University of Michigan Infection Control

Analysis of Infection Control Policies in Various Departments of the University of Michigan Health System

Final Report

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Executive Summary

The University of Michigan Hospital System (UMHS) currently has contact precautions (CP) policies in place to minimize noscomial infections. The Infection Control & Epidemiology (IC) department reports that the policies outlined for CP is not consistently and accurately followed by hospital personnel. Furthermore, IC is concerned about the particular spread of a microorganism, Clostridium difficile (C. difficile), which requires additional precautionary policies.

IC stated that the infection rates of C. difficile in the UMHS are on the high end of those in published literature when compared to other health systems. Currently, there is no baseline to assess how well hospital personnel and visitors are complying with the CP policies. Therefore, IC has asked the student team to determine the baseline of CP compliance at the UMHS’s. IC has also asked the student team to determine possible causes for noncompliance and recommendations on how to make CP policies easier to follow.

To complete this request, the student team observed hospital personnel entering and exiting CP and C. difficile patient rooms in the floors 4-8 of the University Hospital (UH), Cardiovascular Center (CVC) floors 4-5, Burn Unit (BICU), and Emergency Department (ED). The team also developed and distributed an online survey to hospital personnel to determine preferences, behaviors, and thoughts regarding CP policies.

The findings from each step led the student team to draw the following conclusions:

- Policy compliance throughout the hospital (with the exception of the ED) followed a trend (listed as highest to lowest)
  - Wearing gloves before entering a patient room
  - Wearing gown before contact with patient
  - Using Purell/washing hands after exiting a patient room
  - Using Purell/washing hands before entering a patient room
- For C. difficile rooms, the additional policy of “Washing hands upon exiting a patient room” had a very low overall compliance rate.
- Nurses were found generally found higher compliance rates than doctors or family visitors, but similar rates to environmental services
- The PM shift nurses have higher compliance than AM nurses for the “Wash/Purell After” policy and “Wash hands after” policy
- Nurses on no specific floor were found to have a significantly higher overall compliance than another floor in all policies
- The ED department was observed to have lower compliance rates than the other floors studied
  - Doctors and nurses were found to have statistically similar compliance rates to hand hygiene policies
- Family members are not aware of CP policies and signage significance
• Based on surveys, hospital personnel may have a misinterpretation of what required CP and C. difficile policies require regarding hand hygiene
• Low compliance rates are not due to inaccessibility of supplies or feelings that policies are inadequate in containing infection

In order to eliminate and/or mitigate these problems, the student team recommends the following suggestions be implemented:
• Frequent education and clarification eliminate misperceptions of policies
• Covering Purell bottles inside and outside C. difficile patient rooms with a sign reminding personnel to wash hands
• Publicize compliance “hotline” to create accountability for noncompliant hospital personnel
• Frequent random rounds by IC to check for compliance, and on-spot correction
• Educate patient about proper precautions to take, especially regarding activities such as leaving room for a walk or visiting the cafeteria
• Make visitors check in with a clerk or nurse before visiting patients to be properly educated about the necessary precautions
• Provide education stands at major entrances providing information and pamphlets explaining the importance of CP/C. difficile policies and the proper procedures to follow
• Conduct a cost benefit analysis and perform further research on future implementation of ZigBee technology to electronically monitor hand compliance rates throughout the hospital
Introduction

The University of Michigan Health System (UH) Infection Control & Epidemiology (IC) department has a systemized contact precautions (CP) policy to minimize the spread of selected communicable diseases, conditions or microorganisms between inpatients. These diseases may be transmitted by direct contact with the patient or with items in the patient’s environment. Patients who are identified as infectious have a green sign on the outer vicinity of the patient room. Therefore anyone entering the room is required to follow the CP policy. This policy, as outlined in the University of Michigan Hospitals and Health Centers (UH) statement, requires both of the following:

- Using either hand sanitizer or washing hands with soap before and after entering patient room
- Putting on gloves, masks, gowns or other personal protective equipment as necessary before entering patient room

The IC department reports that the policy outlined for CP is not followed consistently and accurately by personnel. Furthermore, the IC department is concerned about the spread of a microorganism, Clostridium difficile (C. difficile), which requires additional precautionary policies. Patients with C. difficile are supposed to have a supplementary label on the exterior of their rooms in addition to the CP green sign. This label, an additional sign, informs personnel that additional precautions are required. However, the IC department reports that the C. difficile rooms are often not properly labeled, making it difficult for hospital personnel and visitors to know when to follow these specific policies. Additionally, the complexity of the current procedure for C. difficile rooms deters many people from following protocol. This deviation from policy may allow the C. difficile microbe to leave patient rooms and contaminate other areas. As a result, the IC department stated that the infection rates of C. difficile in the UM are on the high end of those in published literature, in comparison to other health systems. Currently, there is no baseline to assess how well hospital personnel and visitors are complying with the CP policies.

To establish a baseline to determine how closely hospital personnel currently follow CP policies, the student team observed policy compliance to establish a baseline, with an emphasis on C. difficile infected patients. Additionally, the team was asked to make recommendations on how to make these policies easier to follow.

To accomplish these tasks, the student team collected data by observing anyone who entered identified CP patient rooms, with a focus on C. difficile patient rooms. All preparations taken to enter and exit the room were noted. The objective was to identify how well the current procedure is followed, the areas of deviation, and the reasons for lapses in following the policy. After analyzing the precautions as used in the UH environment, the team has determined a baseline of the policy compliance and developed recommendations for process modifications that will increase the effectiveness of the CP policies, ultimately decreasing the spread of infections.
This report includes how the student team collected and analyzed data for recommendations on CP activities including how personnel prepare to enter a CP room, and precautionary guards personnel wear before and after entering a room. This report presents our methodology, findings, conclusions and recommendations for this project.

**Current Situation**

*C. difficile* is an antibiotic bacterial microorganism of great concern to UMHS, as acquiring this infection, in addition to other illnesses, can lead to serious complications and even death. It is difficult to recognize when a patient has *C. difficile*, as the symptoms including diarrhea and fever, are similar to the flu. *C. difficile* requires additional precautionary methods to prevent spread. Unlike most other organisms, because *C. difficile* is antibiotic resistant, it cannot be easily eliminated by using an alcohol based hand sanitizer such as Purell. Instead, a solution of soap and water is required to kill *C. difficile* on hands.

*C. difficile* patients should typically have two signs outside their room door: a green sign common for CP patients and another sign specific for those with *C. difficile*. The green CP sign displays pictures illustrating the procedures that should be followed: wearing gloves, wearing gowns, and washing hands. In the Emergency Department (ED), both signs are not usually placed outside patients' rooms; in most instances only one (the CP sign) is present. As a result, personnel cannot distinguish between patients who should be treated for just CP or *C. difficile* as well. The sign specific for *C. difficile* patients lists the additional precautions:

- Hands must be washed with soap and water after exiting room instead of hand sanitizer (Purell).
- Any equipment that leaves room must be cleaned with bleach.
- Patient rooms must be cleaned with a bleach solution once patient has been discharged.

Key issues that IC is concerned with, regarding difficulties following CP policies, are the inconsistent presentation of signs and the accessibility of supplies (gowns, masks, gloves, and cleaning solutions) throughout areas of the health system. From what IC observes and reports, hospital personnel are not fully complying with CP policies due to personal preference and insufficient knowledge of policy. In addition, no current benchmark exists to identify how well CP policies are being followed. IC feels that the policy needs to be simplified, easily adaptable, yet still effective in the various locations and departments. Additionally, CP policies must be exhibited in a clear and effective manner, so that hospital visitors not familiar with the policy have the knowledge and tools to properly protect themselves.

**Goals and Objectives**

The main goal of this project was to establish a baseline that recognizes how effectively contact precautions policies are being followed by a sampling of personnel in the hospital.

The secondary objectives of this project were to:

- Identify reasons and areas of noncompliance to CP policies
• Recommend ways to make policies more effective
• Reduce *C. difficile* infection rates

**Project Scope**

The team mainly focused on how thoroughly and consistently CP policies were being followed by a sampling of hospital personnel and visitors as they entered labeled CP patient rooms at the UH. CP patients infected with *C. difficile* and not other microorganisms were of secondary interest. Observations at the hospital of these policies included the following:

- Sanitation of hands before entering room
  - Alcohol based sanitizer or hand washing with soap
- Wearing of barrier methods after hand sanitation
  - Gloves
  - Gown
- Sanitation of hands after exiting room
  - Alcohol based sanitizer or hand washing with soap for CP patients
  - Only hand washing with soap for *C. difficile* patients
- Cleaning of rooms and equipment (when able to observe)
  - Standard cleaning for CP patients
  - Cleaning with bleach solution for *C. difficile* patients

The areas and departments of focus within the UH include:

- General care between the 4th and 8th floor of the UH
- Intensive Care Units (ICU) floors 4, 5, 6, and 7 of the UH
- The Emergency Department (ED)
- The Cardiovascular Center (CVC)
- The Trauma Burn Unit (BICU)

The project did not include other kinds of precautionary policies present, such as protective or droplet precautions, and other departments/units in UH not mentioned above. Additionally, no observation was done at the Mott Children Hospital.

**Methodology**

To determine whether CP policies were being followed by personnel entering a CP labeled room, the team specifically watched the activities the personnel performed before and after entering the room. These observations helped the team create a baseline of how consistently the policies are being followed and identify areas for improvement. The primary subjects observed were:

- Doctors
- Nurses
- Environmental Services
- Family

From the team’s initial meetings with IC, some speculated causes of nosocomial infections were
identified. Causes include environment, materials, methods, equipment, and personnel. The breakdown of causes is summarized in Figure 1 below.

![Cause-and-Effect Diagram](image)

**Figure 1: Cause and Effect diagram for the spread of noscomial infections**

To execute this project, the team performed a literature search, performed preliminary research, and collected quantitative and qualitative data. To assess CP policy knowledge within UH, an online survey was distributed to a sampling of hospital personnel. To examine how CP policies at UH differed from other hospital and clinic institutions, questions were posted on medical forums and the responses were compiled. The team analyzed the qualitative and quantitative data, survey responses and responses to the forum to develop recommendations.

**Performed Literature Search**

The team searched the IOE 481 student project database for previous work on infection control precautionary measures but found no past studies that focused on this topic. Therefore, this project will be the first in IOE 481 to examine CP policies at the UH. The team also searched through over 30 journals and relevant articles for information on infection control, antibiotic resistance microorganisms (specifically *C. difficile*), their spread, and the policies to control spread. 8 of the most relevant articles reviewed for the purpose of this project can be found in Appendix A.

**Performed Benchmarking**

For benchmarking purposes, under the assistance of Ms. Friedman, the team posted questions on the forum of the Association for Professionals in Infection Control and Epidemiology to ask other industry professionals about CP policies at their facilities: what the policies are, how their
hospital personnel ensure compliance, problems they encounter with their policies, and their *C. difficile* rates. The questions posted and the response received from 7 facilities can be found in Appendix B.

**Performed Preliminary Research**
IC receives a list of all CP patients in the hospital system daily at 12:00 am, which was in turn forwarded to the student team. The team then used the list to identify CP patient rooms and stood in the hallway outside to observe the traffic of personnel who entered CP patient rooms. Observation focus was primarily on the activities that occur in preparation to enter and exit the room. Based on the student team’s preliminary observations of the activities performed before entering and exiting a CP or *C. difficile* patient room, the team identified hospital personnel that were of interest and grouped them as doctors, nurses, environmental services and visiting family members, determined the most significant location to conduct observations at, and developed an observation sheet. The developed observation sheet is shown in Appendix C.

**Collected Data**
The data collection occurred on weekdays and weekends from January 30th through March 11th between the times of 7am and 11pm for a collective total of 180 hours. Observations for the time between 11pm and 7am were conducted a few times, but due to lack of personnel activity during that span of time, the team decided to focus on observing the activity between 7am to 11pm. Team members observed hospital personnel policy compliance at the UH three to five times a week at predetermined locations, included in the scope. Observations occurred in two hour shifts, with each team member observing for approximately ten hours per week. The team observed whether or not any individual entering a room put on gloves [and gowns as necessary] before entering, washed hands/used Purell before and after entering room, and whether they specifically washed upon exiting *C. difficile* patient rooms. A breakdown of the data collected is as follow where N is the number of observations: by location in Table 1 below, by days of week in Table 2 below, and by time of day in Table 3 below.

