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# Single-Patient Rooms for Safe Patient-Centered Hospitals

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In the 19th century and first half of the 20th century, hospital accommodations consisted of large multi-bed wards with as many as 20 patients, and semi-private or private rooms for those who could pay. Patients received care in these facilities for decades after the design had become obsolete. Almost 90 years ago, it was proposed that single-patient rooms were the ideal setting to provide patient care.[1] In the last half of the 20th century, new hospitals were built featuring mostly single-, double-, and 4-bed rooms. It is likely that these hospitals may not be able to adequately provide safe patient-centered care over the next 50 years of their life span. Most modern hospitals have public value statements regarding safety, dignity, privacy, and patient-centered care. A tangible way to show commitment to these values would be to give patients their bed with their own bathroom in a single-patient room.

## The Benefits of Single-Patient Rooms

Considerable quasi-experimental and descriptive evidence of the benefits of single-patient rooms on safety, utilization, and satisfaction is available. Single-patient rooms reduce nosocomial infection rates[2] provided that other basic elements of infection control are in place.[3,4] A review of 16 studies showed reductions in both airborne-related and contact-related nosocomial infections.[2] The evidence is more compelling for reducing airborne infections, while some studies show no effect of single-room isolation on contact related to nosocomial methicillin-resistant *Staphylococcus aureus* colonization.[5] Single-patient rooms are easier to clean and decontaminate than multi-bed rooms. In addition, health care professionals may be more likely to perform hand hygiene when moving between rooms rather than between beds, particularly if hand wash stations are well positioned; the evidence that supports this hypothesis is conflicting.

Patient transfers within the hospital can potentially lead to patient harm due to reduced monitoring, missed treatments, and psychologic stress, and consume considerable hospital staff resources. Single-patient rooms can reduce the need for these transfers. For instance, once a patient is admitted to a single-patient room, there is no need to move this patient because of infection control, end-of-life care, or administrative transfers to optimize utilization of multi-bed rooms. Acuity-adaptable rooms are single-patient rooms in which necessary medical care can be provided regardless of patient acuity; intensive care to palliative care can

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be provided in the same setting. One before-after study of acuity-adaptable rooms showed a significant reduction in reported medication errors, likely because of minimizing the confusion caused by multi-bed rooms and patient transfers.[6]

Single-patient rooms can enhance patient flow, whereas shared patient rooms paradoxically limit this flow. For example, in hospital jurisdictions that respect gender privacy, placing a male patient in a 3-bed room means that female patients cannot occupy the other 2 beds. Constrained access to beds in multi-bed rooms can lead to delays in patient flow from emergency wards, intensive care units, step-down units, and postsurgery recovery rooms. Accommodating new patients in multi-bed patient rooms also leads to transfers of patients within the hospital; such transfers offer no tangible benefit to patients, families, or hospital staff. One estimate suggests that 85 beds in single-patient rooms can offer the same bed capacity as 100 beds in multi-bed patient rooms.[7]

Single-patient rooms offer greater potential for privacy, rest, and family support. Considerable attention is paid to the privacy of health information, yet multi-bed rooms do not provide such privacy. Patients may not share sensitive medical history, such as sexual practices or illicit drug use, in a room where strangers can listen.[8] Discussions about life-sustaining treatment or a serious diagnosis with a poor prognosis are inappropriate with other parties present when separated only by curtains. Most patients would not accept multi-bed birthing rooms, but end-of-life care, including cardiac arrest care, is accepted in multi-bed rooms.

Family members can visit single-patient rooms more freely to offer support to the patient and to share information with the health care team. A common design feature in pediatric hospitals is a parent bed. A family member bed would be a welcome feature in adult hospitals with single-patient rooms. Increased availability of family members would improve communication between the family and the health care team, while respecting patient privacy and dignity.

Patients in single-patient rooms do not have to listen to the alarms, utterances, or conversations arising from other patients' beds. Higher noise levels have been shown to be associated with increases in blood pressure, heart rate, and respiratory rates, all physiological findings suggestive of higher stress levels.[2] Reduced noise can improve sleep quality, and better sleep is associated with improved mood and better pain control, all of which may improve patient satisfaction.[9]

A key aesthetic and safety feature of single-patient rooms is that each patient has his or her own bathroom. Even though bathrooms are not the sole source of nosocomial infections, they are certainly important contributors. Most patients would prefer not to share bathrooms with other patients who have an illness involving gastrointestinal symptoms such as vomiting, diarrhea, or gastrointestinal bleeding.

