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Evidence Based Patient Room Design and Improving Outcomes: Case of Healthcare Facility in Saudi Arabia

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Abstract

In healthcare facility, designing inpatient units are very crucial because its physical infrastructure and built environment not only effect patients and family but also Healthcare staff and their outcomes. This Study aimed to cover technical considerations of planning and designing of patient Room Unit in context of future emerging trend with mainly focus on evidence-based user Centered Care Approach and their physical infrastructural, emotional and social need for improved outcomes. The Methodology through engagement of various techniques to gather information of healthcare facilities through observation, Literature review of published journals, academic papers, also Data collection in this qualitative study and basic concept background are investigated through online survey and observation for Saudi Arabia specialized and tertiary Healthcare system. The results are dependent on the overall experience of staff, patient and visitors, and the key design elements that support zoning of space with higher level of satisfaction rate with respectively 87% with positive outcome response (very satisfied/satisfied), 9% Neutral, 4% negative response (Unsatisfied /Very unsatisfied) with respect to overall user experience. This paper shall be useful in assessing design features of Patient room and work flow efficiency. A significant relationship was established between user's preferences, comfort factors, overall need and satisfaction in the patient room.

Keywords— Healthcare Design, Patient Room, Single Occupancy, Outcome and Satisfaction, Saudi Arabia

I. Introduction

To meet the diverse needs of patient room design, there is need to address future Technological and new medical demands, with n strategies that consider the physical, emotional and social needs of users in a way that promotes safety, efficiency and flexibility for change will result better outcomes. Understanding of the issues Facing healthcare, consumer perceptions, expectations and a review of best practices in patient room design will provide a basis for design guidelines that when applied to a new prototype patient room can better accommodate the physical, emotional and social need of all stakeholders, including staff, patient and family /friends. There are many evidences available that the physical environment of hospitals can affect the healing process, e.g. reducing the level of anxiety and stress; shortening recovery periods following surgery through better views of the surrounding environment; increasing social interaction through improved building layout; positioning of furniture to increase patients satisfaction [1].

Progressive hospitals are incorporating the acuity adaptable model of care delivery and universal room design concepts to meet patient need, enhance quality of care, improve Ideally Patient room can be designed into three zones, first The staff zone should be at the entrance to the room to foster efficiency in performing their tasks, while providing the least impact on occupants, Second Patient amenities should be placed at the center of the room, and third at the back of the room, place comfortable seating for visitors . Patients using the right-sized smart rooms report a higher satisfaction rate thanks to increased communication and control. Safety is improved when automated data reduces human error in patient care, and providers can spend more time with the patient and less time charting, repeating steps and searching for information. A care provider has bedside access to labs and tests that provide a critical picture of the patient's treatment plan [2].

As we are living in a competitive environment where the patients' expectation should not be guessed but have to offer the patient room as a space that let the patient customize as per their comfort during the stay in the facility. In a Healthcare facility designing, an Inpatient unit is very crucial because its physical infrastructure and built environment not only affect patients' recovery but also Healthcare staff and facility outcome [3]. Nowadays users are the best-informed, demanding care that meets their physical, emotional, and social requirements. They insist on control over their own healthcare decisions, a right to privacy, family involvement, and a certain level of comfort expected by today's society standards not always seen in hospitals. When designing an acuity adaptable unit, one must understand the research demonstrating that overall patient satisfaction is based on positive evaluations of the patient room and satisfaction with the hospital environment [4].

Future success relies on us being smart, sophisticated and less centralized. We must draw on what we've achieved in the past but not be held back by it. Healthcare staffs need to be empowered to make the right decisions at the right time in the right place. They need the authority to take action, make choices and accept responsibility. They must also be given the chance to make honest, well-intentioned mistakes without undue fear of failure.

II. Literature Review

Evidence Based Design a process for creating health care buildings informed by the best available evidence concerning how the physical environment can interfere with or support activities by patients, families, and staff, and how the setting provides experiences that provide a caring, effective, safe, patient-centered environment [4].

