

# Hand Washing: Reducing Nosocomial Infections

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DEA 453

Phase B



Cayuga  
Medical Center  
at Ithaca

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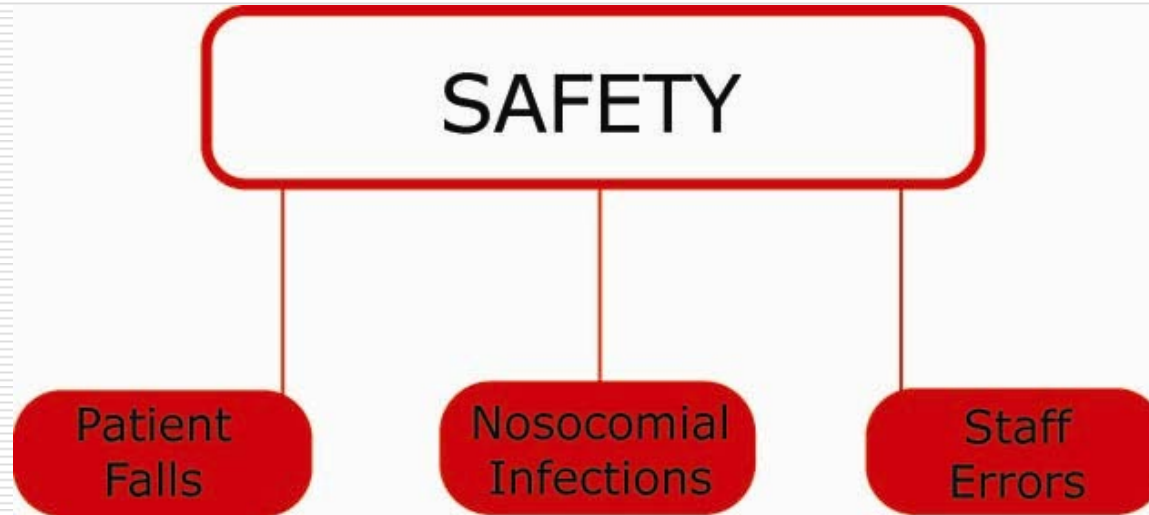
# ANALYSIS

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- ✓ This section includes a discussion of the literature describing the importance of a reduction in the occurrence of nosocomial infections and the benefits of hand hygiene in healthcare settings.
- ✓ Statistics and the significance of the research findings are presented.

# The Environment's Impact on Safety

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According to the Institute of Medicine (2001), healthcare harms too frequently and routinely fails to deliver its potential benefits. Often the built environment is responsible for this harm. However, there is good news: a carefully considered and well-designed healthcare environment can have a positive impact on the safety of patients and staff. Zimring et al (Marberry, 2005) claims that design has a particular role in reducing: (1) nosocomial infections, (2) patient falls, and (3) staff errors.

# Consequences of Poor Design

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## STUNNING FACTS

- ❑ Medical errors and nosocomial infections are among the **leading causes of death** in the United States (IOM, 2001).
- ❑ Medical errors and nosocomial infections each kill more Americans than **AIDS, breast cancer, or automobile accidents** (IOM, 2001).
- ❑ Preventable errors in U.S. hospitals kill from **44,000 – 98,000** patients per year (IOM, 2000).
- ❑ The probability of dying in a commercial plane crash is 1 in 8,000,000 flights, while the probability of dying from a preventable medical error is **1 in 343 to 764** hospital admissions (IOM, 2000).



# Nosocomial Infections

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## What are they?

- Hospital-acquired infections
- Infections which are a result of treatment in a hospital or hospital-like setting, but secondary to the patient's original condition (Wikipedia, 2006)

# Nosocomial Infections

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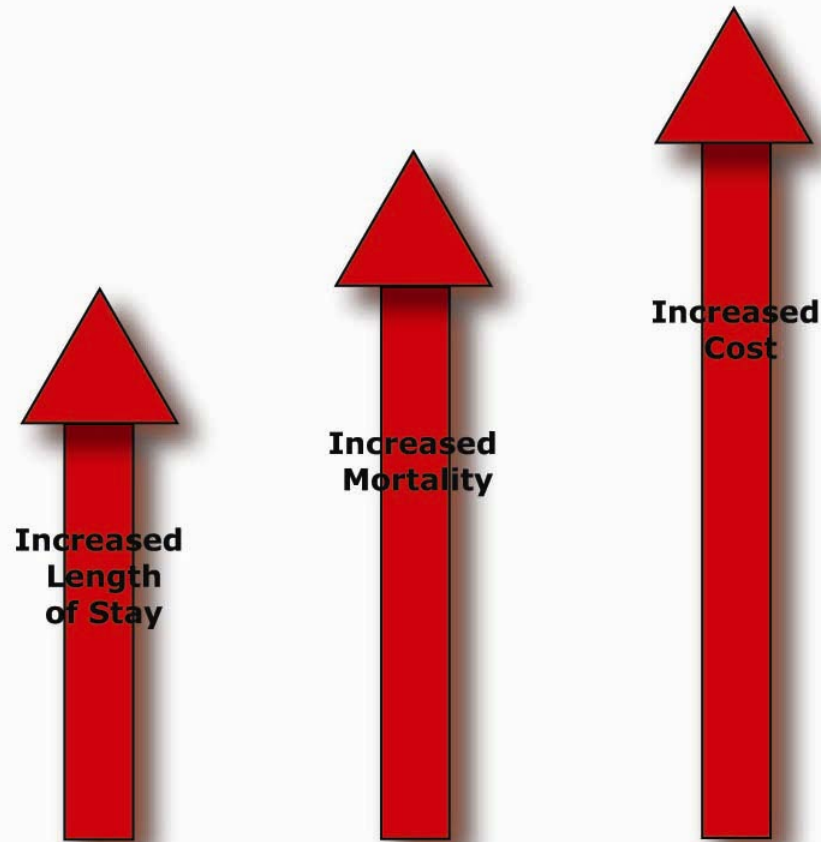
## Why the focus?

- 2 million U.S. hospital patients are affected
- In 1995, nosocomial infections
  - Cost \$4.5 billion
  - Contributed to more than 88,000 deaths



