SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

The objective of this study was to explore and identify physical design correlates of safety and efficiency in emergency department (ED) operations.

Environmental Correlates of Safety and Efficiency in Emergency Departments

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Key Concepts/Context

Whether from professional or governmental institutions or from the popular press, stories abound of the challenges EDs (emergency departments) face (Berger, 2006). Every day, EDs have to treat an ever-rising number of patients coming through their doors, many of whom have highly complex conditions. Clinicians do this with an increased understanding that time for therapeutic care is vitally important, especially in cases of myocardial infarction, stroke, pneumonia, and sepsis, where delay can literally cost a life. This nexus of increased quantity, timeliness, and intensity of care has created many challenges for the operation of EDs today. Interventions have been typically operational, although there is an implicit and growing recognition of the role of the physical environment. However, elaborate/adequate scientific literature on ED physical design is not available.

Methods

This study adopted an exploratory, multi-measure approach to: (1) examine the interactions between ED operations and physical design at four sites, and (2) identify domains of physical design decision-making that potentially influence efficiency and safety in ED operations.

Sample

An opportunity sampling strategy was employed.

Participants in the gaming session involved personnel from seven departments at each site: (1) nursing, (2) respiratory therapy, (3) registration/admissions, (4) imaging, (5) laboratory, (6) pharmacy, and (7) security.

In-depth semi-structured interviews were conducted with the chief nursing officer and/or the nurse manager and the medical director of each ED.

Setting

Four EDs situated in large hospitals voluntarily participated in the study. The four hospitals were part of three systems, located in three geographic regions: (1) Palmetto Health, South Carolina; (2) Intermountain Healthcare, Utah; and (3) Texas Health Resources, Texas.

Metrics and Measurement

The objective of the gaming session was to obtain data pertinent to the research question, which was generated while a team of key stakeholders worked together towards designing an ideal ED where safety and efficiency are optimized. The intention of the gaming was not to arrive at an ideal ED design. Rather, the aim was to capture data on process challenges and conflicts that have meaningful implications on the physical design of EDs.

The objective of the interviews was to cover the ED physician's perspective and that of administrators involved with the day-to-day management as well as long-term strategic planning of the subject sites.

The research team members also conducted touring interviews of the EDs which included spontaneous interviews with frontline staff.

Confounding Variables

None were identified.

Data Analysis

Data were collected in 2011. Gaming sessions were videotaped and interviews were audio taped and professionally transcribed. Transcribed data were analyzed using commonly accepted content analysis procedures. The objective of the analyses was on understanding the various dimensions of efficiency and safety in ED operations, their operational definitions, and the manner in which the physical environment interacts with each dimension.

Findings

Study data suggest that 16 domains of physical design decisions influence safety, efficiency, or both. These include: (1) entrance and patient waiting, (2) traffic management, (3) sub-waiting or internal waiting areas, (4) triage, (5) exam/treatment area configuration, (6) exam/treatment area centralization versus decentralization, (7) exam/treatment room standardization, (8) adequate space, (9) nurse work space, (10) physician work space, (11) adjacencies and access, (12) equipment room, (13) psych room, (14) staff de-stressing room, (15) hallway width, and (16) results waiting area.

Design Implications

The authors noted that while this study was exploratory and qualitative in design, owing to the lack of any existing knowledge for this domain, several key recommendations emerge from the gaming and interview data.

Entrance and Patient Waiting Lounge

- Locate entrance lobby and waiting area in direct line of sight of registration, triage, and security.
- Locate walk-in entrance door in direct line of sight of security and registration or use electronic solutions for monitoring walk-in entrance door and patient drop-off.
- Create separate waiting zones for different acuity levels, if feasible.
- Incorporate security features such as bulletproof glass and metal detectors, as appropriate.

Traffic Management

- Create separate routes for different acuity levels.
- Create sub-waiting areas where needed to avoid patient return to previous physical location.
- Separate ED entry from exit and/or inpatient admission.

Sub-Waiting or Internal Waiting Areas

- Design internal sub-waiting spaces or alcoves with life support utilities to accommodate acute patients when needed.

