Facility Designing Around Patient Safety and its Effect on Nursing

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Introduction

St. Joseph's Community Hospital of West Bend, a member of SynergyHealth, recognized the opportunity to improve patient safety through facility design. An independent, nonprofit, 80-bed acute hospital located in West Bend, WI, St. Joseph's Community Hospital is in the unique position of deciding to relocate and build a new hospital rather than remodel an existing facility. Sparked by the 1999 Institute of Medicine (IOM) report, "To Err is Human," St. Joseph's made patient safety its primary focus in designing a new hospital to increase patient safety and to enhance an organizational culture of safety.

In April 2002, St. Joseph's Community Hospital conducted a Learning Lab conference in Milwaukee, WI, comprising national and local leaders in patient safety. In addition, many observed the session including board members, physicians, nurses, other caregivers, and hospital staff and management. The results were invigorating and encouraging. Participants determined their top ten recommendations to enhance patient safety through design (see Figure 1). In addition, safety-driven design principles were developed including designs to minimize the following serious adverse events, which we call precarious events:

- Operative/Postoperative complications
- Inpatient suicides
- Correct tube-correct connector-correct hole
- Wrong site surgery
- Oxygen cylinder hazard
- Events relating to medication errors
- Deaths of patients in restraints
- Transfusion-related events
- Patient falls
- MRI hazards
Following the Learning Lab, discussions at St. Joseph's continued around patient safety design principles, precarious events, a patient safe culture, and the design process. These discussions resulted in the establishment of a facility design advisory council comprising elected employees who were nominated by their peers and then voted for in a hospital-wide election. In addition to the facility design advisory council, department design teams were formed comprising staff, physicians, and managers.

The typical hospital design process was modified to include a technology fair, mock-ups of patient rooms, and the use of Failure Modes and Effects Analysis (FMEA). FMEA is a tool commonly used in other industries, such as transportation, to identify and prevent problems associated with product and process design (General Motors Corporation, 2001). In hospital design, as in other industries, it is easier to fix potential failures during the planning stages than after construction has begun.

Each design team was asked to conduct FMEAs around their designs at each stage and to assure the patient safety design principles were addressed, including designing around precarious events.

Human Factors

To design with patient safety as your guiding principle, the interplay between facilities, equipment, technology, and humans must be explored at the beginning of the design process.

By definition, human factors analysis is the study of the interrelationships between humans, the tools they use, and the environment in which they live and work (Weinger, Pantiskas, Wiklund, & Carstensen, 1998). Employees interface with the facilities in which they work and with the fixed and moveable equipment they utilize. Designing facilities, equipment, and processes with an understanding of human factors can help to prevent errors and provide a safer environment for both patients and staff.

The work of Reason (1990) and Norman (1988) tells us that human error is attributed to human cognition and the limitations of memory and thought processes. Most daily activities are routine and completed with little or no higher-level thought processes. In these types of activities, errors (known as "slips" or "lapses") can occur for multiple reasons including distractions, interruptions, multi-tasking, or any deviation from the routine activity. Other behaviors require a conscious, knowledge-based thought process that often borrows from past experiences. Errors in these behaviors are referred to as "mistakes" and can result from a lack of knowledge, experience, communication, or even misjudgment.

Other system factors can also have a negative impact on human behavior and thought processes. Examples of these include stress, fatigue, time pressure, goal conflicts, and physical factors such as noise and temperature (Ternov, 2000).
Errors made by those at the "sharp end," those who provide direct care to patients, are referred to as "active failures" (Reason, 2000). These active failures can combine with existing "latent conditions," failures in the system resulting from decisions made by management and architects. This combination of failures can allow errors to reach the patient and potentially cause harm. With an understanding of where latent conditions exist, systems can be designed to prevent errors or mitigate the effects of errors when they do occur. As Ketring and White (2002) state, "Our systems and processes should make it difficult for staff to make mistakes and easy for them to do things correctly."

The Impact of Design on the Nursing Environment

Designing around patient safety, that is, applying the patient safety design principles including designing around precarious events, will change nursing processes and enhance the culture of patient safety for nurses. Using safety design features in the patient rooms and in the overall hospital design will create an environment where nurses will experience greater efficiency and safety in providing patient care.

Patient Rooms

The design of patient rooms, coupled with technology and equipment recommendations, will institute changes in nursing processes and workflow to increase patient safety. The "truly" standardized medical/surgical patient room shown in Figure 2 reflects the following safety design features aimed at creating a safe, efficient, patient-centered environment:

- Standardization in room size and layout.
- In-room sink allowing physician/staff handwashing in patient view.
- Charting alcove with window increasing patient visibility for nurses, physicians, and staff.
- Private room providing personal privacy.
- Close proximity between bed and bathroom reducing the potential for patient falls.
- Bedside computers allowing patient access to records and involvement with care.
- Oversized window increasing natural light and providing a "healing" view.
- Ceiling heights and room size to allow adaptability/suitability.
- Sitting area and guest fold-out bed to encourage family support and involvement with care.
- Noise reduction using low-vibration steel, special noise-absorbing ceiling tiles, and no overhead paging.
- Improved technology including electronic medical records (EMR), computerized physician order entry (CPOE), and an advanced nurse call system (including wireless phones).
Overall Changes to the Nursing Environment

Through the application of the safety-driven facility design principles, we hope to create a safer, more efficient environment for both staff and patients. We anticipate that nurses at St. Joseph’s will experience some of the following benefits as a result of the design around patient safety:

- Less fatigue due to noise reduction, use of EMR allowing information at any location, "true" standardization, and alcoves where nurses can work while sitting.

- Readily accessible patient information to foster improved prioritization and scheduling.

- Enhanced passing of information from nurse to nurse.

