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Redesigning the Office for Family Medicine: Promoting Efficient and Effective Work Processes through Design

Abstract | **Article**

The premise of this paper is that the physical environment contributes to the quality, efficiency, and efficacy of healthcare delivery in outpatient settings. Current family practice models evident nation-wide are based on sterile, institutional designs from the 1960s medical movement, developed before the expansion of information technology, point-of-care testing and portable diagnostic equipment. With changes in technologies and care delivery, family medicine should be re-examined to streamline work processes, improve access to information, reduce wait times, and achieve patient expectations for quality care. This paper presents a case study that demonstrates an effort to seamlessly integrate workflow, technology and the physical environment in an outpatient office prototype for family medicine. The interdisciplinary team started with the belief that the physical environment had to work in concert with clinical operations and that staff would have to fully adopt and embrace a cultural change. The real success of the collaborative effort will be determined after the new office is built and occupied in 2010. A post occupancy evaluation will reveal if, and to what degree, the design concepts applied to the new outpatient clinic contributes to the measurable outcomes identified during the programming phase of the project.

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Introduction

The physical environment greatly affects the quality, efficiency, and efficacy of healthcare delivery in outpatient settings. The 10th Annual International Summit on Redesigning the Clinical Office Practice conference, hosted in 2009 by the BC Academic Health Council, promoted: “The Office Practice Summit will bring together over a thousand revolutionary thinkers and innovative practitioners who are launching a new era in the scope and ambition of local office-based care delivery.” (Institute for Healthcare Improvement, 2009). Yet, in all presentations, the contribution of the built environment to care delivery was ignored. The authors argue that the physical environment is a major contributing factor in achieving the goals and aspirations purported by the organization.

Outpatient care settings have changed little since the medical movement of the 1960s. The designs of these clinics are based on sterile, institutional models developed during an era of paternalistic medicine. These designs were also conceptualized before the rapid expansion of information technology, point-of-care testing and portable diagnostic equipment. Many care providers express dissatisfaction about working around obstructions posed by inefficient facility designs (Halbesleben, Wakefield, and Wakefield, 2008). Today’s sterile, retrofitted, outpatient settings, with no access to daylight or outdoor views, fail to project an image and experience of a healing environment, an important element to care giving (Malkin, 2008, Ulrich, Zimring, Zhu et al, 2008). Given the adherence to principles of patient and family-centered care (Conway, Johnson, Edgman-Levitan et al, 2006); this outdated model is no longer viable as patient and family expectations increase. Likewise, team-based approaches to care delivery warrant new design strategies particularly open areas that facilitate communication and coordination.

There is a strong need to rethink the built environment of a family practice, in order to align facility design with new standards of care. In response, a conceptual investigation began in a graduate architectural programming course at Clemson University, as a public service project for Spartanburg Regional Health System’s (SRHS) Physician Network. NXT Health, a health innovations organization, facilitated a partnership between the Physician Network and Clemson University’s Architecture + Health Program. The core team included experts from NXT, the medical director, physicians, nurses and office staff from the Physician Network, along with faculty and students from Clemson University. The main objective was to RETHINK the family medicine practice in an effort to design a physical environment around ideal work processes and care scenarios for the Physician Network.

Located in upstate South Carolina, the Physician Network started in 1994 with a single practice and grew to include 45 practices by 2009. While the services they offer are vast, this project focused on developing a Family Medicine Practice Prototype for the future growth of the Network. The authors present a case study where a new vision for the practice of family medicine was explored.

Family Medicine – Definitions and Directions

Family medicine typically includes an array of services offered within the “context of community” and includes acute care, chronic care management and preventative care for both genders and all ages. Other services offered by family physicians include maternity, hospital, primary mental health and supportive end of life care (Cassel, 2009).

The American Association of Family Physician’s task force predicts that in the future, family medicine will need to, “redesign the work and workplace of family physicians” and integrate the concept of a “relationship-centered personal medical home” (AAFP, 2009). The task force states that the new model of family practice services should be “accessible, accountable, comprehensive, integrated, patient-centered, safe, scientifically valid, and satisfying to both patient and their physicians” (AAFP, 2009). In addition, this new model should embrace technologies that enhance diagnosis and treatment. Electronic medical records will be central to allow for the fluid movement and access to patient medical information. Furthermore, it is predicted that in the future, more services will be available inside the patient’s home and many services are currently possible.