Many of the improvements suggested by EBD are only slightly more expensive than traditional solutions, if they are more expensive at all. There are many evidence supporting Single rooms for patient accommodation comprising a high proportion will provide:

a) Flexibility of use for patients of gender, any age, and most clinical conditions, including isolation and critical care.

b) Potentially shorter turnover intervals and annual average bed occupancy rate.

c) Minimal patient transfers. This in turn helps to reduce cross-infection.

d) 24-hour admission without disruption.

e) Privacy for treatment and personal activities.

f) Confidentially of discussion.

g) Quiet for sleep and rest .

h) Independence to modify the environment, have visitors without disturbing others.

i) Storage of suppliers for patient's daily care needs.

j) Higher standards of clinical governance.

k) More effective infection control [5].

Also Single Vs Multiple bed accommodation, Single is recommended for quality of care such as safety, privacy, dignity confidentiality, and flexibility. National Health Service Estates

found out that 52% preferred to stay in a single room while 37% preferred a shared space [6].

Single-bed rooms, single-bed cubicles with partitions, and isolation rooms decrease the risk of hospital acquired infection by airborne, contact, and waterborne transmission compared to multiple-bed rooms. Multi-bed accommodations increase the probability and speed of outbreaks; for example, the SARS outbreak in Canada where multi-bed rooms failed in preventing and controlling hospital acquired infections. A study by Farquharson and Baguley [7] shows that approximately 75% of the SARS cases in Canada resulted from exposure to hospital settings. Single-bed rooms facilitate cleaning and decontamination of rooms. On the contrary, cleaning of multi-bed patient rooms implies disruption in functionality and costly transportation of patients, i.e. the temporary removal of all patients from these rooms [8].

Single rooms might decrease the number of the medical errors due to patient transfer between rooms or units, NHS Estates reported that transfers fell by 90% and medication errors by 67% when the US Clarian Hospital changed its coronary intensive care from 2-bed rooms to single acuity-adjustable family-centered rooms [9].

There are some emerging needs and challenges for Rooms lack modern equipment and technology**;** many of the rooms don't meet the Facility Guidelines Institute's standards for healthcare design and construction. Other rooms are licensed to operate but aren't suitable for required clinical practices and are, therefore, underutilized or unoccupied [10].

The conversion of semi-private and shared rooms to private patient rooms requires adding patient rooms to accommodate the displaced beds. Private rooms have shown to help patients rest, shorten hospital stays and reduce infection risks, in addition to providing dedicated space for private health conversations and lowering the stress levels of sharing a room [11].

They face rising demands from patients and their families to make patient rooms more comfortable and conducive to quality care with updated amenities. Researchers have found that modern hospitals that are rich in amenities – for eg. rooms with big windows and access to atriums and outdoor gardens – attract more patients [12].

Hospital leaders' desire to attract patients who choose a medical facility based on the quality of the patient rooms. Patients today can easily compare hospitals in surveys of in-patient experiences, elevating the importance of patient satisfaction. The patient's experience in the room (such as privacy and noise levels) is one of several important factors in the ratings [13].

The design criteria which are needed for consideration while planning and designing of facility are summarized as below:

a) Evidence based principles shall incorporate while designing Built environment for consistently updated to enhance the safety and security of patients, visitors, working staff and management.

b) End users, patients have choices or control over their personal environment including, personalization, access to day-light, noises and sounds, odors, electrical lighting, thermal comfort and visual privacy Provision..

c) The navigation plan for patients, visitors, and staff to their destination provision shall provide with clear and understandable pathways. The navigation plan Components may include way findings and progressive disclosures that is reasonable to a variety of end users regardless of language of origin or physical ability, destination markers, clear sightlines with visual way findings makers such as architectural details, pattern or artwork, kiosks and handheld maps/digital directory.

d) To accommodate privacy needs a culturally appropriate way that provides for patient/staff dignity and modesty, particularly in common areas, check-in registration, check-out/billing, patient/resident rooms.

e) Provision of Patient/staff have Access to nature, example include an indoor, outdoor or roof garden.

f) Lighting shall be provided aesthetically conducive to creating a healing environment and that enhances staff, patient and family safety and security throughout premises [14].