# The Socioeconomic Impact of Nosocomial Infections

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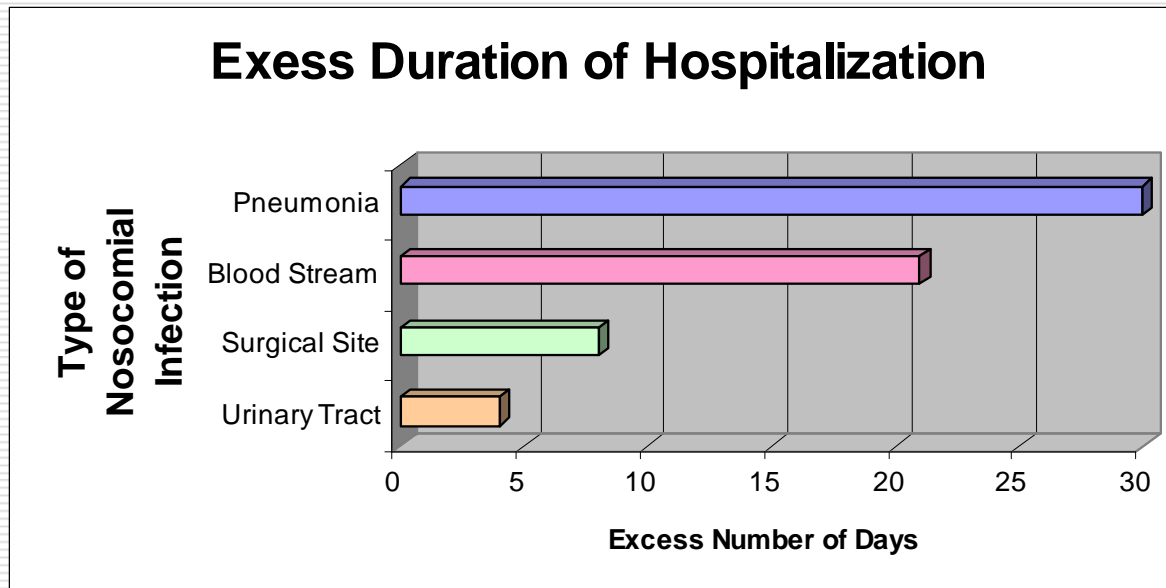
(Yalcin, 2003)



# The Socioeconomic Impact of Nosocomial Infections

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## Increased Length of Stay



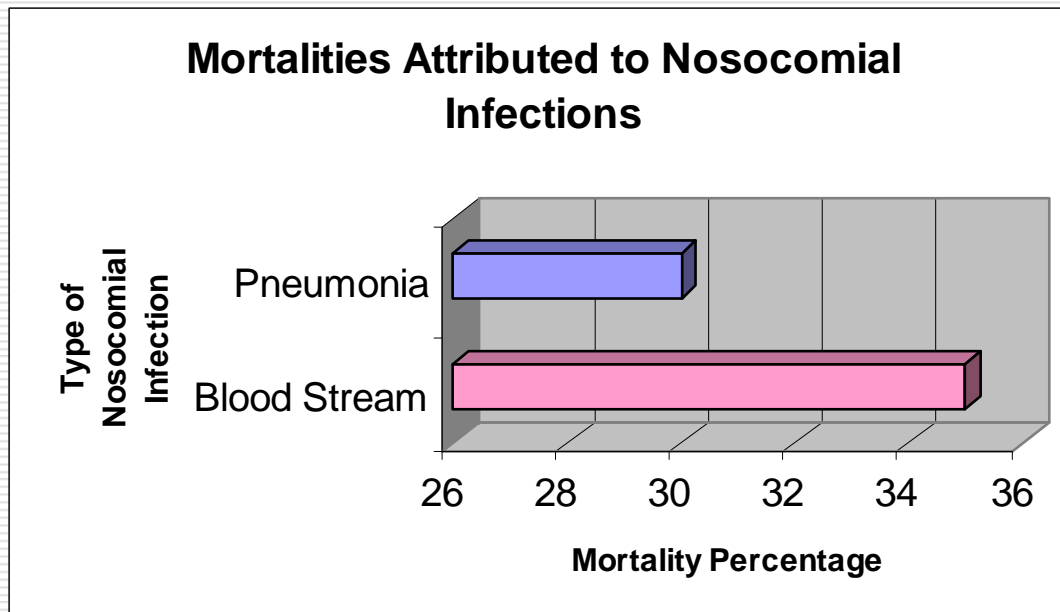
Increased Length of Stay as reported by Jarvis (1996):

- Urinary Tract: 1-4 days
- Surgical Site: 7-8 days
- Blood Stream: 7-21 days
- Pneumonia: 7-30 days

# The Socioeconomic Impact of Nosocomial Infections

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## Increased Mortality



Mortalities attributed to nosocomial infections as reported by Jarvis (1996):

- Pneumonia: 16.3% - 35%
- Blood Stream: 6.8% - 30%

# The Socioeconomic Impact of Nosocomial Infections

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## Increased Cost

- Extra cost of nosocomial infections include:
  - Intensive care stay
  - Hematological, biochemical, microbiological, and radiological tests
  - Antibiotics and other drugs
  - Extra surgical procedures and working hours
- Prolongation of hospital stay is the major extra cost attributable to nosocomial infections in the U.S.

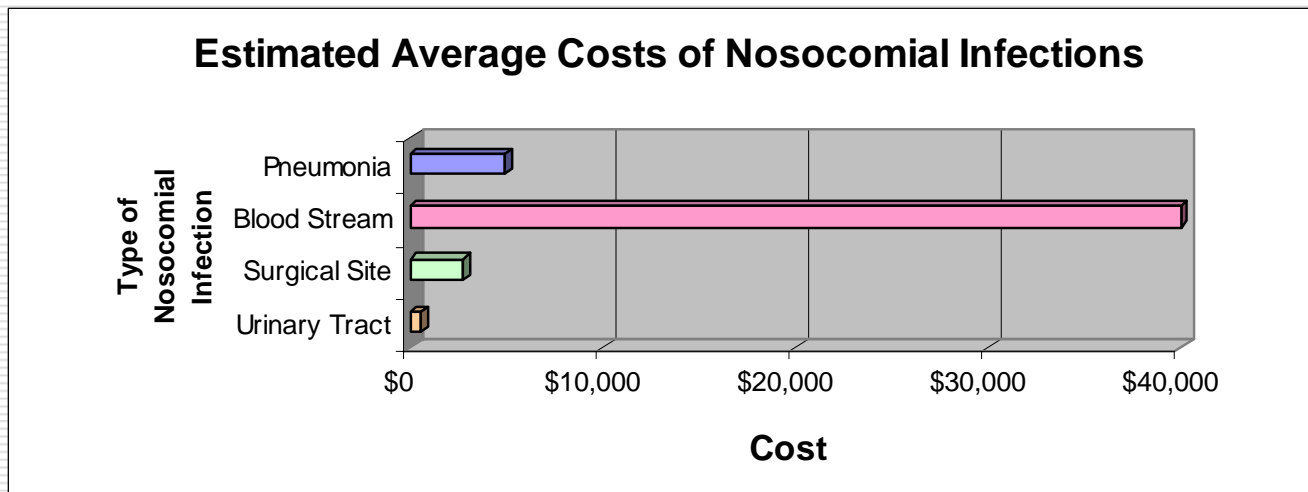
(Yalcin, 2003)



# The Socioeconomic Impact of Nosocomial Infections

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## Increased Cost



Estimated average costs of nosocomial infections as reported by Jarvis (1996):

