

# The Patient Room: what is the ideal solution?

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Design Dilemma

DEA 4350

November 8th, 2010

# Contents

i.	Executive summary, class/project description	3
ii.	Patient room background	4-11
iii.	Infection Control	12-21
iv.	Single vs. multi-patient rooms	22-43
v.	Evidence-based design	44-51
vi.	Innovations/Solutions	52-57
vii.	References	58-60

# Executive Summary

Planning and Managing the Workplace: Evidence-Based Design and the Organizational Ecology of Healthcare Environments  
Design Dilemma Project

## **Course Description:**

This course examines how the physical design of the hospital, in combination with other social, organizational and technological factors, affects quality of care and the experience of patients and care providers. Through a combination of lectures, reading, site visits, projects and workshops students examine the role of Evidence-Based Design (EBD), and the associated key issues and challenges in the planning, design and management of healthcare facilities (DEA6530 Syllabus).

## **Project Description:**

This report will focus on the Design Dilemma project specifically. A “design dilemma” is a critical design decision faced by planners and designers in an actual hospital project for which there is no clear, obvious solution. In this project we will explore the complex web of interdependent system factors, issues and stakeholders that need to be considered in planning, designing, and operating a Med/Surg nursing unit (DEA6530 Syllabus). Each student has chosen a topic or sub-system of interest and we have chosen patient rooms. The report will briefly discuss the history of the typical patient room on a typical Med/Surg unit and then move into what is being done today and more specifically how this relates to infection control, what role a single-occupancy room plays compared with double, and what evidence-based design is used to explore this topic. While we realize how immensely complex the patient room subsystem is we can only focus on so many facets in a satisfactory amount of depth so the aforementioned topics will be discussed. These few topics were specifically picked because they represent some of the biggest problem areas and places where we see room for significant improvement. Through research from health information organizations, academic research sources, and specific case studies we will evaluate the effectiveness of standard practice of today and seek new and innovative ways to improve upon the norm. Personal observations from site visits, class discussions, and experience in the field will be incorporated wherever possible.

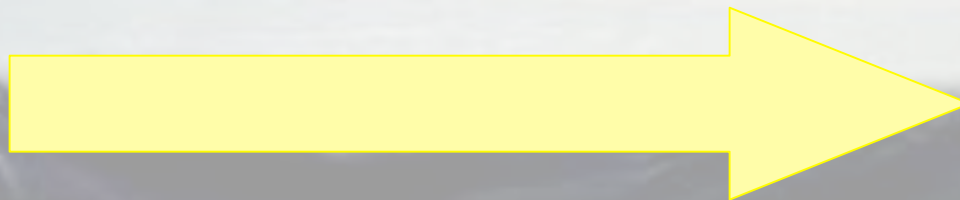
## **Main Findings:**

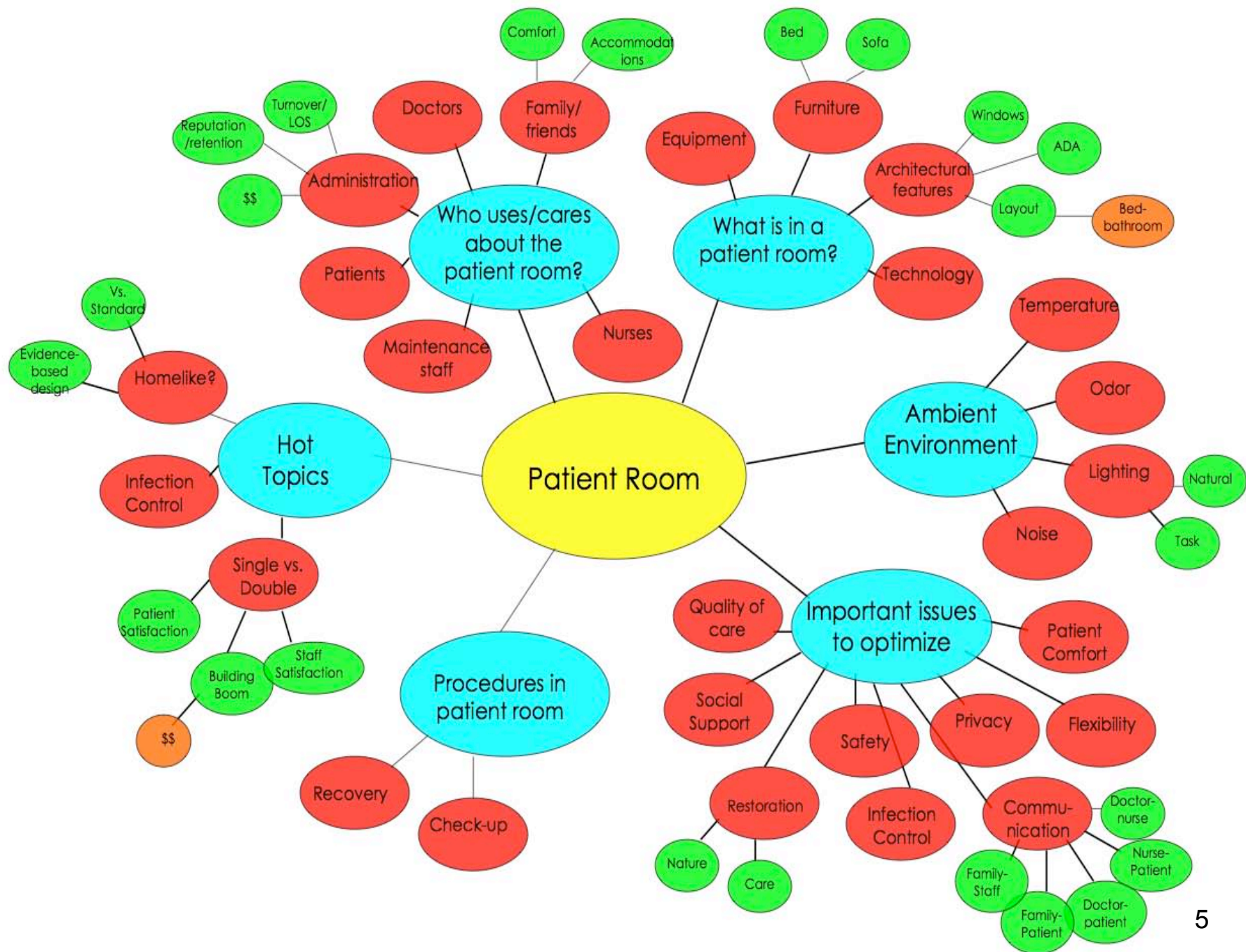
Available evidence states that although there is still great debate over the single vs. multi-patient room, single-patient rooms are extremely helpful in improving patient outcomes. In regards to staff efficiency and patient safety, comfort and satisfaction, the single-patient room is superior to a multi-patient room given features such as visual and auditory privacy, accommodations for family, and features that allow staff to communicate more with patient, while performing less errors. Evidence-based design is another component recently incorporated into the patient room that has seemingly a positive effect on patient/staff well being through interior finishes that improve patient restoration. However both single-patient rooms and evidence based design continue to be highly debatable given the inconclusive evidence from relevant research and the high costs they pose for the hospital. In addition to the amount of patients per room, compliance with things such as hand washing can be altered by several different factors. Some specific studies references include sink and/or alcohol dispenser locations within the room. We also see that clinicians believe the use of single-patient rooms is beneficial in reducing the spread of infection and increasing patient safety.



# The Patient Room: a complicated web of issues

The patient room is a large and complicated topic because its design and functionality directly affect not only patients and families, but hospital staff and administration as well. From optimizing patient well-being and comfort, to saving administration money through strategic use of materials and space allocation during construction, the decisions made regarding the patient room are pertinent to every person involved in the healthcare environment. The following diagram visually expresses the intricate web that will begin the discussion on the critical role that the patient room plays in a hospital.





# The Patient Room: a complicated web of issues

The previous diagram provides insight into the vast array of components that make up a patient room and the different issues it presents and groups it affects. Within this web, however, there is great overlap, which only further complicates the discussion of the hospital patient room. The following diagram highlights just a few out of a great deal of topic/issue overlap that the patient room creates in healthcare debate. For this reason, the following presentation has narrowed its focus to just 3 'hot' topics as a means of exploring the inner-workings of the patient room. These topics were chosen as a result of the great building boom occurring in the healthcare world, which makes the intention behind the design and construction of the modern patient room more important than ever.

## **Hot Topics:**

- **Infection Control in the Patient Room**
- **Single vs. Multi-Patient Rooms**
- **Evidence-Based Design and the Patient Room**



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## History of Patient Rooms

Historically, the majority of patient rooms on a typical med/surg unit were either double or quadruple occupancy. That is, there were between two and four patients per room usually separated by some sort of curtain system. Bathrooms were almost exclusively shared by all occupants of the room. Receptacles for medical gases and suction were openly exposed. Privacy and confidentiality are not encouraged in this sort of environment. While this was generally accepted in the past, virtually all hospitals being constructed today are being built with single-bed rooms.





## History of Patient Rooms

In our site trip to Upstate Medical University in Syracuse, NY we saw their recently opened cardiac unit and how it used exclusively single patient rooms. In stark contrast we were also fortunate enough to see one of the older med/surg units that is not currently in use. In the dated unit we saw dim lighting, double-occupancy rooms roughly the same size as the new single rooms, white floors, white walls, white ceilings. There were no private showers or anything of the sort. The difference was quite remarkable as in the new unit we saw mock-wood flooring, warm colors, flat-screen televisions, couches for family members, receptacles built into the wall so as not to stick out, and other such things. A synopsis of our brief class discussion was that the difference was quite remarkable between old and new. If one were to choose, the new rooms were much more desirable.



# History of Patient Rooms

## What happens in a patient room?

Patients on a med/surg unit are there for a wide variety of reasons. Someone could have acquired an infection requiring IV anti-biotics for a few days and then a routine release. On the other hand there may be a patient living on a ventilator with dual chest tubes and bedsores. These patients may be in rooms right next to each other and may even have the same nurse but require much different equipment to properly care for them. Normally a patient that is on a vent and tubed would be in intensive care but overcrowding can lead to less than desirable circumstances. Virtually everything takes up space, medical equipment is not small or compact for the most part. While the majority of patients will not need elaborate equipment during their stay, some will.

There is more than just the patient and equipment associated with their care to be considered. If a patient cannot be moved and a physician orders a chest x-ray there needs to be adequate room for a portable machine to be maneuvered. Nurses and physicians need room to work with their patients. If a patient needs to be moved while they are in bed and there is not sufficient space for the IV pole or vent the clinicians may not be able to get on each side of the bed to assist each other in the move. This can lead to injury and ultimately the patient is not receiving optimal care.

Most patients will have family coming to visit them at some point during their stay. The classic room had a chair, maybe two in the room. Now families are being considered so we see things such as sleeper sofas, family lounges, and other such amenities. While patient care is of paramount concern, their family needs to be considered as well. Having a place such as a chapel or conference room available for clinicians to speak with family members is an increasing trend.

Without considering what actually happens or what could potentially happen in a patient room it is nearly impossible to design one satisfactorily. Speaking with clinicians and gaining the comprehension necessary to take all of the different factors into account can lead to much more satisfied clinicians, patients, and family members. Satisfying all of these people in turn satisfies the administration because there will be better outcomes, less inpatient complications, lower readmission rates, and therefore the hospital makes more money.



## History of Patient Rooms

“Unfortunately, healthcare always seems to lag far behind the rest of the service industries when it comes to hospitality.”

-Renato Mandanas MD, VP for Medical Affairs at Oswego Health

This comment was not made in specific reference to patient rooms but rather the hospital experience in general. Doing a stereotypical comparison to something such as a hotel where hospitality is crucial exposes a large divide. At hotels there are people to carry your bags for you, park your car, waiting for you in the lobby, showing you to your room and anxious to take care of any needs that may arise during your stay.