<table>
<thead>
<tr>
<th>Location</th>
<th>4th Fl</th>
<th>5th Fl</th>
<th>6th Fl</th>
<th>7th Fl</th>
<th>8th Fl</th>
<th>BICU</th>
<th>ED</th>
<th>CVC 4th Fl</th>
<th>CVC 5th Fl</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>58</td>
<td>73</td>
<td>88</td>
<td>58</td>
<td>120</td>
<td>27</td>
<td>105</td>
<td>79</td>
<td>15</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

<table>
<thead>
<tr>
<th>Days of Week</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>84</td>
<td>93</td>
<td>55</td>
<td>86</td>
<td>66</td>
<td>125</td>
<td>114</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009
### Table 3. Number of Observation breakdown by times of days

<table>
<thead>
<tr>
<th>Times of day</th>
<th>N</th>
<th>248</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>7am-3pm</td>
<td>365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3pm-11pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11pm-7am</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009*

**Distributed Survey**

To further understand the current situation on policy compliance from the hospital personnel’s perspective, the team conducted online surveys. Target subjects included a variety of hospital personnel grouped into doctors, nurses, technicians, and administrative staff. A total of 388 participants responded. The survey provided the team with insight as to methods and precautions personnel specifically take to prevent infection spread as well as assessment of their knowledge on CP policies. The survey also helped determine what the personnel specifically find difficult and/or nuisance in following current policies, as well as what they feel can be done to improve the process. The survey was created by the team and was administered informally through an internet based system called “Survey Monkey.” The survey addressed the most common issues or areas of concern for the majority of hospital personnel and is attached in Appendix D.

**Analyzed Data**

Based on the data collected, the team established a baseline on policy compliance. Areas of the CP policy that were not followed consistently or effectively were identified. Additionally, the team used a combination of qualitative and statistical methods, including root cause analysis, while looking at observational and survey data to determine common areas of lapse in following the policy. Analysis of the quantitative data also helped the team develop suggestions to implement failsafe methods to make compliance easier for hospital personnel.

**Developed Recommendations**

Using the information of the established baseline statistics, the team formulated and recommended ways to improve the CP policy to increase effectiveness of the procedure and reduce *C. difficile* infection rates. The team also identified areas of interest for further research in future studies.

**Support Received From Operating Entities**

The Director of the Infection Control Department at the University of Michigan Health System, the client, provided ongoing details of the problem, requirements, expectations, and contact information. She also assisted the team in distributing surveys and posting questions to medical forums, acted as liaison between the team and other participating individuals to ensure full cooperation, and provided sources of information to aid this project. Throughout the project, she provided regular feedback regarding the quality and quantity of the team’s work.

The project coordinator served as a guide and mentor to the team, helping the team maintain analytical quality during the data analysis process and a positive team-client relationship.
throughout the project. The project coordinator also gave feedback on the team’s progress to help improve the team’s professional skills.

Findings

This section of the report contains the team’s findings from literature searches, benchmarking question responses, observational data, and survey responses. From the observation data, the team established a baseline of current policy compliance, as an overall measure and distributed by shift. After establishing the baseline, floors were further analyzed by grouping them together as medical, surgical, intensive care units, and the Emergency Department. An analysis of the survey responses provided insight into hospital personnel education and perception of contact precautions policies, awareness of personal compliance and reasons for noncompliance. Survey participants were grouped into four major categories: doctors, nurses, technicians, and administrative staff.

Literature Search

The team searched through the IOE 481 project database and found no previous projects on infection control precautionary measures. Additionally, the team search through over 30 journals and relevant articles. Articles included infection control measures and information on *C. Difficile*. The key findings are summarized in the paragraphs below.

The European Union placed new recommendations to prevent hospital infections which include:

- Establishing or strengthening reporting and learning systems
- Embedding patient safety in the education and training of health workers
- Involving patients in the development of safety measures
- Providing patients with relevant information on health risks and safety issues
- Sharing of best practice and expertise in the field of infection control

*C. Difficile* and other antibiotic-resistant organisms are a major public health concern. They are capable of causing life-threatening infections and are difficult to manage because treatment options are limited. The increase in the prevalence of antibiotic-resistant pathogens is occurring at a time when the discovery of new anti-infective agents is slowing down dramatically, which raises a concern that we may be faced with a growing number of potentially untreatable infections in the future.

An article reports that hand hygiene and the use of personal protective measures for infection control has been suboptimal in many reports and studies. Due to the dire consequences of this breach in policy, the obstacles to compliance must be identified and overcome. The two main barriers outlined in this article are education and excess workload – educating hospital personnel on policies and importance of infection control, and excess patient workload/staff shortage.
A study on compliance with infection control at primary healthcare facilities found that the reasons for non-compliance reported by hospital personnel are as follows:

- Facilities
- Knowledge
- Views and opinions
- Physical barriers
- Staffing
- Management

Recommendations were made to overcome those barriers to compliance are listed below:

- Education and training of individual staff groups
- A review of the facilities provided for hand hygiene and the use of protective clothing
- Managers being encouraged to support infection control activities by involving them more fully in education, training and policy development

A study was conducted on staff compliance with hand sanitation at healthcare facilities. Some of the reported findings are as follows:

- Performance of infection control activities was strongly related to the availability of resources and can be controlled by budgeting- however, this is not always desirable
- Nurses were interested in, and concerned about, infection control. They could recognize poor provision of resources in their clinical areas accurately
- Better knowledge of infection control did not have a strong association with observed behavior

Another article focused on the reason for varying rates of infections across hospitals in the continent, states that ultimately cost is the factor resulting in higher or lower infection rates, with hospital layout being a key issue. This is because with a few single rooms available, an outbreak in a patient in a six-bed bay could potentially infect five other patients.

Other findings include:

- Overuse of antibiotics lead to Increase in *C. Difficile* rates
- Patients with *C. Difficile* should be isolated
- Rings and wristwatches should not be worn when interacting with *C. Difficile* patients as they can act as a reservoir for *C. Difficile*

**Benchmarking Responses**

From the responses given by seven other medical facilities, the team found that there was no significant difference in CP policies between those of UMHS and the facilities that responded. For policies specifically regarding *C. difficult*, the UH and all facilities, except Shands Hospital at the University of Florida and Health Management Associates, have the same general policy. Shands Hospital specifically removes the alcohol gel hand cleanser from the room and places a “wash with soap” reminder card in the holder instead. *C. difficile* infection rates for the examined facilities vary, with some experiencing increasing, decreasing or consistent trends of overall *C. difficile*
occurrences. The facilities reported that they used a variety of the following techniques to ensure compliance to CP policies:

- IC rounds
- Annual education
- Medical supplies monitoring
- On spot correction
- Secret observers
- Compliance rate reports
- A method to report noncompliance to Infection Control or similar department
- Progressive disciplinary plans

The effectiveness of these policies, as perceived by these facilities, is keeping noscomial rates low. Reported problematic areas with CP policies at these facilities include:

- Individual interpretation of CP policy
- Perceived practicality
- Staff turnover
- Lack of education

Other comments include questioning the necessity of isolation gowns and the accuracy of CP indicators in computer system.

**Establishing the Baseline**

The floors were first analyzed as a whole system, to give an overall perspective of policy compliance of doctors, nurses, environmental services and family throughout the hospital system. The floors included University Hospital floors 4-8, CVC 4 and CVC 5. The overall compiled data was also analyzed by shift to determine whether or not the shifts exhibit significantly different behavior or compliance. Finally, the UH and CVC floors were compared by grouping them according to their specific function (medical, surgical, intensive care units) in order to determine if any specific floor had higher compliance rates. The Emergency Department was analyzed separately, due to its unique culture and focus on immediate care, compared to the rest of the hospital. The sample size of personnel observed is as shown in Figure 2 below.
The sample size (N) for each personnel grouping is shown in the figure above. Because there are different sample sizes for each grouping, statistical analysis was used to compare compliance rates. Statistical analysis was run using a software program called Minitab. A 2-sample t-test was used for all pair-wise comparisons. A significance level of 95% (α = 0.05) was chosen, so any generated p-values less than this alpha value would imply that the two rates are significantly different, with a 95% confidence level.

**Overall Observed Policy Compliance**

The team studied personnel compliance for each part of the contact precautions and *C. difficile* policy and observed that overall 69% (Table 4) of personnel put on gloves before entering a room labeled with CP or *C. difficile* signage. Comparing the doctor’s versus the nurse’s compliance rates were found to be significantly different (p-value = 0.006), with nurses more compliant (73%) than doctors (57%). Nurses compared to Environmental Services rates were found to be not significantly different (p-value =0.1). Families have a much lower compliance rate than all other personnel, at 8%.

### Table 4: Compliance of wearing gloves before entering patient room

<table>
<thead>
<tr>
<th>Profession</th>
<th>Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor (86)</td>
<td>57%</td>
</tr>
<tr>
<td>Nurses (481)</td>
<td>73%</td>
</tr>
<tr>
<td>Environmental Services (27)</td>
<td>85%</td>
</tr>
<tr>
<td>Family (24)</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Overall (618)</strong></td>
<td><strong>69%</strong></td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

Similarly, the overall compliance with wearing gowns for patient contact (as necessary) was 57% (Table 5). Family members were found the least likely to put on gowns during patient contact. Nurses and environmental services were observed to have the same compliance rate (p-value = 0.6), while doctors and nurses had significantly different compliance rates (p-value = 0); with nurses having the higher compliance at 62%.
Table 5: Compliance of wearing gowns for patient contact

<table>
<thead>
<tr>
<th>Profession</th>
<th>Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor (81)</td>
<td>38%</td>
</tr>
<tr>
<td>Nurses (450)</td>
<td>62%</td>
</tr>
<tr>
<td>Environmental Services (27)</td>
<td>67%</td>
</tr>
<tr>
<td>Family (24)</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Overall (582)</strong></td>
<td><strong>57%</strong></td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

CP policies also require personnel to cleanse hands either by washing with soap and water or Purell before entering a CP or *C. difficile* labeled room. The compliance rates to this policy were very low for all personnel groupings (12%), as shown in Table 6.

Table 6: Compliance of using Purell/washing before entering patient room

<table>
<thead>
<tr>
<th>Before Purell</th>
<th>Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor (86)</td>
<td>9%</td>
</tr>
<tr>
<td>Nurses (481)</td>
<td>14%</td>
</tr>
<tr>
<td>Environmental Services (27)</td>
<td>4%</td>
</tr>
<tr>
<td>Family (24)</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Overall (618)</strong></td>
<td><strong>12%</strong></td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

Upon exiting from a CP labeled room, personnel should either wash hands or use Purell. During observations, occurrence of either or both activities was noted as compliance to CP policy. Nurses had the highest percentage of compliance at 55% (Table 7) while family had the lowest at 5%. Comparisons between nurses and doctors compliance rates were found to be significantly different (p-value = 0.03), with nurses overall being more compliant. Similarly, nurses and environmental services compliance rates also significantly differed (p-value =0), where nurses were again more compliant overall.

Table 7: Compliance of using Purell/washing after exiting patient room

<table>
<thead>
<tr>
<th>After Purell</th>
<th>Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor (77)</td>
<td>42%</td>
</tr>
<tr>
<td>Nurses (431)</td>
<td>55%</td>
</tr>
<tr>
<td>Environmental Services (25)</td>
<td>12%</td>
</tr>
<tr>
<td>Family (24)</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Overall (557)</strong></td>
<td><strong>49%</strong></td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

*C. difficile* policies require different protective measures than CP policies alone upon exiting a *C. difficile* labeled patient room. For these rooms, only hand washing with soap and water upon exit was considered acceptable compliance with policy. Therefore, observations where
personnel did not wash with soap or used Purell were considered noncompliance. Family and environmental services were not observed taking proper precautions upon exiting *C. difficile* rooms - however the small sample size should be noted as a factor that may affect observed compliance. Comparison between doctors and nurses found that neither was statistically different from one another (p-value = 0.398). However, all observed groups were found to have a low compliance rate to this policy.

**Table 8: Compliance of washing hands after exiting *C. difficile* patient room**

<table>
<thead>
<tr>
<th><strong>C. Difficile Wash After</strong></th>
<th>Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor (8)</td>
<td>25%</td>
</tr>
<tr>
<td>Nurse (49)</td>
<td>44%</td>
</tr>
<tr>
<td>Environmental Services (2)</td>
<td>0%</td>
</tr>
<tr>
<td>Family (5)</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Overall (57)</strong></td>
<td><strong>34%</strong></td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

**Observed Emergency Department Policy Compliance**

The Emergency Department was grouped and analyzed separately from the other floors due to the emergent care offered by the unit. The unit has their own training system and method of operations that significantly differ from the other observed units. Overall compliance for all parts of the policy was observed to be significantly lower than the other floors.

