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Impact of acuity-adaptable rooms on patient outcomes: A literature review

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Abstract

Introduction: According to WHO, patient safety is the prevention of errors and adverse effects to patients associated with health care. There is a significant impact of physical environment on health and patient safety. Identifying and eliminating built environment conditions that negatively impact patient safety during various phases of construction of healthcare facilities is a strong need of the hour. **Methods:** A comprehensive literature review retrieved 15 research articles related to acuity-adaptable patient rooms presenting evidence of the positive impact on patient safety. The literature review was focused on all the research articles, which showed impact of acuity- adaptable rooms on various factors like infection control, medication errors, patient falls, noise levels, patient and staff satisfaction, and average length of stay. **Results:** Acuity-adaptable patient rooms reduce both intra hospital patient transfers and errors related to medication that in turn help to improve patient safety. Single-patient rooms in contrast to multi bed patient rooms have been associated with lower infection rates, better staff communication, fewer patient transfers and medication errors, lower noise levels, and improved sleep quality. **Conclusion:** Though, there is an increasing evidence of positive outcomes of acuity-adaptable rooms, there is still a very limited use in real projects. Evaluation and implementation of the concept of acuity-adaptable rooms suggest that they reduce intra hospital transfer of patients and medication errors, and may reduce the incidence of patient falls and increase patient satisfaction.

Key words: Acuity-adaptable rooms, patient safety, hospital acquired infections, patient transfer, integrated patient care, patient environment, medication errors, patient satisfaction.

Introduction

According to WHO, patient safety is the prevention of errors and adverse effects to patients associated with health care. The physical environment has a significant impact on health and patient safety. Identifying and eliminating built environment conditions that negatively impact patient safety during various phases of construction of healthcare facilities is a strong need

of the hour (Reason , 2000). Built environment factors like amount of lighting, quality of air, noise levels, layout of the patient room, and others contribute to the patient safety outcomes like nosocomial infections, falls in healthcare settings and medication errors (Joseph & Rashid, 2007). The concept of the acuity-adaptable room is to keep the patient in the same room from the time of admission to the time of discharge regardless of severity level of the patient (Nena & Sandra, 2013). Nursing staff with skills and training to handle the complete range of severity of the patients are employed in these specially equipped acuity-adaptable rooms. These rooms are larger in size than the normal single patient rooms in order to accommodate critical care equipment, additional staff, procedures, and family

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members. One essential component of these specially designed rooms is the patient visibility from the corridor that aids the nurse in observing her patient. Acuity-adaptable rooms have been shown to decrease medication errors due to fewer intra hospital patient transfers, minimize workflow bottlenecks, and increase patient satisfaction. The existing literature focused on specific outcomes of acuity-adaptable rooms rather than the entire range of outcomes. The study was undertaken as there was a strong need of having a comprehensive study of entire range of patient outcomes of acuity-adaptable rooms.

Materials & Methods

A comprehensive literature review was performed using Google Scholar and PubMed. Searches were not limited to any time-period. Most of the studies were conducted in Europe and North America. Articles were identified using the keywords acuity-adaptable rooms, patient safety, hospital acquired infections, patient transfer, integrated patient care, patient environment, medication errors, and patient satisfaction. 15 research articles related to acuity-adaptable patient rooms presenting evidence of the positive impact on patient safety were retrieved. The literature review was focused on all the research articles, which showed impact of acuity-adaptable rooms on various factors like infection control, medication errors, patient falls, noise levels, patient and staff satisfaction, and average length of stay.

Patient safety

A study conducted using a pre-post method in the Methodist Hospital in Indianapolis, Indiana, after changing its coronary ICUs to acuity-adaptable type from conventional type, showed that there was 90% reduction in intra hospital patient transfers and 70% reduction in medication errors, which is a huge stride towards patient safety (Hendrich, Fay, & Sorrells, 2004). Acuity-adaptable patient room reduces both intra hospital transfers of patients and medication errors, thus improving patient safety.

The intra hospital transfer of patients between rooms or units is a source of medication error because of delays in transfers, communication gaps among staff, and loss

of information during these transfers (Cook, Render, & Woods, 2000; Ulrich & Zhu, 2007). Compared to multi bed wards, single-patient rooms (even ones which are not acuity-adaptable) are associated with better staff communication, less patient transfer, fewer medication errors, and lower infection rates (Chaudhary, Mahmood, & Valente, 2006).