III. Research Methodology

3.1. Methodology

Research and theory concept revolving around Staff, Visitors and patient experience. These factors serve as the framework for an exploration of attributes of supportive healing environment. This research utilized mixed methods to collect qualitative data and analysis for user centered evaluation of staff, patients and visitors perceptions of environmental and physical infrastructural attributes of supportive healing environments.

3.2. Study Setting

with the KSA Vision 2030 and health sector transformation goals to Improve healthcare: By improving the quality and consistency of services and the performance and accountability of healthcare organizations and staff to deliver care that is safe, effective, patient-centered, timely and equitable; and Every one of us has a role to play and our attitude towards our physical and mental Wellbeing, as well as the system that supports it, must change if we are to achieve our ambition of living fulfilling lives in a vibrant society[15].

To promote patient safety, quality and value to enhance well-being and needs to meet the goal of continuous quality improvement. This study and proposed survey is from the perspective of supportive single occupancy patient room design to improve outcomes. It is based on the premise that a physical, psychological and socially supportive environment that can help overall experience for staff, patient and visitors with reference to key elements within the patient room setting that influence a positive healing experience and remain responsive, the needs, values and expectations of all stakeholders (including staff, patient, and visitors) inputs must be considered in the design. To obtain end users feedback on the key issues, need and preferences for the design of single occupancy patient rooms in specialized and tertiary care private healthcare facility at Riyadh KSA.

Questions for the staff, patient and visitors were developed based on emerging inpatient unit themes and pattern from the literature review and contemporary design perspective via online questionnaire link in context o Saudi Arabia Healthcare services to explore the extent to which evidence based patient centered within private hospital settings.

https://docs.google.com/forms/d/e/1FAIpQLSfJIZjYRDp3ah514brPUVIaGThIN_MVQMDlxTfb23AdJHB8AQ/viewform.

Including survey background and purpose of this research with limited duration. The survey questions divided mainly into three categories i.e. psychological, physical and social factors for ease of understanding the relationship of the responses to the concept of healing environment. The main goal of the survey was to explore what elements of the patient room for users (staff, patient and Visitors family and friends) perceive support their needs and contribute to their overall experience of a healing space. The questions focus on the reflective experience of staff, patients and Visitors for the patient room only.

IV. Data Analysis and Findings

The study population included healthcare practicing staff, patient and Visitors family/ friends of more than 120 respondents as shown in Figure 1.