## Disadvantages and Considerations

With single-patient rooms, hospital staff must visit 3 rooms to care for 3 patients, which requires additional walking and time. Other ward design features, such as wireless computer interfaces, satellite workstations, and accessible organized supply rooms, can minimize additional excess staff movement and enhance efficiency. Having single-patient rooms means the loss of roommates who can potentially summon help, but the increased availability of family and friends may offset this loss. Because some patients prefer the company of other patients, a small number of double rooms should be available. Patients isolated for infection control have been shown to have fewer physician visits and have more preventable adverse drug events.[10] This apparent neglect of isolated patients may be explained by the entire array of infection control barriers rather than an inherent risk of single-patient rooms alone.

Single-patient rooms increase new construction costs, but the incremental costs can vary widely depending on other ward design features. One North American analysis found that the cost of a new ward with exclusive single-patient rooms was $182 400 per patient, whereas a ward with exclusive double rooms cost $122 550 per patient. The additional cost was mainly due to fewer patients accommodated on single-patient room wards.[7] However, single-patient room wards do not necessarily house fewer patients: one British analysis documented that ward designs with 100% single-patient rooms required the same space as those with 50% single-patient rooms when other space-saving design features are integrated.[11]

Another report found that full implementation of single-patient room design features in new construction would add 5.3% to initial construction costs, but these costs would be recouped within 1 year through improved efficiencies associated with single-patient rooms.[12] Information about the costs and benefits of converting existing wards to single-patient rooms does not appear to be available at this time; however, the expected costs and benefits should be similar.

The increased expenditures required to achieve primarily single-patient rooms are capital costs rather than labor costs. This cost is in contrast to other efforts to improve patient safety and satisfaction that require mostly labor costs with considerable ongoing hospital staff training and behavioral components to change in the culture of the hospital. This distinction between capital and labor costs has 2 consequences. First, most capital costs occur at the beginning of the investment whereas labor costs are discounted because they occur over a number of years in the future. The concept of discounting means that people who make investment decisions prefer to spend the same dollar amount in the future instead of now. This consequence often leads decision makers to avoid current capital costs and tolerate future labor costs, even though capital investments may ultimately be less expensive. Second, capital costs may be more

likely to produce the intended benefits, such as infection control or patient satisfaction, than costs that require behavioral or cultural changes in attitude. In other words, it is easier to build a single room once than to teach thousands of individuals to be attentive to patient privacy when patient care is provided in multi-bed rooms.

Hospitals currently generate income from surcharges for private and semi-private rooms. Such income would disappear if single-patient rooms were widely available because hospitals could not charge a premium for single-patient rooms if no multi-bed rooms were available. Moreover, any hospital currently being designed with multi-bed rooms must consider the likelihood that regulatory bodies will mandate single-patient rooms in the future. The same forces that currently require reporting of nosocomial infection rates may also one day mandate single-patient rooms. This possibility must be included in any cost analysis for future hospital investments.

Even though the concept of single-patient rooms is intuitively appealing, there are gaps in the amount and quality of existing research demonstrating potential advantages or value. Thus, studies of the important design elements, benefits, downsides, and costs of converting existing construction to single-patient rooms should be conducted.

## Current Status

France has adopted single-patient rooms for all new hospital construction for the past 20 years; a small number of double rooms are available for patients who prefer rooms with other patients. British, Dutch, and Norwegian hospitals are moving toward increasing single-patient rooms as the culture of these countries is changing to embrace single-patient rooms as the standard of care. Single-patient rooms are a minimum requirement for new construction of medical/surgical wards and obstetrical units, according to 2006 American Institute of Architects guidelines.[13] The Ward of the 21st Century in Calgary, Canada, is a multifaceted research initiative in hospital design, with single-patient rooms as a cornerstone feature.[14]

## Summary

Clinicians should advocate for single-patient rooms in any new hospital construction, expansion, renovation, or redesign. Single-patient rooms are permanent physical features that potentially could improve safety and patient satisfaction without the need for ongoing staff training, audits, or reminders. Money spent on capital costs to improve patient care may be more efficient than money spent on changing hospital culture and the behavior and attitudes of health professionals. It is not necessary to wait 50 years for existing hospital structures to deteriorate before the full potential of single-patient rooms can be realized.

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