In contrast, the classic view of a hospital is that you show up, there is no parking, you have to walk a great distance, you get inside and don't know where you need to go, they stick you in a room and forget about you while delivering bad food three times a day. This is exaggerated of course but not far from how many view their experience. There are hospitals taking steps toward making experiences more hospitable. This was absolutely evident in our trip to Upstate, as previously discussed. Other examples include Weill Medical College in New York City where it was explained to us in a class presentation that they are now using valet parking because people were having trouble finding places to park. Oswego Hospital started a major construction project in the summer of 2009 and as a result had terrible problems with way finding. The hospital had not undergone extensive renovation for quite some time and the people of the community had grown accustomed to it. As a result they hired several full-time customer service representatives that were scattered around the building in order to help people find their way, supply wheelchairs, get people to their cars safely, whatever needed to be done. These are not massive changes but can go a long way in regards to how patients feel they are being treated.





A blurred photograph of a hospital room. In the foreground, a bed with white linens and a pillow is visible. In the background, medical equipment is mounted on a light blue wall, including a large adjustable arm holding a device, and several smaller units and cables. The overall image has a soft, out-of-focus quality.

# HOT TOPIC1: INFECTION CONTROL

## Patient Room and Infection Control

Single-bed rooms are not being built exclusively for patient satisfaction, though this is a factor. There is a wide body of research available that says single rooms reduce infection rates. The most commonly mentioned types of infections are nosocomial, or hospital-acquired infections. The motivation is simple, a patient is allowed a specific and often certain amount of money for their hospital stay based on their diagnosis. If, while an inpatient, they happen to develop an infection and need to stay an extra few days or week, the hospital gets paid the same amount. This is a huge incentive to do whatever possible to avoid nosocomial infections.

It has been said that water fixtures such as sinks, faucets, showers, and toilets have been seen as potential sites for pathogenic microorganisms (HERD Journal 2008). While classically these fixtures were in a single, separate bathroom within the patient room that is not necessarily the case anymore. There are now some rooms being built with sinks exposed in them right in the room so that caregivers have a convenient and obvious place to wash their hands. While this may seem a threat it should also be noted that instead of several people sharing a bathroom that cannot possibly be completely disinfected every time one of them uses it, a single patient is now using the facilities. This does not, however, protect against the nurse, physician, or family member who uses the sink after interacting with many different people and patients. It should be noted that empirical evidence linking these fixtures to nosocomial infections is limited (HERD Journal 2008).

However, just because there is no specific evidence does not mean that these should be ignored. If there is the potential to harbor bacteria then it is clearly something to be addressed and considered.

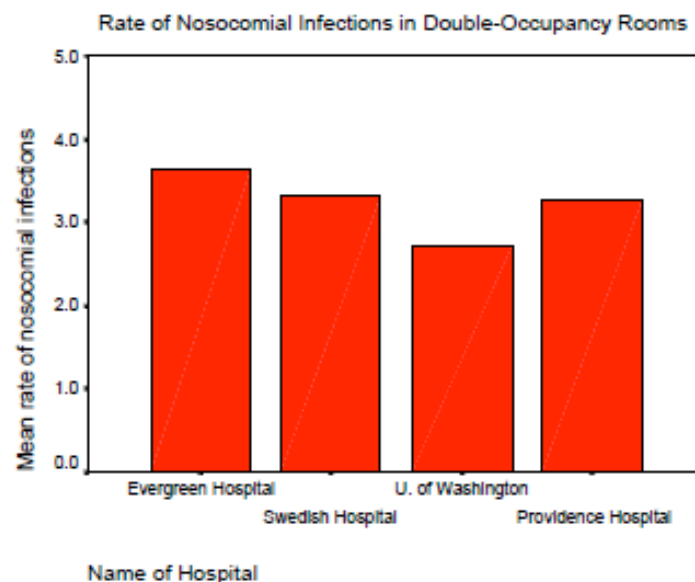
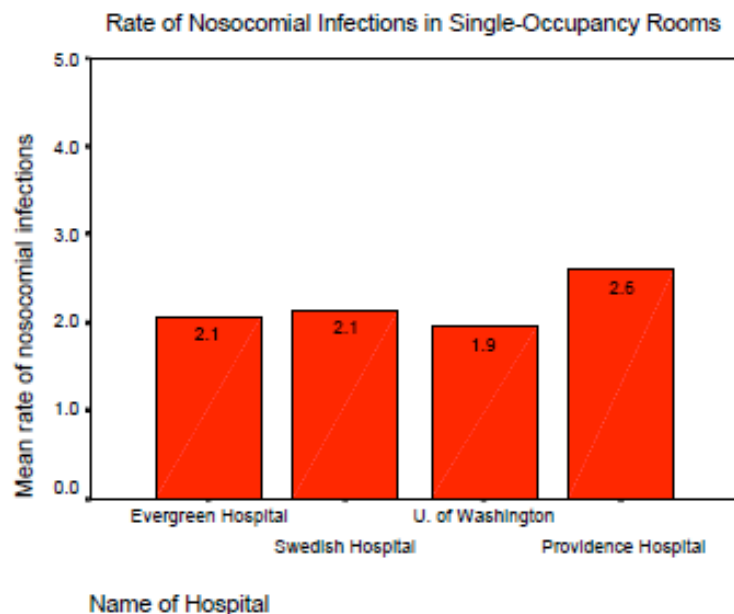


## Patient Room and Infection Control

A 2003 study from Simon Fraser University looked at the use of single patient rooms versus multiple occupancy rooms in acute care environments across four hospitals in the Seattle area and Oregon of varying sizes (bed size of 117, 168, 450, and 697). While the percentage of single rooms varied from almost all to drastically less, the conclusions were quite similar. Fifty-seven percent of respondents said that the rate of nosocomial infection is either low or very low in single rooms whereas this number was only 10 percent in double rooms. On the other side, eleven percent said the infection rate is high or very high in single rooms compared to forty-six percent in double rooms (Chaudhury, Mahmood, Valente 2003).

We can draw from this some very relevant conclusions. Using a range of different hospitals increases the validity of the study. Looking at how the data was collected we discover that survey data was used with 77 respondents total. Of these 77 there were 73 nursing staff members and four administrative staff members (one from each hospital). What we have then is a strong representation of front-line medical workers who are with patients on a very regular basis. These are the people who notice trends, know what is normal, know what patients want. They recognize which patients develop infections during their stay and which do not because it is part of their daily routine to chart all of these things.

### Rate of nosocomial infection





# Patient Room and Infection Control

## Airborne Infection:

Walking down the halls of a med/surg unit you will notice signs on some of the doors noting contact, airborne or droplet precautions among others. These are so that visitors and staff know the patient in that room has some sort of condition that needs to be treated differently. Droplet precautions typically have a room under negative pressure and there will be a cart outside the room stocked with gloves, masks, gowns, etc... for people to put on before entering the room.

Looking at the effect of single-bed rooms in reducing airborne infection, we see that in order to prevent the spread of pathogens they play a major role in increasing isolation capacity, facilitating filtration, ventilation, and airflow control. Patients are often immunocompromised and, therefore, more susceptible to disease of any kind. Being able to isolate those who are most contagious and at risk of infecting others keeps everyone safer (HERD Journal 2008).

Methicillin-resistant *Staphylococcus aureus* (MRSA) is commonly thought to be spread by contact. While MRSA is spread by contact it is also airborne through infected patients shedding skin cells. Without an isolated room it would be extremely difficult to contain this type of infection (HERD Journal 2008).

If all patient rooms were double-occupancy, how could this be effectively controlled? In the past, hoods have been used but their effectiveness and their being accepted by patients is subject. The advantage of isolation reaches beyond keeping other inpatients from becoming infected. Clinicians can treat the patient more routinely because they do not have to be concerned with outside factors. The patient that is already infected with one thing does not have to worry as much about further complications from other neighboring patients that may be infected with something completely different. Clearly, it is not solely the infected patient who benefits from being in a single-bed room.

# Patient Room and Infection Control

## Airborne Infection:

Sources of some airborne pathogens can be construction and renovation activities or ventilation system contamination and malfunction. This could mean dust and moisture accumulating in the heating, ventilation, and air conditioning systems or the failure of these systems. In one study, there was an outbreak of invasive pulmonary aspergillosis (IPA) in a ward housing acute leukemia patients. This ward had natural ventilation and the hospital was doing extensive construction and renovation. The infection rate climbed to 50%. Some of the patients were moved to another ward with HEPA filters and for the following three years none of them developed IPA. However, those kept in the regular ward had a 29% rate of infection during the same time (Joseph 2006).

Contamination and malfunction of HVAC systems can pose a threat of its own. A specific MRSA study where six patients and one nurse were infected found that ventilation grills in two patient bays were harboring MRSA. When this happened, the ventilation system would shut down daily during its cycle, which created negative pressure so air from the patient ward got sucked into the ventilation system. When the system came back on, the infected air came out to infect patients and staff (Joseph 2006).

These previously discussed cases seem preventable now that we know what caused them. Indeed there are processes and steps to take in order to improve air quality. Using HEPA filtration is one way to control air pollutants. Some believe the most effective way to combat these pollutants is to control them at the source (Joseph 2006). Joseph's "Steps involved in providing clean filtered air in the hospital," are demonstrated in the graphic.

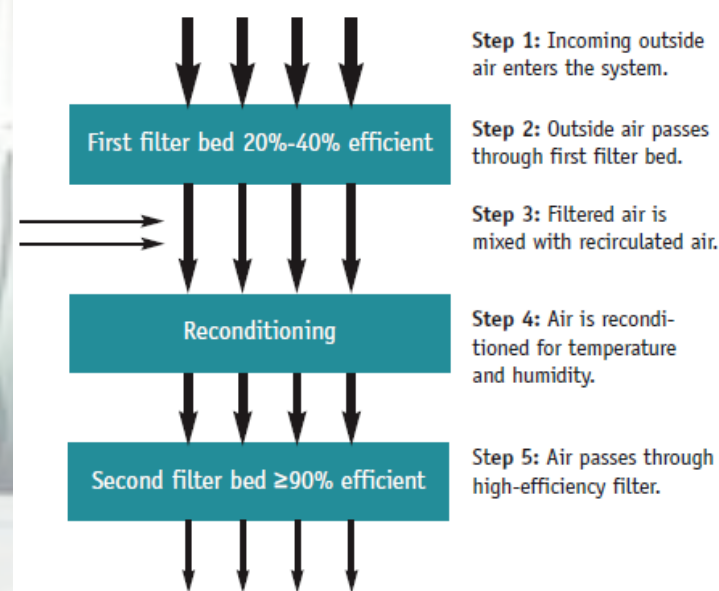


Figure 1: Steps involved in providing clean filtered air in the hospital (Source: Author)



# Patient Room and Infection Control

## Contact Transmission:

The easiest way to deter contact transmission of infection and disease is to clean often and thoroughly. This sounds simple enough as every hospital is staffed with housekeeping workers who are trained in cleaning and disinfecting rooms. Different rooms that may have housed patients with different diseases or infections may be treated differently. The issue comes when a patient is discharged but was in a dual-bed room so the other patient is still there. Even if the vacant half of the room is cleaned immaculately there is still the threat of pathogens that can settle on all surfaces throughout the room. A further threat is that the hospital is full so people normally getting single rooms are now in doubles. If the Emergency Department has people waiting for rooms the housekeeping staff is rushed to clean as quickly as possible so that the room or bed is available. This type of process does not necessarily encourage best practice and diligence .

According to the staff at the Mayo Clinic, “Clostridium difficile, often called C. difficile or "C. diff," is a bacterium that can cause symptoms ranging from diarrhea to life-threatening inflammation of the colon. Illness from C. difficile most commonly affects older adults in hospitals or in long term care facilities and typically occurs after use of antibiotic medications.” This is a serious problem in many hospitals across the country. Two cases in the UK with especially severe outbreaks found that there were predominantly multibed rooms with shared toilets. There were very few single rooms with private toilets. These factors together were seen as major contributors to the outbreak (HERD Journal 2008).

It is not realistic to expect someone to completely disinfect the entire bathroom every time someone uses it if there are multiple people in the same room. This type of practice simply would not be feasible. Having single-bed rooms as the norm would help to contain this sort of outbreak. While we wouldn't want anyone to come down with this sort of illness it would be very desirable to limit it to as few patients as possible.