- Less catch and fetch functions by storing patient supplies in the charting alcoves and within the patient room.

- Enhanced visibility of patients through windows in the alcove doors.

- Standardization of room layout including connection for gases, etc. (no back-to-back rooms).

- Patients more involved with care; for example, medication profiles given to patients, and sinks located in the corner of patient rooms allowing patients to view caregivers washing their hands prior to providing care.

- Bar coding of drugs at point of service coupled with information system prompts to minimize delivery errors.

- Less lifting of patients due to improved lifting systems.

- Central meeting area supporting the "collegial" nursing process.

- Fewer medication errors resulting from implementing EMR, bar coding, tube systems, and improved processes.

- Fewer falls through improved technology and identifying high-risk patients.

All the above-mentioned changes should allow nurses to spend more time on direct patient care and less time reorganizing and reworking processes. Nurses should be able to focus more on education and disseminating information to the patients and their families and on providing other services consistent with professional nursing. More time spent with patients answering questions and providing care are, in part, due to patients’ increased involvement with care. Fewer catch and fetch
functions (finding medical records, IV poles, and supplies) will result from improved technology and processes. In addition, less time should be needed reworking physician orders and documenting care with the aid of new technology.

Given the expected decrease in adverse events and precarious events, it is anticipated that the average length of stay per patient should decrease, reducing the average cost per admission.

Creating an Organizational Culture of Safety

Within a health care organization, developing an environment that provides a nonpunitive, convenient, and confidential system for reporting errors and safety concerns is the necessary first step to instituting a safety-oriented culture. The organization must then establish a mechanism for tracking and analyzing the data collected. By tracking and analyzing the errors that occur, hospitals can strategically incorporate defenses and barriers into the system that can prevent errors or mitigate the effects of errors that do occur. A culture that promotes open reporting of errors and safety concerns is essential in identifying those areas where changes or improvements are needed.

Creating and maintaining an organizational culture of safety has been a top priority at St. Joseph's. Early in the design process, hospital leadership recognized the need to have better information about where errors were occurring within the hospital system. Changes were made in the error-reporting system that eliminated the need for department supervisors to view and sign each error report before submitting it to the performance improvement department. With the new procedure, staff can report errors directly to the performance improvement coordinator either by phone, by using a standardized written form, or through an anonymous hotline number. This improved process for error reporting, coupled with executive support of a nonpunitive environment, allowed St. Joseph's to more efficiently collect information on internal errors, especially medication errors. Medication reports of latent conditions, near misses, errors, and adverse events have increased from a baseline of approximately 250 per month prior to the new procedure to 950 within a 3-month period (see Figure 3). All reports are categorized by type of event, outcome, the department the report was generated from, drug involved (if any), and administration method. A multidisciplinary team, led by the performance improvement coordinator, analyzes the reports to identify trends and develop possible solutions. Pareto charts, such as the one shown in Figure 4, are developed to assist with the analysis. Department directors receive a monthly summary of the reports generated from their respective departments. They are openly discussed at departmental staff meetings where as a team, they work together to develop solutions.

![Figure 3. Monthly Medication Patient Safety Reports](http://www.medscape.com/viewarticle/457089_print)
By tracking and analyzing internal errors, existing latent conditions that contribute to errors can be identified and prevented in the new facility. Examples of latent conditions identified include wires to trip over, poor medication storage, inadequate surgical separation of clean versus dirty, and inadequate door openings. Additionally, processes within our existing facility can be improved and updated prior to completing the new facility.

Recently, it was identified through error reports that pharmacy orders from the New Life Center were not reaching the pharmacy in a timely manner where the pharmacist could review the medication orders and create an updated drug profile. This created the potential for drug-to-drug interactions and duplications to occur. While the implementation of CPOE will eventually eliminate this problem, an interim solution was needed. The New Life Center team determined that an immediate and cost-effective solution would be to place a fax machine in the department and fax all medication orders immediately to the pharmacy.

Reports on errors and adverse events are also communicated to physicians regularly. This keeps them informed and improves communication and collaboration between nurses and physicians. Physician participation and leadership have been essential in both the facility design process and in promoting a culture of safety.

Conclusion

Although the mission of nursing remains the same, designing around patient safety will reduce the potential for errors and mitigate the effects of errors when they do occur. Working together, nurses, physicians, and other health care professionals can promote an organizational culture of safety through open communication and analysis of errors and adverse events. With patient safety as a primary focus, significant improvements in patient care can be achieved. If you would like more information on designing for patient safety, please contact John Reiling at (262) 334-8230.

References


Sidebar: Executive Summary

- Rather than looking at the flaws in the design of the health care system when errors occur, blame is often directed at the caregivers.
- One community hospital recognized the opportunity to improve patient safety through facility design.
- Safety-driven design principles were developed including designs to minimize the most prominent serious, precarious events.
- Safety design changes to the nursing environment were aimed at creating a safe, efficient, patient-centered environment.

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About The National Patient Safety Foundation: The National Patient Safety Foundation (NPSF) was founded in 1996 by the American Medical Association, CNA HealthPro, 3M, and contributions from the Schering-Plough Corporation. The NPSF is an independent, nonprofit research and education organization. It is an unprecedented partnership of health care practitioners, institutional providers, health product providers, health product manufacturers, researchers, legal advisors, patient/consumer advocates, regulators, and policymakers committed to making health care safer for patients. Through leadership, research support, and education, the NPSF is committed to making patient safety a national priority. For more information, visit www.npsf.org. In recent years, health care has become aware of the extent of medical errors and its devastating affect on caregivers and patients. Caregivers have been placed in an environment and circumstance where errors will happen periodically. Rather than looking at the flaws in the design of the health care system, blame is often directed at the caregivers.

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