



Performance Improvement in the ED Key Principles in Emergency Department Design

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Responding to Change

It's often said that the emergency department is a hospital's true front door. With community growth and growth in the number of under- and uninsured patients, emergency departments are seeing a significant increase in patient volume. Leading healthcare organizations are asking, "Can our emergency department provide the kind of care we'd like to deliver to our community?" and "Is the patient experience in our emergency department consistent with our healthcare brand promise?" In many cases, the answer leads to an investment in redesign of both care delivery processes and facilities.

Key Design Principles for Today's Emergency Departments

Emergency department performance is measured from the perspectives of its key stakeholders – the patients, staff and the healthcare organization. Innovative design considers all these different perspectives and the close relationship between process and physical space in healthcare delivery. Through its extensive experience with these projects in recent years, Plunkett Raysich Architects has identified several key principles in the design of state-of-the-art emergency departments:

Decrease patient wait times/patients that leave without being seen – Streamline patient flow through the facility and the registration-to-treatment process to decrease the "time-to-doc." Keep patients moving forward, not going back to the waiting room.

Create efficiencies for staff – Streamline staff flow and

workload through design attention to patient flow, the location of patient treatment areas and interaction within the phases of care.

Accommodate new technologies – Increase space to accommodate use of new healthcare technologies within treatment rooms and imaging within the department.

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Increase safety for patients and staff – Design the department with lock-down and monitoring features and separate and control entry to and exit from the department. Improve decontamination features to safely treat individual patients while

also keeping other patients, staff and the community safe.

Increase privacy for patients and staff – Build in features that foster privacy for patients and staff when discussing patient care. Anticipate future growth and change – Flexibly design the department to grow, change and adapt easily to future community healthcare needs and practice protocols.

The Value of Innovative Design

Emergency department design concerns more than physical space. The design should support creation of the unique care environment envisioned by each healthcare organization. To that end, innovative emergency department design supports common business objectives, including:

- Improved patient care and safety.
- Improved patient experience.
- Increased staff retention and attraction.
- Attraction of increased philanthropic dollars.
- Support for the healthcare organization's brand in the community.

Co-Design as a Best Practice

Plunkett Raysich Architects' codesign process engages care



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providers and other central stakeholders in planning and decision-making during the design process to determine emergency services. The cross-functional team begins the process with evaluation of the service delivery dynamics, use of the existing space and challenges and successes driven by the existing model of care. The team then moves into imaging and visioning lean practices and designing an improved care experience for patients and staff. They may tour other state-of-the-art facilities in this phase. From there, they develop consensus on key goals and design elements. Plunkett Raysich Architects' team members provide a design, with small-scale and life-size mock ups. The hospital staff tests the design and recommends changes prior to objective construction based on the establishments of performance metrics.

When care providers participate in planning and design decisions, they become champions of the new care delivery model that will flow from the design and physical space. The codesign process produces tangible results, such as:

- The design translates the hospital's vision for its patient experience into actuality.
- The design optimizes the care process and environment within the space and budget.

- The emergency department better represents the healthcare organization's brand and becomes a differentiator for that organization in the community.
- Emergency Department Design Case Studies
- The following case studies detail Plunkett Raysich Architects' use of innovative design principles and its codesign process in the renovation and expansion of emergency departments at three leading hospitals.

Beloit Health System – Beloit Memorial Hospital Emergency Department

Budget: \$8,500,000

Scope: 11,200 sq.ft. renovation and 18,800 sq.ft. addition

Project Overview

In 2007, Beloit Memorial Hospital determined that its existing facility was not meeting the growing demand for emergency care in its community. Patient volumes increased over the prior decade at an average rate of 560 patients per year. The combination of patient increases with inadequately sized treatment areas and a slow registration process led to an increase in patient wait times. Patient satisfaction dropped, and the number of patients "Left Not Seen" increased by 262% in three years. The hospital embarked on a capital improvement project to improve patient outcomes, support family needs and create an environment of care that would retain and attract the best and brightest.



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Plunkett Raysich Architects partnered with Beloit Memorial Hospital managers, physicians, nurses, administration and support staff in a codesign process to create a healthcare environment that would respond to qualitative and quantitative performance measures. During the design process, the entire team toured emergency departments at three different hospitals to observe other methods of care delivery involving waiting, registration, triage and treatment. Armed with this experience, the team could better identify its own priorities and vision of care for the community. The team established the following key project drivers:

- Timely delivery of care
- Patient privacy
- Technology/clinical excellence
- Safe environment
- Compassionate care
- Comfortable environment

The team also developed a project vision statement to summarize the goal of the emergency department: "A Center of Excellence that Exceeds Patient Expectations."

