduce the overload in a central or main waiting area.
- By separating a “sick” waiting area from a “well” waiting area, the spread of sickness may be reduced.



Figure 6: Sub waiting area (Source: Authors).

Restrooms

- Doors that swing away from the restroom are recommended in case a patient collapses inside the room.
- Door hardware that opens from the outside is recommended.
- A practical recommendation is to have a pass-through door for urine samples. This can

prevent spills and will ease in hallway traffic flow.

- ADA: A minimum door width of 36" is recommended for ADA accessibility; ADA requirements of a minimum 5'-0" turning radius for comfort is required in accessible restrooms; grab bars are required in all restroom stalls. Size and height requirements depend on restroom design.

Nursing Stations

- Nursing work areas should have high-quality lighting, both task and area lighting.
- Adequate writing surface and storage space to keep the Nursing Station clean and organized is essential.
- Medication, sharp equipment, and other such items should be stored in a location that is away from patient access and view, and should be lockable.
- There should be an adequate amount of display and tacking surface that allows for posting and removing of visual aids without causing damage to the wall surface.
- ADA: Counter height in all areas of patient and staff interaction should allow for wheelchair access, 32" height above the floor for writing, unless other areas provide for this.

Pharmacy

- The pharmacy location should be near the cashier station in the Health Center. This allows for ease of circulation.
- The pharmacy area should have adequate storage for all medications on clean, dry shelving.

- The pharmacy area should be visually accessible by other staff members.

- All areas of medication storage should be lockable.

- ADA: The counter height in the pharmacy window should not exceed 32".

Staff Areas

- All staff areas should be clean and comfortable in order to provide a harmonious working atmosphere.
- Staff lounge and restroom areas must be pleasant and comfortable.
- It is recommended that the staff lounge be large enough to accommodate the entire staff for meetings. If that is not feasible, staff meetings can be held in the patient waiting area in off-hours. Some Centers have dedicated conference rooms.
- Where possible, create a pleasant environment outdoors for staff to enjoy lunch breaks away from the workplace.
- Individual staff lockers should be provided to secure personal belongings.

Laboratory

- Laboratory space should have an adequate amount of working surface, task lighting, ventilation, and storage.
- When this space is located opposite the patient restrooms, urine samples can be passed through a window or door for quicker analysis.
- Storage of all hazardous materials and medications

should be lockable and handled separately for refrigerated items.

Storage

- All storage areas should be located relatively close to the area they serve.
- All storage areas should have low humidity and a temperature range of 60 degrees to 78 degrees, depending on the items stored.
- Shelving should support the weight of the items, plus more, in order to withstand the stress of the items over a long period of time.
- All medications and biohazardous waste products should be kept in lockable storage cabinets.
- All medications and biohazardous waste products should be kept in lockable storage cabinets.

Mechanical Space

- HVAC equipment should be sized to meet the heating and cooling needs of the carefully zoned areas. The system should be maintained on a regular basis.
- Mechanical units should be placed in an area that is restricted to maintenance personnel.
- If the units are placed outdoors, adequate protection against vandalism and theft should be taken into consideration without blocking the required airflow around the unit.
- Mechanical noise should be at a minimum so as to not be distracting to patients and staff. This can be achieved by providing sound isolation material around the mechanical spaces.

ADA Compliance Requirements – Synopsis

Meeting the provisions of the Americans with Disabilities Act (ADA) is a legal obligation of building designers, owners, and operators. The goal is to make facilities universally accessible to persons with disabilities, thus creating a better environment for everyone.

A key consideration to be observed in the planning and design of new or remodeled facilities is the removal of barriers, which impede access to disabled persons with mobility, hearing, seeing, and other impairments (sometimes a combination thereof). Basic principles involved include, but are not limited to: The “accessible route” for wheelchair persons; i.e., a clear path 36” wide, which enables unimpeded passage from a parked car into the building entrance, hallways, bathrooms, and activity areas; curb cuts and ramps, which help overcome level differences; lowered counters, controls, dispensers, mirrors, water fountains, and phones to compensate for height and reach limitations; door pull limitations and lever-type controls or hardware to compensate for limited physical strength in hands and arms; directional signage for the disabled in general, and tactile signage for the visually disabled in particular; parking spaces dedicated to the use by disabled persons, etc.