Triage

- Make provisions for adequate number of computers, printer, pneumatic tube system, lab specimen collection abilities, tools, equipment, phones, and so forth at the physical location allocated for triage.

Exam/Treatment Area Configuration

- Visual disconnections between zones serving different acuity levels does not facilitate sharing of resources and information – that is, enabling redistribution of resources where most needed. Podular configurations accentuate this problem. Other configurations could also pose the same problem if good visibility is not maintained between clinical work zones serving different acuity levels.
- Restricted visibility between clinical work zones reduces the potential of teamwork, as clinicians are not aware of location of others and problems they may be facing.

- Restricted visibility results in a sense of isolation of clinicians. According to study participants, isolation is not good for staff morale and impedes communication between caregivers.
- Podular configurations may result in too many secured doorways and corridors – multiple hallways, entrances, and exits. This poses an efficiency problem. It increases transportation time and creates obstructions.

Exam/Treatment Area Centralization versus Decentralization

- Larger EDs warrant decentralized clinical work zones. However, visibility is critical between work zones and patient rooms served, as is visibility between the clinical work zones.
- Restricted visibility between clinical work zones impacts efficiency. Restricted visibility between clinical work zones and patient rooms impacts safety.
- Corridor shape and location of clinical work zones (nurse stations) vis-à-vis patient rooms is critical. Simpler corridor configurations and patient rooms zoned around nurse stations work better. Patient rooms completely cut off visually from nurse station line of sight pose a safety problem.
- Back rooms that end in a hallway, dead-end, and out-of-sight rooms pose a potential threat to the security and safety of staff, particularly female; the same is true for rooms that have limited visibility from the outside. Avoid these conditions in ED design.
- Walking distance resulting from decentralization (especially when support spaces are centrally located) should be examined when a decentralized model is considered as appropriate.

Exam/Treatment Room Standardization

- Standardizing patient rooms across all levels of acuity and service (other than trauma) promotes flexibility and efficiency.
- Hardwiring rooms across all levels of acuity to accommodate technology, equipment, and communication needs for the highest acuity level promotes long-term flexibility.
- Avoiding custom labels for patient rooms promotes flexibility and efficiency.
- Standardize location of equipment and supplies in patient rooms.

Adequate Space

- Assume continuation of paper-based record keeping in nurse stations even when HIT is implemented. Allow sufficient flexibility for ergonomic positioning of nurses while working.
- View the clinical zone in patient rooms as team work spaces. Consider spatial needs of equipment, while ensuring team positioning and access for safe and efficient care delivery.

Nurse Workspace

- Locate nurse stations to optimize nurse-patient visibility.
- However, design nurse stations to minimize intelligible speech from reaching patient rooms. Further, design documentation/workstations to minimize potential distractions from family members, without losing sight of patients.

Physician Workspace

- Optimize visibility of patient rooms from physician workspace, while limiting potential of direct interaction from patients and families.

Adjacencies and Access

- Optimize proximities and adjacencies between (1) triage and critical care zones, (2) imaging and ED, (3) pharmacy and ED, and (4) blood bank and ED.
- Where possible, locate these support programs on the same level.

Equipment Room

- Pay particular attention to location, size, shape, and internal circulation of equipment room. Ease of access and equal distance/proximity from all patient rooms are important.

Psych Room

- Psych rooms should not be placed near exits, registration desks, or visitors. If such location is necessary, careful consideration of design and technology must be given to avoid potential for elopement.
- Locating psych rooms to include them in the smallest of operational zones will enable smooth ramping up and down of operations within multiple patient care zones, without losing staffing efficiency.
- The psych areas should be designed (1) to be calm with softer lighting, and (2) to have restricted visibility to anything or anyone (nurses, other patients, or public) that might visually stimulate their anxiety or anger.

Staff De-Stressing Room

- Provide a centrally located break room for staff to unwind.

Hallway Width

- If hallways are intended to accommodate patient beds during surge events they should be wider, have access to medical utilities, and include hand-sanitation stations.

Results Waiting Area

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- Provide a separate results waiting space in close proximity and on the patient flow route to increase treatment bed utilization.

Limitations

This study was exploratory and qualitative in design; therefore, the findings from this study should be treated as preliminary.