# Patient Room and Infection Control

## How do these issues impact the administrator?

Administrators have people coming to them constantly wanting things. Whether it is a surgeon wanting a new robotic surgical device, a radiologist wanting a new CT scanner, or the Infection Control Officer looking for a new ventilation system, everything costs a great deal of money. This is especially true in the world of healthcare because you cannot often just buy something if it is a major investment. You may need to go through the CON (certificate of need) process, acquire funding, etc...

Compared to a 256-slice CT scanner, HEPA filters may not seem outrageously priced but the administrator needs to consider other options as well as the return on investment that can be expected. Estimated HEPA filter costs for a 32-bed unit with 90% efficiency filters would have an additional first cost of \$15,000. Additional operating cost per unit per year would be around \$4,000 for the increased power necessary, and HEPA filter replacement would cost approximately \$6,000 per year for the materials and labor. While HEPA filters are recommended for healthcare facilities by the Centers for Disease Control and Prevention (CDC) and the Healthcare Infection Control Practices Advisory Committee (HICPAC), they are not exclusively and consistently used. The added cost just listed is the reason for not exclusively using them. Monetary values did not seem to be available for the return on investment that could be expected from using HEPA filters. The ROI would come from patients recovering quicker and going home sooner. Another source would be preventing readmission. If people improve their health substantially while they are inpatients they are much more likely to stay healthy once they leave the hospital (Joseph 2006).

Compared to some thing simple such as staff education or placing alcohol hand sanitizing stations in convenient areas, HEPA filtration actually looks rather expensive. Whereas alcohol stations have low initial cost and low maintenance, HEPA filters cost thousands of dollars to both initiate and maintain. These are the issues to be dealt with by the administrative staff.

## Patient Room and Infection Control

Steps to reduce the spread of infection can take many different forms. From HEPA filters to hand washing, all things need to be considered. With this consideration comes the design implications of implementation. Hand washing is widely accepted as a simple way to reduce rates of infection. Some barriers to hand washing include; inconvenient sink location, lack of time, lack of soap or paper towels, and forgetfulness. This is as reported by hospital staff. Anjali Joseph goes on to discuss an Ulrich study that found there is some support for the notion that providing numerous, conveniently located alcohol-rub dispensers or washing sinks can increase compliance. Installing alcohol-based dispensers at the bedside in particular leads to improved adherence. Joseph goes on to look at the work of Pittet who found that a combination of bedside antiseptic hand-rub dispensers and posters reminding staff to clean their hands increased compliance (Joseph 2006).

Clearly the location of sinks and dispensers influences the actions of clinicians. If a patient is located in the middle of the room but a nurse has to go past them to get to a sink near the window they are less likely to do so because of the inconvenience. In the same way if the sink is located behind the door so that they have to walk in, close the door, turn their back to the patient and then wash their hands they are, again, less likely to comply.





## Patient Room and Infection Control

One thing that was not common before but is becoming much more prevalent is patient education on things such as hand washing. Information through the internet, television, etc... has people much more aware of what is going on in regards to their health for the most part. In the past it was very rare for a patient to question a physician or nurse on their practice but now is actually being recommended that patients take the initiative to do so.

Many hospitals have formed committees centered around infection control and even hand washing in specific. Oswego Hospital implemented a hand washing committee and had a kickoff event where they set up in the lobby with all sorts of different alcohol based sanitizers that people can use to help control the spread of infection. They also had hand washing demonstrations and in-services to educate both clinicians and others how to adequately wash their hands.



1. Wet your hands with water and apply soap.



2. Rub hands together to make a lather.



3. Rub your palms, fingers, and back of your hands.



4. Rub your hands really well for at least 20 seconds.



5. Rinse hands with water.



6. Dry hands using paper towel or an air dryer.



# Patient Room and Infection Control

## Impact on administration:

Already assuming that a hospital has made the large transition to having primarily singled-bed rooms on their med/surg unit, there are still further investments to be made. Putting sinks or alcohol dispensers in every room goes far beyond the initial investment. Alcohol stations need to be restocked fairly regularly and, though they are of relatively low cost they are not free. If a hospital has made the recent switch to single-bed rooms and did not incorporate sinks it will most likely take an outside company to strategically place the sinks in the room.

Depending on the size of the organization, infection control personnel can range from a current employee's new duty to a full-time job to an entire team. Sub-committees such as the aforementioned hand washing committee may be useful but at what cost? How are people being compensated for participating in these committees. If they can be active members during their scheduled work hours it may not cost the hospital anything further but if someone must come in to cover for them while they are doing things involved with the committee that would add to costs. Even if they work their regular schedule but have to use overtime for committee duties this would, again, contribute to additional costs.

The administrator must consider what the return on investment is in this situation. Once overtime and scheduling conflicts arise administration will start to hear from department managers whose budgets are being influenced by the new committee. Departments are typically on very tight budgets in hospitals because the operating and profit margins are so low. In this situation any tampering could cause the manager to worry about their perceived performance. It is likely that in a review all that would be noticed is that overtime hours increased in their department when really it was due to a committee initiated by the administration to begin with. The complexity of something as simple as a hand washing committee is quite daunting and demonstrates how all sides need to be considered throughout the decision-making process.

A blurred photograph of a hospital room. In the foreground, a bed with white linens and a pillow is visible. In the background, medical equipment including a monitor, a light fixture, and other devices are mounted on a light blue wall. The text is overlaid on the center of the image.

# HOT TOPIC 2: SINGLE VS. MULTI-PATIENT ROOM

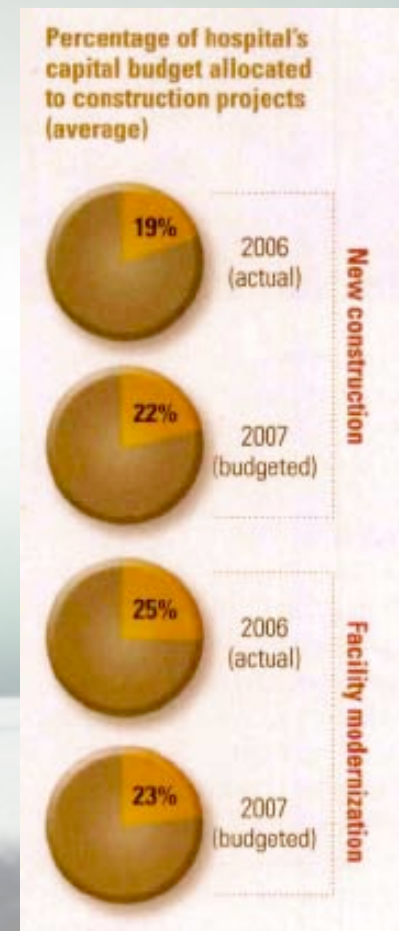
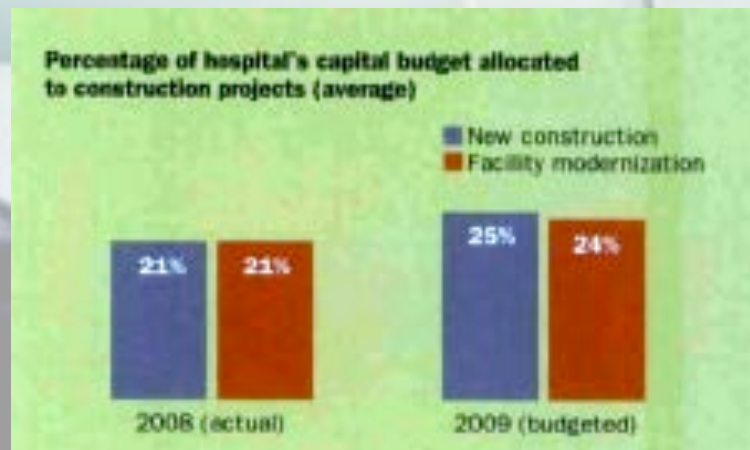


## Why should we care so much about the single patient room?

The construction of single patient rooms has become a hot topic in the healthcare world because of the great building boom that hospitals have been experiencing in the past 10 years, and the financial crisis that has made every dollar spent on healthcare construction extremely valuable. With inter-hospital competition, an aging baby-boomer population and the deterioration of dated facilities fueling the building boom, the debate over private patient rooms has become more relevant than ever.

### “The Building Boom”

An enormous sum of money has been put into the expansion and modernization of healthcare industries in the past few years. According to an analysis by RSMeans Business Solutions, in the United States in 2007, \$41 billion was spent on hospital construction and a reported \$40.7 billion in 2008, with no sign of slowing down in the near future (Carpenter, 2009). In October of 2007, the U.S. Census Bureau stated that not only was health care construction growing 15 percent faster than in 2005, but its current value was also estimated at \$43 billion (Hoppszallern, 2007). For example, in Detroit alone, the Detroit hospital is undergoing \$75 million in modernization to the Detroit Hospital as part of a \$300 million, 3-year project, while simultaneously building a \$310 million hospital in West Bloomfield Township (Smith, 2007).



(Carpenter, 2009)

## Why so much building Activity?

### • Aging Baby Boomers:

The large “baby-boomer” generation is now reaching an average of 63 years of age and are requiring more medical attention as a result. This increase in occupancy in hospitals is a major stimulus for hospital expansion and refurbishing.

“According to the Census Bureau, between now and 2050, the number of people over 65 will double, and this group makes up the largest market segment (37.5 percent) in healthcare” (HermanMiller Healthcare, 2010).

### • Dated Facility

According to Marco Capicchioni, the vice president of facility services and real estate for Henry Ford Health System, “With the advances in technology, we think there’s going to be a need for new facilities and renovations to keep up with the way medicine is done.” In addition, hospital administration deemed surgery facilities built in the 1960’s and 1970’s completely inadequate for the types of advanced surgeries performed today (Smith, 2007).

### • Inter-Hospital Competition

Hospitals are very competitive with one another in regards to bed occupancy and recruitment and retention of the most qualified staff. Expansion and modernization of the hospital are critical in enhancing a hospital’s reputation and quality of care.

#### Why hospitals say they are building now

Aging facility .....	51%
Operational efficiency/patient flow .....	43%
Technological advances .....	35%
Consumer demands for privacy and family centered care .....	31%
Determined population-based need .....	31%
Enhance marketing .....	31%
Competition .....	29%
Increase market share .....	29%
Demographic changes .....	22%
Funds are available .....	16%
Space for future undesignated growth .....	15%
New location .....	9%

→ Patient flow  
influenced by baby-  
boomer generation



## Failing economy puts restriction on construction

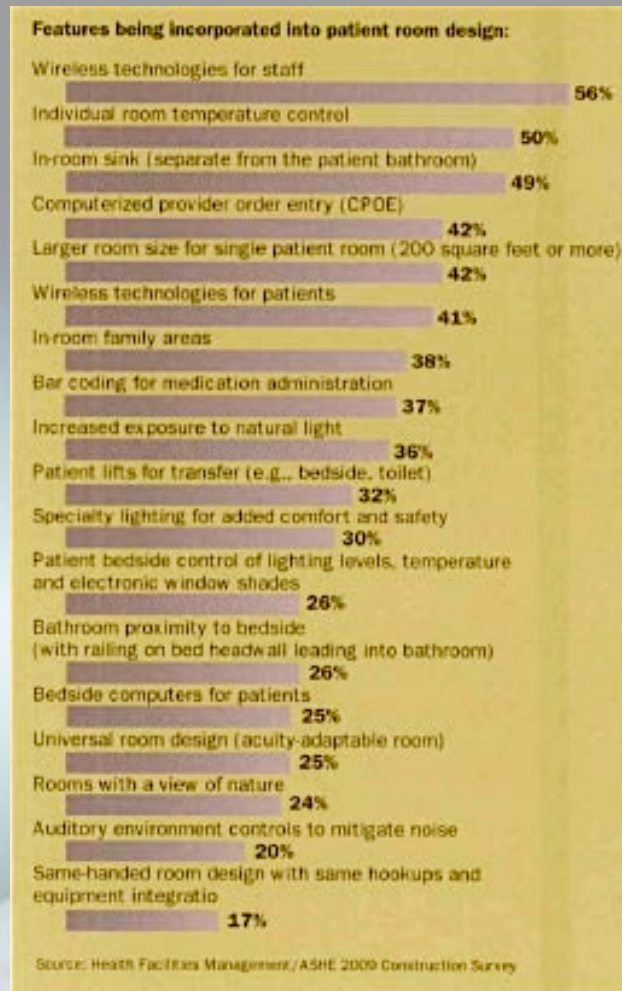
With the US economy struggling throughout the past five years, the unbridled building boom in healthcare is experiencing constraint, making decisions in regards to resource allocation extremely critical. In addition, the costs of healthcare expansion are simultaneously rising, exacerbating the restriction on spending.