Rethinking a Family Medicine Clinic

Project Process

The overall process involved three phases: Research, Programming, & Schematic Design. The Research and Programming Phases took place during the spring 2009 academic semester. The goal of these phases was to gather information, analyze the findings, and translate the information into programmatic and design concepts. The third phase, Schematic

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Design, took place immediately after the semester. The goal of this phase was to apply the concepts to create a cohesive and effective design for the family practice to be constructed in 2010. (A fourth phase will test these design solutions in a post-occupancy evaluation, after the completion of the project.)

Research Phase

Eleven students enrolled in Architectural Programming conducted a literature review to gain a broad understanding of trends in outpatient care. They then conducted observational field research in three outpatient settings within the SRHS system, organized and identified by the medical director. Prior to the field work, each student completed training on human subjects, patient protection (HIPPA requirements) and specific health system requirements.

In the first field study, students ‘posed’ as new patients to gain a patient’s perspective (a concept closely related to a ‘mystery shopper’ within the realm of commercial sales). Each student documented the total length of visit (cycle time or through put), the length of time for each step along the way, and the environmental problems observed.

To gain a staff perspective, each student returned to the same clinic to shadow staff in three zones: a) office personnel in the office support zone, b) a nurse in the clinical support zone, c) a physician in the provider zone. The students documented: (a). steps involved for each of the work processes performed by staff , (b) physical barriers perceived to obstruct workflow, and (c) the influence of the clinic’s floor plan on workflow.

Based on the findings from the field studies, assessments were made as to where inefficiencies seem to occur. Conclusions were drawn concerning effective techniques for streamlining the flow for various patient types in the new facility.

Programming Phase

Three collaborative work sessions, each lasting two to three hours, were organized to create a forum for the interdisciplinary team to share ideas and perspectives in an interactive setting. The first work session involved initial brainstorming to identify the vision for the family medicine practice, project goals and architectural goals. The second session involved reviewing the facts and issues and establishing programmatic elements to support the vision and goals. The team discussed each programmatic element, compared current work flows discovered in field research with ideal work flows, and established key spatial adjacencies and technical requirements for each programmed area. Finally, in the third session, three diagrammatic scenarios were presented to discuss key relationships between areas, technology and equipment needs, and work flow. Additionally, design qualities for specific areas such as assessment rooms, procedure rooms, a resource area and shared work areas were discussed in-depth.

Following each meeting, the architectural team synthesized the information to define overarching project goals, make design recommendations, and to define spatial needs to align with client expectations and requirements.

Project Goals

1. The design of the facility should assure a high quality of care through the adoption of efficient work processes.

An overarching goal is to become an operationally excellent practice where the design is organized around optimized workflows to maximize efficiency of care processes. The design should encourage optimum staff performance, slim down waiting times and reduce wasteful human, financial and natural resources.

2. The clinic should support patient and family-centered care in order to align care practices and delivery with patient expectations.

The principles that define patient and family-centered care focus on those for whom the medical practice exists: the patient. Institutional and clinical settings are typically associated with a sense of loss of control, resulting in increased levels of fear, stress and anxiety. The organization and operation of the clinic should provide patients a sense of respect, control and independence.

3. Provide a therapeutic, sustainable setting for community-centered healthcare delivery.

Sustainable design and green practices inherently address issues of health at a multitude of scales – individual, regional and global. Through the acceptance of a broad definition of health, green design initiatives encourage a therapeutic environment as specified in the Green Guide for Healthcare (2009).

4. Utilize technology-enhanced design concepts to allow for fluid and continual upgrades to latest technologies that provide rapid access to patient medical information.

Technology continually and rapidly evolves, changing the face of medical practices in the process. New technological advances hold potential for improved diagnostic and treatment capabilities, giving provider’s information on demand,

expediting care, and presenting new opportunities for improved quality and outcomes. However, as technology progresses, so too must the spaces within which care is delivered. Flexible design (both spatial and functional) allows for the seamless integration of technology within medical practice in order to assure the highest levels of care. The selection of easy-to-use and enabling technologies further allows patients to play an active role in their care processes, whereby promoting patient satisfaction.