Design Solution

Through the codesign process, the hospital staff was integral to the development, shape and implementation of their new facility. The staff engaged in "puzzle play" to develop the proper adjacencies and flow. With the design staff, they tested new layouts, were able to visualize plan alterations during the design meetings and make collaborative decisions to improve and maintain the project drivers.

As treatment room design evolved, the team tested the design in a live mock-up to ensure that all equipment, casework, plumbing/medical gas and electrical locations met their requirements and could be experienced in real time. This enabled all hospital service lines to experience the proposed treatment/trauma room design and make any necessary changes prior to construction. As construction proceeded, a treatment room was mocked-up again for final review prior to rough-in of utilities. Once the design was approved, all other

rooms could be constructed with minimal concern for changes.

Reducing "time-to-doc"

The team put great effort into reviewing and streamlining the registration and triage process to improve this key element of service. With the new design, patients continually move forward toward treatment and never return to the waiting area. The new process ensures that patients receive diagnosis and treatment more efficiently.

The original department featured private and semi-private treatment rooms. With the new design, patients are taken to different treatment suites depending on acuity. This allows for improved treatment of all patients and a separation of high-acuity patients from low-acuity patients or children. The main trauma suite consists of four treatment rooms, three specialty treatment rooms, two behavioral treatment rooms and two trauma rooms, but as patient census grows, the department can flex into the adjacent suite, which contains 10 additional treatment rooms.

The project provided the hospital and community with essential features:

- 12 additional treatment areas
- Direct access to a digital X-ray and CT scan room within



the trauma suite

- Access to laboratory and quick turn-around of tests via a new pneumatic tube system, which allows for quicker diagnosis and treatment
- New six-ambulance garage

Proven Results

Within a year of completion, Plunkett Raysich Architects conducted a post-occupancy evaluation to benchmark performance measures that affect patients, families and staff. The study revealed the positive impact of the new emergency services department:

- 36% decrease in patients spending six or more hours in the emergency department
- 64% reduction in the percent of patients “left not seen/ triaged not seen”
- Elimination of the need for ambulances to stage outside, waiting for access
- Staff satisfaction has improved within the new department and is attributed to the following items:
 - Flexibility
 - Treatment room size
 - Improved patient and staff privacy
 - Aesthetics
 - Ambulance garage

Wheaton Franciscan Healthcare – All Saints Emergency Department

Budget: \$21,825,000

Project Scope: 40,835 sq.ft. of a 216,000 sq.ft. hospital addition

Project Overview

Wheaton Franciscan Healthcare – All Saints consolidated emergency services at St. Luke’s and St. Mary’s Hospitals into a state-of-the-art department capable of handling 70,000 patient visits annually. Located in Racine, the existing emergency departments at both hospitals had become inadequate, and the improvements dovetailed with an extensive new addition at St. Mary’s. Emergency services would be housed on the first floor, leaving the floors above for a new cardiovascular

institute. With this addition, St. Mary’s could better serve the entire community and become a new destination for healthcare.

Wheaton Franciscan Healthcare had several goals for its new emergency services facility, including:

- Improve patient experience by improving patient and staff flow and access
- Reduce “time to doc” to allow for improved treatment response
- Provide proper separation between ambulance and walk-in traffic
- Improve turn-around for lab and radiographic services
- Create a safer environment for patients and staff
- Improve privacy for patients and families
- Provide diagnosis areas for potential cardiac patients
- Provide appropriate hazardous material decontamination services

Design Solution

Plunkett Raysich Architects partnered with Wheaton Franciscan Healthcare in a codesign process that involved nursing,



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physician, EMS, registration, security, infectious control, Flight-for-Life and administration staff to create a facility that could better serve the current and future healthcare needs of the community.

Through the codesign process, the team evaluated the flow of patients, staff and services in the existing departments, noting differences between the two campuses. The process enabled the team to identify its best practices and the causes of bottlenecks and other challenges within the existing care delivery model. Using this information, the team collaborated on a design that supported its goals.

Reducing “time to doc”

Plunkett Raysich Architects divided the department into key blocks of treatment areas. Patients are triaged in one of three rooms and then taken to the appropriate treatment area. The fast-track suite contains eight treatment rooms, including two airborne isolation rooms and two pediatric treatment rooms. The trauma suite includes 14 acute care treatment rooms and eight trauma rooms. Each suite has direct access to the lab and the radiographic X-ray room.