**“The cost of building a standard community hospital, he notes, has climbed to \$325 to \$350 per square foot--and twice that in California because of earthquake laws--from \$250 to \$300 two years ago and just \$180 per square foot five years ago when the current boom was beginning. That means hospitals could see their costs almost double in the four or five years it takes to get a project from the drawing board to completion” (Hoppszallern, 2007).**



“Interest rates are rising from historic lows, and reimbursement rates for patient care are in question, especially given the Bush administration's **proposed cuts to Medicare and Medicaid.**

**Commodity prices have soared,** labor costs are increasing, and contractors are so busy in some parts of the country that they've upped their charges in order to take on new projects” (Hoppszallern, 2007).



## Incorporation of Private Patient Rooms Today

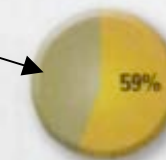
In recent healthcare construction, there has been a strong trend towards the incorporation of the private patient room. The gradual move away from the semi-private, or shared, patient room is fueled by the greater control of infection in a private room, the increased popularity and enhancement of reputation hospitals have received, and the reported decrease in staff errors.

- In 2007, 59% of inpatient beds are in single/private rooms
- By 2010 a predicted 74% of inpatient beds will be in private rooms (Hoppszallern, 2007).

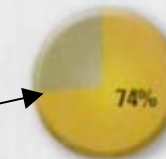
Within the private patient rooms being built today, many more amenities are being included within each room to enhance patient satisfaction and quality of care. The most popular of these are, "are wireless technologies for staff, individual room temperature controls, in-room sinks, CPOE and room sizes of 200 square feet or more" (Hoppszallern, 2007).

Current as of 2007,  
when the article was  
published

### Growth in Private Patient Rooms



Percentage of inpatient beds  
currently in private/single  
rooms (average)



Percentage of inpatient beds  
that will be in private/single  
rooms within the next three  
years (average)

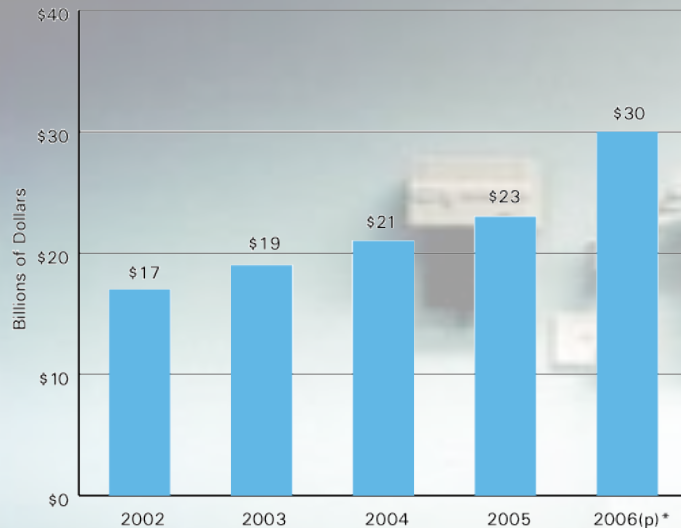
The 3-year prediction,  
which estimates  
numbers today in 2010

"With what we are learning about the reduced rates of infection in private rooms, five years from now it may be considered malpractice to place patients in a semiprivate room."

-Don McKahan, health facility planner, architect and principal of McKahan Planning Group, Del Mar, California (Hoppszallern, 2007).



## Escalating costs of construction intensify the debate around private rooms



Medicare Payment Advisory Commission (2007) Healthcare Spending and the Medicare Program, June 2007

It has been estimated that the cost has **risen to \$325 to \$350 per square foot** for the standard community hospital and double that estimate in California due to earthquake laws. Five years ago, the average cost was only \$180 per square foot. With these rising numbers, hospitals **costs may double** during the 4-5 year span between the proposal and construction completion. (Hoppszallern, 2007).

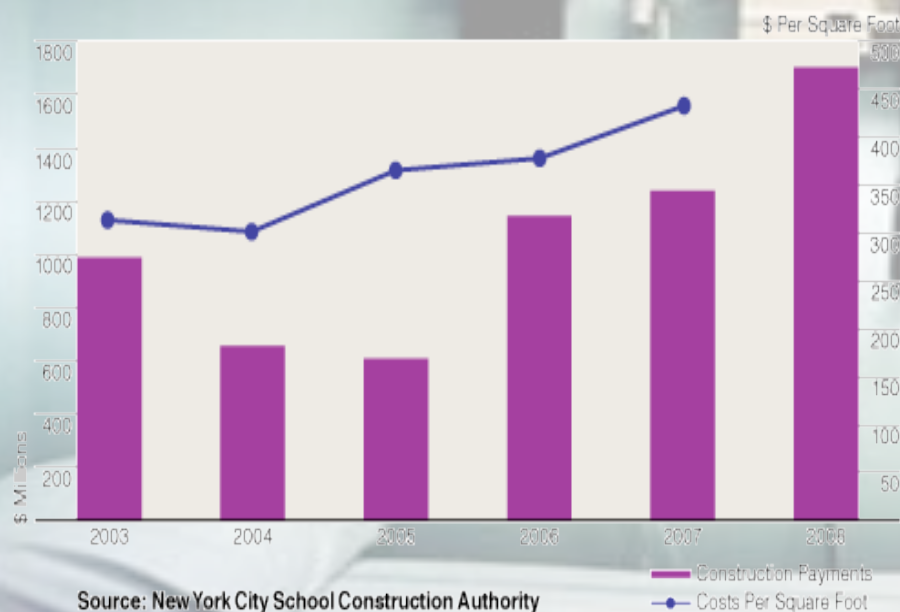
Every year, the cost of construction and building materials continues to rise with increasing momentum. With a push for private rooms, nearing 200 square feet per room, hospitals are forced to spend exponentially more in building/expanding the project to incorporate more private rooms. According to Turner Construction's Levine, a building project that incorporates **100% single rooms rather than one that incorporates only 75% single rooms, is estimated to cost 7% percent more** (Hoppszallern, 2007).

"According to an analysis by RSMeans, **costs per square foot are expected to go up about 16 percent nationally** for a two- to three-story hospital and 14 percent for a four- to eight-story hospital, largely reflecting fluctuations in building materials commodity prices." (Carpenter, 2009)

**Private rooms require more square footage: 200 square foot rooms at \$350 per square foot in 2007 are only predicted to rise 14-16% each year!**

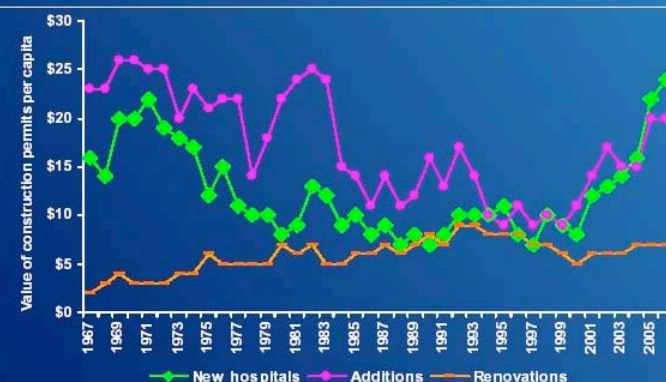
## New York City Construction Costs: insight into increasing financial demands

“The cost of new hospital **construction is up 12 percent per year**, while renovation and alteration costs are escalating at roughly six percent per year.” (NYBC, 2010).



New York City Building Congress, 2010

### New hospitals and additions predominate



Note: Construction permit values are all inflated to 2006 dollars  
The hospital category of construction includes ASCs and Imaging centers  
Source: Permits reported by McGraw Hill, deflated by the McGraw Hill construction cost index

Currently, average hospital construction in **New York City** runs at close to **\$600 per square foot**, Boston and Washington D.C. are estimated at \$500-\$555 per square foot, and Los Angeles and San Francisco are at \$380-\$400 per square foot (New York Building Congress, 2010).

Although this represents the construction costs for New York City schools, the same parallel and linear relationship can be drawn for Hospitals built in NYC, except with even higher construction costs.



## Is the transition to private patient rooms worth it?

Research has documented several key accomplishments and predicted successes that the private patient room brings to a hospital:

- Increased inner-staff/patient communication:
  - Doctor-nurse communication
  - Doctor-patient communication
  - Doctor-family communication
  - Nurse-patient
  - Nurse-family
- Better infection control
  - Isolation decreases risk of disease/bacteria transmission among patients
- Increased patient satisfaction
  - Increased privacy (visual & auditory)
  - environmental control/comfort
- Increased social support
  - more opportunities and space to socialize with friends and family
- Decrease in medical errors



## Single Patient Room and Safety

# What is patient safety?

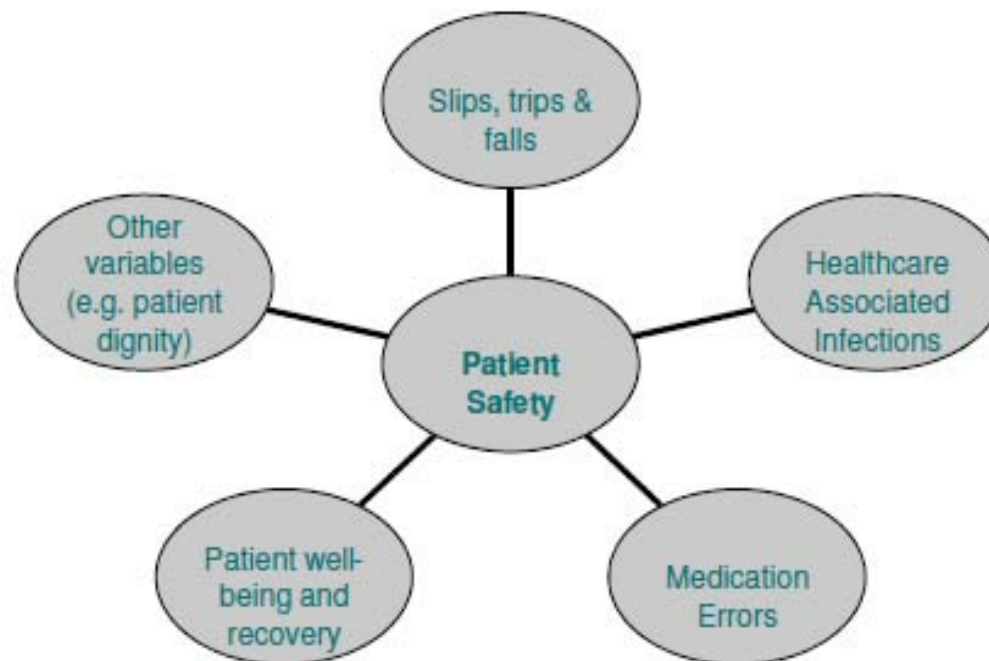


Figure 1: Number of variables which were identified as being at the centre of a definition of patient safety.



## Single Patient Rooms and Safety: Infection Control

### What is the current status of Infection Control in the U.S.?



For the sake of the patient and for the hospital's reputation and financial standing, infection control has become of paramount concern to current health officials. The lower the infection rates within the hospital, the more popular the hospital is to patients seeking medical attention.

#### The Current Facts:

- Hospital-acquired infections cause the U.S. hospitals a reported sum of **\$5 billion each year** (Institute of Medicine, 2001).
- In 2002, there were approximately 1.7 million cases of hospital acquired infections in US hospitals, with 98,987 associated deaths
- Approximately 1 out of every 22 hospitalized patients acquired an infection in 2002 (Ulrich, 2008).