Specific provisions which are applicable to Ambulatory Health Care Centers can be found in part in the Guidelines/Evaluation Criteria, Section 18, “ADA Compliance Requirements.” (see also the ADAG CD in Preiser and Ostroff, 2001).

Life Safety Code – Synopsis

The Life Safety Code Handbook (NFPA, 2003) published by the National Fire Prevention Association contains provisions which are intended to reduce the loss of life and injury due to fire in buildings. As such, it constitutes an inexpensive form of insurance against catastrophic losses and related litigation.



Figure 7: Fire egress (Source: Authors).

Key considerations to be observed in the design and construction of buildings are: types of occupancy, appropriate construction methods and fire resistance; means of egress and appropriate hallway, staircase and exit door widths; travel distances; exit lighting and their identification, as well as operating features such as alarm and fire detection systems, sprinkler systems, fire exit drills, signage, etc.

Space does not permit to detail provisions of the Life Safety Code, which are applicable to health centers and which were contained in the final project report to Cincinnati Health Network, Inc.

Conclusions

The healthcare needs of the underinsured and medically underserved patient populations in the United States have increased dramatically in recent years. This is a widely reported fact.

While funding has increased for community health centers, the demand for primary care in outpatient facilities has increased, particularly as the number of individuals without healthcare insurance escalates. According to survey data reported from the advocacy group Families USA (<http://www.familiesusa.org/>), one third of Americans under the age of 65 went without public or private health insurance for some or all of a two-year period 2007 and 2008. Consequently, access to health services for uninsured individuals is limited to hospital-based emergency departments or primary care sites that offer free or subsidized services.

At this writing, nearly fifty million Americans currently receive some level of assistance from

the federal Medicaid program. Compounding matters, the condition of the public health and primary care architectural infrastructure is diminishing precipitously in the United States at this time. Unfortunately, however, no national statistics exist to empirically document this trend. Despite this, the dwindling percentage of already scarce taxpayer resources allotted for capital improvements to this infrastructure is likely to reach a crisis level soon. New initiatives are needed to address and inventory the declining conditions of buildings devoted to community based outpatient care. Although no such national database exists at this time, a national facility performance database would be a valuable assessment tool in strategic planning at the federal, state, and local level in both the public governmental and in the private sector.

In the past decade, an area of research in the environmental design field known as evidence-based design for health has emerged (Hamilton, 2003). This approach is centered on the systematic appraisal of the performance of a care setting from the standpoint of the physical setting. More specifically this area is becoming known as evidence-based Building Performance Assessment. The goal is to avoid costly, otherwise avoidable mistakes and deficiencies and in this regard differs little from its parallel movement in the health sciences to reduce and eliminate medical errors in care settings.

In today's highly competitive health care environment, the establishment and implementation of quality benchmarks for health care facilities is evermore important. This also applies to the sector that caters to

the indigent and those providers who are depending on government reimbursement for services for the poor. In the case that is reported here, community health centers had been accommodated in buildings, most of which were not originally designed for that function. Rather, community centers, commercial buildings, etc., were adapted to the health care function, and they met this challenge with more or less success as the data summary indicates. In addition to patient flow, security and privacy, and the image of the facility, issues pertaining to energy consumption and maintenance were analyzed and recommendations for solving these problems developed.

While three of the five centers that were evaluated might receive a grade of satisfactory (West End, Lincoln Heights and Walnut Hills), one was totally unsatisfactory (East End). One, Mt. Auburn, was considered to be almost "state-of-the-art," as it was recently remodeled. Mt. Auburn is integrated into the basement of a Montessori school, which had been designated as a historic landmark. The fact that it was in the basement, and therefore had few windows for admission of daylight, and that this health care facility was not freestanding, were definite negatives, even if this facility was considered the best among the five evaluated.

One innovative aspect of this case study is to create performance profiles of health care facilities. As explained above, this was done in terms of numbers of patient visits, as they relate to the size of the facility (in square feet), the number of full-time employees (FTEs), as well as energy consumptions on an annual basis. Thereby, productivity benchmarks were developed which could guide the future

planning and design of community health care centers, or any similar building type for that matter.