Noise levels

Providing single-bed rooms lower noise levels and improve sleep quality of the patient. Most noises in multi bed patient rooms stem out from the presence of visitors, staff, or patient sounds such as coughing, crying out, and rattling bedrails. These findings also have important implications for patient sleep, because noises stemming out from the presence of other patients can be the major cause of sleep loss in multi bed rooms (Ulrich et al., 2008). In a comparison of sleep pattern of six healthy volunteers in an ICU setting, the average noise level measured was 8 dB higher in the open ICU than in the single patient room, as were the respective peak noise levels (65 dB versus 54 dB). Furthermore, the total sleep time in the single-bedroom was greater than that in the open ICU, although the number of arousals from sleep were similar in both the settings (Ulrich et al., 2008).

Infection control

i. Airborne transmission

It is important to isolate patients, who are infected with airborne pathogens to prevent spread of infection. Single-bedrooms obviously increase isolation capacity, facilitates filtration and ventilation, and airflow control through negative pressurization; thus preventing a patient with an airborne infection from infecting others and protects immune compromised patients from airborne pathogens (Ulrich et al., 2008). Studies of cross-infection for contagious airborne diseases such as influenza, TB, measles, and chickenpox have revealed that placing patients in single rooms (Ben-Abraham et al., 2002), single-bed cubicles with partitions (Gardner, Court, Brocklebank, Downham, & Weightman, 1973) or rooms with fewer beds and more space between patients (McKendrick & Emond, 1876) is safer than housing them in spaces with more patients. "Research on burn patients and other vulnerable or immuno-

suppressed patient groups provides strong evidence that single rooms in combination with air filtration substantially reduce the incidence of infection and mortality.” (McManus, Mason, McManus, & Pruitt, 1994)

ii. Contact transmission

Single bed rooms reduce contact transmission of infections as they facilitate easy and thorough cleaning and decontamination of the rooms after the patient gets discharged.

Patient satisfaction

Patients when they interact with fewer caregivers, view the physicians and nurses as a cohesive team. According to one study, orthopaedic and psychiatric patients treated in single rooms were more satisfied with the care given than those, who were treated in multiple bed wards (Schweitzer, Gilpin, & Frampton, 2004). They also observed that there was an opportunity provided for confidential discussions in private rooms. Patients who stay in single rooms have better patient privacy and confidentiality, better communication with the staff (Ulrich et al., 2008).

Length of stay

The concept of acuity-adaptable rooms was pioneered in 1970s in Loma Linda University Medical Centre in California. Loma Linda University Medical Centre was able to decrease the average length of stay of its cardiothoracic patients. Furthermore, 30% of its patients were discharged within 4 days (Gallant & Lanning, 2001).

Discussion & Conclusion

The use of single-patient rooms decreases airborne and contact transmission of nosocomial infections by increasing isolation capacity, facilitating easy and thorough cleaning and decontamination of rooms and the maintenance of air quality. Patients in single bed rooms benefit from reduction in noise due to visitors, healthcare staff and other patients such as coughing, crying out, and rattling bedrails which in turn improves sleep and enhance satisfaction of the patient. In providing personal information to the healthcare providers, patients in these type of rooms will be more comfortable as there will be no breach in auditory and visual privacy.

Though, there is an increasing evidence of positive outcomes of acuity-adaptable rooms, there is still a very limited use in real projects. Evaluation and implementation of the concept of acuity-adaptable rooms suggest that these rooms reduce intra hospital patient transfers and medication errors, and may reduce the incidence of patient falls and increase patient satisfaction.

Most of the studies were performed in European and North American settings. There is a paucity of studies focused on impact of acuity-adaptable rooms in the Indian setup. Though there were many studies, which dealt with outcomes of acuity-adaptable rooms, they did not elaborate on the costs involved. In a developing country like India, cost is a significant factor, which influences the purchase decisions. There is a need for further studies on costing of acuity-adaptable rooms. This will facilitate administrators in the decision making process for setting up of acuity-adaptable rooms in hospitals.

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