In the following tables (Table 9–Table 13), “W/P Before” and “W/P After” indicate washing hands and/or using Purell before and after entering patient rooms. “N” indicates the number of total observed occurrences.

According to ED personnel, the ED uses the green CP sign to indicate both a CP and *C. Difficile* patient room. Therefore, all rooms with a CP sign are also to be treated as a *C. Difficile* room, and personnel exiting those rooms are expected to comply with the hand washing policy upon exit. However as shown in Table 9, the overall compliance rate to “Wash Hands After” is the lowest at 4%. The overall compliance to the gloves policy is the highest at 38%. Doctors, nurses and environmental services have similar compliance to wearing gloves before entering. Only a small percentage of nurses were observed to wear gowns, while all other personnel were not observed to comply with this policy. Doctors and nurses were observed to have similar compliance rates for “W/P Before” and therefore not significantly different (p-value = 0.4).

Doctors and nurses were also found to have statistically similar compliance to washing hands or using Purell after exiting a room (W/P After) (p-value = 0.9).
Table 9: Emergency Department compliance rates

<table>
<thead>
<tr>
<th>ED Compliance</th>
<th>Gloves Compliance (%)</th>
<th>Gown Compliance (%)</th>
<th>W/P Before Compliance (%)</th>
<th>W/P After Compliance (%)</th>
<th>Wash Hands After Compliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor (21)</td>
<td>43%</td>
<td>0%</td>
<td>24%</td>
<td>30%</td>
<td>5%</td>
</tr>
<tr>
<td>Nurse (78)</td>
<td>37%</td>
<td>6%</td>
<td>14%</td>
<td>29%</td>
<td>4%</td>
</tr>
<tr>
<td>Env. Services (5)</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Family (1)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Overall</td>
<td>38%</td>
<td>5%</td>
<td>15%</td>
<td>28%</td>
<td>4%</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

**Observed Policy Compliance of Nurses by Shift**

The team broke down the analysis further to examine if there was a difference between shifts. Overall analysis by shifts was focused on nurses, due to the majority of observations being comprised of nurses. Nurses were also found to have a more structured shift, and analysis focused on the difference between these shifts. The shifts that the team focused on were observations occurring during 7AM to 3PM (AM Shift), and observations occurring during 3PM to 11PM (PM Shift). As discussed in our methodology, the late night shift (11PM-7AM) had very little activity so was therefore excluded from analysis.

Table 10 shows the compliance of nurses during the AM shift versus the PM shift, comparing each part of the CP policy. The team first analyzed the difference in compliance with the gloves policy using Minitab and found that there is no significant difference between shifts for this policy (p-value = 0.178). A similar comparison between the AM and PM nurse for wearing gowns before patient contact found no difference between nurses of the two shifts (p-value = 0.98), although both groups had high compliance rates.

Next, the team compared the AM versus PM compliance for the policy of washing hands or using Purell (W/P Before) before entering a patient room. Both shifts have low observed compliance to this policy and had no significant difference between the shifts (p-value = 0.11).

Comparing the policy of washing hands or using Purell after exiting patient rooms (W/P After) found a significant difference between the shifts (p-value = 0.03), where the PM shift nurses had a higher compliance rate. Similar comparisons of the hand washing policy for *C. difficile* rooms also found a significant difference (p-value = 0.009) between the shifts, where the PM nurses again had a higher compliance rate than the AM nurses.
**Table 10: Nurse Compliance Rates by shift**

<table>
<thead>
<tr>
<th>Nurses</th>
<th>AM Shift: 7AM-3PM</th>
<th>PM Shift: 3-11PM</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM Compliance (%)</td>
<td>N</td>
<td>PM Compliance (%)</td>
<td>N</td>
</tr>
<tr>
<td>Gloves</td>
<td>82%</td>
<td>236</td>
<td>77%</td>
<td>162</td>
</tr>
<tr>
<td>Gown</td>
<td>73%</td>
<td>241</td>
<td>73%</td>
<td>162</td>
</tr>
<tr>
<td>W/P Before</td>
<td>16%</td>
<td>236</td>
<td>11%</td>
<td>162</td>
</tr>
<tr>
<td>W/P After</td>
<td>56%</td>
<td>236</td>
<td>66%</td>
<td>162</td>
</tr>
<tr>
<td>Wash Hands After</td>
<td>28%</td>
<td>32</td>
<td>71%</td>
<td>15</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

**Observed Policy Compliance of Nurses by Floor**

The observational data was further broken down by the floors, where floors with similar functions (i.e. surgery, intensive care) were grouped together for comparison to determine if any has higher compliance rates than others. Because doctors rotate throughout the hospital, comparing doctor compliance by floor to floor is not an accurate representation of specific floor or unit compliance. In addition, since there is not an adequate sample size to compare environmental services staff by floor, they were not included in this comparison. Family was considered to be identical throughout the hospital, as no one is given formal training and there were few variations in their noncompliance from floor to floor. However, nurses remain stationary on their assigned floors and therefore comparing their floor compliance is likely to remain a steady trend. Therefore, floor compliance was analyzed only through nurse compliance.

*Comparing nurses on floors 4, 5, and CVC5: Surgical floors*

Floors 4, 5 and CVC 5 are all surgical floors and therefore grouped together for nurse compliance comparison. Comparing the glove compliance of 4<sup>th</sup> floor to 5<sup>th</sup> floor nurses, compliance rates were found to be significantly different (p-value = 0.002), indicating that 5<sup>th</sup> floor nurses have a higher compliance rate (83%). However, glove compliance rates between 5<sup>th</sup> floor nurses and CVC 5 nurses were not significantly different (p-value = 0.3).

For the gown compliance policy, the 5<sup>th</sup> floor again has the compliance rate at 88%. The 5<sup>th</sup> floor is significantly better (p-value= 0.00) than the 4<sup>th</sup> floor when compared. However, the 5<sup>th</sup> floor and CVC 5 have no significant different in compliance to the gowns policy (p-value = 0.09).

For compliance to the policy of washing hands or using Purell before entering a patient room (W/P Before), all compliance rates are low (11-15%). For the washing hands or using Purell policy after exiting a patient room (W/P After), nurses on floors 4, 5 and CVC 5 have much higher compliance rates compared to W/P Before, each ranging within 66-69% compliance.
Comparing nurses on floors 6, 7, and 8: Medical floors
Floors 6, 7, and 8 were grouped and compared together as they are all medical floors. As shown in Table 12, the gloves compliance of the nurses on floors 6, 7, and 8 is very similar (80-85%). Similarly, the compliance of the nurses to the gown policy is not significantly different for any of the three floors. Compliance for washing hands or using Purell policy before entering a room (W/P Before) is again the lowest for all three floors, especially the 6th floor nurses (8%) compared to the 8th floor nurses (19%) (P-value = 0.03). However, the 6th floor nurses have a much higher compliance rate to the policy of washing hands or using Purell after exiting a patient room (W/P After), at 82% compared to the other floors. This compliance rate is significantly higher than the nurses on the 7th and 8th floor (p-value = 0.00).

Table 12: Compliance to CP policy by Floor 6, 7 and 8

<table>
<thead>
<tr>
<th></th>
<th>Gloves Compliance(%)</th>
<th>N</th>
<th>Gown Compliance(%)</th>
<th>N</th>
<th>W/P Before Compliance(%)</th>
<th>N</th>
<th>W/P After Compliance(%)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor 6 Nurse</td>
<td>84%</td>
<td>73</td>
<td>72%</td>
<td>73</td>
<td>8%</td>
<td>73</td>
<td>82%</td>
<td>55</td>
</tr>
<tr>
<td>Floor 7 Nurse</td>
<td>80%</td>
<td>41</td>
<td>83%</td>
<td>43</td>
<td>17%</td>
<td>41</td>
<td>33%</td>
<td>43</td>
</tr>
<tr>
<td>Floor 8 Nurse</td>
<td>85%</td>
<td>89</td>
<td>81%</td>
<td>89</td>
<td>19%</td>
<td>89</td>
<td>46%</td>
<td>89</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009

Comparing nurses in BICU and CVC 4: Intensive Care Units
The Burn Unit (BICU) and 4th floor of the Cardiovascular Center (CVC4) are both intensive care units and therefore grouped together for comparison. The compliance of BICU nurses compared to CVC 4 nurses for the gloves policy is significantly higher for BICU nurses (p-value = 0.03). However, compliance to the gown policy is not significantly different between the two units (p-value = 0.53). For the policy of washing hands or using Purell before entering a patient room (W/P Before), the CVC 4 nurses are significantly more compliant than BICU (p-value = 0.037). However, for the compliance of washing hands or using Purell after exiting a patient room, BICU nurses are significantly more compliant (p-value = 0.003).

Table 13: Compliance to CP policy by CVC 4 and Burn Unit (BICU) Nurses

<table>
<thead>
<tr>
<th></th>
<th>Gloves Compliance(%)</th>
<th>N</th>
<th>Gown Compliance(%)</th>
<th>N</th>
<th>W/P Before Compliance(%)</th>
<th>N</th>
<th>W/P After Compliance(%)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC 4 Nurse</td>
<td>80%</td>
<td>56</td>
<td>61%</td>
<td>43</td>
<td>20%</td>
<td>46</td>
<td>57%</td>
<td>54</td>
</tr>
<tr>
<td>BICU Nurse</td>
<td>96%</td>
<td>24</td>
<td>52%</td>
<td>23</td>
<td>4%</td>
<td>24</td>
<td>88%</td>
<td>24</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009
Table 14 illustrates doctor, nurse and overall compliance with the policy of hand washing with soap after exiting *C. difficile* patient rooms. It must be noted that few doctors were observed entering *C. difficile* rooms (total of 8), especially on Floors 5, 6, 7 and 8, resulting in the zero compliance for those floors. Therefore, these compliance rates may not be representative of true compliance. The nurses have no significant difference in compliance across the floors. When comparing the compliance of the nurses on the 6th floor to those on the 8th floor, we found no significant difference (p-value = 0.2). Also, when comparing the nurses on the 7th floor to the 8th floor, we found no difference (p-value = 0.6).

<table>
<thead>
<tr>
<th>Floor</th>
<th>Doctor (%)</th>
<th>Nurse (%)</th>
<th>Overall (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>40%</td>
<td>0%</td>
<td>18%</td>
</tr>
<tr>
<td>5</td>
<td>6%</td>
<td>78%</td>
<td>54%</td>
</tr>
<tr>
<td>6</td>
<td>0%</td>
<td>32%</td>
<td>32%</td>
</tr>
<tr>
<td>7</td>
<td>0%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>8</td>
<td>0%</td>
<td>56%</td>
<td>56%</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009; N=567*

Due to the sheer volume and number of observations of nurses entering patient rooms, nurses have a higher potential impact than all other occupations combined. Thus, they were specifically focused on by the student team during data analysis. A graph of nurse compliance rates, broken down by location, was created (Figure 3). The policy with the worst compliance rate across all floors is the hand hygiene before entering a patient room policy (W/P Before). With the exception of floor 4 nurses and CVC 5 nurses, the second lowest policy compliance is that of hand hygiene after exiting a patient room (W/P After).
Figure 3: Compliance Rate of Nurses to CP Policy by Floor Breakdown
*Observations by Student Lean Team, February & March 2009

Survey Data
For the survey sent to UMHS personnel, the breakdown of responses was as follows (Figure 4):

Figure 4: Breakdown of Survey Participants (388 Respondents)
Personnel were grouped into four major categories, based on what they listed as their profession in the survey. The “Administration” category includes all clerks, administrative staff, social workers, and staff whose primary task is not patient interaction. Hospital personnel that designated themselves as any type of nurse (RN, charge, head) or nursing student was grouped together under the “Nurses” category. All physicians, including fellows, attending and medical students were identified as “Doctors.” The “technicians” category included any technical staff in the hospital as well as therapists.

Hospital personnel were asked if they could identify contact precautions (Figure 5) and C. difficile (Figure 6) sign on sight. The survey asked personnel to fill in what precaution the sign signified.