It was also hoped that this project would lead to the establishment of a modest database on community health care centers, which could then be used to develop a prototype program. This, in turn, was seen to be the possible basis for an architectural competition for designing future, state-of-the-art community health centers in the City of Cincinnati and elsewhere.

As was the case in a previous health center evaluation project, the design parameters for a community health center that is appropriate to a given community and context are critical in its acceptance by the local population (Schramm, 1995). This means that on top of state-of-the-art criteria (which are dictated by function), as well as minimum space criteria (which are established by State Health Departments), local, contextual and cultural factors are critical in developing successful community health centers. In the case of rural health centers in Northern New Mexico referred to above, most were found to be in converted, rather modest residential buildings. It became clear that slick, high-tech, urban imagery would have been totally inappropriate and not acceptable by the local population. Locals would have implied that a glitzy image of the professional service delivery facility was too sophisticated and probably too expensive to utilize, and thus would have scared them away. This observation was recently verified in a project on rural health centers in Perry County, Ohio (Edwards and Strunk, 2005). Another important consideration is that community health centers should be freestanding and easy to access on foot or by

car, with its signage and imagery expressing community values.

The most critical and perhaps innovative aspect of the case study reported here is the quantification of objective performance measures of health center design, using the number of patient encounters per year, and relating them to the cost of staffing, space and energy use. Therein may lie the greatest benefit of POEs. Similarly, using 8 indicators/objective measures of building performance showed great promise in the development of a rational decision making and strategic planning tool in the just completed 'Facilities Master Plan for the Public Library of Cincinnati and Hamilton County, OH (Preiser and Wang, 2006).

Future Directions

The application of post-occupancy evaluation techniques to the establishment of community-wide performance benchmarks in health care facilities was reported here. This tool, if used appropriately, can provide invaluable feedback on existing facilities and their quality, as well as feedforward to be integrated into the programming and design of future community health care centers in such a way that it is sensitive to customer-held values (Hershberger, 1985; Hammond and Schwandner, 1997; McLaughlin, 1997). It is of critical importance to articulate the capital improvement project mission statement at the outset. This allows for total building performance to be assessed. This, in relation to the construction budget, site selection, the level of amenity, and the incorporation of recent innovations in planning and design such as the LEED. LEED is the acronym for the United States Green Building Council's program in Leadership

Through Energy efficient Environmental Design (Guenther and Vittori, 2008). The three levels of certification available at this time are silver, gold, and platinum level certification. This system is a point-based inventory of a building's compliance with a set of goals and principles set out by the USGBC. More recently the Green Guide for Healthcare has been published in tandem with the USGBC and this program is rapidly gaining acceptance in the U.S. healthcare industry among clients. To date, the health care industry in the U.S. has lagged significantly behind other building types and their clients in this regard. Unfortunately, outpatient centers in urban neighborhoods that serve underrepresented and underserved patient population have tended to be overlooked thus far with respect to LEED certification. At this writing, as a result, no such center has yet been LEED-certified.

The question may arise: "Don't all thoughtful and skilled architects who work in the arena of healthcare engage in evidence-based design and conduct POEs of their completed buildings? Simply put, the answer is no. This approach requires the systematic assessment of precedent, a willingness to revisit one's past projects, and an investment of time and resources. Few are being trained in this area of applied research for professional practice. It is a cost-effective method and particularly so in the case of a network of similar care settings that operate under the administrative umbrella of a single organization. Such was the case of the aforementioned State of Louisiana Office of Public Health and the Strategic Facility Improvement Initiative (SFI) it launched in 1991 and which continues at this writing. The use of the POE process can be applied widely not simply to one or two centers in a given community.

Therefore, there is no need to continually reinvent the same wheel. Architecturally, actively learning from past mistakes as well as past achievements is therefore invaluable.

Specifically, communities globally can benefit from the protocol reported above as applied to future research on these key issues:

1. Systematic Performance Assessment Protocol—The adoption of a systematic assessment of building performance across a network of similar care settings can help in planning, design and operations of community-based centers for public health and primary care. Day to day operations can be assessed and improved through the use of the POE protocol reported above. Past mistakes can be avoided.