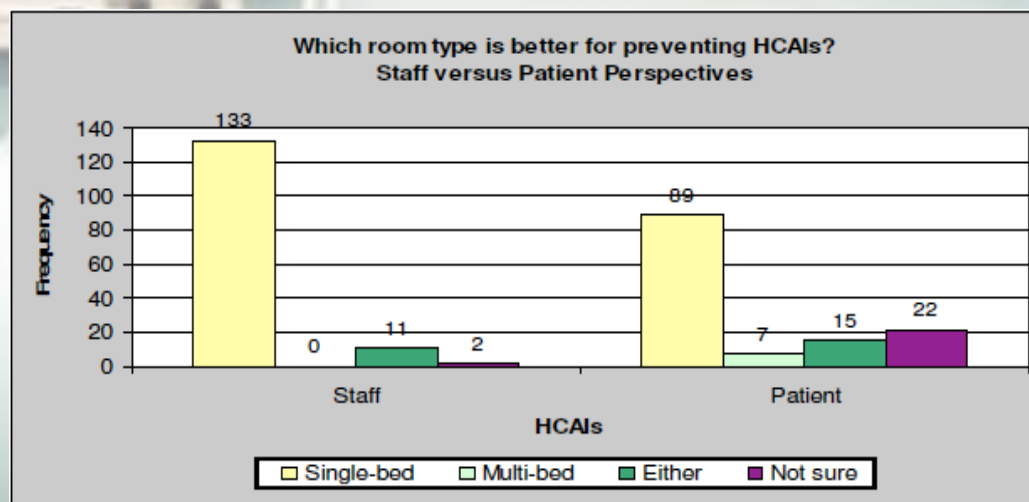
## Single Patient Rooms and Safety: Infection Control

### An explanation for private rooms as an infection control solution:

(Ulrich, 2008)

- Private toilets enable separation or isolation of patients-- those with unrecognized infections can be tested without being mixed in with uninfected individuals in multibed rooms
- Reduces airborne infection transmission by increasing isolation capacity
- Infected patients carry airborne pathogens that can easily be spread if the patient is not in isolation, or a private room
- Private rooms facilitate “filtration, ventilation, and airflow control”
- Provides protection to immuno-compromised patients in nearby rooms from airborne pathogens
- Single rooms facilitate thorough cleaning of a room because cleaning multi-bed rooms would disrupt other patients or force patients to relocate during cleaning
- Research shows that hospital staff is more likely to sanitize hands in a single room due to the layout

“SARS is transmitted by droplets that can be airborne over a limited area. SARS in Canada was predominantly a hospital-acquired- not community acquired- infection because approximately 75% of SARS cases resulted from exposure in hospital settings [in 2003]” (Ulrich, 2008).



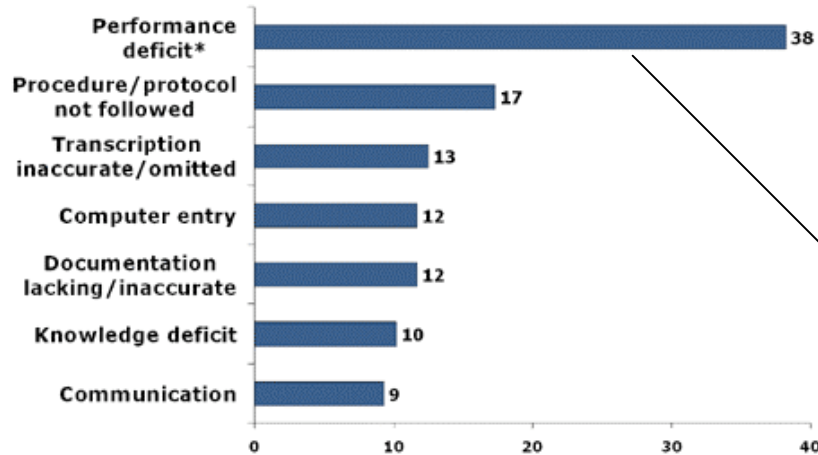
(Arup & NHS, 2010)

“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” (Ulrich, 2008).



## Single Patient Room and Increased Patient Safety

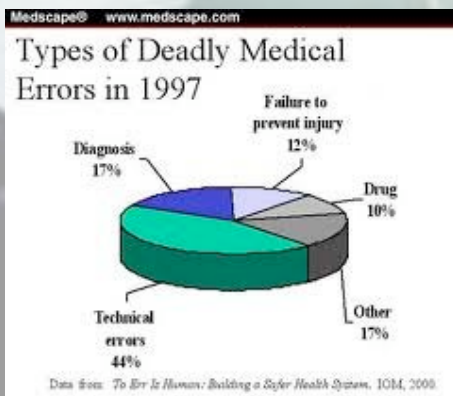
**Most Frequently Reported Causes of Medication Errors:  
Voluntary Reporting System, 2000–2004  
(Percentage of Reports with a Cited Cause)**



Data: Santell, J.P. et al. 2005. *MedMarx Data Report*. USP Center for the Advancement of Patient Safety. © 2005 The United States Pharmacopeial Convention, Inc. All rights reserved. \*Failure to act in accordance with education and training.  
Source: McCarthy and Leatherman, *Performance Snapshots*, 2006. [www.cmwf.org/snapshots](http://www.cmwf.org/snapshots)

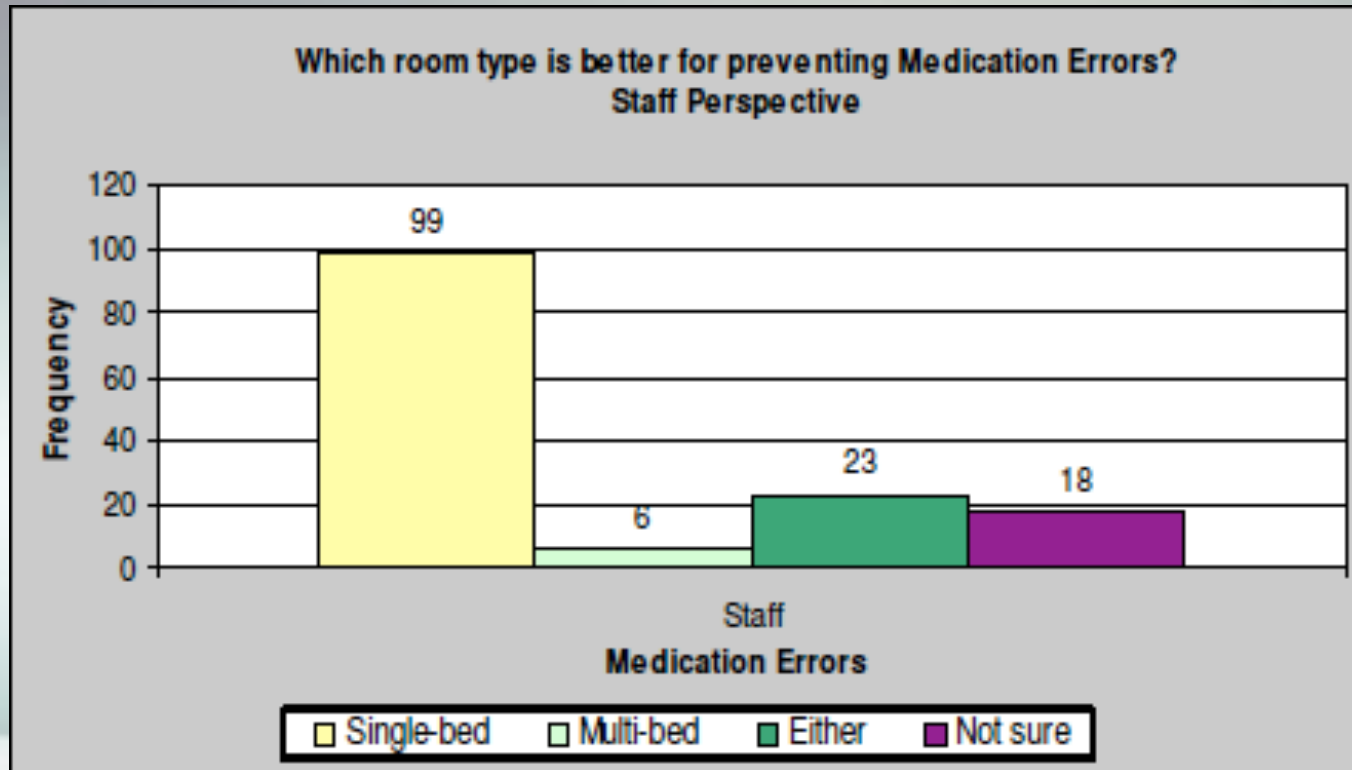
“The institute of Medicine reported that in the US alone, an **estimated 44,000 to 98,000 people die annually from medical mistakes**. Current estimates from the Agency for Healthcare Research and Quality place medical errors as the eighth leading cause of death in the U.S. That makes medicine deadlier than highway accidents, breast cancer, or AIDS.” (Institute of Medicine, 2001).

Performance deficit is accountable for 38% of medication errors, which may be a result of a multi-bed room system in a hospital, due to mix-ups and distractions.



Evidence-based design has put a great deal of effort into studying the effect single-patient rooms have on the ultimate safety of the patient. Several of the most impressive solutions researchers have found that private rooms provide are increased safety in regards to **slips, trips and falls** due to the close proximity of the patient bed and ensuite bathroom in a single patient room. Another is the **reduced medication errors** staff are likely to make in a single-patient room because they are less prone to mixing up medications between patients, they are less distracted by other patients, and identical layouts (or “**handedness**”) of the rooms make it easy and efficient to find their tools and equipment (Fairhall, 2010).

## Single Patient Room and Increased Patient Safety



(Arup & NHS, 2010)

In a research study performed by Arup and National Patient Safety Agency comparing the benefits and drawbacks between multi-bed and single-bed rooms in hospitals, they surveyed staff on patient safety in regards to medication errors. The survey reported **that almost all (99%) of hospital staff found that single-bed patient rooms decreased chances of medication errors** in the healthcare environment. (Arup & NHS, 2010).



## Single Patient Room and Social Support

### What previous studies have shown:

- Patient pain is reduced and physiological outcomes improve as a direct result of social support from nurses, families and significant others in the hospital environment
- In Finland, researchers found that in 193 bypass grafting patients, when inner-hospital social support was high, the patients experienced less fear and anxiety
- Social support in regards to patient-family social interaction helped patient's physiological outcomes and enhanced patient progress
- "Family presence and their social support through touching, talking, and surveillance helped patients to deal with their treatments better and facilitated their clinical progress."
- Social support for families also reduces family stress in addition to patient stress, and enhances a family's satisfaction of a particular hospital (Ulrich, 2008)



(New York Times, 2009)

Kaiser Permanente rethinking of patient room



(New York Times, 2009)

### Single patient room as a means for social support:

Social interaction is facilitated by lounge-like settings, comfortable furniture in flexible arrangements that are conducive to gathering and talking. The single patient room allows for more space for incorporating these things than a double or multi-bed room. The increased privacy in a single patient room also makes it easier and more comfortable for family members of patients to spend time and socialize with their loved one. Overall, single rooms are significantly more accommodating for family members, which ultimately enhances the social support the family is able to provide for the patient.

