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Inpatient Facility Requirements

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ABSTRACT

This paper provides an overview of inpatient bedroom and support space criteria based on clinical requirements of care. Space requirements are described functionally as they relate to the level of care required or the acuity of the patient. For the purposes of this paper, and in the majority of cases, the level of care provided falls into one of two categories: acute care or intensive care. While patients may be grouped according to medical specialty and be assigned to a bed on a specialty unit, the majority of those specialty beds will continue to fall under either the acute or intensive level of care and will continue to require similar services.

INTRODUCTION

For the purposes of this paper, hospital inpatients receive care during a hospital stay that exceeds a few hours. Ranges of acuity and mobility vary greatly, and the focus of care may be diagnostic, interventional, recovery, palliative, or any combination of the preceding.

Care has become increasingly complex and technical, placing greater demands on staff training, technology, equipment, and support services. Along with that, the demand for private patient rooms is at an all-time high, and while no standard currently exists, recent hospital design has tended toward 80% to 100% single rooms in response to the rapid increase in inpatient acuity and associated complexity of care, the growing need to isolate patients for infection control management, and last but not least, the general market demand to ensure rest and privacy.

Facility requirements of areas in which patient care is provided are defined by the American Institute of Architects/ Academy of Architecture for Health (AIA/HHS) (1996) guidelines as well as by the clinical care provided. An inpatient care unit usually consists of patient bedrooms that support direct care as well as activities of daily living; and general support space, including nurse stations, medication rooms, treatment rooms, soiled and clean utility rooms, equipment staging space, galleys, staff space, family space, conference/teaching rooms, call rooms, and offices.

Design of new or renovated patient care units has become increasingly complex and requires a team of skilled and experienced architects and engineers and a user group consisting of direct care providers as well as those involved in hospital-wide operations.

ACUTE CARE

For the purpose of this paper, "acute care" patients are those who do not require intensive care. It should be noted, however, that as more and more procedures and diagnostics are carried out in the ambulatory setting, as the length of inpatient stay decreases in response to reimbursement pressures, and as the population ages, the acuity or level of nursing care required within the inpatient setting continues to rise rapidly. Data clearly indicate that many of the patients seen previously in intensive care units are now cared for on acute care units and are grouped according to illness or medical specialty. Larger hospitals may have dedicated units for surgery, medicine, orthopedics, cardiac surgery, cardiac medicine, oncology, pediatrics, gynecology, psychiatry, and others, while smaller hospitals are apt to group patients more broadly.

The patient distribution might be as follows:

Orthopedics Unit	Patients with orthopedic (bone) issues – usually surgical
Surgical Unit	Patients recovering from general surgery

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Medical Unit	Patients with medical issues
Cardiac Surgery Unit	Patients recovering from cardiac (heart) surgery
Neuroscience Unit	Patients with neurological problems
Oncology Unit	Patients with cancer
Pediatric Unit	Children's unit
Gynecology Unit	Patients with gynecological problems (usually surgical)
Vascular Unit	Patients recovering from vascular surgery

Inpatient bedrooms in the acute care setting are usually designed for one to two patients and do not differ significantly in terms of configuration or services. A typical room layout includes a patient bed, bathroom, hand-washing sink, supply storage, a "headwall" or "medical column" providing connections for monitoring, medical gases (typically oxygen, compressed medical air, and vacuum), normal and critical branch power supplies, nurse call, and lighting for reading and night light control. The room also has examination lights, bedside furniture, and space for family or visitors. A closet for the patient's belongings is provided, along with access to television, telephone, and room temperature control.

Unit-based support requirements are more affected by the specialization of units. The orthopedic unit will require expanded physical therapy space, the cardiac surgery unit more extensive cardiac monitoring technology, pediatric units will require specialized play rooms, and psychiatry will demand a more residential setting, with dayrooms and dining rooms.

Just as there are minimal differences in the configuration of patient rooms across types of general care unit, there are minimal significant HVAC systems design differences among rooms. The general trend, however, toward increasingly acute patients and more complex treatments requires care in establishing HVAC and electrical design criteria. Additionally, more intervention and technology increase the need for local temperature and lighting control.

CRITICAL OR INTENSIVE CARE

Critical or intensive care units are segregated from general care units by requirement of the AIA/HHS guidelines. Intensive care units serve a broad spectrum of acutely ill patients with single system and multi-system disorders/failure.

The layout and size of the intensive care bedroom differs from the general patient bedroom in that it is likely to be a larger and private room to allow for additional intensity of services. There are greater requirements for medical gases, electrical, and physiologic monitoring as well as a finer control over HVAC systems and air filtration. There is generally more generous provision for clinical supplies and work surfaces and reduced provision for toilet and bathing facilities. Hazardous waste disposal units also may be incorporated in the room. Space is planned and equipped to accommodate a wide range of specialized equipment, including those that support diagnostic and treatment procedures within the room. Though not the norm, specialized HVAC requirements for anesthesia delivery may be required.

The unit-based support areas of the intensive care unit are similar to that of the acute care unit with additional space and systems to support more technology, equipment, and supplies. Again, the design of the core is affected by the specialty of care delivered within the particular unit. In all cases, maximizing the visibility of the patient by care providers from the corridor and/or the nurse station is paramount.

