



## KEY POINT SUMMARY

### OBJECTIVES

This study looked to identify factors that impede or inhibit the implementation of optimal operational flexibility within inpatient units.

## Factors Impeding Flexible Inpatient Unit Design

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*2012 | Health Environments Research & Design Journal  
Volume 6, Issue 1, Pages 83-104*

### Key Concepts/Context

The physical environment can have a significant impact on operational efficiencies within healthcare environments. In an era of cost curtailment, design interventions that can provide maximum flexibility will become increasingly necessary. Following a 2006 study that identified domains within the design process that affect flexibility within acute care inpatient units, researchers wanted to understand whether domains external to the design process could influence the successful optimization of flexibility within the same environment.

### Methods

This study was conducted utilizing a grounded theory approach through three data collection methods: (1) in-depth semistructured interviews; (2) a gaming session; and (3) shadowing frontline personnel. Participants consisted of stakeholders from five recently built acute care patient units, representing three separate health systems that were an opportunity sample. Data was collected during two-day site visits from June 2009-November 2010.

In-depth semistructured interviews were conducted by the same team of researchers at each of the five participating hospitals, and all interviews were audio taped for transcription. A plan of inquiry was developed to guide the interviews that focused on internal and external challenges within each organization that interfered with achieving optimal flexibility within the new units. Participants for the interviews included the chief nursing officer and chief operating officer from each organization.

Gaming sessions were used to explore the concept of maximizing flexibility by gaining insight into the issues that influence department managers' decision-making processes, their unique requirements for operational flexibility, and performance



### DESIGN IMPLICATIONS

Viewing these findings in light of prior research from the 2006 study, the authors feel that flexibility and efficiency strategies can be influenced by

- (1) return on investment,
- (2) communication,
- (3) culture change, and
- (4) problem definition. While this study focused on operational efficiencies within acute care inpatient units, the nine factors identified in this study could also be applied within the overall context of hospital design when considering design strategies for flexibility and efficiency.

optimization. Game boards were made to represent the two most common circulation configurations in the United States: (1) race track and (2) linear double-loaded. Participants were offered 12 types of shapes as alternatives to each unit configuration. Each unit configuration consisted of 34-36 single-patient rooms. Participants were then given gaming pieces that were scaled modular pieces of different room configurations. Each gaming session was three hours long, and participants consisted of six managers from the following departments at each hospital: nursing, respiratory therapy, dietary services, environmental services, materials management, and pharmacy. Participants were asked to focus on three key issues pertaining to their inpatient unit design: (1) configuration; (2) shape; and (3) internal arrangement of key programmatic spaces. The gaming board was placed in the middle of the table, and all stakeholders were encouraged to verbalize their thoughts through the different stages of decision making while arranging the pieces into the optimal flexible unit. Video and audio recordings were taken during the gaming sessions to capture the participants' thoughts and movement of the gaming pieces. Both video and audio recordings were transcribed by expert medical transcriptionists.

Shadowing of one frontline staff member from each of the participating departments was conducted during normal day-shift hours at each site. These sessions were used to understand the context of operations within each organization and department to gain deeper insight into the interviews and gaming sessions.

Transcriptions from the interviews and gaming sessions were encoded and organized to capture common themes between the participating sites and unique factors within each site that pertained to operational flexibility. Written reports of the findings were then distributed to the participants to receive feedback on accuracy and potential misinterpretations of facts.

### Findings

Through this study, nine factors emerged that had the potential to hinder the optimization of operational flexibility. These factors were classified into four broad domains: (1) systemic, (2) cultural, (3) human, and (4) financial. These factors are situated within a timeline that begins prior to the decision to build, through the design/build phase, to occupancy. Also, numerous cultures exist within all organizations that impact the different timeline phases and influence the achievement of optimal flexibility. For this study, the specific cultures of interest were: (1) financial culture, (2) human resource management culture, (3) information systems/management culture, and (4) operations culture.