>Urinary Tract: \$558-\$593

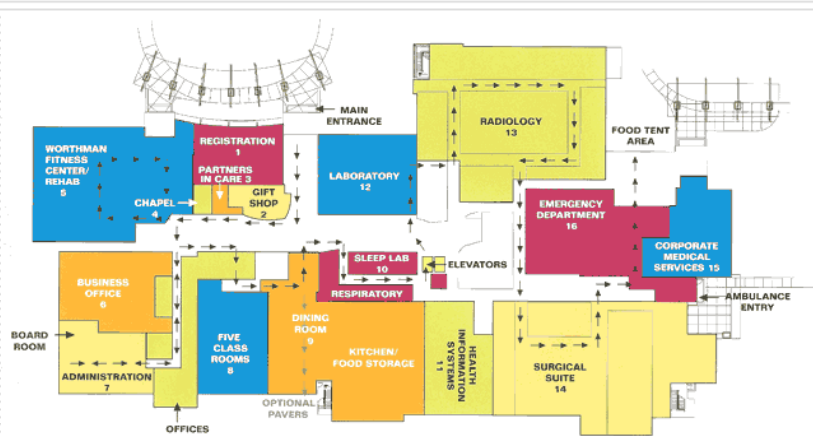
>Blood Stream: \$3,061-\$40,000

>Surgical Site: \$2,734

>Pneumonia: \$4,947

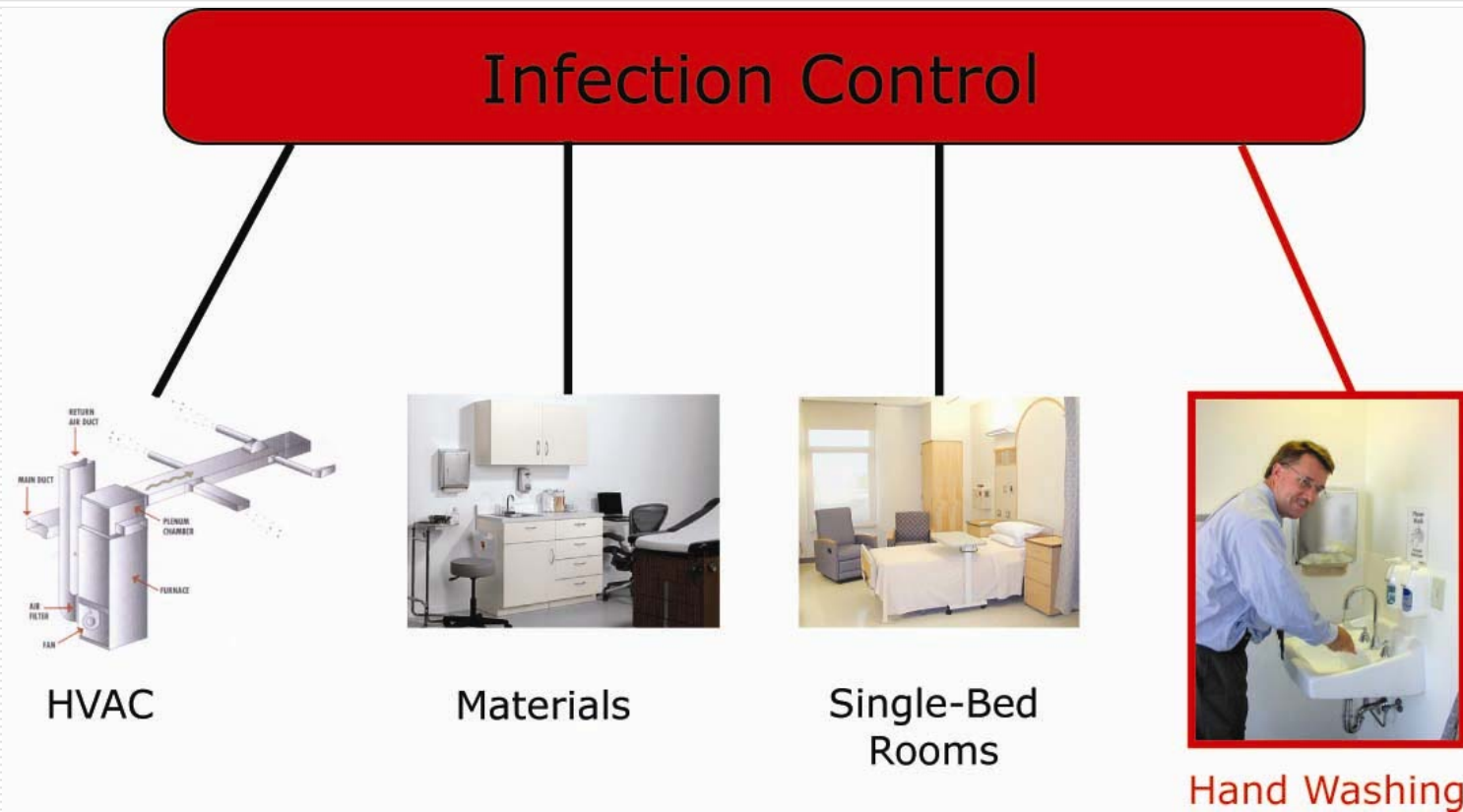
# Prevention of Nosocomial Infections

- The high mortality rates and increased economic expense that result from nosocomial infections justify efforts to control the spread of infection in hospitals.
- But how can we design hospitals that help prevent the spread of these infections?



# Prevention of Nosocomial Infections

## Hospital Design



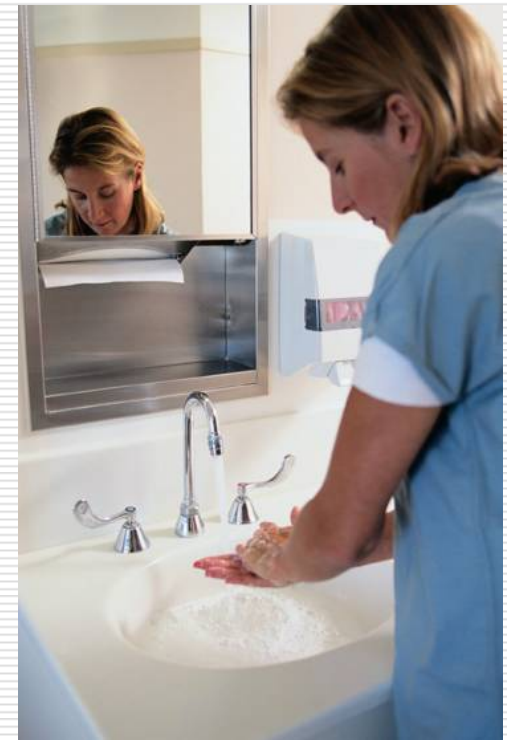
# Hand Washing

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## Why the focus?

- **Hand Hygiene is the single most effective way to prevent nosocomial infections.**

(Van Enk, 2006)



# Hand Washing

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## **Even though we know that:**

- The most common way infections are spread is by staff members touching a patient or contaminated piece of equipment with their hands, then touching another patient without washing their hands (Van Enk, 2006),

## **AND**

- The Centers for Disease Control and Prevention clearly mandates that all healthcare personnel decontaminate their hands as they enter a patient's room and as they leave the room (CDC, 2003),

**Compliance of healthcare workers with recommended handwashing practices remains unacceptably low, often in the range of 30% to 50% (Boyce, 1999).**



# Hand Washing

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## So why aren't they washing?