5. Design flexible spaces that can accommodate changing needs in technology and care practices over time

Technological and practice-based advances in healthcare delivery demand a flexible infrastructure in order to avoid premature building obsolescence. Flexible design (both spatial and functional) allows for the seamless integration of technology within the medical practice to assure ongoing state-of-the-art services. Spaces capable of evolving respond to changing preferences and work styles, practice and industry trends, and technologies to ensure that the family practice provides the most comprehensive and up-to-date care to their patients.

Key Insight & Recommendations

The key insights that emerged from the observation research and programming work sessions are organized in five areas: a). inefficiencies, b). utilization of technology, c). visual and acoustical privacy violations, d). limited daylight and views, and e). spatial issues. Within each area, common themes reported by multiple students are noted with a corresponding operational and design solution that emerged from the team. Interestingly, the vast majority of comments concerned privacy issues. Many physical features in the built environment appeared to be in conflict with the goal of patient privacy regulations (HIPPA regulations).

View our recommendations

Spatial Needs

Facts and Assumptions:

The eventual site for the new family practice for the Physicians Network is located in the affluent Five Forks area of Simpsonville, SC (part of the greater Greenville/Spartanburg area). The specific site for the new building was selected prior to the programming effort and presented some challenges given its limited dimensions (60 feet by 160 feet) and strict covenants.

The residents in the Five Forks area are generally highly educated young professionals with children and with incomes reported to be 112% higher than the median income of South Carolina (City-data.com, 2008). These demographics suggest that the prospective clients of the new clinic are educated, technologically proficient and have high expectations concerning primary care services.

Discussions with the client team yielded several assumptions that provided a starting point.

- *Four care providers in the clinic (physician or nurse practitioner) with a corresponding nurse (figure 1; A,B,C, & D)*
- *Each care provider would see approximately 24 patients per day including (four new patients, twelve existing patients, three patient physicals, five acute/sick patients, and one patient procedure).*
- *The physicians and nurses on the client team agreed that approximately 70% of patients do not need an exam table during their visit and the table in certain cases can be dangerous. Thus, two levels of rooms are proposed – a) assessment rooms which offer a flexible, family-like non-intimating room to accommodate various functions. b) a procedure room as needed for clinical examinations such as gynecological exams and minor procedures.*
- *Each care provider would be designated three and one half assessment rooms (three designated, one shared) and one procedure room*
- *The staff will pre-plan for patient visits, including registration, patient history, billing and insurance, and test results*
- *The practice will be equipped with wireless technologies, allowing for Electronic Medical Records (EMR) and wireless communications*
- *Certain portable equipment and supplies will be stored within each provider pod (such as vital sign equipment, carts, medical supplies) or in a central location within the overall clinic (such as portable x-ray equipment)*
- *Assessment rooms will be fully equipped with vitals equipment, a docking station, a computer and other high-use*

equipment and supplies.

- Lab equipment has potential for rapid response results

Operational and Design Requirements: Organizing and completing field work along with discussions with core staff, allowed the team to organize the family practice within three primary zones (figure 1): 1. Office Support 2. Clinical Support (lab and nurse areas), and 3. Provider (support and direct care). A fourth zone, General Support includes shared storage and server requirements.



Figure 1: Plan organization and zoning

1. The Office Support Zone encompasses the public and clerical realms of the family practice. The public spaces (“Front of House”) include patient check-in and access to educational information. The clerical area (“Back of House”) entails the business administration of patient processing.
[View the Office Support Zone Table](#)

2. The Clinical Zone encompasses the technical and nursing components of the family practice that provide supplemental treatment and evaluation of patients. The first area supports diagnostic activities while a second area supports the nurses.
[View the Clinical Support Zone Table](#)

3. The Provider Zone has two general areas including care delivery support, with work space for providers, and direct patient care areas for the assessment, diagnosis and treatment of patients.
[View the Provider Support Table](#)

Schematic Design Phase

The aim of the schematic design phase is to apply the defined goals into design concepts and solutions for a specific context defined by the client (figures 2 and 3). The overarching vision for the new family practice prototype is to expand upon the traditional view of health. The goal is to redefine patient expectations by providing efficient, high quality care that leverages the latest technologies within the context of healthy sustainable spaces. The clinic should serve as a model and resource for the entire community to promote health and wellness along with patient treatment.