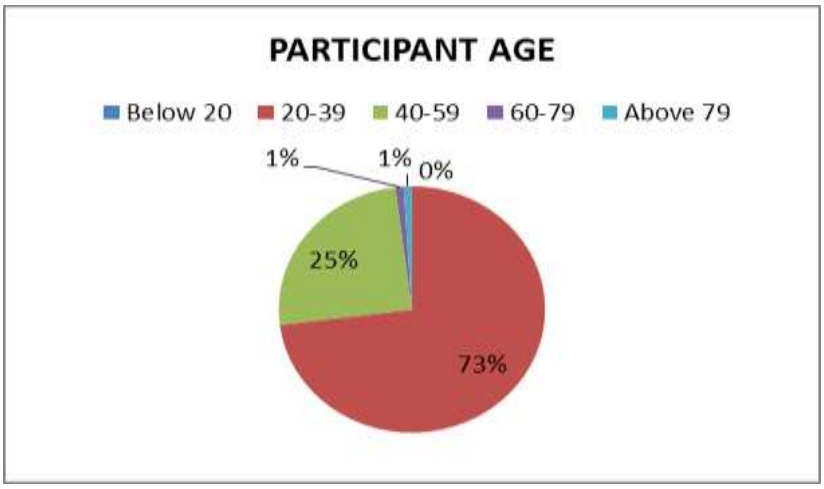


Figure 1. Staff, Patient and Visitor Participation

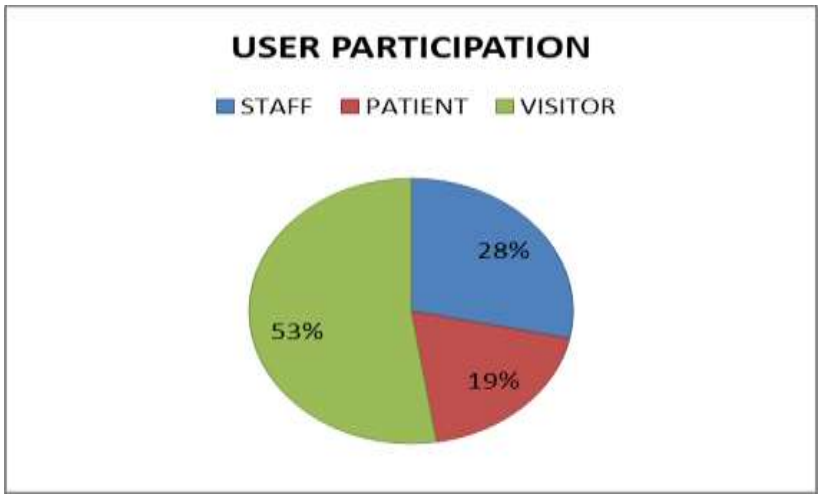
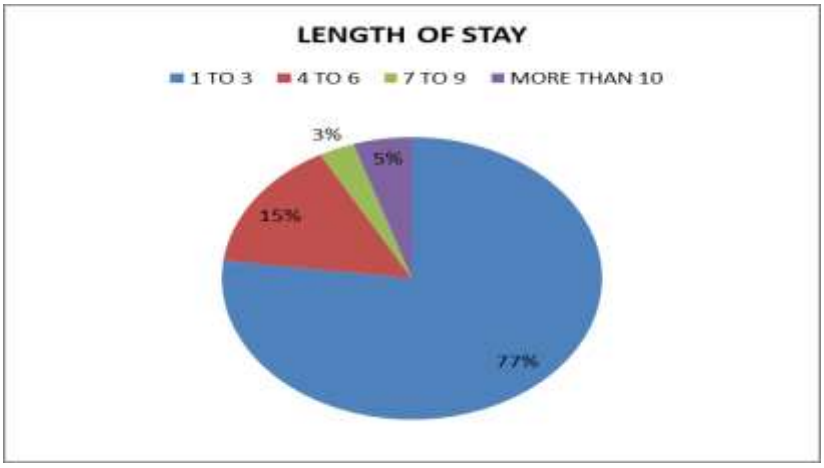


Figure 2. Classification of Age



Demographically, the largest group of User participants is from family and friend and the

second highest groups are staff, also majority of user. Participant age varies from 20 to 79 years as shown below

Generally Inpatient zone is where the patient spends the majority of their time, where the staff concentrates with more attention, visitors come to support loved ones and stay together. In last 24 months majority respondent, Length of stay between one to three days as shown in Figure 3.

4.1. Investigating Attribute in KSA Facility

To examine attributes, questions were formulated to seek information on physical and cultural dimensions of the specialized and tertiary care facility. The emotional attributes and their elements can be addressed where respondents expressed their perceptions of how they felt in the patient room setting and request response on the multi sensory experience of the space. Survey included sense of control, feelings, impressions of space and comfort.

Figure 4 shows psychological factors and users feeling experience while staying in patient room.

The sequence of question addresses the functional elements of the space including space/layout, furniture, finishes, appearance and architectural objects.