### Risk Factors for Noncompliance with Hand Hygiene

- Being a physician or nursing assistant rather than a nurse
  - Being male
  - Working in an intensive care unit
  - Wearing gloves or a gown
  - Heavy workloads
  - Performing activities with high risk of cross-transmission
  - Having many opportunities for hand hygiene per hour of patient care
- (Pittet, 2001)

# Hand Washing

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## So why aren't they washing?

### Perceived Barriers to Hand Hygiene: Reasons Reported by Healthcare Workers for Not Washing their Hands

- Skin irritation
- Inaccessible supplies
- Interference with worker-patient interaction
- Wearing gloves
- Forgetfulness
- Ignorance of guidelines
- Insufficient time
- High workload and understaffing
- Lack of scientific knowledge demonstrating benefits
- Inconveniently located or insufficient number of sinks
- Disagreement with guidelines

(Pittet, 2001)

# SYNTHESIS

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- ✓ Presentation of a case study on Surgicare, part of the Cayuga Medical Center, including data obtained through observation.
- ✓ Were any of the previously mentioned risk factors or barriers associated with noncompliance with hand hygiene observed at Surgicare?
- ✓ Were additional factors observed?

# Case Study - Surgicare

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Surgicare, part of the Cayuga Medical Center, is an ambulatory surgery center located in Lansing, NY. The facility houses three pre-operative and 9 post-operative bays, a central nurses station, 2 operating suites, and an endoscopy suite. A wide range of surgeries are performed at the facility, including general, plastic, ophthalmologic, gynecologic, endoscopic, and ear, nose and throat procedures (CMC, 2000).



Surgicare entrance



Post-operative suite: view of bays 2-5.



# Case Study - Surgicare

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**What:** > An observational study that looked at the hand hygiene practices of healthcare workers in the post-operative section of Surgicare

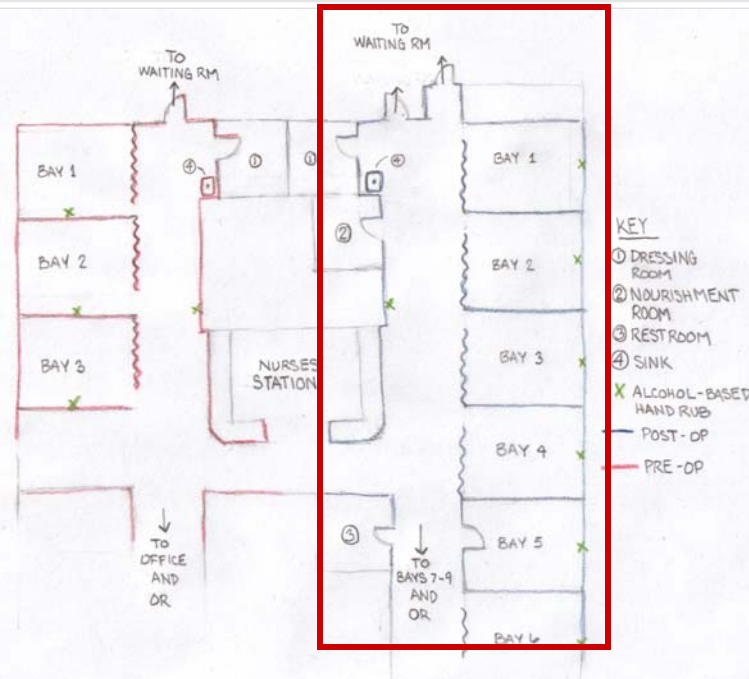
**Why:** > To examine the hand hygiene practices of healthcare workers and apply this knowledge to the literature in order to create a solution to the problem of poor compliance with hand hygiene guidelines

**Where:** > Surgicare, on Warren Road at Rt. 13 in Lansing  
> Post-operative section

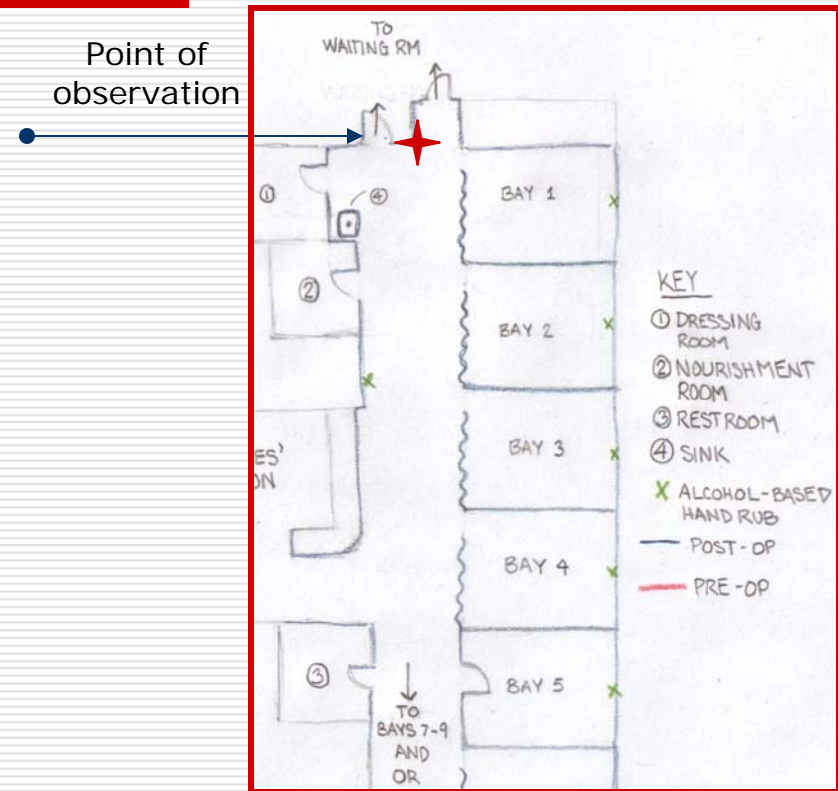
**Who:** > Healthcare workers (HCW) including doctors and nurses

**When:** > Observational periods occurred between 9:00am and 1:00pm on various weekdays

# Case Study - Surgicare



Floor plan of Surgicare: post-op, pre-op, and nurses' station



Close-up of observation area: post-op bays 1-5, nourishment room, dressing room, part of nurses' station

# Surgicare Stats

- Two types of hand washing:
  - 2 foot-pedal sinks
    - 1 in pre-op; 1 in post-op; both located outside of dressing rooms
  - 15 alcohol-based hand rub (ABHR) dispensers
    - 1 in each bay (12); 1 on each side of nurses' station (2); 1 across from bay 7 (1)
- Three hand lotion dispensers
  - 1 on each side of nurses' station; 1 across from bay 7; all three immediately next to an ABHD