A short description of different types of intensive care units is as follows:

Neonatal Intensive Care	For newborns
Pediatric Intensive Care	For pediatric patients more than one year through adolescence
Surgical Intensive Care	For patients following general surgery
Cardiac Surgery Intensive Care	For patients following cardiac surgery
Cardiac Medical Intensive Care	For patients with cardiac medical issues
Thoracic Surgery Intensive Care	For patients following chest surgery
Transplant Intensive Care	For organ transplant patients
Medical Intensive Care	For general medical patients
Neuroscience Intensive Care	For patients with neurological issues or following neurosurgery
Burn Intensive Care	For second- and third-degree burn patients

SPECIALTY CARE

Specialty care beds may be designated as acute clinical or intensive depending on the level of care and instruction required. The range of specialties is wide and each has unique design requirements. The following are some examples.

Bone Marrow Transplant. Laminar airflow and anterooms are required. HVAC systems consist of local secondary air circulation and filtration and temperature control units. Ventilation pressurization is usually provided from a central system.

Clinical Research. Patients are generally ambulatory and undergoing clinical testing of a drug or procedure. An environment that is residential in appearance and still provides

for necessary monitoring, lab testing, and evaluation is required.

Postpartum. Private rooms that accommodate the family and infant are required. Individual control of light and temperature is recommended.

Psychiatry. As the general population ages, there is a growing requirement for inpatient psychiatric units to support the patient's medical needs as well. New or renovated acute and intensive psychiatric beds should be fully equipped with the systems and support located on medical acute space or intensive care units. At the same time, the units must provide group rooms, dining rooms, and occupational therapy space. There are significant regulations related to security and safety, and care must be taken to ensure that HVAC equipment or other exposed components are inaccessible.

Transplant. Patients have received an organ transplant and are at risk of infection due to their medical regimen to reduce the risk of organ rejection. Rooms all have positive pressure with HEPA filtered air, and anterooms are recommended.

Burns. Patients are often critically ill and, therefore, require full intensive care unit system support. Major issues are hydration and temperature control as well as the prevention of infection.

ISOLATION AREAS

These are rooms where patients are isolated from other patients and/or visitors. Caregivers and visitors use special precautions before entering or leaving the rooms. There are two types of isolation rooms.

Protective isolation (positive pressure). These may also be called *reverse isolation* rooms. These rooms house patients who are immunocompromised and can become infected from airborne contaminants from outside. They usually have the same requirements as in the transplant rooms described above.

Infectious isolation (negative pressure). These may also be called *forward isolation* rooms. These rooms house patients who are infected and can spread infection by releasing airborne contaminants to the outside. They have a negative pressure compared to the outside with exhaust air not recirculated unless HEPA filtered.

INFECTION CONTROL

Quality cost-effective patient care demands that the spread of hospital acquired pathogens between patients be minimized. Precautionary policies should be designed and adhered to for patients known to have the designated pathogens. An even more difficult problem, however, is dealing with important reservoirs of undetected antibiotic-resistant organisms among hospitalized patients, reservoirs that are documented to be increasingly prevalent. Thus, we are now forced to consider all patients as potential undetected sources of these organisms.

Precaution Categories

The Centers for Disease Control and Prevention (CDC 1990, 1994) has defined three other categories of precautions.

Contact isolation precautions—for patients with serious pathogens that have been shown readily to spread within the hospital on the hands and clothing of health care workers. Use of gowns and gloves by health care workers is recommended.

Droplet precautions—for patients with pathogens that are known to spread by aerosolized large droplets with a limited range.

Airborne precautions—for patients with pathogens that are known to be spread more widely by aerosolized small droplet nuclei.

Standard precautions are applied to all patients. These precautions are designed both to prevent transmission of blood-borne pathogens to health care workers (previously covered under universal precautions) and to prevent hospital spread of pathogens between patients on the hands of health care workers. All patients must be considered recognized or potentially unrecognized carriers.

SPECIAL TREATMENT FOR TUBERCULOSIS

Hospitals have always had isolation rooms. The current drug-resistant tuberculosis epidemic with many victims also infected with HIV is formulating a serious challenge for the hospital patient room designers. The CDC (1990) provides a comprehensive review of the problems and suggests guidelines on disease control. It notes that

> Transmission is most likely to occur from patients with unrecognized pulmonary or laryngeal tuberculosis who are not on effective anti-tuberculosis therapy and have not been placed in tuberculosis (acid-fast bacilli [AFB]) isolation.

The prevention of infection transmission in health care settings requires that all of the following basic approaches be used:

a. prevention of the generation of infectious airborne particles (droplets nuclei) by early identification and treatment of persons with infection,

b. prevention of the spread of infections into the general air circulation by applying source-control methods,

c. reduction of the number of infectious droplet nuclei in air contaminated with them,

d. surveillance of health care facility personnel for infection.

It has been shown that when inadequate attention is given to any of these approaches, the probability of infection transmission is increased. In specific cases, e.g., to control the spread of tuberculosis transmission, specific actions should include

- screening patients for active tuberculosis and tuberculous infection,
- providing rapid diagnostic services,
- prescribing appropriate curative and preventive therapy,
- maintaining physical measures to reduce microbial contamination of the air,
- providing isolation rooms and airborne precautions for persons with, or suspected of having, infectious tuberculosis,
- screening health care facility personnel for tuberculosis infection and tuberculosis, and
- promptly investigating and controlling outbreaks.

Although completely eliminating the risk of infection transmission in all health care settings may be impossible, adhering to these guidelines should minimize the risk to patients, staff, and visitors.

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