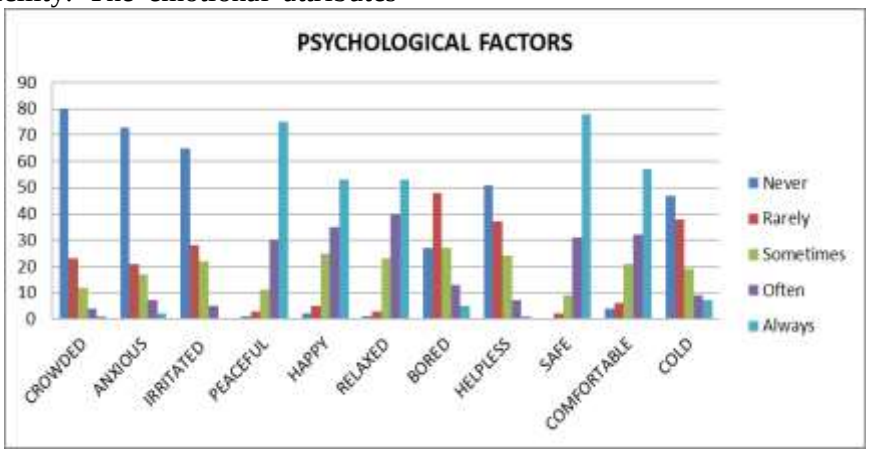


Figure 4. Psychological factors and user's feeling experience

Figure 5. shows the rating of room elements according to how they meet user need. Figure 6. Shows the item rating in terms of the desire importance of overall comfort in a patient room setting of adjustable /controllable elements during stay. Figure 7 shows the rating of items in term of importance of overall comfort in a patient room setting but sometime rating conflict because of staff, patient and visitor's preferences and this type of issue can impact room design as well as the amount of control, choice and comfort of users.