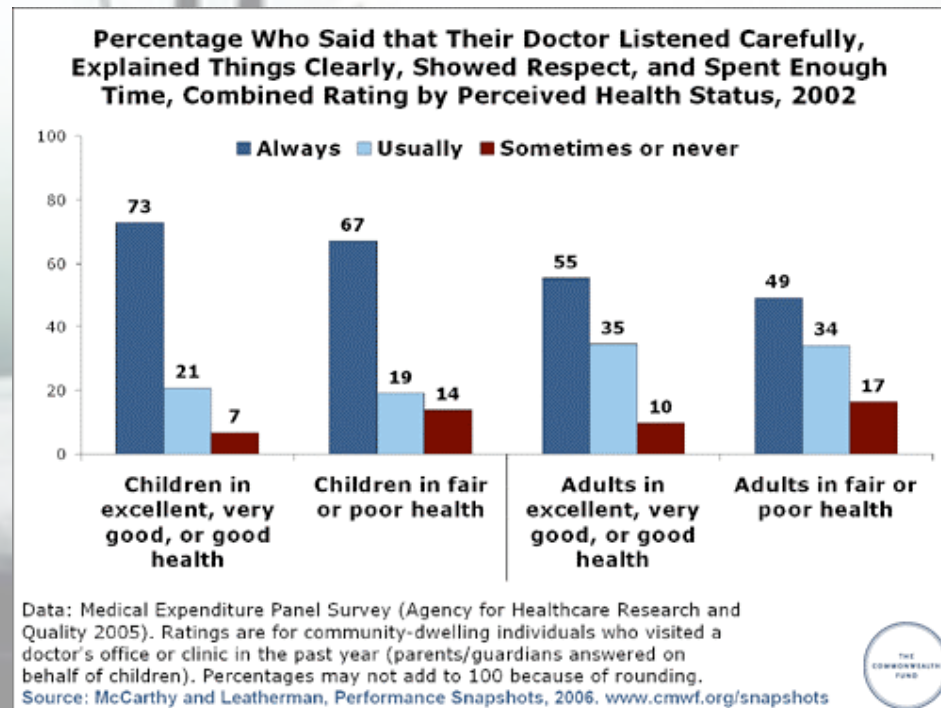
## Single Patient Room and Communication

- The privacy that a single patient room provides, enables patients to communicate more freely with physicians and nurses about history and current state because there are no other patients or staff present
- According to Press Ganey's national data in 2003, **patients were 4.5% more satisfied with their privacy in a single room** than in a double room
- Staff feel it is more appropriate for maintaining the confidentiality of patient exams
- **Single patient rooms facilitate the communication** that takes place between patients, family members and hospital staff, which is vital to patient satisfaction with care and family involvement in care
- In a study done by Kaldenburg in 1999, results showed that spaces that are private and peaceful improved communication within the room, and staff is more reluctant to share patient information with the patient when another patient is in the room.

(Ulrich, 2008).

“According to the data obtained from 2,359,935 patients nationally in 2006, the five top-priority issues that patients identified as affecting satisfaction are associated with communication and empathy, including **(1) response to concerns/complaints made during the hospital stay... (5) how well the nurses kept you informed**”

(Ulrich, 2008).





## Single Patient Room and Staff Efficiency

Studies have shown that staff efficiency improves when working in hospitals with a majority of single patient rooms.

- Staff report fewer patient transfers in single patient rooms
- Nurses report that patients require less medication in single patient rooms
- 53% of staff members report overall improved efficiency in single patient rooms
- 30% of staff did not view the single occupancy room as requiring a great deal more of walking (Chaundry, 2003).

Room Requiring the Least Amount of Walking by Staff

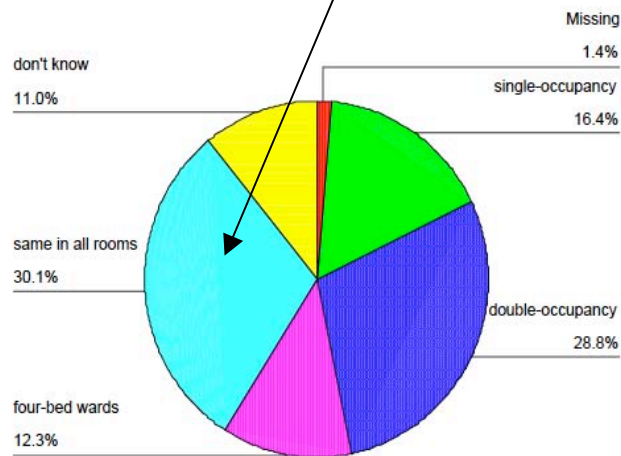
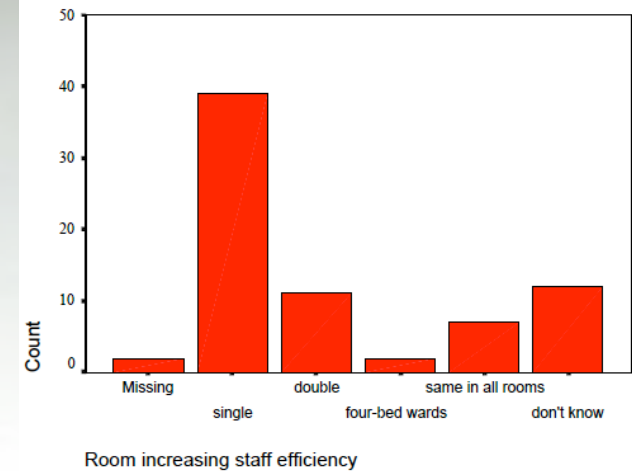


FIGURE 5: Comparison of rooms in terms of staff walking time

Room Increasing Staff Efficiency



Room with Fewer Patient Transfers

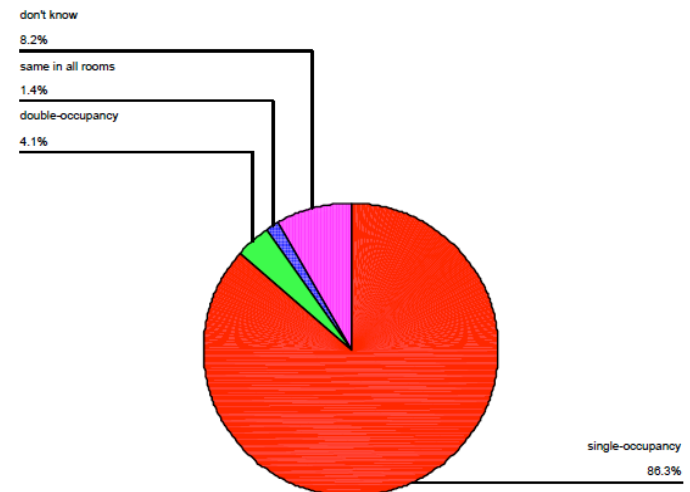


FIGURE 2: Comparison of rooms in terms of patient transfer.

## Single Patient Room and Patient Satisfaction: environmental comfort

**Multi-bed patient rooms** are reported to have **higher noise levels** due to the multiple occupancy within one room, which results in more frequent consultations, visitors, and patient communication with other patients or staff members. This could potentially cause problems for patients attempting to sleep or rest, which could ultimately affect the rate of recovery and length of stay at a hospital.

- Patients report higher satisfaction with a hospital stay when noise levels are reduced and temperatures are not too cold, causing great discomfort.
- Excess noise in a patient room, can cause a patient's **stress levels to rise** and their **recovery rate to slow** because noise elevates psychological and physiological stress in patients due to anxiety and annoyance (Ulrich, 2008).
- Elevated stress levels in patients can **heighten heart rate and blood pressure levels**, which can be detrimental to a patient's recovery
- Too much noise **raises the risk of medical errors** because staff can't hear instructions

### Press Ganey Report, 2003:

"Data from **2.1 million patients** in 1,463 facilities showed that **satisfaction with noise levels was on average 11.2% higher for patients in single-bed rooms** than for those in multi-bed rooms; this pattern held across all patient categories and for different ages, genders, and facility sizes and types."

(Press Ganey, 2003).





## Why is there still debate over single-patient rooms?

While there are many benefits to the single-patient room, there are also some drawbacks that make administration hesitant to build hospitals with only single-patient rooms.

### What are some of the drawbacks of a single-patient room?

- Single-patient rooms are more **expensive** than multi-patient rooms to incorporate into a hospital
- Single-patient rooms may cause **social isolation** rather than social support
- A building with 100% single-patient rooms affects the **layout** of the hospital
  - Walking distances ---->
  - Staff satisfaction and fatigue ---->
  - Quality of patient care



## Single Patient Room and Layout Complications

Building a hospital with a majority of single-patient rooms changes the layout of the hospital floor. Typically, this construction lengthens the corridors of hospital wards and therefore increases walking distances for staff members-- primarily the nursing staff. This in turn could result in nurse fatigue and frustration, and therefore lower quality of patient care.

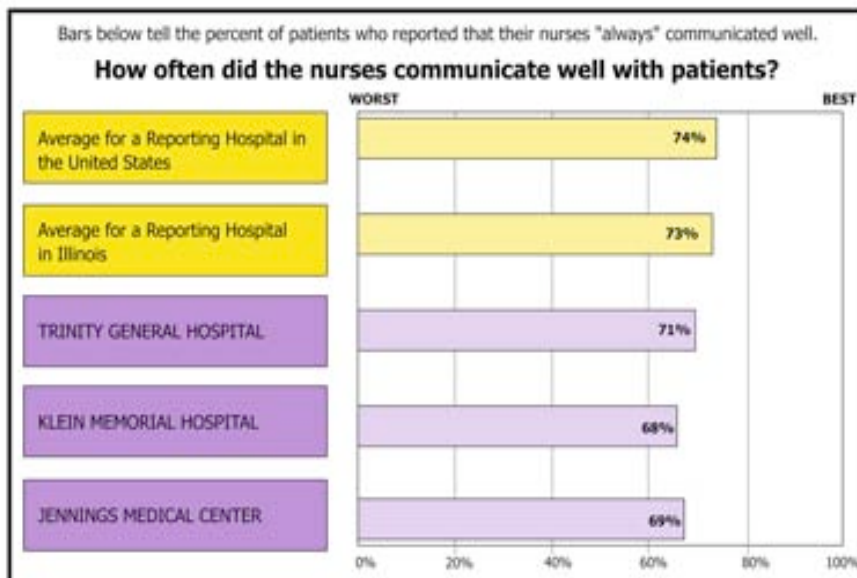
**Longer Corridors → More Walking → More Fatigue → Lower Quality Care**

A tendency for hospitals, when building 100% single - patient rooms, is to align each room one after the other, creating **long corridors for the nurses to travel**. This alignment is often necessary to ensure that each private room maintains its privacy and that each one's layout is identical to the next (the “handedness” of the room). The identical nature of each room allows for greater staff efficiency and safety because all of the supplies and facilities kept within the room can be found quickly and easily. The long corridors that are oftentimes inevitable, however, increase the distances traveled by nurses daily, which can **ultimately lead to nurse fatigue given their long hours**. According to John Reiling, President and CEO of Synergy Health and St. Joseph's Hospital, “Fatigue has been identified as a contributing factor to human error. While the effects of fatigue on patient safety is not known, **fatigue has been found to have a negative impact on alertness, mood, and psychomotor and cognitive performance**, which can have an impact on patient safety” ( Hughes, 2008).



## Nurse Fatigue and Lower Quality of Care

“To a patient, the nurse is the face of the hospital, the person who most directly affects a patient’s experience. Changes in both the process of caregiving and the layout of patient areas have taken a toll on nurses. They are being asked to do more with less: In a recent survey, **67 percent of nurses said their workload has increased over the last six months.** Forty percent of nurses work shifts that last more than 12 hours. And the very technologies that make a patient’s life easier and improve information sharing among staff require extra training and effort for already overworked nurses”



“Improving the efficiency of caregivers is good for patients because **higher efficiency leads to better care and lower cost of care. It’s good for nurses, who get to spend more time on direct patient care and less time running around.** That leads to higher job satisfaction, and nurses who have high rates of job satisfaction are less likely to leave—a huge consideration when the average cost to replace a full-time registered nurse is \$36,567. **Happy nurses are also engaged nurses.** Research shows that organizations in all industries that have a high level of engagement among their employees can outperform their competition by 20 percent.”



## Single Patient Room and Social Isolation

While single patient rooms provide a lot of opportunity for social support by offering privacy to a patient and his/her family, oftentimes, patients may experience social isolation from spending a great deal of time alone throughout the day. Some patients also report that they are attended to less by staff, when they are placed in a single patient room. These complaints are most prevalent in children's hospitals, where children suffer the most from a lack of social interaction.

In a UK study done, surveying close to 150 hospitals around the country on the topic of building 100% single-patient rooms within the hospital, researchers found what administration found to be the top 4 main disadvantages with this approach:

### **The four main disadvantages identified for 100 per cent single room occupancy were:**

- Lack of interaction with others.
- Difficulty for staff with observation and safeguarding.
- Feelings of isolation and anxiety when left alone in the cubicle.
- Greater demands on workforce.