![Precautions](image1)
![C. difficile](image2)

**Figure 5:** Contact Precautions sign presented in survey (left)
**Figure 6:** C. difficile sign presented in survey (right)

For the CP sign, of those who answered incorrectly, the most common responses include Antibiotic resistant precautions (ARP), vancomycin resistance Enterococcus (VRE) precautions, and Isolation, as demonstrated in Table 15 below. The survey identified that a smaller percentage of Technicians and Administration lacked the ability to identify the sign as CP in comparison to doctors and nurses (Figure 7).
Table 15: Most common answers for identifying Contact Precautions signage (Right)

<table>
<thead>
<tr>
<th>Answer</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>83.46%</td>
</tr>
<tr>
<td>ARP</td>
<td>4.33%</td>
</tr>
<tr>
<td>VRE</td>
<td>2.54%</td>
</tr>
<tr>
<td>Isolation</td>
<td>2.80%</td>
</tr>
<tr>
<td>Others</td>
<td>6.87%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388

Figure 7: Percentage of Doctors, Nurses, Technicians and Administration who correctly recognized Contact Precautions sign

The next question asked participants if they were able to recognize the *C. difficile* signage (Figure 8). Among those who responded, 88.97% answered correctly (Table 16), identifying the sign as associated with a *C. difficile* patient. Other common responses (Table 16) included “Did not know” (4.36%), methicillin resistant Staphylococcus aureus (MSRA) (2.56%), and VRE (2.05%).

Table 16: Most common answers for identifying *C. difficile* signage

<table>
<thead>
<tr>
<th>Answer</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clostridium Difficile</td>
<td>88.97%</td>
</tr>
<tr>
<td>Do not know</td>
<td>4.36%</td>
</tr>
<tr>
<td>MRSA</td>
<td>2.56%</td>
</tr>
<tr>
<td>VRE</td>
<td>2.05%</td>
</tr>
<tr>
<td>Others</td>
<td>2.05%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388

Looking at a breakdown of correct responses by personnel type (Figure 8), 95-96% of most doctors and nurses were able to identify the sign correctly compared to 83% of Technicians and 68% of Administration.
Participants were then presented with a list of policies and asked to identify those activities that specifically corresponded to the CP policy. Overall, 58.58% of all personnel surveyed were able to identify all six policies completely (Table 17), whereas 27.81% answered 5 out of 6 correctly.

Table 17: Percentage of respondents who were able to identify CP policies, breakdown by number correct

<table>
<thead>
<tr>
<th>Number Correct</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 6 questions</td>
<td>58.58%</td>
</tr>
<tr>
<td>5 out of 6</td>
<td>27.81%</td>
</tr>
<tr>
<td>4 out of 6</td>
<td>13.31%</td>
</tr>
<tr>
<td>less than 4</td>
<td>0.30%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388

In Table 18 below, bolded headings are activities that are part of the CP policy, whereas italicized ones are not. Among those who were not able to answer all 6 correctly, one noticeable trend was that almost all respondents (91.1%) listed “Gloves for patient contact” as a part of the CP policy, rather than “gloves for room” (40.0%). Additionally, the areas where respondents had the most difficulty identifying CP policies include wearing “gown for interaction with environment” (67.2%) and wearing “gown for bathroom” (57.2%). The results are further broken down by respondents who were able to identify 4 or 5 policies out of 6 correctly. Again, these results show that approximately 40% of each group correctly identified “Gloves for room” as part of CP policy, compared to the 95-96% response rate for “Gloves for patient contact.” For the respondents that identified 5 out 6 correctly, trouble areas included identifying “Gloves for room” (40.4%), and the less problematic “Gown for bathroom” policy (80.85%). However, in the group that identified 4 out of 6 correctly, problem areas included several target areas, with the most significant ones being “Gloves for room” (40.0%), “Gown for bathroom” (48.9%), and “Wash/Purell After Exiting Room” (66.7%). Other policies such as “Gown for environment” and...
“Wash/Purell before Entering Room” were lower (~71-73%) compared to the response rate for those who identified 5 out of 6 correctly (~86-96%).

Table 18: Response breakdown for respondents who did not identify all 6 CP policies correctly

<table>
<thead>
<tr>
<th>Gloves for room</th>
<th>Gloves for pt. contact</th>
<th>Gown for room</th>
<th>Gown for pt. contact</th>
<th>Gown for environ.</th>
<th>Gown for bath</th>
<th>W/p before</th>
<th>W/p after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall:</td>
<td>40.00%</td>
<td>91.11%</td>
<td>20.56%</td>
<td>89.44%</td>
<td>67.22%</td>
<td>57.22%</td>
<td>83.33%</td>
</tr>
<tr>
<td>5 out of 6 correct</td>
<td>40.43%</td>
<td>96.81%</td>
<td>14.89%</td>
<td>98.94%</td>
<td>86.17%</td>
<td>80.85%</td>
<td>96.81%</td>
</tr>
<tr>
<td>4 out of 6 correct</td>
<td>40.00%</td>
<td>95.56%</td>
<td>20.00%</td>
<td>100.00%</td>
<td>73.33%</td>
<td>48.89%</td>
<td>71.11%</td>
</tr>
</tbody>
</table>

*Note: Headings are abbreviated for table use. Full titles are as follows in order from left to right, “Gloves for Room,” “Gloves for Patient Contact,” “Gown for Room,” “Gown for Patient Contact,” “Gown for environment,” “Gown for bathroom,” “Wash/Purell Before Entering Patient Room,” and “Wash/Purell After Exiting Patient room”

*Survey administered by Student Lean Team, February & March 2009; N=388

Additionally, survey results were broken down by personnel type, as indicated in Table 19.

According to Table 19, nurses were able to best identify all 6 of the CP policies at 60.5% compared to Doctors, Technicians and Administration.

Table 19: Percent of Doctors, Nurses, Technicians, and Administration who were able to identify CP policies (by number of policies identified correctly)

<table>
<thead>
<tr>
<th>Number of Questions Correct</th>
<th>all 6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors (65)</td>
<td>38.5%</td>
<td>30.8%</td>
<td>10.8%</td>
<td>15.4%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Nurses (228)</td>
<td>60.5%</td>
<td>23.7%</td>
<td>10.1%</td>
<td>4.4%</td>
<td>1.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Technicians (62)</td>
<td>43.5%</td>
<td>25.8%</td>
<td>17.7%</td>
<td>9.7%</td>
<td>3.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Administration (23)</td>
<td>34.8%</td>
<td>17.4%</td>
<td>17.4%</td>
<td>21.7%</td>
<td>4.3%</td>
<td>4.3%</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388

Participants were then presented with a list of policies and asked to identify those activities that specifically corresponded to the C. difficile policy. Overall, 33.79% of all personnel surveyed were able to identify all six policies completely (Table 20), whereas 43.78% answered 5 out of 6 correctly.

Table 20: Percentage of respondents who were able to identify C. Difficile policies, breakdown by number correct

<table>
<thead>
<tr>
<th>Number Correct</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 6 questions</td>
<td>33.78%</td>
</tr>
<tr>
<td>5 out of 6</td>
<td>43.78%</td>
</tr>
<tr>
<td>4 out of 6</td>
<td>14.32%</td>
</tr>
<tr>
<td>less than 4</td>
<td>8.11%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388
In Table 21 below, bolded headings are activities that are part of the C. difficile policy, whereas italicized ones are not. Among those who were not able to answer all 6 correctly, almost all respondents (93.8%) listed “Gloves for patient contact” as a part of the CP policy, rather than “Gloves for room” (61.2%). Additionally, the areas where respondents had the most difficulty identifying CP policies include wearing “Wash/Purell before Entering Patient Room” (21.2%). The results are further broken down by respondents who were able to identify 4 or 5 policies out of 6 correctly. Similar to the response rates for the identifying the CP policy, again, respondents had a much higher response rate to “Gloves for Patient Contact” (~90-98%) compared to “Gloves for Room” (61.2%). The difference between the two groups become even more striking as they are broken down into groups who identified 4 or 5 out of 6 policies correctly. For the group who identified 4 policies correctly, only 15.0% listed “Gloves for Room” while over 90.5% listed “Gloves for patient Contact” as part of the policy. In addition to not identifying “Gloves for Room” as part of C. difficile policy, the other largest problem area included “Wash/Purell before Entering a Patient Room” for both the groups who got 4 or 5 correct.

Table 21: Response breakdown for respondents who did not identify all 6 C. difficile policies correctly

<table>
<thead>
<tr>
<th></th>
<th>Gloves for room</th>
<th>Gloves for pt. contact</th>
<th>Gown for room</th>
<th>Gown for pt. contact</th>
<th>Gown for environ</th>
<th>Gown for bath</th>
<th>w/p before</th>
<th>w/p after</th>
<th>Soap before</th>
<th>Soap after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall:</td>
<td>61.22%</td>
<td>93.88%</td>
<td>49.39%</td>
<td>94.29%</td>
<td>89.39%</td>
<td>86.94%</td>
<td>21.22%</td>
<td>4.90%</td>
<td>73.47%</td>
<td>94.69%</td>
</tr>
<tr>
<td>5 out of 6 correct</td>
<td>82.10%</td>
<td>98.15%</td>
<td>62.35%</td>
<td>100.00%</td>
<td>99.38%</td>
<td>96.30%</td>
<td>24.69%</td>
<td>3.70%</td>
<td>72.22%</td>
<td>97.53%</td>
</tr>
<tr>
<td>4 out of 6 correct</td>
<td>15.09%</td>
<td>90.57%</td>
<td>20.75%</td>
<td>94.34%</td>
<td>92.45%</td>
<td>90.57%</td>
<td>16.98%</td>
<td>9.43%</td>
<td>79.25%</td>
<td>90.57%</td>
</tr>
</tbody>
</table>

*Note: Headings are abbreviated for table use. Full titles are as follows in order from left to right, “Gloves for Room,” “Gloves for Patient Contact,” “Gown for Room,” “Gown for Patient contact,” “Gown for environment,” “Gown for bathroom,” “Wash/Purell Before Entering Patient Room,” “Wash/Purell After Exiting Patient room,” “Use Soap Before Entering Patient room,” and “Use Soap After Exiting Patient Room”

*Survey administered by Student Lean Team, February & March 2009; N=388

Additionally, survey results were broken down by personnel type, as indicated in Table 22. According to table 22, nurses again were able to best identify all 6 of the CP policies at 40.6%. Doctors and Administration were similarly able to identify policies correctly, at 26%, compared to 19% of Technicians.

Table 22: Percent of Doctors, Nurses, Technicians, and Administration who were able to Identify C. difficile policies (by number of policies identified correctly)

<table>
<thead>
<tr>
<th></th>
<th>Number of Questions Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>all 6</td>
</tr>
<tr>
<td>Doctors (65)</td>
<td>26.2%</td>
</tr>
<tr>
<td>Nurses (224)</td>
<td>40.6%</td>
</tr>
<tr>
<td>Technicians (58)</td>
<td>19.0%</td>
</tr>
<tr>
<td>Administration (23)</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388
The survey also indicated that 97% of personnel felt that signage was a helpful reminder to follow contact precautions or *C. difficile* policies. This percentage did not significantly differ by profession.

When asked how often survey participants follow the policy in their daily activities, 87% of personnel indicated that they did proper hand hygiene before putting on gloves, broken down by personnel type in Figure 9 below.

![Figure 9: Percentage of Doctors, Nurses, Technicians and Administration who report using proper hand hygiene before putting on gloves](image)

However, 99% of participants reported that they followed proper hand hygiene appropriate to the listed signage upon exiting from a patient room.

Survey participants were asked if there were instances when they did not follow CP or *C. difficile* policies and why. Survey comments indicated that a majority of personnel felt that noncompliance during emergency situations was acceptable- due to the student team’s inability to evaluate emergency situations, noncompliance for emergencies were considered an outlying circumstance. The other most commonly identified reasons for not following procedures are indicated in figure 10, with the 280 survey respondents justifying their noncompliance because they were only entering the room for a quick moment.
Of the participants who responded, a majority of doctors (82%) and nurses (78%) indicated that they felt it was acceptable to not follow policy for quick room visits (Table 23). However Administration rarely (9%) listed “quick in and out” as a reason they may deviate from following policy.

Additionally, surveyed personnel were also asked if gloves, gowns and supplies were easily accessible, to help determine if any lack of accessibility existed that may have contributed to noncompliance. 98% of participants listed that these supplies were easily accessible.

