

Designing the ED of Tomorrow

In part I of EPI's new design series, **Dr. Manuel Hernandez** explains how smart architectural decisions can lead to real improvements in emergency care.

“If you build it, they will come.” These words have been uttered in movies, by businessmen and women and they form the backbone of revenue-driven healthcare delivery models. While many state-sponsored and single payer healthcare models believe these words don't apply to their reality, this could not be further from the truth.

As acceptance of emergency medicine evolves, history has taught us that utilization rates generally follow an upward trend (10, 12, 14). Eventually, almost every ED will require expansion or replacement. When the time arrives, careful planning during the predesign, design, construction and occupancy phases will play a critical role in determining how successful the new ED will be in meeting community need.

Understanding what to build and how to build a new ED requires, to a certain degree, a leap of faith. Most peer-reviewed information on ED design focuses specifically on modifications to processes or overall capacity while little attention has been paid to how the built environment can impact care delivery. To understand this, we must often look to other clinical areas and draw our own conclusions. Alternatively, we can turn to the architectural literature where an emerging discipline known as evidence-based design is beginning to study how the built environment impacts care delivery and vice versa.

Regardless of what research is consulted, there are a number of design considerations that should be incorporated into any ED design project. Too numerous and complex to cover in a single



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review article, the following are key high-level concepts that should be incorporated into any new ED project.

Understanding Process and Patient Flow

Planning a new or expanded ED presents a golden opportunity to rethink how care is delivered. Every ED design project should begin with an assess-

01 Proper design can create intuitive way-finding for patients and families. The Gates Global Vascular Institute (Buffalo, NY, USA) uses large lettering and bright lighting to ease locating the emergency department entrance.

02 Identical design of trauma rooms as in the case of UMASS Memorial – Lakeside creates an ease of orientation for clinicians providing fast-paced, high-acuity care. Proximity to adjacent departments such as imaging speeds time to diagnostics and reduces overall transport times and time out of department for critically-ill patients.



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03 Situational awareness is essential in the ED. Designing departments that ensure a clear line-of-site from staff work areas to all treatment stations promotes patient monitoring and early recognition of clinical decompensation.

04 Access to natural light and the external environment is an important consideration to promote patient and family satisfaction along with a sense of well-being.

05 Open treatment station design promotes patient access and ability for physicians and care team to manage multiple high-acuity patients simultaneously.

06 ED treatment station design with dedicated hand-washing and staff work / documentation stations promote infection control and increased time at bedside. Introduction of entertainment devices such as a TV improves patient satisfaction and distracts from prolonged delays.

ment of current operations to understand what processes work well and where opportunities exist to improve. Leveraging methodologies such as LEAN can yield significant benefits in terms of length of stay, walkout, mitigating access block and has been shown to be effective in both developing and mature emergency medicine systems (3, 11). Regardless of methodology employed, process redesign undertaken in collaboration with architects provides the design team with keen insights into ensuring the built environment is designed to support operations as opposed to hindering them (16).

Process standardization has been shown to decrease morbidity and mortality in a range of clinical areas while also reducing overall length of stay (2, 15). From a facility perspective, creation of standardized, or universal, patient care rooms promotes improved efficiency and results in more flexible clinical areas (1, 5).

Rethinking departmental layout can also positively impact patient safety as well as improve patient perceptions of privacy (8, 13). In both cases, the design of the built environment had a direct impact on the outcomes observed.

Technology Planning

Technology planning is never more important than at the beginning of a new design project. Careful consideration of the impact of processes and workforce models and vice versa will ensure an informed ED design that places technology in the right places at the right time in the care delivery process.

For example, point-of-care testing (POCT) has been a proven technology with respect to accelerating time-to-diagnosis, and reducing overall length of stay (17). Planning for POCT requires consideration regarding the location of analyzers, reagents and quality control materials as well as planning for appropriate wireless bandwidth to facilitate seamless interface with existing electronic health records.

Another important facility planning consideration is the impact of computerized physician order entry (CPOE) on processes. When planned properly, CPOE has been shown to have a meaningful impact on overall length-of-stay while reducing incidence of medical errors and overall mortality (9, 18). As with POCT, planning for the location of CPOE stations, IT bandwidth and the

point in the care process where order entry may occur are all important when considering potential design solutions.

Inter and Intra-Departmental Adjacencies

As the front door to many hospitals, the ED's location relative to other clinical, diagnostics and therapeutic areas becomes an important consideration. Similarly, the location of different components of the ED itself become important considerations in planning and design.

A 2008 study identifying barrier to timely evaluation of chest pain patients in the ED noted that design considerations such as presence of solid doors on exam rooms and proximity of patients to the physician work area can impact time to patient evaluation (4). Anecdotally, even the location of diagnostic imaging modalities within the ED can have appreciable impacts on efficiency and length of stay. One U.S. ED reported significant reductions in overall length of stay and walk-out rates tied to the relocation of a fixed plain radiograph room immediately adjacent to the triage stations (7). Similarly, reductions in overall intradepartmental transports can yield positive impacts on cost and efficiency (6).

Choosing the Right Architect

Choosing the right architect to support an ED project is not always an easy undertaking. Healthcare architecture is one of the most complicated subspecialties and, while many architectural firms claim experience in healthcare design, experience does not always translate into proficiency. When choosing an architectural partner, this author recommends considering the following as part of the selection process:

- + Experience in healthcare planning and design
- + Approach to including staff in planning and design process
- + Ability to translate future care delivery models into built environment
- + Demonstration of proven outcomes in previous projects
- + Diversity of design solutions
- + Previous client references
- + Global expertise to facilitate innovative solutions

Regardless of the stage of evolutionary development, EDs globally and their patients will benefit from ED planning and design projects that are focused on careful evaluation of the countless factors impacting the development of a successful design solution informed by global best practices, active engagement of key stakeholders and selection of an experienced architectural partner.



Ample work stations and electronic patient tracking technologies, all with direct line-of-sight to patient treatment stations, increase patient monitoring and enhance the overall patient experience.

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