### **The four main disadvantages identified for 100 percent single room occupancy from a child's point of view:**

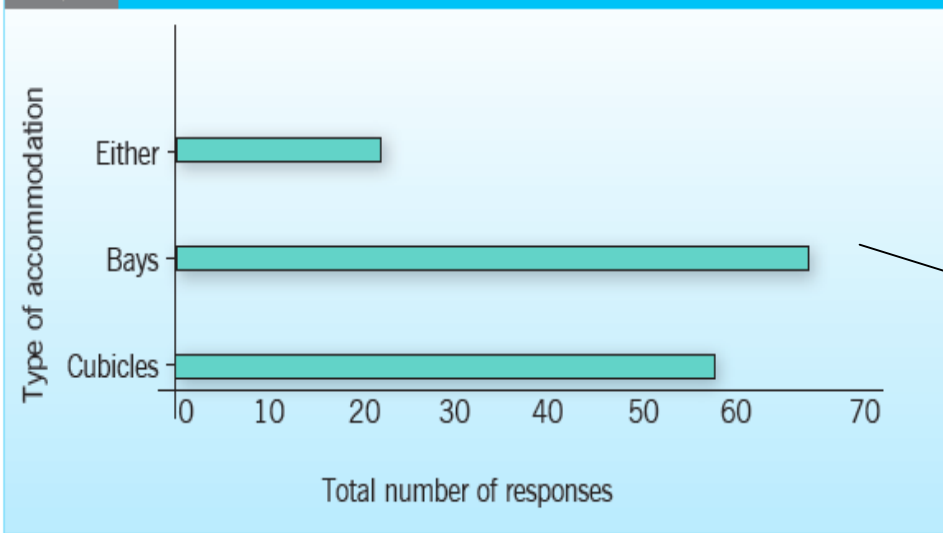
- There would always be someone to talk to.
- The possibility of making new friends and playing.
- More going on and more fun.
- Not being alone or lonely.

**SOCIAL ISOLATION**

**DISSATISFACTION**

## Single Patient Room and Social Isolation A study from a Children's Hospital

**Figure 5** Children and young people's preferences for cubicles or bays (n=146)



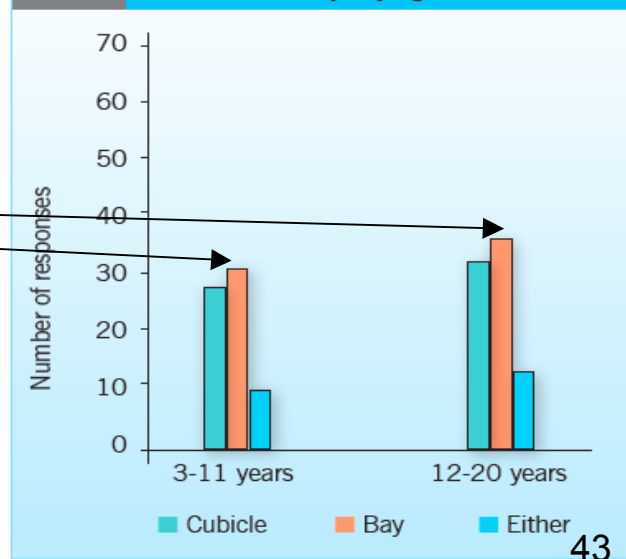
According to the Department of Health in 2004, "Considerations in planning healthcare facilities for children and young people include alleviating fear and anxiety, maximising security, safety and sociability, reducing boredom and creating a healing environment" (Department of Health, 2004).


Although the preference for bays over cubicles is not significant in children, there is still a majority, and therefore hospitals should incorporate choice.



This graph separates the different age groups, and continues to represent the same slight preference for bays over cubicles in the children's hospital.

**Figure 6** Children and young people's preferences for cubicles or bays by age (n=146)



A photograph of a patient room with a bed, medical equipment, and a wall-mounted light fixture. The room has light blue walls and a white bed with a white pillow. Medical equipment, including a monitor and a light fixture, is mounted on the wall. The text "HOT TOPIC 3:" is overlaid on the image, followed by "EVIDENCE BASED DESIGN" and "IN A PATIENT ROOM" in large, bold, black capital letters.

# HOT TOPIC 3: EVIDENCE BASED DESIGN IN A PATIENT ROOM



## What is Evidence-Based Design (EBD)?

According to the Center for Health Design, a shortened definition for Evidence-Based Design is, “Evidence-Based Design is the process of basing decisions about the built environment on credible research to achieve the best possible outcomes” (2010). In healthcare, EBD uses credible data documenting patient and staff safety, comfort, efficiency and overall well-being to make informed design decisions. The incorporation of nature in a patient room to improve recovery time, or designing “handedness” in patient rooms to improve staff efficiency are examples of classic EBD decisions made in the hospital environment. Roger Ulrich, a large figure in the EBD world states in his 2008 study, “Just as medicine has increasingly moved toward *evidence-based medicine* where clinical choices are informed by research, healthcare design is increasingly guided by rigorous research linking hospitals’ physical environments to healthcare outcomes and it is moving toward *evidence-based design*” (Ulrich, 2008).

### Who is currently using EBD in the U.S.?

- The Center for Health Design’s “Pebble Project” consists of approximately 50 healthcare providers and manufacturers committed to evidence-based design for their future construction projects.
- The Military Health System is currently undertaking a \$6 billion capital construction program for their 70 hospitals that serve 9.2 million people throughout the world, and it has committed to using EBD as a design strategy.
- Kaiser Permanente and The Global Health and Safety Initiative, who as a team are responsible for over 100,000 hospital beds, have declared the primary use of EBD in their attempt to increase ‘triple safety’ for patients, staff, and the environment.

(Ulrich, 2008).



### Why do we care about EBD?

- “The confluence of a growing understanding of the hospital environment as a factor in healthcare and a boom in hospital construction projects presents the healthcare industry with a unique opportunity to recreate the hospital to better meet the needs of patients, families, and caregivers” (Herman Miller, 2010).
- “The United States will spend more than \$180 billion for new hospitals in the next 5 years alone, and healthcare construction is projected to exceed \$70 billion per year by 2011. These new hospitals will remain in place for decades” (Ulrich, 2008).



## **A closer look at Evidence-Based Design through design application**

Evidence-Based Design is an extremely large and complicated topic that addresses issues from the implications of hospital noise levels to the restoration effects of fish tanks in family-patient lounges.

With such an exhaustive topic, closely examining just a few applications of EBD will provide a sufficient explanation of its goals, successes and failures.

### **EBD hospital applications to be explored:**

- The effect of access to nature on patient restoration
- The “handedness” of a patient room and nurse efficiency and safety
- Home-like décor and patient/family comfort





## Evidence-Based Design: Nature and Restoration

A great deal of research has been conducted concerning the relationship between access to nature and a patient's experienced pain and recovery time. Countless studies regarding this topic have proven that whether it is a window to the outdoors, or a video displaying natural images, patients exposed to any form of nature experience significantly less pain and recover much faster. When addressing the patient room design specifically, studies reported that patients in rooms with a view to the outdoors have a shorter length of stay, and experience less pain and therefore require less pain medication. Additionally, windows in a patient room allow for natural lighting to enter the room, which is also beneficial to pain reduction and shortening recovery time.

“Viewing nature may decrease pain by eliciting positive emotions, reducing stress, and distracting patients from focusing on their pain... If patients become diverted by or engrossed in a pleasant distraction such as a nature view, they have less attention to direct to their pain, and the experienced pain will therefore diminish” (Ulrich, 2008).

Weighing the pros and cons of incorporating windows into a patient room from an administrator's perspective can be very difficult. For example, while installing and maintaining windows/shades can become very expensive, their role in decreasing the length of stay for a patient also saves the hospital a great deal of money.

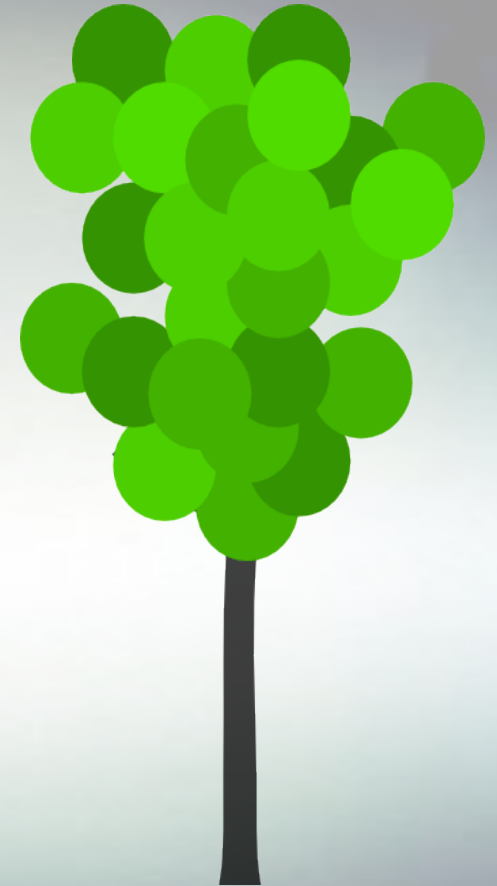
### Cons:

- Expensive
- Affects the ward layout, potentially causing longer corridors and greater walking distances
- Extra maintenance
- Glare from light
- Issues with heating/cooling

### Pros:

- Decreases experienced pain
- Reduces patient stress
- Increases patient satisfaction and comfort
- Decreases length of stay and recovery time
- Aesthetically pleasing

“Access to daylight has been found to reduce pain, depression, and length of stay as well as improve patient and staff satisfaction. Views of nature have been linked to reduced pain, reduced stress, and shorter length of stay” (Herman Miller, 2010).



## Evidence-Based Design: Patient Room Layout

The strategic layout of a patient room has become a hot topic in evidence-based design because researchers have proposed that **same-handed patient rooms could increase patient safety and reduce staff workload and error**. According to an article in Healthcare Design magazine, same-handed rooms are described as patient rooms that have identical configurations, so that **navigation of every room is instinctive** for staff. Same-handed rooms allow staff members to think significantly less about the placement of supplies and technology because the layout is consistent from room to room (Vickery, 2009). Another component of the same-handed room, is a layout that allows for **close proximity between the patient bed and the bathroom**. In the majority of same-handed rooms the bathroom is located adjacent to the bed with a handrail to reduce walking distances and risk of falling for patients. Same-handed, standardized, layouts also try to **optimize nurse views of the room** while maintaining a view of the outdoors for the patient.



The patient room headwall at St. Joseph's Hospital, St. Paul, Minnesota, is canted toward the corridor for better visibility of patients

(Healthcare Design, 2006)

### Same-handed room and patient falls:

According to 2010 data, “One third of patients who fall suffer moderate-to-severe injuries that reduce mobility and independence, increase length of hospital stay and, subsequently, increase the risk of premature death” (Bunker-Hellmich, 2010). In 1997, when majority of patients were in multi-bed rooms, there were 6 patient falls per 100 patients, and only 2 per 100 patients in 2002 in single rooms (Hendrich, 2004). One suggested way to decrease the frequency of patient falls in the hospital is to optimize the layout so that the distance between the toilet and the bed are reduced, and to allow staff a sufficient monitoring view of patients at all times. The image to the left is a mockup of same-handed layout at St. Joseph's Hospital, which optimizes both of these components.

“Repetitive actions performed in standardized patient rooms are thought to reduce cognitive burden on staff and, consequently, reduce errors (from both latent conditions and active failures) especially in life threatening or emergency situations” 48 (Bunker-Hellmich, 2010).



# Evidence-Based Design: Patient Room Layout

How come all hospitals have not incorporated same-handed patient rooms?

## Inconclusive research has provided little solid evidence:

- Although designers and researchers have presented the concept that the close proximity of the bed to the bathroom will reduce patient falls, the research itself is still in its infancy, and there has been no conclusive evidence showing that this is the case. This concept seems as though it would make sense, but it is also just by speculation alone because the concept is so new and minimally used that more studies must be done to prove that it is the case.
- While the consistency between rooms is perceived to increase staff efficiency and decrease risk of medical error, the evidence proving this is the case is also inconclusive. For example, Butler Health System (in Butler, Pennsylvania) performed a study rating nurse efficiency and error between same-handed rooms and mirror-reverse rooms in extreme detail before undergoing a large construction project. When the study was done, the staff didn't find any advantages in the same-handed room in comparison to the mirror-reversed room (Vickery, 2009).