ABHR  
Dispenser

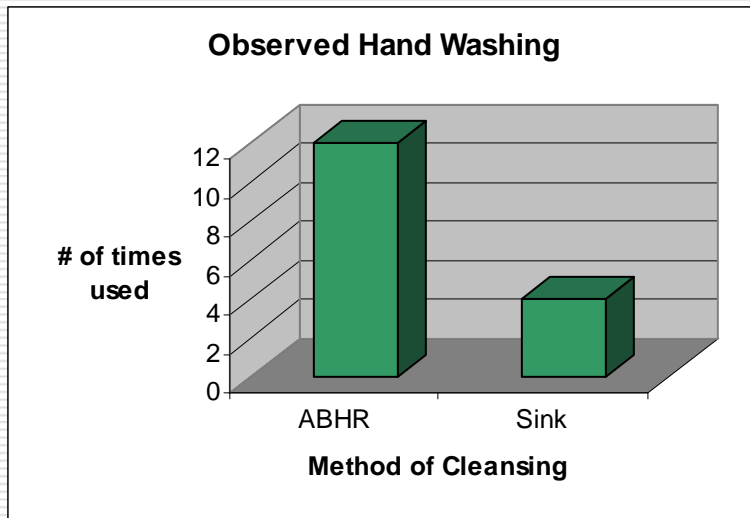
Lotion  
Dispenser



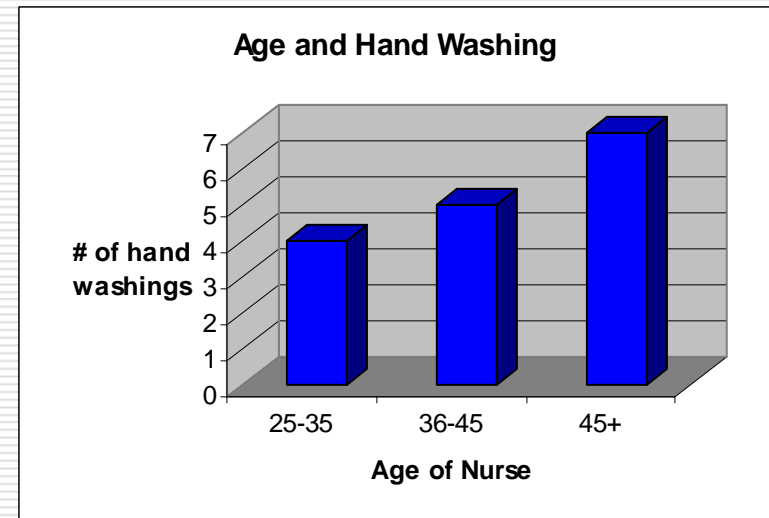
Sink

# Observation Results

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➤ ABHR was used 3 times more than sinks.

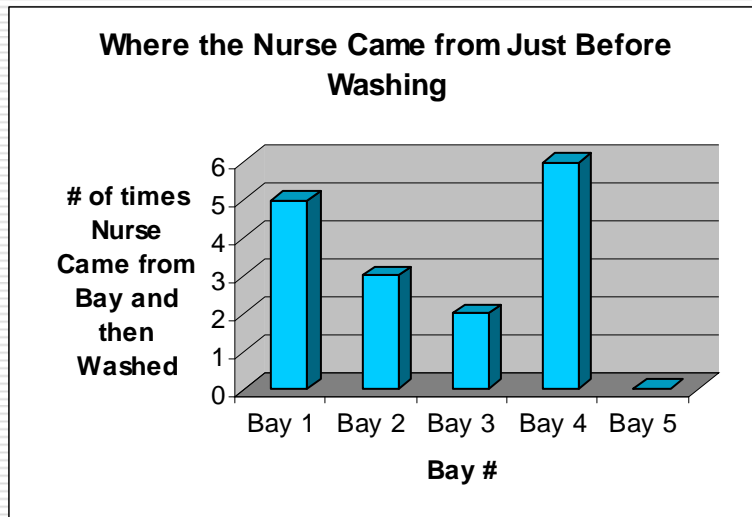


➤ Nurses aged 45 and over were seen washing more often than other age groups.

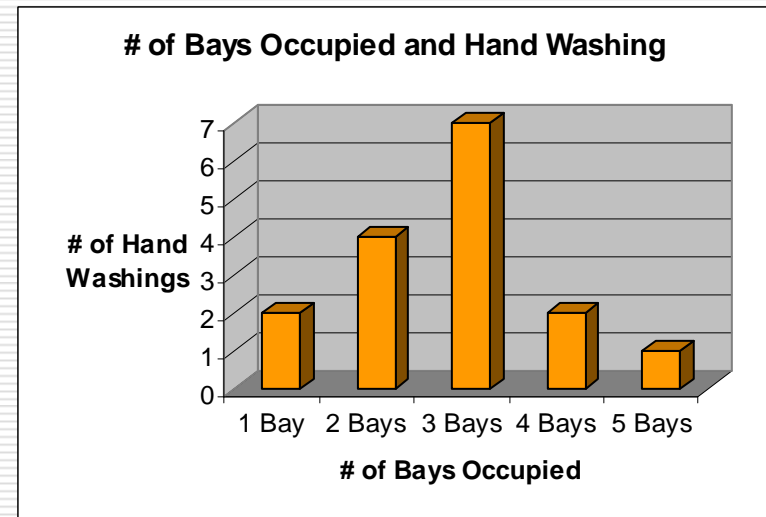


# Observation Results

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➤ Nurse is slightly more likely to wash hands after coming from bays 1 and 4.



➤ Nurse is more likely to wash hands during a moderate level of patient activity.