**Table 23: Breakdown of personnel who listed “Quick in-and-out” as reason for noncompliance**

<table>
<thead>
<tr>
<th>Profession</th>
<th>Thought quick in-and-out acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>82%</td>
</tr>
<tr>
<td>Nurses</td>
<td>78%</td>
</tr>
<tr>
<td>Technician</td>
<td>42%</td>
</tr>
<tr>
<td>Administration</td>
<td>9%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388

**Table 24: Breakdown of personnel who listed “Did not see need” as reason for noncompliance**

<table>
<thead>
<tr>
<th>Profession</th>
<th>Did not see need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>12%</td>
</tr>
<tr>
<td>Nurses</td>
<td>4%</td>
</tr>
<tr>
<td>Technician</td>
<td>2.22%</td>
</tr>
<tr>
<td>Administration</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388
When asked what precautions the personnel would like to remove from policy, 73% of personnel indicated they did wish to remove any. Additionally, 77% of all personnel felt that the contact precautions policies are sufficient in containing infection. The remaining other responses suggested removing the following parts of the CP or C. difficile policy (figure 11):

![Figure 11: Most commonly identified precautions that personnel felt should be removed from CP policy](image)

Participants were asked for any recommendations they might have, based upon their experience and observations. Comments are compiled in Appendix E. The most common suggestion was to educate family members with information pamphlets, and prevent children from visiting CP or C. difficile patient rooms. Other common suggestions included requiring the use of shoe covers, implementing a system to report noncompliant hospital personnel and educate patients, reminding visitors especially to wash their hands.

Finally, doctors were asked if they felt it was acceptable to keep hands in their pockets during rounds instead of following CP/C. difficile policies. This phenomenon was a common observation for doctors who rounded as a group. Of the surveyed doctors, 41% felt that it was acceptable to keep their hands in their pockets, whereas 59% of felt that it was not (Figure 12).
Conclusions

From the quantitative analysis of observation data and survey responses, the team established the current baseline of personnel compliance to CP policies. The team discovered links between the observation data and survey responses which revealed much about the hospital culture, outlined reasons for noncompliance, staff perception of the policies, and staff perceived compliance rates versus actual observed compliance.

Baseline

Using the findings from the observation data, the team established a baseline of overall compliance for each part of the CP and C. difficile policy, as well as compliance specifically by nurse shift, and nurse compliance by floor. The baseline for the ED policy compliance was also established by individual comparison.

Overall Compliance with the Policy

Overall, with the exception of the ED, the team found that policy compliance followed a trend as listed below (highest to lowest policy compliance):

- Wearing gloves before entering a patient room 69%
- Wearing gown before contact with patient 57%
- Using Purell/washing hands after exiting a patient room 49%
- Using Purell/washing hands before entering a patient room 12%

For C. difficile rooms, the additional policy of washing hands upon exiting a patient room also had a very low overall compliance rate at 34%.
When analyzing the compliance rates by occupation, the team found nurses to generally have a higher compliance rate to policies than doctors and family visitors. However, when compared to environmental services, nurses were found to have similar compliance rates, with nurses having a higher compliance in only one policy (Using Purell/washing hands after exiting a patient room). Observations implied that family members are either not aware of the signs and policies and are many times confused by the signs on doors.

Compliance of Nurses with the Policy by Shift
When analyzing the compliance of nurses by AM (7AM-3PM) and PM (3PM-11PM) shifts, the team found no significant difference between the nursing shifts in the policies for gloves, gown, and hand hygiene before entering a patient room. However, for hand hygiene policies after exiting a CP or *C. difficile* room, the team found that PM nurses have a higher compliance rate than AM nurses as summarized in Table 25 below.

<table>
<thead>
<tr>
<th>Nurses</th>
<th>AM vs PM Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloves</td>
<td>No difference</td>
</tr>
<tr>
<td>Gown</td>
<td>No difference</td>
</tr>
<tr>
<td>W/P Before</td>
<td>No difference</td>
</tr>
<tr>
<td>W/P After</td>
<td>PM higher compliance</td>
</tr>
<tr>
<td>Wash Hands After</td>
<td>PM higher compliance</td>
</tr>
</tbody>
</table>

*Observations by Student Lean Team, February & March 2009; N=618

Emergency Department Compliance to the Policy
The ED was found to be unique to the rest of the hospital, as the compliance rates followed a different trend as listed below (highest to lowest policy compliance):

- Wearing gloves before entering a patient room 38%
- Using Purell/washing hands after exiting a patient room 28%
- Using Purell/washing hands before entering a patient room 15%
- Wearing gown before contact with patient 5%
- Washing hands after exiting a *C. difficile* room 4%

Although the ED treats all CP rooms as *C. difficile* rooms also, the compliance rate for the hand washing policy after exiting a room is the lowest out of all policies. Doctors and nurses were found to have statistically similar compliance rates to hand hygiene policies. Only a few nurses (6% out of 78) were observed to follow the gowns policy; all other personnel did not comply with this policy.

Compliance of Nurses with the Policy by Floor
When comparing the nurses on surgical floors (4, 5 and CVC 5), the team found that CVC 5 and 5<sup>th</sup> floor nurses had similar compliance rates in glove and gown policies, but had significantly higher compliance than 4<sup>th</sup> floor nurses. The compliance rate for hand hygiene before entering
a patient room was low for all three floors, whereas the hand hygiene compliance after exiting a room is higher, but still similar for all three floors.

A comparison of the nurses on the medical floors (6, 7 and 8) found similar compliance rates among all three floors for the glove and gown policies. Again, compliance for the hand hygiene policy before entering a patient room is low across all three floors. However, the compliance rate for hand hygiene after exiting a patient room is significantly higher for the 6th floor when compared to the other two floors.

When comparing the ICU units (BICU and CVC 4), the team found that BICU nurses have a higher compliance to the gloves policy than CVC 4. Nurses on both units have similar compliance rates for the gown policy. CVC 4 nurses have a higher compliance to hand hygiene policy before entering a patient room whereas BICU nurses have a higher compliance rate to hand hygiene policy after exiting a patient room.

For *C. difficile* rooms across University Hospital floors (5 through 8), the team found no significant difference in nurse compliance to the hand washing policy. Due to the limited sample of doctors observed (total = 8) for these rooms, the team was not able to make any specific conclusions regarding doctors and their policy compliance regarding *C. difficile* rooms.

As detailed above, no specific floor was found to have a significantly higher overall compliance than another floor in all policies. In addition, as shown in Figure 3 in Findings, the team found that that compliance rates for the nurses on each floor follows similar trends and that no floor stands out to serve as a model for others to follow.

**Contact Precautions Signage and Education Surveys**

For the majority of both survey and observation data comparisons, doctors and nurses are the focus of analysis and conclusions, as these hospital personnel groups enter patient rooms most frequently, in comparison to Administration and Technicians.

From the survey results, out of 66 doctors, 86% recognized the CP signage. Similarly, out of 232 nurses, 88% recognized it. However only 38.5% of Doctors were able to identify all 6 of the CP policies, compared to 60.5% of Nurses (Table 26). Already, the survey results imply that although doctors are aware of what the signs represent, a small proportion of them know what the actual policies are. According to infection control, being able to identify 5 or 6 out of the 6 CP policies was deemed as having adequate understanding of the policies. According to this revision, a majority of nurses (84.2%) were able to better identify either 5 or 6 of the policies compared to 69.2% of doctors (Table 26). These survey statistics parallel the lower observed policy compliance rate for doctors, implying that doctors might have a less comprehensive understanding of the policies that subsequently lead to their lower level of compliance.
A further analysis of how participants responded in the survey indicated specific trends—looking at all participants (Administration, Technicians, Doctors and Nurses) who responded, 41.42% were not able to identify all 6 of the CP policies correctly. Within this subgroup, respondents were further distinguished by those who identified 5 out of 6 policies correctly, and those who identified 4 out of 6 correctly as target groups of interest. Participants of both groups identified the “Gloves for room” policy accurately about 40% of the time (Table 27), whereas a large majority (91%) incorrectly identified “Gloves for Patient Contact” as being part of the CP policy. This trend in response may indicate that there exists a misinterpretation of the policies, and that while personnel may be educated that gloves are necessary, they are not aware that gloves should be put on regardless of whether or not they have patient interaction. This mistake was common among both groups who got 5 and 4 correct out of 6. Additionally, for the group that identified 4 policies correctly, another major unidentified policy included “Gowns for bathroom” (48.9%) indicating that perhaps this part of the policy is not emphasized during policy education, and therefore not obvious, to personnel.

**Table 26: Summary of Doctors and Nurses ability to Recognize CP Signage and CP policies**

<table>
<thead>
<tr>
<th></th>
<th>Recognize CP Signage</th>
<th>Identify all 6 Policies</th>
<th>Identified 5 or 6 Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>86.0%</td>
<td>38.5%</td>
<td>69.2%</td>
</tr>
<tr>
<td>Nurses</td>
<td>88.0%</td>
<td>60.5%</td>
<td>84.2%</td>
</tr>
</tbody>
</table>

*Survey administered by Student Lean Team, February & March 2009; N=388

**Table 27: Response breakdown for respondents who did not identify all 6 CP policies correctly**

<table>
<thead>
<tr>
<th></th>
<th>Gloves for room</th>
<th>Gloves for pt. contact</th>
<th>Gown for room</th>
<th>Gown for pt. contact</th>
<th>Gown for environ.</th>
<th>Gown for bath</th>
<th>w/p before</th>
<th>w/p after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>40.00%</td>
<td>91.11%</td>
<td>20.56%</td>
<td>89.44%</td>
<td>67.22%</td>
<td>57.22%</td>
<td>83.33%</td>
<td>84.44%</td>
</tr>
<tr>
<td>5 out of 6 correct</td>
<td>40.43%</td>
<td>96.81%</td>
<td>14.89%</td>
<td>98.94%</td>
<td>86.17%</td>
<td>80.85%</td>
<td>96.81%</td>
<td>96.81%</td>
</tr>
<tr>
<td>4 out of 6 correct</td>
<td>40.00%</td>
<td>95.56%</td>
<td>20.00%</td>
<td>100.00%</td>
<td>73.33%</td>
<td>48.89%</td>
<td>71.11%</td>
<td>66.67%</td>
</tr>
</tbody>
</table>

*Note: Headings are abbreviated for table use. Full titles are as follows in order from left to right, “Gloves for Room,” “Gloves for Patient Contact,” “Gown for Room,” “Gown for Patient contact,” “Gown for environment,” “Gown for bathroom,” “Wash/Purell Before Entering Patient Room,” and “Wash/Purell After Exiting Patient room”

*C*Observations and Survey administered by Student Lean Team, February & March 2009; N=388

**C. difficile Signage and Education Surveys**

For the *C. difficile* signage survey and observation data comparisons, doctors and nurses are again the focus of analysis and conclusions, as these staff groups enter patient rooms most frequently, in comparison to Administration and Technicians.

For *C. difficile* signage, 97% of doctors and 96% of nurses recognized the sign. In contrast to these high identification rates, 26.2% of doctors and 40.6% of nurses were able to identify all 6 of the *C. difficile* policies (Table 28). Again, the survey results imply that although doctors and nurses are well aware of what the signs represent, a significantly smaller proportion of them know what the actual policies are. According to infection control, being able to identify 5 or 6 out of the 6 *C. difficile* policies was deemed as having adequate understanding of the policies. According to this revision, a majority of nurses (83.9%) were able to better identify either 5 or 6
of the policies compared to 64.6% of doctors (Table 28). This trend is similar to that observed with CP signage and policy education previously mentioned. These survey statistics again parallel the lower observed policy compliance rate for doctors (25%), implying that doctors might have a less comprehensive understanding of the policies that subsequently lead to their lower level of compliance.

From the observation results the team found that only 25% of doctors and 44% of nurses comply with the hand-washing policy for \textit{C. difficile} rooms (Table 28), while the majority of respondents (~98%) indicated on the survey that they follow proper hand hygiene policy after exiting a patient room. Compared to the knowledge demonstrated in identifying \textit{C. difficile} policies, the level of observed compliance to washing hands with soap and water after exiting a room is far less. These results imply that although both doctors and nurses are aware of the signage and the policy implications, a far smaller portion are actually compliant.