## Construction expenses of the same-handed room:

- “One challenge to same-handed room design is that it represents a construction cost premium, since plumbing chases are not being shared as in the back-to-back model. Some construction managers estimate the additional plumbing costs at approximately \$3,000 per room” (Cahnman, 2006).
- On the contrary, the repetition of millwork and mockups that allow for contracting rehearsal could offset some of the additional costs.
- In addition to the added costs of separate plumbing installation for each room, the same-handed rooms are not ideal for space allocation and may cause longer walking distances and more square footage leading to higher costs and staff fatigue (Vickery, 2009).



## Evidence-Based Design: A Homelike Approach

A newly forming trend in healthcare design is the implementation of home-like cues throughout the hospital and within the patient rooms. Through psycho-analysis and close research, hospital administration has found that creating a **home-like environment for patients reduces stress and promotes calming in patients**, especially in pediatric departments. Manipulation of the lighting, interior colors, flooring and furniture all contribute to an ambient environment that promotes a sense of “healing” and comfort within the patient.

### An Application of ‘Homeliness’ in design- Pittsburgh Children’s Hospital

The Pittsburgh Children’s Hospital, one of the top ten most highly regarded children’s hospitals in the country, recently underwent a complete interior transformation in an attempt to promote an ideal healing environment for its young patients. The administration’s ultimate goal was to transform the hospital’s 1.5 million square feet into a place that felt like home to patients and families. The hospital hired Christina Astorino, founder of Fathom interiors, who used “psychology, neuroscience, anthropology and architecture to come up with metaphors, visual imagery and insights that helped shape the new hospital’s physical design, environment and overall branding message.” She also adds that the average human is only able to accurately express 5% of his/her thoughts consciously, so there have to be alternative approaches to extract patient’s needs from their subconscious. The 4 ultimate themes that emerged after survey, research and close analysis of patients were transformation, control, connection and energy.

Design solutions to promote home-like environment:

- Wooden floors
- Bright colors, interesting textures and patterns
- Soft and playful lighting
- Hiding medical equipment
- Windows

(Carpenter, M. , 2009).

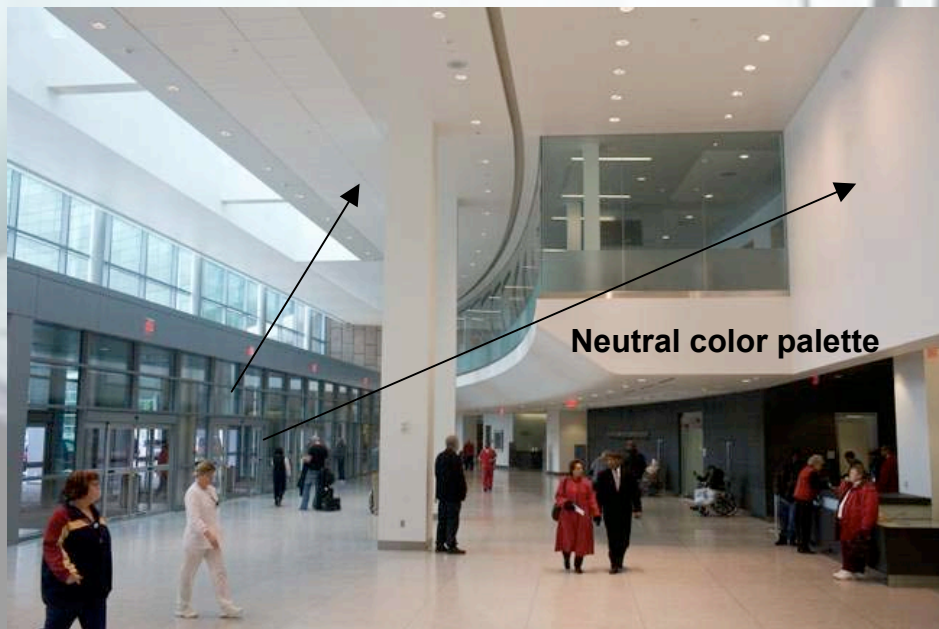


A composite image representing feelings of all audiences about the ideal hospital experience, with home-like elements.



## Evidence-Based Design: an alternative to the home-like solution The Cleveland Clinic

The Cleveland Clinic is one of the leading hospitals in the United States. With branches located all over the country and overseas, it is also one of the largest hospitals in the country as well. Their design approach is to establish a “healing environment,” not through visual stimulation, but through clean, sleek and neutral color palette and great interior simplicity. In an effort to instill a sense of ‘World Class Care,’ (their motto) in every building around the world, The Cleveland Clinic has begun to standardize their interiors so as to maintain this modern, simple and sleek look from Cleveland, to Las Vegas, and all the way to Abu Dhabi.



Interior of Cleveland Clinic Heart Center

Bill Blunden, the leading consultant for all of the clinic's construction projects, posits that his inspiration for the Clinic's recent and widespread transformation came from a quote of a family friend. This quote, which is taped to the inside cover of his journal describes her negative experience at a U.S. hospital as a newly diagnosed cancer patient. This negative experience was a result of over stimulation through colors, lighting and architectural features that made the hospital look **more like a scary amusement park or mall**, not a place of healing. With this notion in mind, Bill has led the Clinic's transformation with an ultimate goal of healing and restoration through great **simplicity**, professionalism, high quality, and modernity. This, he believes, is the most calming and appropriate atmosphere for hospital.



A photograph of a patient room with a bed and medical equipment. The room has light blue walls. On the wall, there is a medical equipment rack with various devices, including a monitor, a control panel, and a light fixture. A bed with white linens and a pillow is in the foreground. The text "The Ideal Patient Room: proposed solutions to a complicated issue" is overlaid on the image.

# The Ideal Patient Room: proposed solutions to a complicated issue

## Proposed Solutions:

Although it is still unclear what the 'ideal' patient room consists of, the amenities that the single-patient room provides and the increased psychological and physical comfort that aspects of evidence-based design provides are all modifications to the standard patient room that will enhance the well-being of the patient. As the study has shown, there are pros and cons to each, the most glaring cons being the high cost of these solutions and increased workload on staff, so the most *ideal* solution for hospitals at this point is to weigh the negative and positive aspects given the available resources. If resources are unavailable in a particular hospital, or concern for staff workload is of particular priority, there are smaller innovative solutions that may compensate for the inability to incorporate some of the structural approaches described throughout the report. The following suggestions are all positive additions to the patient room, but incorporating all may be unrealistic and impractical for most hospitals-- each can be considered independent of the others.

- **Single-patient rooms should be the norm**, but patients should have a **choice** in room type, especially for pediatrics
  - This choice could be through easily removable walls between rooms that allow for social interaction between patients who mutually consent
- **Within the patient room:**
  - Designated family zone with possible "murphy bed" to enhance social support
  - Reduce clutter
  - Standardize and de-emphasize medical equipment within the room
- Optimize **patient control** through adjustable lighting and temperature
  - The standard lighting should be soft lighting
- Construct hospital with **windows as a priority** for patient rooms, but strike balance between construction and maintenance costs and resulting long corridors
  - In rooms without outdoor views, incorporate **potted plants** throughout
- Incorporate **access to internet and technology** in patient rooms to mitigate feelings of social isolation
- Use sound **absorbing ceiling tiles** and give patients the **option of music**, which can decrease stress and offset any noise from hospital traffic or nearby rooms
- Maintain '**same-handed**' **layout** in patient rooms for staff efficiency and decrease risk of patient falls and medical errors
- **Decentralize nursing stations** to counteract the long walks down hospital corridors
- **Strategically locate the hand washing dispensers**, so patients play a role in monitoring staff procedure



## To compensate for insufficient funds: potted plants vs. room window

While evidence has shown that views to nature enhance the patient stay by increasing satisfaction, decreasing stress, and reducing experienced pain and length of stay, oftentimes it is expensive for hospitals to install and maintain windows in every patient room. Also, structurally, aligning the patient rooms, so that each has a window can lead to long corridors and greater distances for staff to walk. A seemingly simple, but effective solution if this is the case, is **incorporating potted plants into a patient room, rather than a window.**

### Support from literature:

A study done in the Journal of Alternative and Complementary Medicine titled, *Ornamental Indoor Plants in Hospital Rooms Enhanced Health Outcomes of Patients Recovering from Surgery*, researchers studied whether or not the presence of plants in the patient room had positive influences on patient health outcomes using various medical and psychological measurements. The basis for the study the researcher states, "Other researchers have reported that passive or active contact with nature=plants brings about positive physiologic, psychological, emotional, and cognitive changes that reduce stress and improve the quality of life for the individual. Several studies have also shown that the presence of nature/plants contributed to pain reduction, less need for analgesics, and faster recovery from surgery." After performing the study and collecting the data from hundreds of patients, the researchers concluded that there was great therapeutic value of plants in the hospital environment as a "noninvasive, inexpensive, and effective complementary medicine for surgical patients" (Park & Mattson, 2009).

### Issues to consider:

- Maintenance of the plants could incur costs and take staff effort/time
- Allergies patients may have with plants
- Plants could produce clutter in the room, which may increase risk of falls
- Plants may increase chance of insects presence in room



# Optimize patient control and social support through choice

- **Choice in single vs. multi-patient room**

- incorporating removable walls as a means of choice in room type

- **Temperature and lighting**

- provide handheld controls for the lighting and temperature in the room
- patient should be able to manipulate shades automatically from the bed as well

- **Music**

- provide the option of different music to be played throughout the room, but volume must be in check for the sake of other patients

- **Technology**

- hospitals are beginning to incorporate flat panel televisions with wireless capabilities and access to social networking.
- This innovation enhances social support, patient satisfaction, patient education, and decreased stress
- in cases of social isolation this is an ideal solution

(Vickery, 2010)



“Things like rearranging furniture, adjusting lighting and setting temperature are small things that seem unimportant at first but when you feel so much stress, a little bit of control over your environment makes you feel a little more comfortable and confident.”

-Mrs. Odman, a mother of a young boy who has been cared for at Montreal Children’s Hospital for several years (MUHC, 2005).



## Safety, efficiency, and ease on staff

### Same-handed layout when possible:

Although research is still inconclusive for the superiority of this layout over the mirror-reversed layout, the close proximity between the patient bed and bathroom and the standardization of materials throughout the room can only enhance patient safety and staff productivity and satisfaction.

- **standardization of material location in each room**
- **close patient bed to bathroom proximity**
- **provide staff 'zone' to reduce clutter and harsh institutional feelings**

### Patient room cluster layout

Arranging patient rooms in clusters helps the nursing staff in terms of walking distances and efficiency in patient monitoring

“Much of the positive effect for workers comes from the clustered arrangement of rooms (clusters of twelve rooms, in the case of the MUHC). This layout improves nurses' efficiency; reduces the distance they have to walk; allows a better nurse/patient ratio; brings care closer to patients; and improves patient visibility. The design of the patient room affects the whole care unit and, indeed, the whole hospital” (MUHC, 2005).

Decentralized nursing units often seem like an ideal solution, but they have been found to decrease staff communication, increase nurse isolation and feelings of stress and decrease efficiency within the hospital (Becker, 2008).



MUHC Cluster Layout

### Infection Control Solutions:

- A combination of bedside antiseptic hand-rub dispensers and posters reminding staff to clean their hands increases compliance (Joseph 2006).
- Using HEPA filters to reduce airborne infection. In one study, there was an outbreak of invasive pulmonary aspergillosis (IPA) in a ward housing acute leukemia patients. Some of the patients were moved to another ward with HEPA filters and for the following three years none of them developed IPA. However, those kept in the regular ward had a 29% rate of infection during the same time (Joseph 2006).
- A combination of bedside antiseptic hand-rub dispensers and posters reminding staff to clean their hands increases compliance (Joseph 2006).





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