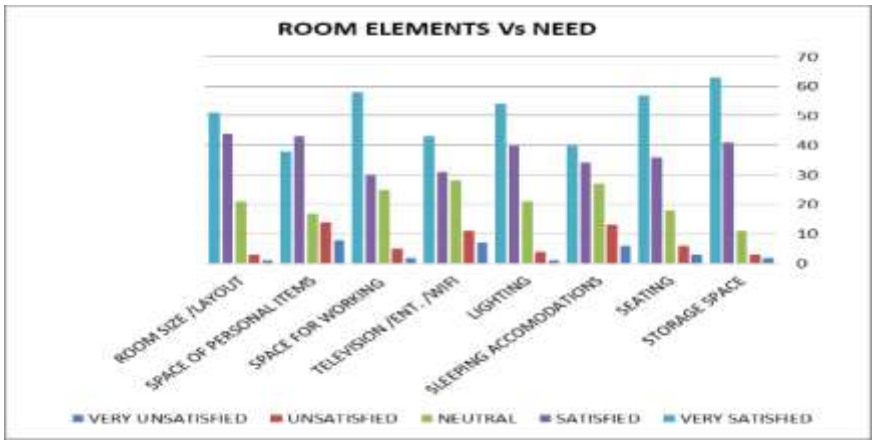


Figure 5. Room Elements Vs Need

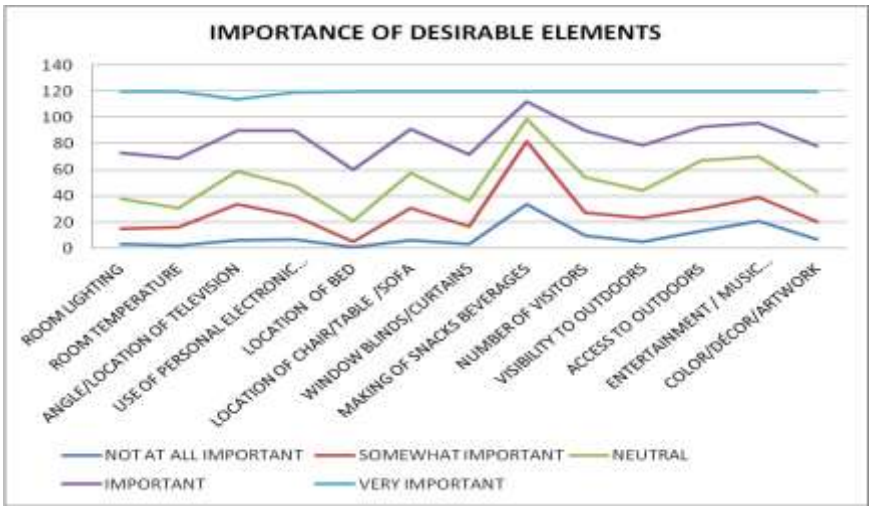


Figure 6. Rating of Adjustable/Desirable elements

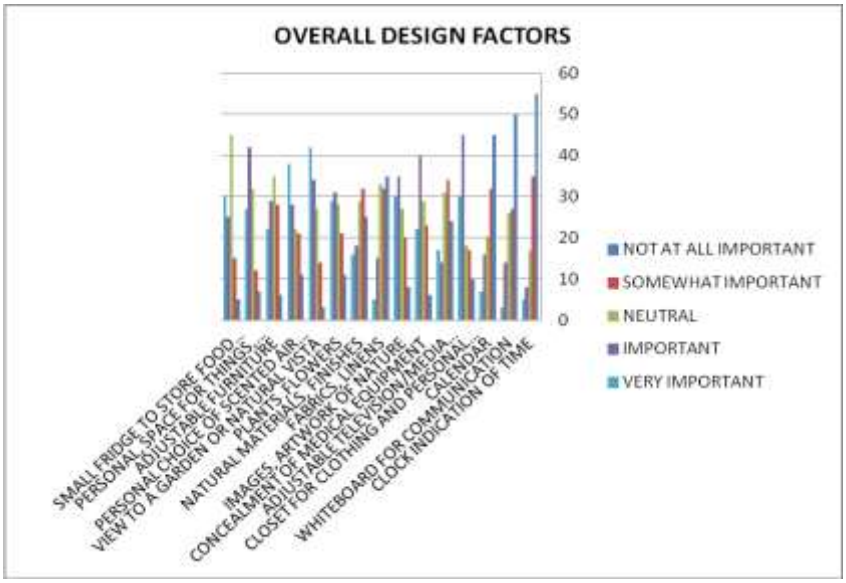


Figure 7. Design elements and Overall factors

4.2. Design Consideration

Designing patient room shall have as per standard size and Layout must compliance with local code with standard space requirements, windows, and patient privacy, Hand washing stations, toilet /bath room and Storage facility. Considering safety and quality of patient cares as well as designing facility may help to reduce preventable accident such as patient falls, hospital acquired infection [1].

Design features for the headwall, footwall, nursing support area, and family amenities are important for satisfaction. Also Headwall, defined by the wall behind and the ceiling over the patient's head are the most important spaces for incorporating clinical care elements. And Footwall, defined by displays those items that the patient will directly view, such as the television, clock, and tack board and dry-erase board for information displays [16].To create most efficient hospital Patient room there shall be consideration of emerging technological trend such as Virtual reality, 3D Simulation Technology, Information

technology, intelligent environment and personalized atmosphere [17]. To create a more efficient hospital room design, architects can:

Divide the Room into Three Zones: The staff zone should be at the entrance to the room to foster efficiency in performing their tasks, while providing the least impact on occupants. Patient amenities should be placed at the center of the room, and at the back of the room, place comfortable seating for visitors.

Use Lightweight or Wheeled Furniture: Wheeled furniture and lightweight, modular ottomans can be quickly moved out of the way in an emergency. A sofa that can expand into a bed will serve a dual purpose.

Design Bathrooms Based on Need: Front-located bathrooms leave room for a larger visitor area in the back of the room but may limit visibility to the patient. Rear-located bathroom provide improved sight lines to the patient but sacrifice family space and expansive exterior views out of the room. Center-bar bathrooms represent a compromise between the front and back bathroom options, allowing both maximum visibility into the room and unobstructed views to the outside. These patient room details allow architect to design with the patient experience in mind while also providing clear pathways for staff [18].