\textbf{Table 28: Summary of Doctors and Nurses ability to recognize \textit{C. difficile} signage, policies, and wash hands}

<table>
<thead>
<tr>
<th></th>
<th>Recognize \textit{C. difficile} Signage</th>
<th>Identify all 6 Policies</th>
<th>Identified 5 or 6 policies</th>
<th>Wash Hands After Exit (Observed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>97.0%</td>
<td>26.2%</td>
<td>64.6%</td>
<td>25%</td>
</tr>
<tr>
<td>Nurses</td>
<td>96.0%</td>
<td>40.6%</td>
<td>83.9%</td>
<td>44%</td>
</tr>
</tbody>
</table>

*Observations and Survey administered by Student Lean Team, February & March 2009; N=388

Again, looking further to all participants (Administration, Technicians, Doctors and Nurses) who responded, 66.2% were not able to identify all 6 of the \textit{C. difficile} policies correctly, a much higher incorrect response rate than for CP policies. Within this subgroup, respondents were further distinguished by those who identified 5 out of 6 policies correctly, and those who identified 4 out of 6 correctly as target groups of interest. Participants of both groups identified the “Gloves for room” policy accurately about 61.2% of the time (Table 29) (higher than 40% previously identified for the CP policy), whereas a large majority (90-98%) incorrectly identified “Gloves for Patient Contact” as being part of the \textit{C. difficile} policy. This trend response again may indicate that there exists a misinterpretation of the policies, and that while personnel may be educated that gloves are necessary, they are not aware that gloves should be put on regardless of whether or not they have patient interaction. This mistake was especially common among the group that identified 4 out of 6 policies correctly, who identified needing “Gloves for room” in only 15% of the responses. Both groups additionally did not identify needing to “Wash or Purell Before (W/P Before)” as a necessary part of the policy (21.22%). However, an overwhelming majority (94.7%) correctly identified the need to wash with “Soap After” as part of the \textit{C. difficile} policy. These survey results indicate that while personnel are aware that there exist differences between the CP and \textit{C. difficile} policy, certain aspects of it, such as “gloves for room” and “Wash/Purell before” are not as obvious to recognize.
Table 29: Response breakdown for respondents who did not identify all 6 C. difficile policies correctly

<table>
<thead>
<tr>
<th></th>
<th>Gloves for room</th>
<th>Gloves for pt. contact</th>
<th>Gown for room</th>
<th>Gown for pt. contact</th>
<th>Gown for environ</th>
<th>Gown for bath</th>
<th>w/p before</th>
<th>w/p after</th>
<th>Soap before</th>
<th>Soap after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall:</td>
<td>61.22%</td>
<td>93.88%</td>
<td>49.39%</td>
<td>94.29%</td>
<td>89.39%</td>
<td>86.94%</td>
<td>21.22%</td>
<td>4.90%</td>
<td>73.47%</td>
<td>94.69%</td>
</tr>
<tr>
<td>5 out of 6 correct:</td>
<td>82.10%</td>
<td>98.15%</td>
<td>62.35%</td>
<td>100.00%</td>
<td>99.38%</td>
<td>96.30%</td>
<td>24.69%</td>
<td>3.70%</td>
<td>72.22%</td>
<td>97.53%</td>
</tr>
<tr>
<td>4 out of 6 correct:</td>
<td>15.09%</td>
<td>90.57%</td>
<td>20.75%</td>
<td>94.34%</td>
<td>92.45%</td>
<td>90.57%</td>
<td>16.98%</td>
<td>9.43%</td>
<td>79.25%</td>
<td>90.57%</td>
</tr>
</tbody>
</table>

*Note: Headings are abbreviated for table use- Full titles are as follows in order from left to right, “Gloves for Room,” “Gloves for Patient Contact,” “Gown for Room,” “Gown for Patient contact,” “Gown for environment,” “Gown for bathroom,” “Wash/Purell Before Entering Patient Room,” “Wash/Purell After Exiting Patient room,” “Use Soap Before Entering Patient Room,” and “Use Soap After Exiting Patient Room”

*Observations and survey administered by Student Lean Team, February & March 2009; N=388

General Survey Conclusions

In order to improve compliance to policies, survey participants were asked general questions about how effective they found infection control methods. The results indicate that:

- 97% of personnel found signage to be a helpful reminder to follow policies
- 98% of personnel feel gowns, gloves and supplies are easily accessible
- 77% of personnel feel current polices to be effective in containing infection

These findings indicate that despite personnel reporting that they feel the policy is effective in containing infection, and that supplies are easily accessible, the observed policy noncompliance must then be due to variations in personnel behavior. During observations, the team noted that supplies were always available at the hospital personnel’s disposal and therefore should not be a significant complaint.

Additionally, from the observation data, the team found that, with the exception of the ED, hospital in-patient units and the CVC are properly following the signage system. Contact Precaution patient rooms were properly identified with a green CP sign, while C. difficile patient rooms had the green CP sign in addition to the “No Purell” (Figure 6) sign. However, in the ED, the CP sign is used as an inclusive substitute to indicate both CP and C. difficile precautions. Based on the collected data, it is unclear whether all ED personnel are aware of this distinction, as compared to signage in the rest of the hospital.

From the observation results, the team found that the policies with the lowest compliance were:

- Wash/Purell hands before entering patient room 12%
- Wash/Purell hands after exiting patient room 49%

The survey results indicated that 87% of personnel self-reported doing proper hand hygiene (gloves, wash/Purell) before entering CP or C. difficile patient rooms. 99% of personnel similarly admitted to doing proper hand hygiene after taking off gloves. These self-reported compliance rates, when compared to actual observed compliance rate, indicate that there
exists a large discrepancy between what personnel think they are doing, and what they actually do.

This dichotomy may exist due to misinterpretation of the policies as well. For example, hospital personnel may Purell hands after exiting a C. difficile patient room, believing that they are following policies properly, and therefore reporting themselves as compliant. However, as C. difficile patient rooms require hand washing with soap and water upon exit, these individuals would be observed to be noncompliant, which may explain the differences between observation compliance and survey self-reported compliance.

These misinterpretations of the policy extend into situations where personnel feel exceptions may exist. Survey results revealed that many respondents admitted to being noncompliant during situations when they entered patient rooms briefly, as a quick “in-and-out” circumstance. Out of the 388 participants, 272 responses identified as this reason (quick in-and-out) to be an acceptable reason to deviate away from CP or C. difficile policy. Similarly, hospital personnel reported noncompliance towards hand hygiene for situations that involved moving from one patient room to another. For these instances, personnel indicated that they may wash/Purell hands only once upon exiting a patient room and before entering a new patient room, whereas policy indicates that hand hygiene must be done each times. Survey respondents justified these situations by saying that because they washed/Purell hands in the interim between entering patient rooms, this was an acceptable deviation from policy.

Other major reasons for noncompliance included being short on time (22%), simply forgetting to follow policies (28%). Addressing these issues should lead to an increase in policy compliance. Additionally, personnel rated emergency situations as reasons for noncompliance. Due to the urgent nature of emergencies and the immediate care necessary, these situations were not taken into account as “reasons” of noncompliance, as compared to non emergent settings.

During observations, the team observed that doctors, especially when rounding in a group, did not wear gloves. Instead, they were observed to put their hands in their coat pockets while entering patient rooms. This question was posed specifically to doctors in the survey, where out of 43 doctors surveyed, 49% reported that they found it an acceptable practice. However, in most cases, doctors do end up touching something in the patient’s room although they don’t intend to. However many medical students commented that during rounding, they feel obligated to enter and exit rooms as quickly as possible, forgoing proper precautions, in order to avoid hindering the lead resident or doctor they are following.

**Recommendations**

Overall, the team recommends shifting the University Hospital’s culture to be more hand hygiene oriented, where both hospital personnel and patients alike work together to prevent disease spread. This change in culture may be facilitated by several modifications and additions to hospital operations, including but not limited to, modifying or clarifying existing policy.
methods to be more effective, implementing failsafe mechanisms for staff, creating an accountability system, and educating patients and visitors.

Culture
The team recommends pushing the UH for a “contact precautions culture”. By placing big Purell bottles placed around the hospital simply reminding patients, hospital personnel, and visitors to take precautions, regardless of whether or not they visit a CP patient room. The team recommends placing a table at the entrance of the hospital with a volunteer to help remind visitors to do proper hand hygiene. Hospital personnel should be constantly reminding each other to follow policy; this will require education, since many don’t know why these precautions are important.

Education
The survey analysis indicates that signage while signage is easily recognized by hospital personnel, the policies themselves are not as well understood by hospital staff. Therefore, frequent education and clarification of policies may be necessary to ensure that the hospital personnel understand what is expected and when exceptions to the policy, if any, exist.

Based on concerns identified by personnel in the survey, the team also recommends that steps be taken to educate the patient about their condition and the proper precautions to take. By explaining what safety measures the patient should take, and the importance of each, infection may be contained to a minimum, avoiding public hospital areas. This education should include precautions for activities such as leaving the room for a walk, and visiting the cafeteria. As the hospital stresses the importance of these precautions to the patient, the patient can also actively take part in preventing disease spread.

Similarly, additional recommendations include educating the visitors (including family) about the policies that exist. Currently, there are no policies that exist with regards to visitors. After interacting with patients, visitors forgo proper precautions, and potentially carry infections back to public hospital areas. From here, infections can easily spread to patient rooms, putting vulnerable patients at higher risk to the disease. Patient families should therefore be informed about CP and C. difficile policy as quickly as possible upon entrance into the hospital.

Suggestions include requiring all visitors to check in with a clerk or nurse who can verify whether or not the patient being visited is identified with any precautions. The clerk or nurse can then inform the visitor of the proper precautions to take (as necessary) while interacting with both the patient and hospital environment. Areas such as the major entrances and elevators should have signage urging visitors to check in with hospital personnel before visiting the patient. Additional information pamphlets explaining the importance and proper procedures to follow may facilitate visitor compliance.

Since many patients are put into contact precautions after being admitted to the hospital, the family may not be aware of the acquisition of any bacteria. We recommend adding onto the signage a checkbox labeled “Visitors/Family,” which can be marked off once the nurse has
educated the family. Thus, if a nurse walking by a CP or C. difficile patient room notices family
inside without the box being marked off, they can use this opportunity to educate patient family.

Failsafe Mechanisms
Based on the observations and survey data, the team recommends placing covers over the Purell
bottles both the inside of C. difficile patient’s room, as well as those placed in the immediate
vicinity outside the patient room. These bottles should be covered with a sign (preferably with
illustrations for quicker comprehension) reminding personnel to wash hands instead. This
provides a failsafe method to prevent Purell use when in and exiting a C. difficile patient room,
increasing personnel compliance.

Accountability
The team also felt that accountability on the part of the personnel who do not follow the policy
would help improve policy compliance. Methods implemented by other institutions include a
“hotline” where hospital personnel can report noncompliance of colleagues. This will help
hospital personnel report anyone that is not complying, so that they are given a warning.
Although this system exists with UMHS, it is not widely publicized, and further awareness of the
system may help increase personnel compliance. During observations, the team also noticed an
increase in compliance when personnel realized that there were observers watching them.
Thus, another way to ensure compliance is to frequently have members of the infection control
department round for compliance observations, so that hospital personnel is aware that they
are being watched. These rounds should occur randomly, to prevent hospital personnel from
having biased or patterned compliance.

The team recommends a strong push for policy accountability. The team recommends having
the Nurse Manager play a role in observations and accountability since they will have the most
access to hospital personnel during the day. The team recommends a three month period in
which the Nurse Manager holds all personnel accountable if they see a lapse in compliance, even
just to remind fellow colleagues to follow policy. If these policies are rigorously enforced for
three months, they can eventually be instilled in the culture. It is important to hold one hospital
personnel role (Nurse Manager) accountable for compliance of floor, as they will feel personally
responsibility towards policy adherence.

New Technology
Another possible option can include implementing technology that can help monitor hand
washing without manual observance. The University of Iowa recently developed a sensor
monitor system called ZigBee that monitors hand hygiene compliance by using pagers placed in
specific spots (personnel, patient bed, sink) that all communicate with each other. Sensors on
the pagers record activity as the proximity between the two decrease. For example, as hospital
personnel approach a sink to wash hands, the sensor on the personnel’s pager communicates
with the sensor on the sink, recording time of day, duration of wash and other details. The same
pager can communicate with sensors located on patient bed, indicating whether or not the
personnel have performed proper hand hygiene before approaching a patient bed. This data is
recorded and automatically updated into server system within the hospital, allowing compliance
rates to be studied in a much more effective and accurate manner. However this system must be thoroughly analyzed in terms of effectiveness in implementation in a hospital as large as UH, while taking costs into account. However this technology should be kept in consideration for further research.

Further Studies

Some issues or concerns that the team came across throughout the duration of the project, which are of extreme interest but out of the scope of this project, will be provided here for possible future studies.

The first issue is the accuracy of the CP patient list provided by the computer systems of the UH. Patients who are listed as CP have to be manually entered and removed from the system. The team often found patients on the list that had been removed from precautions but remained on the list and patients that were on precautions but were not on the list.