Throughout the process, the team created five major design concepts, informed by the design goals, to effectively create an operationally excellent, patient-centered, healthy family practice prototype. Measurable benefits are hypothesized and will later be tested one year after the facility is occupied in a Post Occupancy Evaluation (Preiser, Rabinowitz, and White, 1987). Results from the POE will be compared to the practice that will relocate along with other practices within the Physician Network.



Figure 2: Schematic Floor Plan



Figure 3: Aerial view showing overall spatial organization

Resource Lounge

The Resource Lounge (figure 4) is the first impression for patients and should therefore be an active, community friendly environment to replace the traditional waiting room. An open public area with various programmed activities at the front of the facility will allow families to move fluidly in the public area during the office visit. A stimulating resource lounge and health bar, will provide access to health educational materials to inform patients and families about preventative health, wellness, nutrition, and treatments. This space can also house seminars and demonstrations on healthy living.

Digital registration can be completed prior to the office visit through the internet using a personal computer or PDA. People can check-in and out from kiosks in the Resource Lounge, with the help of a Patient Access Representative, where they will be informed of the steps involved in their visit that will allow the patient and family a feeling of control.

The Resource Lounge is immediately surrounded by the areas used by patients, including the assessment rooms and laboratory. Placing these destinations upfront greatly simplifies way-finding for patients, offering a clear sense of orientation, reducing the staff time used to direct confused patients. Additionally it gives the sense that their appointment has already begun. These qualities contribute to patient respect, control, and independence.

Design hypotheses:

- Patient satisfaction will increase as a result of active participation in care processes
- Patient satisfaction will increase as a result of the therapeutic environment
- Retrieved education materials in resources area will increase
- The number of new patients will increase at the practice
- Patients using pre-planning services (through the internet and centralized scheduling) for up-front planning prior to the office visit will increase
- Patient health outcomes will increase
- Waiting times will decrease due to improved access to medical information
- The use of home-based diagnostic testing will increase as a result of patient education



Figure 4: Rendering of Entry Patio and Resource Lounge

Separate Public Patient Areas & Staff Work Areas

Operational excellence in the family practice is hindered by the overlap of public and private areas within the clinic. Private staff work was often interrupted by wandering patients. Additionally, to respect patient privacy, nurses and providers would have to travel far from the exam rooms to discuss patient medical conditions. Often this was not possible and privacy was violated. Utilizing a separate private staff core from the more public patient/family core immediately solves the inefficiencies created by joint circulation (figure 5). Separating private and public zones will allow for more fluid movement as well the ability for staff to engage in private conversations as needed.

Design hypotheses

- The patient cycle (throughput) times will decrease due to efficient design and operational processes
- Staff satisfaction and productivity will increase
- Patient satisfaction will increase as their privacy is respected

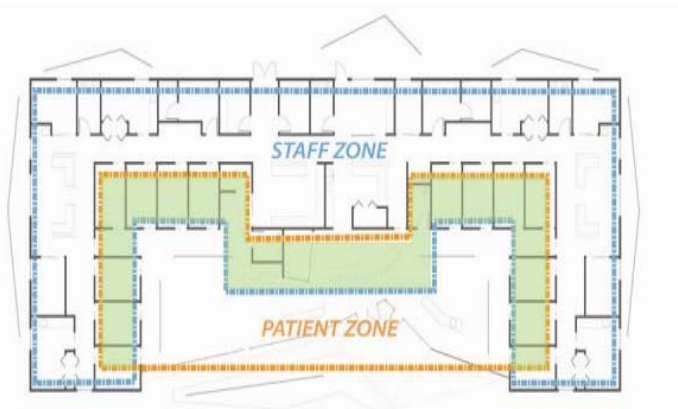


Figure 5: Separate patient and staff zones, overlapping at assessment rooms

Provider Pods

In many current offices, providers and nurses travel great distances to access patient rooms, supplies, and collaboration areas. Clustering frequently used spaces and providing adjacencies for providers and their nurses greatly minimizes travel distances. It also allows clear views to assessment rooms, and promotes collaboration for increased patient care. Since these pods are in the private core, the Nurse Station and Provider Office can be fully utilized for team meetings and pre-planning. Additionally, each pod is joined by a shared nurse station to promote collaboration among staff and to provide additional assistance as needed (figure 6).

The pods are kept relatively open to encourage efficiency and effectiveness. They include cross-programmed spaces as operations flux daily; reconfigurable interior wall systems can promote flexible use over time and fluid accommodation to technology.