2. Wayfinding and Overall Functionality—The reduction of the stress experienced by patients and staff can result through the use of POE protocols focused on wayfinding in these care settings. The design of clear, coherent, legible care settings can result in a higher level of satisfaction and even aid in the propensity of patients to avail themselves of opting to seek and receive care and treatment. A poorly planned, incoherent, overcrowded, center is a source of environmental stress, and in the extreme, avoidance.

3. Specialized User Constituencies—Spaces for children and the aged need to be specifically assessed in future research on this subject. These constituencies are a growing percentage of all patients and areas designed for their particular needs and preferences are justified on the basis of stress reduction and overall satisfaction levels.

4. High Quality Architectural Design—The type of center that is the subject of this research tends to be rather generic in its architectural expression. These centers tend to express a dull, institutional, aesthetic vocabulary. This is too often a result of insufficient construction budgets and underfunded ongoing maintenance budgets, as much as it is attributable to uninspired architectural design. The design standard needs to be raised significantly and evidence-based research can help to make the case for high quality architecture.

5. The Role of Local Culture in Placemaking: As a means to combat the aforementioned generic “aesthetic” that characterizes so many community-based centers, especially those in the public sector, research is needed on the role and function of indigenous vernacular influences on outpatient center architecture. Is a center whose architecture makes use of local building traditions, materials, and construction techniques, i.e., those of the American desert Southwest, for a new center planned in Prescott, Arizona, more preferred by staff and patients versus one that does not focus on these dimensions of placemaking? In other words, evidence-based research is needed to ascertain those essential qualities that create a health center’s *genius loci* or sense of place in its immediate and broader cultural community.

A carefully sited, planned, and designed community-based outpatient center functions as a civic symbol, not dissimilar from the “civicness” expressed in the local public library. It functions as a source of pride and accomplishment, and this alone resonates throughout the entire community. However, the impact of high quality architecture can be even more far-

reaching. In the case of Louisiana, the quest to replace aged, obsolescent facilities has in fact become part of the public health culture in the state, i.e. neighboring parishes seek to upgrade their facility once it is learned that a neighbor has upgraded theirs. The same, of course, can occur within a given city or town where more than one center is located. A new center in a neighboring community can spark interest. The construction of so many new facilities has resulted in a positive ripple effect—with the main beneficiaries the previously underrepresented and underserved patient.

Such efforts to improve the nation’s inventory of community-based outpatient centers are modeled in many respects on the Healthy Communities national program initiatives of the 1990s, although these initiatives are not “architectural” *per se* (Verderber 2005). Increasing the value-added amenity of architecture is a worthwhile civic investment. This does, however, require a learning curve among care providers. Clients must make the effort to commission POEs studies of existing facilities as the foundation for any subsequent planning and design activities. The patient is increasingly being viewed in both the public and the private, for-profit sector, as a consumer of healthcare (Verderber and Refuerzo, 2003). As patient-consumers become more knowledgeable about their conditions and their options for treatment, it stands to reason that they will become more knowledgeable about supportive (versus counter supportive) care settings and what specific factors render them as such. The Internet is having much impact in this regard although the persistence of a digital divide between insured and uninsured patients, between wealthy and poor, and urban and

geographically remote patients, will likely remain problematic for years to come.

Capital improvement pressures on not-for-profit care providers will remain particularly acute in the coming years unless both a national and global initiative is launched. The dilemma of chronically underfunded clinical care settings is expected to grow more severe as population increases in urban communities in the U.S. and elsewhere. A breaking point will be reached, unless something is done to create construction funding. The problem of underfinanced facilities for community-based outpatient care is exacerbated in communities facing budget shortfalls. Despite this less than rosy scenario, a sustained commitment to the building and assessment of high quality, evidence-based architecture for community health is needed at this time. This is a call to action to the architectural profession that not coincidentally parallels current widespread calls for an evidence-based medical and allied health professional landscape (Landro, 2003). A genuine spirit of architectural advocacy in community-based healthcare in the U.S. and globally can yield tremendous benefits in the coming years as the world's population continues to increase dramatically. Building performance assessment can greatly help in this effort.

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