The second concern is the spread of infection through hand accessories such as rings, watches, bracelets, etc. This concern was brought up both through the team’s observations and comments received from the survey.

The third concern is the possibility of infection spread through shoes. Concerns were that bacteria could be picked up and spread by shoes. Suggestions included periodic bleaching of floors and the requirements for disposable “booties”.

The fourth issue is the compliancy rate of the environmental service staff and the food staff. The two occupations comply with different CP policies, and the team did not have enough observational data to make concrete conclusions about these two groups.

Lastly, extensive cost-benefit analysis could be done on all the recommendations the team provided above; ranging from the cost of additional education to the new ZigBee technology.
Appendix A: Articles in Literature Search

1. "PATIENT SAFETY : NEW RECOMMENDATIONS TO PREVENT HOSPITAL INFECTIONS."

   Summary
   This article discusses new recommendations placed by the European Union to
   prevent hospital infections. The key recommendations include establishing or
   strengthening reporting and learning systems, embedding patient safety in the
   education and training of health care workers, involving patients in the
   development of safety measures and providing patients with relevant information
   on health risks and safety issues. The document also encourages the sharing of best
   practice and expertise in this field.

   how concerned should we be?." CMAJ: Canadian Medical Association Journal 180.4
   Feb. 2009

   Summary
   This article discusses the impact of antibiotic-resistant organisms such as C. difficile
   and how they are a major public health concern, particularly in hospitals.
   “Antibiotic-resistant organisms appear to be biologically fit and are capable of
   causing serious, life-threatening infections that are difficult to manage because
   treatment options are limited. This increase in the prevalence of drug-resistant
   pathogens is occurring at a time when the discovery and development of new anti-
   infective agents is slowing down dramatically. There is concern that in the near
   future, we may be faced with a growing number of potentially untreatable
   infections.”

From journal: “Clostridium difficile”

C. difficile is the major cause of diarrhea associated with antibiotic use and is the most
common infectious cause of nosocomial diarrhea. A major outbreak of C. difficile infection
occurred in many hospitals in Quebec beginning in 2002. (32,61) Markedly increased disease
rates (as high as 156 cases per 100 000 people) and severity occurred, especially among
elderly people. In this outbreak, there was often a poor response to metronidazole therapy.
(61,62) The emergence of such severe disease is thought to have occurred because of the
presence of a hypervirulent epidemic strain of C. difficile, known as PCR ribotype 27, or
North America pulso-type 1 (NAP1). (63) The same strain of C. difficile has caused extensive
and severe disease in the United States and Europe. (33) It is not clear why this strain
appeared and caused such severe disease in the past few years, but this may in part be
related to changing patterns of antimicrobial use in hospitals. The NAP1 strain associated with these outbreaks is resistant to fluoroquinolones, and fluoroquinolone use was found to be a major risk factor for C. difficile-associated disease in the Quebec outbreak. (32) The NAP1 strain has now been identified in most provinces, and it has become the predominant strain in many hospitals, indicating the potential for severe outbreaks in many parts of the country.


Summary
In this journal, the authors report that hand hygiene and the use of personal protective equipment to prevent transmission of infectious diseases has been suboptimal in many observational reports and studies. Considering the potential consequences that these breaches in barrier precautions may pose to clinicians, patients and institutions, it is essential to understand what obstacles to compliance may be present in the healthcare setting and how to overcome them. The two main barriers outlined are education – educating staff on policies and on importance of infection control, and fatigue (or excess patient workload / staffing shortage).


Summary
This is a study on compliance with infection control precautions at primary healthcare facilities. The reasons for non-compliance given by staff were grouped into 6 categories:

- Facilities
- Knowledge
- Views and opinions
- Physical barriers
- Staffing
- Management

Recommendations made were as follows:

- Education and training of individual staff groups
- A review of the facilities provided for hand hygiene and the use of protective clothing
- A review of policies to ensure that they are primary care specific
- Wider dissemination of evidence-based infection control guidelines to address the 'not a risk' and 'lack of evidence' issues
- Occupational health services being more fully involved in the investigation of skin problems caused by soap and gloves
- Better involvement of occupational health in purchasing consumables
- Training staff in phlebotomy, wearing gloves from the start
- A review of staffing levels
- Managers being encouraged to support infection control activities by involving them more fully in education, training and policy development.


**Summary**

This is a study on staff compliance with hand sanitation at healthcare facilities. Findings include:

- Hand decontamination was performed too seldom and haphazardly by most nurses, but technique was not as poor as in some studies (Larson 1988, Larson and Kretzer 1995)
- Glove use was not as wasteful as commonly thought
- Performance of infection control activities was strongly related to the availability of resources and can be controlled by budgeting, but this is not always desirable
- Nurses were interested in, and concerned about, infection control. They could recognize poor provision of resources in their clinical areas accurately
- Better knowledge of infection control did not have a strong association with observed behavior
- Overall performance was superior in hospital B, which had better resources but was without recently updated infection control guidelines


**Summary**

This article states that ultimately cost is the factor resulting in higher or lower infection rates at different hospitals. Hospital layout is an issue. Ms. Wiseman, RCN infection control adviser says, with few single rooms available in the NHS. 'If you
have an outbreak in a patient in a six-bed bay, you have five other potentially infected patients,' she says. Professor Cookson said in a recent article about MRSA that changes to the hospital environment had encouraged the spread of MRSA in the UK (Cookson 2005). These include:

- A reduction in the number of hospital beds, leading to increased ward transfers
- Decreased lengths of stay, so that some infected patients leave before MRSA is detected
- Increased staff workloads, resulting in less time to deal with infection control
- High rates of bed occupancy--sometimes they can be more than 100 percent


**Summary**

This article describes how overuse of antibiotics led to an increase in *C. difficile* rates. Experts suggest that confirmed patients with *C. difficile* should be put in private rooms, and gloves and gowns should be worn by healthcare workers when treating them.


**Summary**

This article in the Canadian Medical Journal defines *C. difficile*, its symptoms, and preventative measures. Hand washing with soap and water and cleaning with bleach is essential. Also, rings and wristwatches should not be worn when working as they can act as a reservoir for *C. difficile*. 
Appendix B: Benchmarking—Contact Precaution Policies at other Facilities

1) **What are the contact precaution policies you have in place specifically to minimize the spread of selected communicable diseases, conditions or microorganisms, which may be transmitted by direct contact with the patient or items in the patient's environment?**

- Policy: "Transmission-Based Precautions" states: Gloves and gown for contact with the patient or the patient's environment. *(Olathe Medical Center)*
- We have an overall "Isolation Policy" that includes droplet, contact, airborne, AFB, and Enhanced isolation. For contact isolation the patient is put in a private room, staff entering must wear gown and gloves, and hands must be cleansed prior to leaving the room. Housekeeping uses their normal quat for cleaning but the follows with a bleach wipe down on high risk units as determined by infection control surveillance. *(St. Joseph's Hospital)*
- Patients identified w an MDRO are placed on Contact precautions in our computer {private room, glove, gowns, disinfect equipment etc] - they are maintained on CON until they have had 2 neg surveillance swabs off abx.(*Winchester Hospital*)
- Contact Precautions as defined and outlined by CDC guidelines: gown and gloves on entering room, etc. *(Shands at the University of Florida)*
- We use 2 categories of contact precautions: C – Contact for diarrhea and C diff – emphasizes hand hygiene w/ soap and water and D – Drug resistant precautions for MRSA and VRE – emphasizes respiratory etiquette for pt contact and aerosol producing procedures. They both require gloves for pt and pt environment contact, gown if clothing may contact pt or pt environment and emphasize equipment and surface disinfection. *(Northwest Medical Center)*
- We have protocol allowing nursing to isolate per CDC without MD order, all conditions requiring isolation. *(Health Management Associates)*
- **Purpose:** Transmission-Based Precautions are used to interrupt the transmission of infectious organisms. There are three types of Transmission Based Precautions, which may be used alone or in combination for diseases that have multiple routes of transmission. When used alone or in combination, they are used in addition to Standard Precautions.

*Equipment:* Appropriate door signs, chart and rand stickers, and personal protective equipment

*Policy and Practice: Contact Precautions*

Contact, or touch, is the most common and most significant mode of transmission of infectious agents. Patients in Contact Precautions include those patients who are
colonized or infected with Antibiotic Resistant Organisms (ARO, such as MRSA, VRE), Clostridium difficile ("C. diff") infection, or other organisms deemed significant by Infection Control. Contact transmission can occur by directly touching the patient, contact with the patient’s environment or by using contaminated gloves or equipment.

HAND CLEANSING IS THE MOST IMPORTANT ACTIVITY TO PREVENT TRANSMISSION!

CLEANSE HANDS with antimicrobial soap or alcohol-based hand cleanser before caring for patient and after contact with ANYTHING in the room.

ALWAYS CLEANSE HANDS AFTER REMOVING GLOVES.

Patients in Contact Precautions require:
- Private Room, Dedicated, disposable equipment (e.g., stethoscope, blood pressure cuff, thermometer, etc.).
- Any shared equipment used is to be cleaned with hospital disinfectant (including disinfectant-impregnated wipes)
- Wearing of gown and gloves when entering the room.

Discontinuing precautions:
- Consult with Infection Control before discontinuing Contact Precautions:
  - Clostridium difficile: when patient’s diarrhea is resolved
  - MRSA: consult IC when admitted

(Alta Bates Summit Medical Center)

2) **Do you have any additional precaution policies specifically for Clostridium difficile? If so, please describe them.**

- No. (Olathe Medical Center)
- For C. dif we have contact isolation signage that is similar but also says everyone entering the room must wash their hands with soap and water prior to leaving the room and this includes visitors. The patient with C. dif is taken out of isolation after 48 hours with no diarrhea. (St. Joseph’s Hospital)
- We designate them Contact Plus+ and have a special bright green sign - the major difference is hand washing w/ soap & water and housekeeping uses a bleach solution to clean the room. (Winchester Hospital)
- We place a red sticker on Contact Precautions sign as a flag for Environmental Svc. to use the bleach solution to clean the room. Also, we remove alcohol gel and place a card in it instead that reminds folks to use soap and water hand washing. (Shands at the University of Florida)
- We use 2 categories of contact precautions: C – Contact for diarrhea and C diff – emphasizes hand hygiene w/ soap and water and D – Drug resistant precautions for MRSA and VRE – emphasizes respiratory etiquette for pt contact and aerosol
producing procedures. They both require gloves for pt and pt environment contact, gown if clothing may contact pt or pt environment and emphasize equipment and surface disinfection.) (Northwest Medical Center)

- No additional precautions for C. diff). (Alta Bates Summit Medical Center)
- Remove alcohol hand sanitizer from room with signage to use soap and water. EVS cleans room with bleach. (Health Management Associates)

3) Have your C. difficile rates been steady, increasing or decreasing?

- Decreased dramatically 2006 to 2007, very slight decrease 2007 to 2008. (Olathe Medical Center)
- Slowly increasing. Lab reports indicate cases in the community, unrelated to hospital stays, are also increasing. (St. Joseph’s Hospital)
- They were fairly stable until we added the bleach cleaning and now we are trending downward especially the last four months. (Winchester Hospital)
- Neither one, recently. Spike of both number of cases and extreme severity of cases in 2004. Antibiotic management, use of bleach for cleaning, and probiotics for patients on antibiotics seems to have worked well, and we are now running consistently below our pre-2004 levels. (Shands at the University of Florida)
- It’s steady. (Northwest Medical Center)
- We go up and down but do see a slight increase currently. (Alta Bates Summit Medical Center)
- Decreased, very little C-Diff transmission. (Health Management Associates)

4) How do you ensure staff compliance to those contact precaution policies?

- Daily IC rounds, annual education, Infection Control liaisons. (Olathe Medical Center)
- Just through education and IC monitoring of compliance. (St. Joseph’s Hospital)
- Remind, remind, remind - though actually they are pretty good. (Winchester Hospital)
- Periodic monitoring of supplies to make sure that the gowns, etc. are readily available, and ongoing monitoring as we round on the units. We do "on the spot" corrections when non-compliance is observed, and report occurrences to unit management. We also encourage staff in support departments, who were complaining about nurses and physicians not doing the precautions, to report to IC when they observe non-compliance. Some of them are not willing to do this because they "don't want them mad at me", but others will report. (Shands at the University of Florida)
- Daily rounds, general education, we have not audited w/ observation. (Northwest Medical Center)
• We “walk about” with spot education if not being followed (or praise if warranted), teach at in service, orientation, ...... basically we preach. (Alta Bates Summit Medical Center)

• We monitor this like hand hygiene with secret observers and report compliance rates. Offenders are trended and disciplined per progressive disciplinary plan. (Health Management Associates)

5) How effective are those policies and how do you think you could improve them?