Design hypotheses

- *The patient cycle (throughput) times will decrease due to efficient design and operational processes*
- *The total distance travelled by staff will be reduced as a result of provider pod groupings*
- *Patient satisfaction will increase as staff is more prepared and cycle times decrease*
- *Patient care will increase as a result of collaboration and shared knowledge*
- *Patient volumes will increase by 10% within first year*



Figure 6: Rendering of nurses station in core of private provider pod

Assessment Room

The typical exam room portrays an institutional environment often associated with increased levels of fear, stress, boredom, and anxiety. According to physicians, the exam table is underutilized and often unnecessary during patient consults. Therefore, the planning team decided the exam room should be replaced with an assessment room that acts as the meeting point for patients and providers. (If patients need a more involved exam, they can be escorted to the adjacent procedure room.)

The assessment room should have a relaxed, stimulating and comfortable atmosphere to put patients at ease, and can also be used to educate patients on various conditions and treatments.

The assessment room will exhibit flexibility with modular furniture systems and docking stations, as well as digital display monitors. In this way, it can accommodate rapidly changing technologies and methods (figures 7 and 8).

Design hypotheses:

- *Assessment room flexibility will be utilized to accommodate various activities*

- *Flexible furnishings and portable equipment are successful in accommodating various activities and occupant preferences*
- *Patient comfort and satisfaction will increase due to relaxed atmosphere*
- * *The number of changes that affect physical modifications or renovations to space such as new equipment, technologies, communication systems, etc. will be reduced*

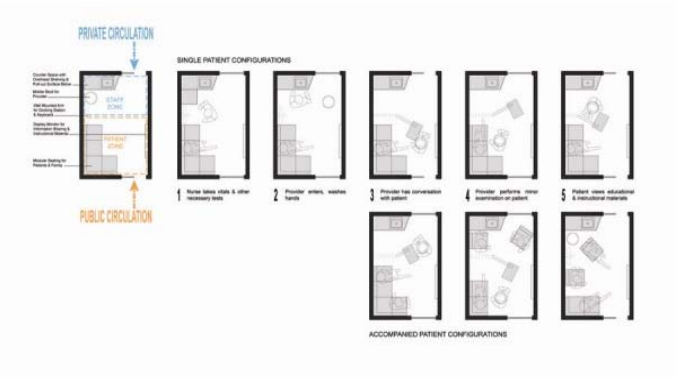


Figure 7: Assessment room equipment and flexibility



Figure 8: Rendering of assessment room

Healthy Building Design

Sustainable design and green practices inherently address issues of health at a multitude of scales – individual, regional and global. Through the acceptance of a broad definition of health, green design initiatives encourage a therapeutic environment as specified in the Green Guide for Healthcare (2009). Areas such as connections to nature, access to daylight, noise control and elimination of toxic materials and systems all are attributes that define environmental quality and have been shown to improve physical and psychological health, satisfaction, reduce stress and increase productivity.

Thus, staff work spaces should be located in close proximity to exterior walls to provide natural light and views. Similarly, views should be provided at the ends of corridors to reinforce connections to the outside and orient occupants, making the environment feel more open. In addition, areas where there is direct patient care (assessment rooms and procedure rooms) should also have daylight (figures 9 and10).

Measurable hypotheses:

- *Staff satisfaction, mood and morale will increase due healthy building design*
- *Staff productivity will be increased due to lighting, outdoor views and decreased distractions.*
- *Patient satisfaction will increase due to more pleasant and efficient staff*
- *Costs associated with energy use for lighting in the clinic will decrease*



Figure 9: Diagrammatic section through resource lounge and office support zone



Figure 10: Diagrammatic section through resource lounge and provider zone

Conclusion

There are increasing expectations to shift from a provider-focused to a team-based approach to providing care. External pressures are also increasing expectations to boost volumes and productivity, reduce costs and improve the quality of care simultaneously. The authors propose that the design of the environment helps achieve these expectations, and positively influences measurable outcomes such as operational efficiency, staff satisfaction, and associated energy and operational costs. A professional architectural practice is further developing the schematic design ideas presented in this paper through the design development phase so construction will be complete in 2010. The design goals (hypotheses) will be studied after the construction, occupation and commissioning of the facility. The long term objective is to improve the integration of design and research in the development of high performing outpatient care environments.

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