4.3. Design Principle

Design for safety. From the outside of the patient room, staff at the floor's central nurse's station should have maximum visibility to observe patients. Inside the room, hand washing sinks should be positioned at the room entrance to make for efficient staff use. Including a short, straight ceiling track to help a patient get out of bed and to the toilet or other activity, can reduce staff injuries. A standardized room configuration sets default locations for equipment, supplies and waste, easing movement for staff moving from room to room. Inside the rooms, bedside charting provides quick, proximate access to patient information. Space for family and other concerned visitors, with furniture that can be slept upon, can accelerate a patient's recovery. Just outside the room entrance, design in a space for point of care testing to monitor patient conditions. Lighting near the room entrance and at the supply server eases makes it easier for staff to find materials and perform tasks.

Design for operational excellence: A dashboard provides patient information for staff near the room entrance, and a nursing alcove allows for the retrieval of waste without entering the patient room. Nurse servers provide access to supplies.

Design for patient experience: Maximize exterior views and natural light exposure into the room. Special glass can give patients some control for privacy by darkening an interior window. (Nurses can override this if patients must be closely monitored.) Windows in toilets provide additional natural light. The layout of furniture and equipment removes clutter and eases patient and family movement. Along the floor, patient room entrances are dispersed evenly to provide a noise buffer between rooms [19].

Once the patient room plan is determined, the hospital must confirm the detailed design features for the headwall, footwall, nursing support area, and family amenities.

Headwall. The wall behind and the ceiling over the patient's head are the most important spaces for incorporating clinical care elements. Provisions for medical gases, power, information systems, monitoring, and critical equipment storage are located here. A hospital must determine which mode will deliver these services: a headwall system (remanufactured or built-in), a power column, or an articulated-arm boom. Pre manufactured or built-in headwalls are most common in lower-acuity and multi-acuity settings and are the least expensive

Footwall. The footwall displays those items that the patient will directly view, such as the television, clock, and tack board and building directory, dry-erase board for information displays. It is also the ideal location for artwork. Most new hospitals are incorporating flat-screen television monitors, some with computer capabilities.

Nursing support. Depending on the decision regarding supply distribution, the nursing-support area within the patient room can consist of a simple sink and counter, or additional

drawers and cabinets, and a computer. Soiled trash and linen hampers can be concealed or exposed; if they're concealed, the room environment is enhanced, Special consideration is required for contact-isolation supplies that also can be stored in movable carts. Some hospitals prefer that these supplies be located outside rooms so that they can be shared and relatively protected from contamination. Family amenities. Accommodations can be a built-in sleeper sofa, foldout bed, or sleeper chair. Some hospitals allow small refrigerators for family food storage and larger wardrobes for visitor coats. Computer outlets and Web access are newer amenities [16].

V. Result and Discussions

From the user's perspective of patient room designing to improve outcomes based on the healthcare physical, psychological and socially supportive environment can help healing environment and improve the overall experience for staff, patient and visitors.

Majority participants are Very Satisfied/ Satisfied with 87%, Neutral 9%, and Very Unsatisfied/ Unsatisfied 4% only with overall experience.

Still further research needed to explore for how visitor's, patient and families be more participated for design and methods to use that shall help better understand their diverse need? Also explore to resolve some of elements like orientation, size, type functions and location of fixtures with respect to activities and facility control setting.

VI. Conclusion

An Integrated Patient Room design considering psychological, physical and social attributes with Organization goals to achieve quality outcomes with better patient satisfaction, In which physical environment including emotional, behavioral and important infrastructural features that have directly impact on patient healing and experience for betterment of Safety, Infection control, Comfort, Adaptability, Control, Efficiency, and built healing Environment of healthcare facility. Based on this research study results, improved outcomes with higher user's satisfaction rate can be achieved by providing design solutions to user centered single occupancy patient room to enhance comfort and reduce length of stay by increasing natural light, providing connection to nature and family/friend participation for increasing the opportunity for patient control, safety features, easy accessibility with welcoming atmosphere. Since the User are diverse with staff, patients and Visitors (family/friends) need to balance complex levels of hierarchical requirements in order to optimize the patient room design in such a way that maximize functionality and work flow.

VII. Acknowledgements

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