• As effective as a written policy can be, I guess. It is reviewed each year and improved/amended. (Olathe Medical Center)

• We think they help keep nosocomial rates down. (St. Joseph’s Hospital)

• I think our downward trend says something is working. We are working with a group of staff on one unit to improve compliance with many aspects of Infection prevention and tracking their infection rates- they're working on one aspect at a time - the prior 4 months was Hand Hygiene - this 4 months is Environmental cleaning - next four month will be Isolation compliance so it will be interesting to see what they observe when that is the focus. (Winchester Hospital)

• Could only improve with more staff to be "out there" more to observe on a more consistent basis -- including nights, weekends, etc. (Shands at the University of Florida)

• Consistent staff compliance. I like using the 2 categories. The issue of whether gloves/gowns being donned prior to room entry for any purpose is controversial. We still currently allow staff to enter room if they touch nothing. (Northwest Medical Center)

• Our HAI rates, especially with MRSA (which has increased tremendously in the community) have remained stable or decreased. So I’d say they’re working. (Alta Bates Summit Medical Center)

• After they knew they were watched and a few folks written up, compliance went way up. (Health Management Associates)

6) What are the problematic areas or concerns, if any, with those policies or with policy compliance?

• As with any policy, who reads it besides the administrative people? I would be very surprised if front-line nurses actually access this policy. (Olathe Medical Center)
• The biggest problem is staff turnover and the time it takes to comply with isolation requirements. Staff are spread very thin and have numerous requirements. Ongoing education by IC is just another burden to them. (St. Joseph’s Hospital)
• Some staff just don’t "get it" but slowly but surely we are getting to them. (Winchester Hospital)
• Compliance is viewed as an inconvenience, although the reasons have been communicated many times, in many ways. It takes extra time, it slows people down in getting done what they need to do, etc. Overcoming negativity in this regard is my major problem. (Shands at the University of Florida)
• Staff do not want to don gloves/gowns if they think they are not touching anything or performing pt care. (Northwest Medical Center)
• We started active surveillance cultures in January. We don’t yet know if the rate of MRSA positive nares will increase. But, if it does, we may find ourselves w/o enough beds to isolate the additional # of patients. Staff is always trying to expand on the number of reasons that they do not have to don PPE when entering an isolation room. The staff in Women and Infants area thinks that their patients are not at risk for the same organisms as the med surge patients, thus immune to the need for PPE or Contact Precautions. (Alta Bates Summit Medical Center)
• Physician compliance and I include them in the monitoring and report to administration. (Health Management Associates)

7) Do you have any other comments regarding this issue?

• CDC readily admits that the usage of isolation gowns has not been adequately demonstrated to prevent nosocomial transmission of organisms, but that a combination of interventions prevents this transmission. Modern healthcare is to be evidence-based. I would like to see a definitive study that we can use to show that yes, isolation gowns are necessary for all Contact Precautions patients. (Olathe Medical Center)
• We continue to have some problems with our computer system "losing" isolation indicators and I find someone in a 2 bed that should have been admitted to a private but generally it works well. (Winchester Hospital)
• Re education is never ending. We are regularly asked to re evaluate pts on isolation to free up beds. (Alta Bates Summit Medical Center)
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## Appendix C: Contact Precautions Data Sheet

<table>
<thead>
<tr>
<th>Unit</th>
<th>Unit Rm</th>
<th>Who (Doc, Nurs, Foot, CLO, etc.)</th>
<th>Foot</th>
<th>CP sign on door (if closed)</th>
<th>Alcohol before entering room</th>
<th>Gown before contact (with pt's eyes or face)</th>
<th>Gloves before contact (with pt's eyes or face)</th>
<th>Equipment before cleaning</th>
<th>C. diff handwash before and after</th>
<th>C. diff handwash after</th>
<th>Hand hygiene (Purell)</th>
<th>Date</th>
<th>Observer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
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Appendix D: Part of Survey that was Distributed to Hospital Personnel

2. CP1

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
</table>
| 1. This sign below indicates that the patient is under which precaution category? (Please enter text.) | [Image of sign with instructions: Visitors: Report to the Nurses' Station Before You Enter This Room. Staff: to enter the room. Visitors: when participating in patient care activities. Wear Gloves: to enter the room. Wear Gowns: for contact with the patient, the patient's environment or bathroom. Visitors: when participating in patient care activities. Staff and Visitors MUST wash hands when entering and exiting room. Body Substance Precautions at all times. Usted no entienda cualquier parte de este signo, favor de llamar 4-701 para un idioma del hospital. To reach the sign, please contact Infection Control & Epidemiology. (503) 417 or 714 at 417 or 714.]

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4. CP3

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What are Contact Precaution policies? Check all that apply.</td>
<td>[Checkboxes for: Wear glove to enter room, Wear glove for patient contact, Wear gown to enter room, Wear gown for contact with patient, Wear gown for contact with patient's environment, Wear gown for contact with bathroom, Wash/Purell hands before entering room, Wash/Purell hands after exiting room.)</td>
</tr>
</tbody>
</table>
6. CPS

1. Are the signs for CP and C. diff helpful reminders?
   - Yes
   - Mostly
   - Not really
   - No

2. Are gloves and gowns easily accessible?
   - Yes
   - Mostly
   - Not really
   - No

3. Do you have the habit of using Purell or washing your hands with soap before putting on surgical gloves?
   - Purell
   - Washing hands with soap
   - Neither

4. Do you have the habit of using Purell or washing your hands after taking off surgical gloves?
   - Purell
   - Washing hands with soap
Appendix E: Survey Comments from Questions 10 and 15 of Survey

Q10: Do you think current Contact Precaution policies are sufficient in containing infection?
1. They are not being followed.
2. I believe they help, but there needs to be more education for families to reduce spread of infection.
3. Interns, residents, and attendings seldom follow the policy.
4. I would like to have visible instructions for these patients when they choose to leave the room, e.g. when walking in hallway for exercise.
5. The tools in the room, especially writing utensils, medical devices - stethoscope, reflex hammer, etc. make me feel uncomfortable. I think they are a bit inadequate, and honestly if no one else on my team puts on a gown, as the med student I am not going to speak up to make everyone on my team wear a gown. It is a bit attending/resident dependent or nurse dependent, if the nurse is insistent and present, the team will all wear gowns.
6. I see a lot of nurses contact the patient then get things in the nurse server or not even use gloves at all when in contact with the patient.
7. I haven't seen the data but there appears to be fair degree of laxity about this on the wards at all levels. The nursing staff is great at adherence to precautions but the medical staff isn't always terribly careful.
8. I think the extra time required should be considered when assigning these patients to nurses; they should count as 2 patients or some type of formula should be developed.
9. I wish to cover my shoes with disposable shoes wrap to avoid carrying contaminated secretions in my shoes.
10. Food services do not follow the policy.
11. Patient doors should remain closed. Nothing is done about transporting infectious microbes on the shoes. Patients and families do not receive adequate, if any, education regarding transmission of infectious microbes. I have seen visitors with their babies crawling on the floor of C-Diff rooms. Family members almost never wear gowns or gloves even if they are helping the patient to the bathroom, etc. CP
patients regularly get up and help themselves to water and coffee in the nutrition room despite signs not to enter, often refilling their used cup from the pt room.

12. For those in a patient room not touching patient- make everyone say "I’m not touching the patient". They might start out not touching the patient but doesn't always stay that way. Would be easier just to say- everyone entering room much have gown and gloves on.

13. I feel when you have more than one patient on your assignment and you are busy, you over look things like putting a gown or gloves on when you enter the room to check a pump or hang IV's.

14. Not everyone contains the patient in the room and allows patient to general bathroom area.

15. Not all staff follow CP. Discharge rooms are not always thoroughly cleaned (e.g. yesterday 2 CP rooms did not have privacy curtain changed until I asked for it).

16. If all areas follow the guidelines; i.e. portable CXR, EKG, patient transportation, environmental services, etc.

17. I strongly feel that the use of "Contact precautions" terminology is confusing. To me BSP are contact precautions. Wearing gloves/ washing hands. This always confuses me. I was taught that contact precautions were interchanged with BSP and not ARP.

18. Many people do not follow the precautions and sometimes we don't know about the infection until after we have had contact with the patient.

19. Too many patients come in with contact precautions that could be screened right away and are not.

20. There is no strict adherence to the policies from every discipline. It is individuals only.

21. There are several occasions when the ARP is not mentioned in report and or not passed along/informed by the lab or doctor.

22. Concerns with linen disposal and diet trays.

23. Legs are not covered, back is not covered, and hair is not covered. Shoes are not covered.
24. I still feel like booties should be worn, because items are dropped on the floor and being picked up by staff and patients. Floors are not being properly cleaned by housekeeping staff, they are so DIRTY!!! Families are not complying because they get mixed info from each staff member. They don't want to wear the gowns their entire visit, which could be the entire 24hr period. I don't blame them but they then are not washing their hands when leaving the room.

25. Some patients who are ad lib don’t pay attention to their role in contact precautions

26. Not in containing acenetobacter- still having problems and are using further isolation practices

27. Need to crack down on medical teams rounding in the morning. They tend to not gown up when seeing pts on rounds or glove/wash hands.

**Q15: What are additional contact precaution policies that you would add?**

1. Remove Purell bottles from outside C.diff rooms

2. Educate family members-with informational pamphlet

3. Shoe covers for personnel

4. Have a way to report staff that is noncompliant

5. Reminding patient to wash hands; educate patients about precautions

6. Training for cleaning staff; especially for after patient leaves, they may not wipe down walls; curtains not always changed, nor is box of gloves

7. Better notification that patient is ARP before they come to unit; Carelink should indicate what kind of precaution

8. Masks for personnel

9. Classes for all professions

10. Provide Littman stethoscopes to be used in CP rooms so that doctor’s are not contaminated

11. Minimize the number of times you enter the room

12. Sinks outside room for hand washing instead

13. ICU sinks need to be closer to entrance
14. CP procedures should be followed for all patients until cleared in ICU

15. Paper towel dispensers by door so that after washing hands, can use paper towel to open door

16. Add bright tape around patient to indicate how far u can go without needing protections

17. Education about utensils such as pens/reflex hammers

18. No kids in CP patient rooms; educate family members- they go into nutrition rooms and contaminate everything, nutrition rooms need card access

19. No cohorting, if pt's assisted to same RN too easy to forget and cross contaminate.

20. More training for physical therapists when they are taking them out for a walk etc.

21. frequent re-education of MDs, especially in AM rounds

22. Hospital should provide scrubs- C diff may not be killed with regular laundering

23. Longer circumferential gowns

24. Wearing mask when changing linens and in bathroom

25. Frequent cleaning of bathroom and room (twice a day)

26. Don’t let patient go to cafeteria

27. Limit people to enter during rounds

28. Re-write the CP signs, ambiguous

29. Ban visitors from visiting if they don’t follow precautions

30. Disposable blood pressure cuffs

31. Make sure the contact precautions are followed 100% of the time even if it is only a slight possibility they have c. diff or ARP

32. Education on all areas of precautions chemo, contact, respiratory, there are always conflicted opinions and sometimes no definite answer.

33. Educate transportation

34. There needs to be something done with the bathroom as soon as a patient gets done using it even if they only urinate.
35. Patient should be in a closed examination room. In our area often in the hall initially. Also, there are no private bathrooms.

36. Attempt to pair patients that have the same strains for nursing assignments

37. Attendings MUST also follow the policies.

38. Stricter regulations on cleaning equipment those patients have used.

39. I suspect that there is fair bit of contamination of stethoscopes, door handles and light switches as well as other medical equipment.

40. No white coats in patients rooms. Practitioners should wear scrubs that they put on and take off as they come in and leave the hospital.

41. I would like to see a study that proves that the gowns as opposed to good hand washing/glove use and gowns only when in direct contact with source of ARP actually decrease infection rates throughout the hospital.

42. I would enforce the house care workers and transporters. They seem to be out of the loop when it comes to the spread of the micro-organisms.

43. I feel the attendings should not be wearing shirts/ties they should be wearing scrubs that can easily be changed if any substance/contact occurs.

44. Too many nurses are in CP rooms with no gloves or gowns and touching pt and IV pole.

45. Different sign **blocking entrance** to CP rooms