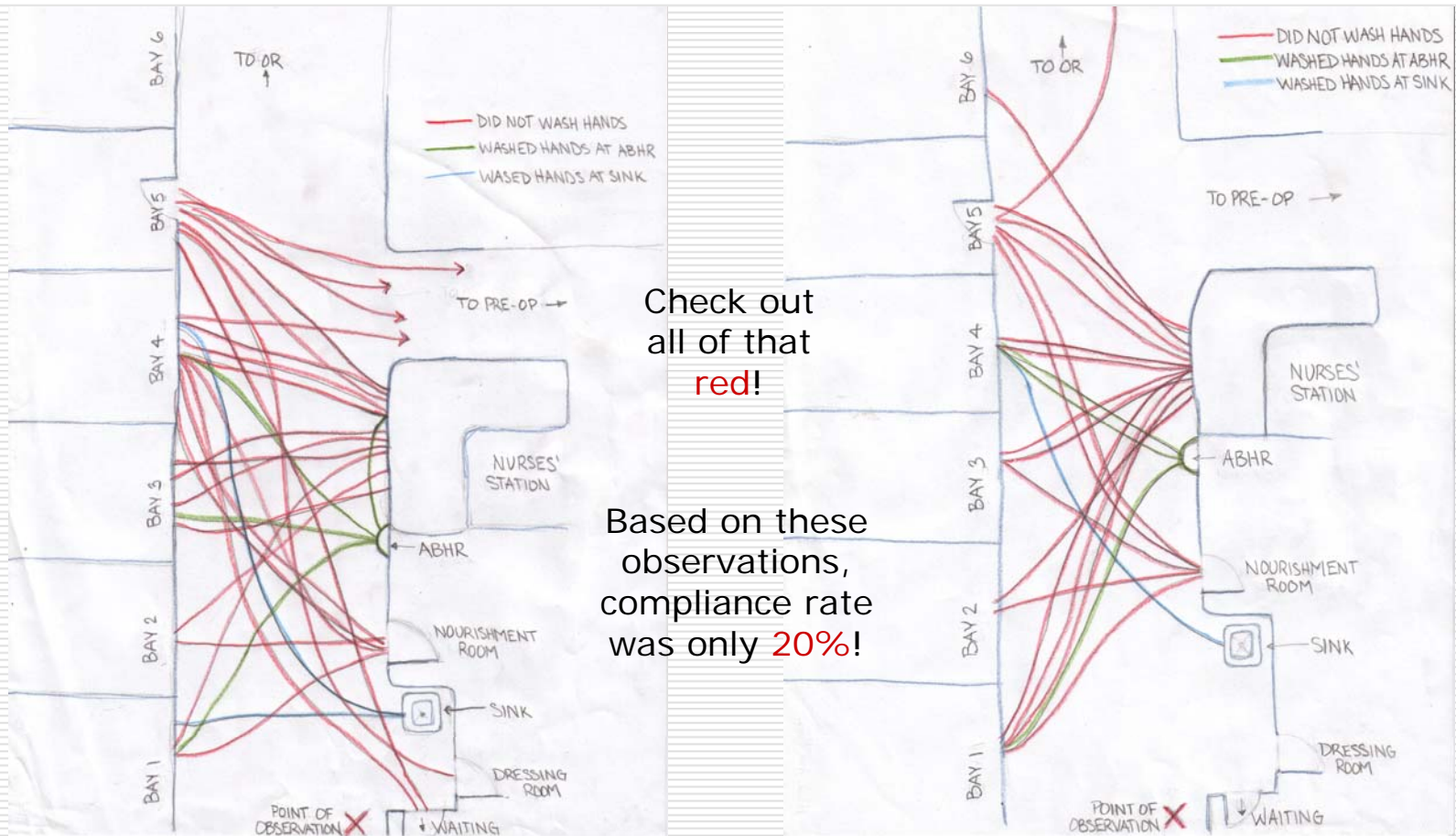
# Tracing Circulation Paths

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On two occasions, the circulation paths of the nurses were traced. The objective was to examine the frequency with which the nurses washed their hands immediately upon exiting a bay and the frequency with which they did not.

As illustrated on the following page, the amount of red (representing a missed opportunity to wash) on the diagrams is alarming. Since the study lacked the technology and information required to record infection rates, we can only hypothesize about the spread of infection that results from the demonstrated lack of compliance to hand hygiene guidelines.

# Tracing Circulation Paths



# General Observation Notes

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- All nurses observed were female.
- All Doctors observed were male.
  - Not one doctor was observed washing his hands.
- Nurses were never observed using the wall-mounted hand lotion dispensers.
- The ABHR dispensers that were located in the bays seemed to be in an inconvenient location.
  - They are mounted on the wall behind the bed. It appeared as though the staff member would need to reach over the patient's head to use the disinfectant.
  - When asked, the nurses confirmed that these dispensers were not in the best location for them, but explained that it was the only hard wall that they could be mounted on. She said these dispensers are used for immediate clean-up, such as bodily fluids that might spray on their skin.



View inside bay:  
ABHR dispensers  
located on wall  
behind patient's  
head

# Limitations

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- ❑ Because of patient privacy, there was no way to observe the activities that took place in the bays when the curtains were closed. This fact has at least two implications:
  1. It is impossible to tell whether or not the nurse used the ABHR dispenser located in the bay upon entering and/or exiting. When nurses were observed exiting the bay and then failed to wash their hands, it is possible that they had already washed their hands with the ABHR dispenser inside of the bay. This would make the actual rate of compliance higher than the observed rate of compliance.
  2. It is impossible to tell whether or not the nurse or doctor actually needed to wash their hands after they came out of a bay. It is possible that when they were in the bay they just talked to the patient, which would make it unnecessary to disinfect their hands. Since it was impossible to count the actual number of opportunities for washing, the observed compliance rate more than likely fails to match the actual compliance rate.
- ❑ The point of observation made it impossible to see into the nourishment room, which featured a sink. The nurses were observed using this room very frequently, but there was no way for the observer to know whether or not she used the sink to wash her hands.

# Link to the Literature

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Pittet (2001) found that **being male** and **being a physician rather than a nurse** are both risk factors for noncompliance with hand hygiene.

- The case study found this to be **true**.
- The male doctors were observed in the post-op doing one of two things: (1) to help the OR nurse bring the patient into the bay and get him/her settled; and (2) to “debrief” the patient on the outcome of the procedure.
- These male doctors were never observed washing their hands upon exiting bays.
  - However, this could be explained by the fact that most of the time, the doctor was just explaining the results of the surgery to the patient. It seemed as though there was just discussion and no physical contact, and therefore no need to wash his hands.

# Link to the Literature

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**Skin irritation** was reported by HCW as a reason for not washing their hands (Pittet, 2001).

- The study demonstrated that this **might not be true** for nurses at Surgicare.
- One can assume that the hand lotion dispensers were provided in response to the research that shows skin irritation to be a major deterrent to hand washing.
- However, the nurses were never seen using the lotion.
  - Because they are not being used, this might indicate that the nurses aren't experiencing irritated skin.
  - However, they might not have irritated skin because they aren't washing frequently enough.
  - This is a complex issue that could not be detangled in this study because of a lack of time and resources.

# Link to the Literature

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**Pittet (2001) noted that **having a high workload** is a risk factor for noncompliance to hand hygiene.**

- The study found this to be **true**.
- Data obtained through observation showed that a moderate work load, or caring for a moderate number of patients, was the optimal situation for hand hygiene.
  - When there were only a few patients to care for, hand hygiene was low.
  - When there was a moderate level of patient activity, hand hygiene was the highest.
  - When there were a large number of patients to care for, hand hygiene was low.
- Perhaps this is due to the fact that when activity is slow, the nurses become relaxed (and therefore forget), and when the activity is fast-paced, the nurses become very busy (and therefore forget).



# INVENTION

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- ✓ This section presents the current methods for solving the problem of noncompliance. It also provides the results of these attempts to improve hand hygiene.
- ✓ The current methods for increasing compliance along with the results of the case study help to create a solution that would increase the occurrence of hand washing by the staff at Cayuga Medical Center's Surgicare facility.

# Solutions to the Problem

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Research is being done to determine the most effective solutions to the costly (in terms of money and lives) problem of noncompliance with hand hygiene.

Pittet (2001) suggests that a multi-modal, multidisciplinary strategy is necessary because single interventions often fail. Randle et al. (2006) agrees that an interplay of multiple interventions was key for a change in the way that staff perceives the practice of hand hygiene from low priority to a core element of daily practice. A multimodal campaign might include changes in:

- strategies for motivation
- the physical environment
- organizational culture

# Solutions to the Problem

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The four perceived barriers to hand washing (cited by HCW) that are consistently being targeted in research studies are:

1. Inaccessible or inconveniently located sinks and ABHR dispensers
2. Forgetfulness
3. Heavy workload
4. Ignorance of guidelines and lack of scientific knowledge

# Solutions to the Problem

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## How are these problems being solved?