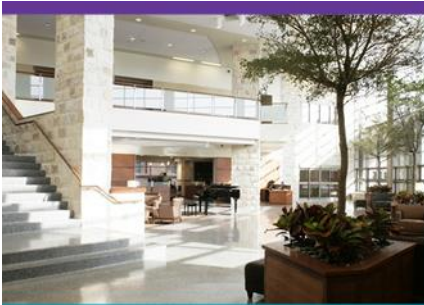
Systemic factors are found within the internal and external systems of organizations. This domain consisted of three factors that can have a hindering effect on the desired future state of operations: (1) performance benchmarks,



(2) information technology, and (3) regulations. Performance benchmarks relate to departmental productivity. Data suggests that productivity targets and productivity comparisons with national benchmark data influence department managers to optimize operational performance through productivity in two key areas: (1) nurse access to supplies and (2) nurse access to medication. These areas impact flexibility from the perspective of efficiency and quality of care. These areas are represented in the physical design by the number and location of support services within the unit to accommodate medication and clean supplies. These design decisions that are intended to increase departmental efficiency can greatly impact capital investment due to the possible increases in expensive equipment, staffing ratios, and unit size. While technology is instrumental in achieving desired efficiencies, data suggests that issues relating to (1) conflicts between new technologies and protected patient information, (2) lack of standardized communication platforms, and (3) timely deployment of new technologies can reduce intended operational efficiencies and determine use patterns within new unit designs that hinder flexibility. Regulations due to prevailing codes can limit alternative strategies for building design. Data revealed that these regulations can produce implications downstream that affect operational efficiencies and limit intended flexibility.

Cultural factors are values and expectations that define the culture of care. This domain consisted of two factors that can have a decisive influence on the desired future state of operations: (1) inertia and (2) physician expectations. Inertia refers to the reluctance of individuals within an organization to adopt the new technologies and/or processes intended to improve future-state performance. Data from the interviews revealed that an unwillingness to use the new technology and parallel processes that create redundancy while implementing new technology can create suboptimal efficiencies that lead to reduced flexibility. Data also revealed that physician expectations can hinder adopting new processes. When physicians perceive that a new process intended to improve quality of care will create additional steps, they are unlikely to adhere to the new process and more likely to revert to old processes. This results in a new design being used to support an old care delivery model, which reduces the intended flexibility.

Human factors are issues that create a gap between expectations generated during the design process and the actual operational environment that is delivered. This domain consisted of two factors that result in numerous impediments to attaining intended operational efficiencies: (1) perception and (2) cognition. Perception refers to the inconsistencies between the visual attractiveness of shapes in plan drawings and the operational efficiencies/inefficiencies associated with those shapes once the new facility is built. Data from the gaming session revealed that participants who were not trained in the design field preferred curved shapes in plan form visually without understanding their impact on the user experience. Cognition refers to the mismatch between mental representations and physical reality. Data from the gaming session revealed that stakeholders that are not



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trained in the design profession have difficulty in comprehending visual and physical links and scale within two-dimensional architectural drawings.

Financial factors are issues associated with the allocation of finite financial resources to competing priorities. This domain consisted of two factors that can result in significant constraints to operational efficiencies: (1) capital cost and (2) human costs. Data from the study revealed that fundamental objectives of a new facility can be undermined by first-cost constraints and the value-engineering process, resulting in unseen intended operational flexibility. Human costs refer to personnel costs associated with a new care delivery model. Data revealed that in several instances operating budgets for new facilities were not consistent with the increased number of staff needed to operate new care delivery models.

### Limitations

Limitations to this study are that the findings were based on an inductive process. Further research designed to obtain empirical data would help to gain insight into the strength and generalizability of the domains found within this study. Also, this study was conducted with five participating hospitals. A larger sample size is needed to gain deeper insight into the impact of each domain upon operational flexibility within multiple care models.