Improving staff access and flow, Plunkett Raysich Architects designed the room-type alignment and adjacencies based on current nursing staff ratios of two acute rooms and one trauma room per nurse. All rooms allow for direct supervision of staff from primary workstations. In addition, the department was developed into two suites to allow it to flex up based on changing patient census.

Additional design features that also aligned with project goals are:

- Separation of walk-in traffic from ambulance/EMS traffic by designing a “front door” and “back door” on opposite sides of facility. Secured access is provided to the ambulance garage to maintain order yet allow easy access by EMS.
- All patient treatment rooms are private and feature private toilet facilities for greater privacy and reduced risk of infection.

- 12-bed unit for observation of patients with potential cardiac concerns while testing is performed, which freed up needed treatment rooms and inpatient beds
- Direct access to laboratory services within the department and two dedicated X-ray rooms, with planned future access to a 64-slice CT Scan room
- Lock-down capabilities for the department and a security suite directly adjacent to the 24/7 entry for direct supervision
- Dedicated behavioral treatment room suite with direct supervision work areas
- Decontamination room with separate access from the exterior of the building, custom showers, an holding tank for contaminated materials and direct access to treatment rooms once decontamination is complete, therefore separating patient types to eliminate cross-contamination.
- Rooftop helipad for more secure and safe arrival/ departure to the healthcare campus and ideal access to the department via dedicated elevator.

Proven Results

Wheaton Franciscan Healthcare earned the HealthGrades® 2010 Emergency Medicine Excellence Award.



Wheaton Franciscan Healthcare – St. Francis Hospital Emergency Department

Budget: \$3,200,000

Project Scope: 6,800 sq.ft. renovation and 8,900 sq.ft. of addition

Project Overview

Plunkett Raysich Architects partnered on design and renovation of the emergency department at St. Francis Hospital in Milwaukee in 1976 and 1995. Due to previous agreements, the site had limited expansion opportunities, and the 1976 ambulance garage design had been maintained over the years. As a result, St. Francis hospital's ambulance garage did not keep pace with the needs or sizes of the current EMS equipment, and the existing waiting, triage and registration areas could not adequately meet the needs of the patients or staff.

Wheaton Franciscan Healthcare ventured into a renovation/ addition of the emergency services facility at St. Francis, with several goals:

- Improve patient experience by improving patient and staff flow
- Reduce "time to doc" to allow for improved treatment response
- Provide proper separation between ambulance and walk-in traffic
- Create a safer environment for patients and staff
- Improve hazardous material decontamination services

Design Solution

Plunkett Raysich Architects partnered with Wheaton Franciscan Healthcare in a codesign process that involved nursing, physician, EMS, registration, security, infectious control and administration staff to create a facility that aligned with the current and projected community healthcare needs. The team evaluated the use of the existing space and ways the culture, methods and protocols of the department had changed since the last renovation. The team then collaborated on a design to support its new goals.



As agreements with the adjacent building owners had recently changed, Plunkett Raysich Architects requested the ability to investigate the impact of this change on the hospital's emergency care services. The result was further expansion of the department to allow emergency services flexibility it needed, as well as space for a dedicated fast-track suite to speed care for patients based on their level of acuity.

Design features essential to the goals:

- The original ambulance garage was re-purposed for a new waiting room, with large windows in place of the original ambulance bay doors. By using the original garage during the initial phases of construction, disruption in the department was reduced, and patients could enter the facility without being affected by the cold winter.
- More direct paths to the central elevators and cafeteria were created for improved visitor access to main hospital after hours.
- Lock-down capabilities for the department and a security suite directly adjacent to the 24/7 entry for direct supervision
- Dedicated behavioral treatment rooms with the ability to

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isolate all critical utilities from patient access if the space was used as a holding room

- Separation of walk-in traffic from ambulance/EMS traffic
- Decontamination room with separate access from the exterior of the building, custom showers, an holding tank for contaminated materials and direct access to treatment rooms once decontamination is complete, therefore separating patient types to eliminate cross-contamination.

Proven Results

Wheaton Franciscan Healthcare earned the HealthGrades® 2010 Emergency Medicine Excellence Award.

Embarking on an Emergency Department Design Project

Many of Plunkett Raysich Architects' clients have found that touring other state-of-the-art emergency departments is a valuable opportunity to observe the connection between best practices in care delivery and the physical space that supports it. To learn more about emergency department design or to schedule an emergency department tour, please contact Michael Scherbel at mscherbel@prarch.com.



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