### 1. Inconveniently Located Sinks and ABHR Dispensers

**SOLUTION:** Placing ABHR dispensers immediately next to each bed is becoming common. HCW are also being encouraged to carry a bottle of disinfectant in their pocket. A newly-designed flat bottle was made available to nurses to facilitate pocket carriage (Pittet, 2000).

### 2. Forgetfulness

**SOLUTION:** Using the visual display of large posters emphasizing the importance of hand washing reminds staff to wash. Collaborative groups of HCW across all departments created a message for a poster. Each poster featured the name of the department who proposed the message to help develop a sense of ownership in the campaign. The posters were rotated twice weekly to reduce the potential for habituation (Pittet, 2000).

# Solutions to the Problem

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**How are these problems being solved?**

## **3. Heavy Workload**

**SOLUTION:** Because nurses are so busy, ABHR dispensers are a great alternative to sinks because they are so convenient and fast: they have excellent spreading quality and rapid evaporation. Their most attractive quality is their rapidity of action (Pittet, 2001). Nurses don't have time to waste scrubbing their hands with soap and water and then drying with towels each time they enter and exit a bay.

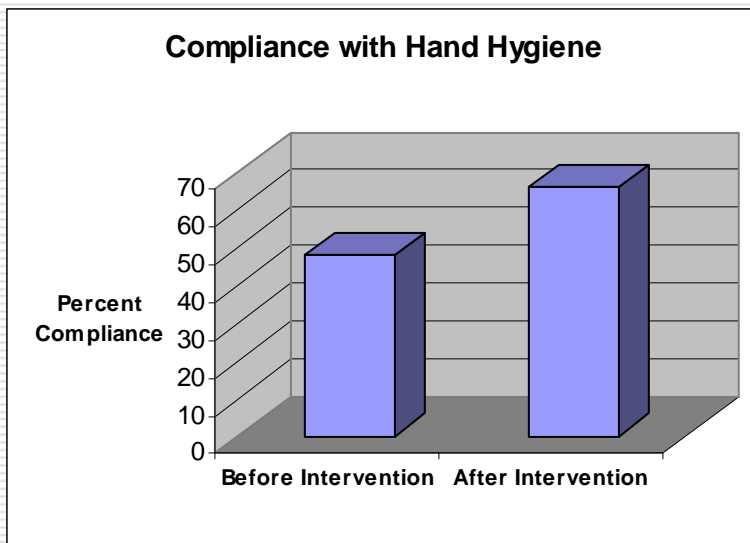
## **4. Ignorance of Guidelines**

**SOLUTION:** If the nurses aren't aware of the hand hygiene guidelines, it might be because the organizational culture doesn't treat it with the proper attention. Culture changes that promote safety as a top priority and support from influential individuals, such as the CEO and director of nursing, are important to the campaign's success (Randle et al., 2006).

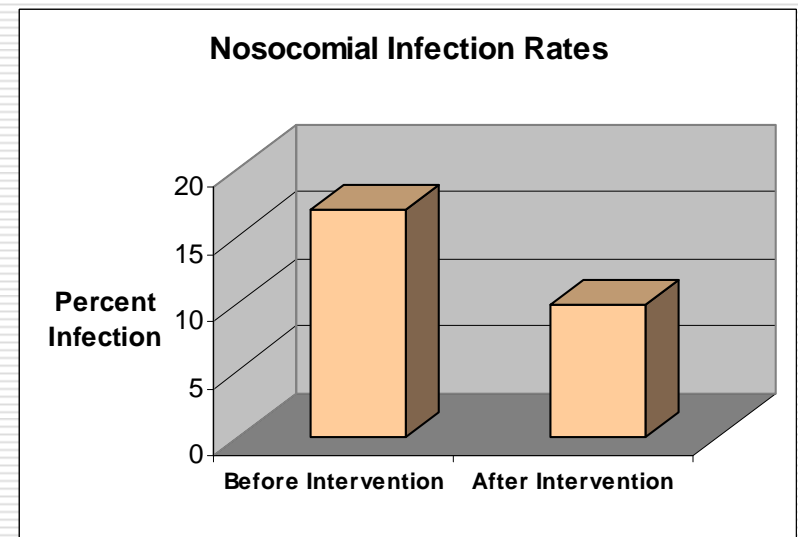
# Results Of Interventions

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In a Pittet et al (2000) study that monitored overall compliance with hand hygiene before and after the four interventions mentioned in the previous pages, a sustained improvement in compliance with hand hygiene was found which also coincided with a reduction in nosocomial infections.



Compliance improved progressively from 48% in 1994 to 66% in 1997.

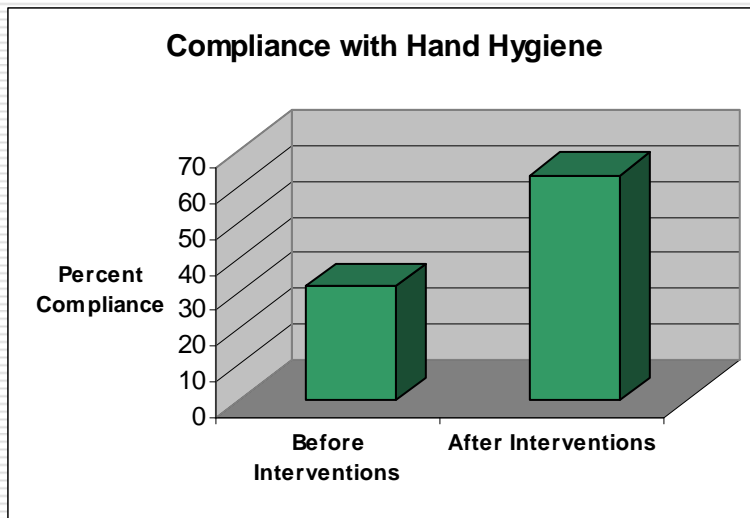


During the same period, overall nosocomial infection decreased from 16.9 in 1994 to 9.9 in 1998.

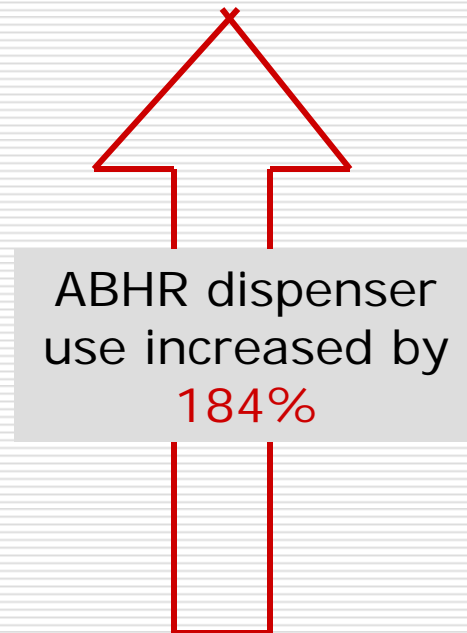
# Results Of Interventions

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The “Clean Your Hands Campaign” was also a multi-modal campaign consisting of the previously mentioned strategies in order to improve compliance in a hospital in England (Randle et al., 2006).



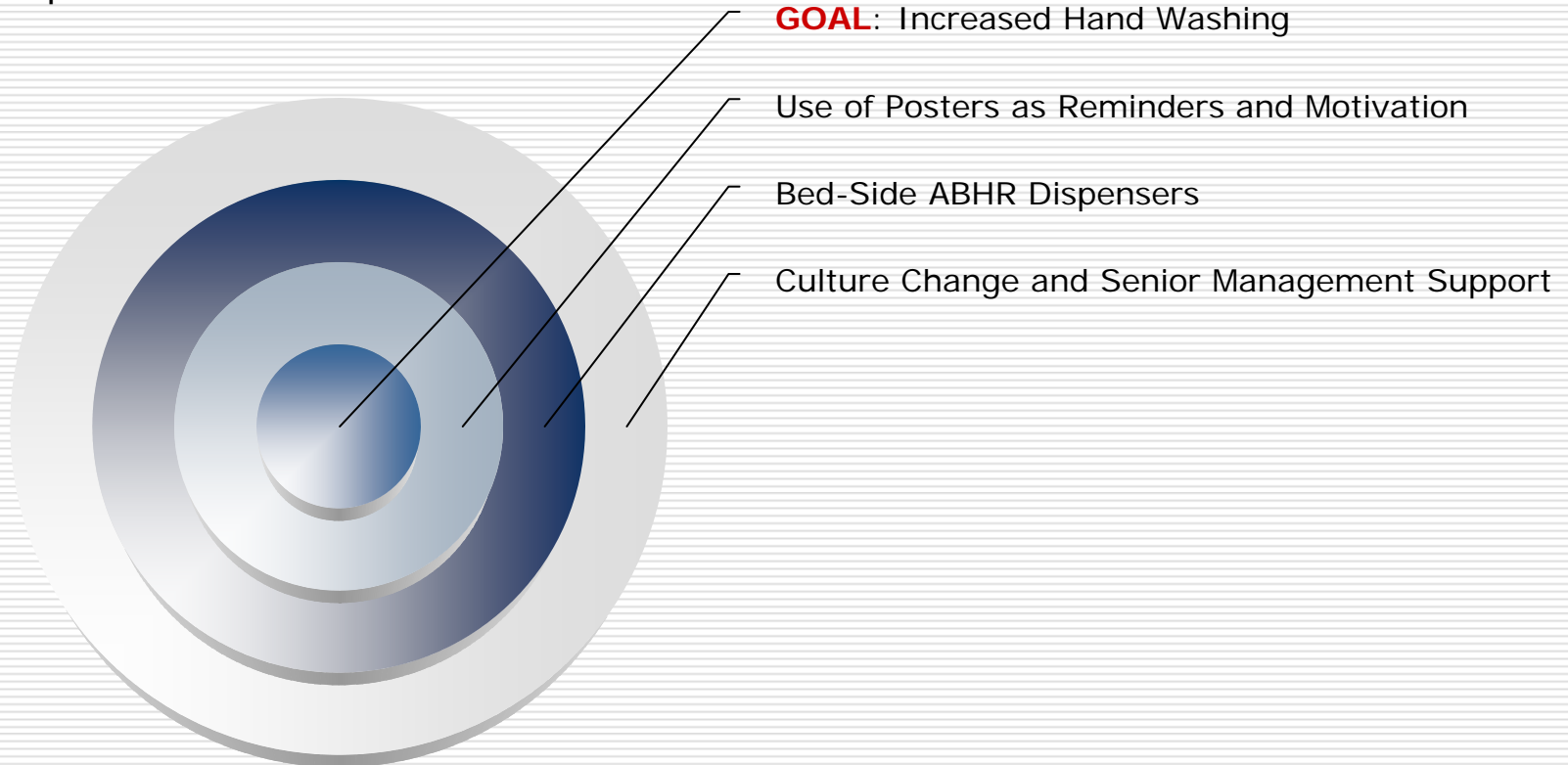
Rate of compliance increased from 32% at the start of the six-month study period to 63% at the end.



# Solutions for Surgicare

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The literature provides compelling evidence for a multi-modal campaign in the fight to control nosocomial infections through hand hygiene. The program for Surgicare will incorporate three main solutions:





# Solutions for Surgicare

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## ❑ Culture Change and Senior Management Support

A lack of institutional priority for hand hygiene could be a major factor in Surgicare's poor adherence to recommendations for a couple of reasons. First, the absence of a climate that encourages safety could explain why the staff are ignorant of guidelines (if that were the case). If the culture of the organization supported hand hygiene as a key feature of success, then the idea of washing hands frequently would be ingrained into the mind of each staff member.

Second, a lack of institutional priority might have something to do with the fact that doctors were never observed washing their hands. Perhaps if senior management were champions of the hand hygiene campaign, the doctors would be more likely to wash up more often. As it is, they have no role models in the hierarchy above them to motivate change. The doctors themselves should also be involved in the campaign. They could be part of the collaborative groups that create the posters, and they can also strive to be role models for the nurses.



# Solutions for Surgicare

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## ❑ Bed-Side ABHR Dispensers

ABHR dispensers mounted on each hospital bed will provide HCW with quick and convenient access to hand hygiene. This intervention is a response to the observation data that showed that hand hygiene compliance is lowest when nurses are the busiest. Instead of reaching over the patient to access the ABHR dispensers, the nurse can comfortably access the disinfectant from the side of the bed.

Not only does the location of the dispensers reduce the time it takes to clean their hands, but the fact that these dispensers are filled with fast-acting alcohol also cuts down on time. As opposed to soap-and-water cleansing, these dispensers make washing fast – 10 seconds to decontaminated hands.



# Solutions for Surgicare

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It is possible that the reason why the nurses weren't washing their hands frequently is because they tend to forget: When there is very little activity, they become relaxed and forget; when there is lots of activity, they become busy and forget. It was obvious that the environment needed to provide the nurses with some reminders.

Posters that emphasize the importance of hand washing should be displayed throughout the pre-op and post-op areas as well as the nurses' station. A weekly poster rotation schedule would reduce the chance that the nurses would become used to them, a phenomenon that would eliminate their effect.

Another method that could be used to remind the HCW to wash would be buzzer systems at the perimeter of each bay. As a nurse crosses the threshold either into or out of the bay, she would feel a buzz (similar to the silent feature of a cellular phone) from a device in their pocket that would remind them to wash. Again, in order to eliminate habituation, the style of the buzz would change often.



"Cross Transmission"



"Time Out!  
Disinfection"

# Conclusion

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Nosocomial infections are a significant burden on us all. They cost significant amounts of money, and they also claim lives. There are many ways that we can design healthcare environments to reduce the occurrence of these types of infections. Improving compliance with hand hygiene remains the single most important measure to prevent nosocomial infections (Pittet, 2000).

Although these campaigns aimed at increasing hand washing are costly, they are well worth the time, effort, and money spent. Most importantly, lives will be saved and we will be able to erase nosocomial infections from the list of leading causes of death. We will be able to uphold the cardinal rule of medicine: "First, do no harm." The significant amount of money that will be saved can be put to better uses: hospitals will be built or renovated, the latest technology will be purchased, and patients will be attracted.

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