Materiel Services, University of Michigan Hospital

Standardize Storage & Maintenance of Inpatient Isolation Materials

Final Report – Team 1

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EXECUTIVE SUMMARY
The University of Michigan (UM) Hospital has been experiencing a steady increase in the number of patients requiring isolation, and the UM Hospital anticipates that this volume will continue to increase. To prevent communicable diseases from spreading, health care providers entering rooms of patients in isolation are required to wear isolation materials, such as disposable cover gowns, gloves, and masks. Currently isolation materials are stored just outside the isolation patient rooms but there is no standardized storage model for these items within the UM Hospital. Materiel Services (MS) requested that an IOE 481 team develop a standard set of storage containers and processes for storing and restocking isolation materials.

The team analyzed the current processes associated with storing and restocking isolation materials used by various units at the UM Hospital. The team performed a literature search and contacted other institutions to obtain information on what other health care providers have found to work well. Also, the team interviewed staff, gathered and analyzed materials usage data, and quantified the cost associated with various solutions to find a solution. The belief is that standardizing isolation material storage containers and the restocking process will help the UM Hospital ensure the health and safety of caregivers, patients, and visitors. The project has been completed and the team developed a set of recommendations for standardization.

Background
The UM Hospital treats patients with a variety of communicable diseases that require the patient to be put in isolation. Persons entering an isolation room are required to wear protective garments to prevent the spread of communicable diseases. The isolation materials are stored in various containers outside an isolated patient’s room so anyone entering the room can easily access the materials.

No standardized process for storing and restocking isolation materials outside patient rooms currently exists. Previously, the UM Hospital attempted to standardize the storage of isolation materials and tested the use of isolation stations that hung on a patient’s door, but the isolation stations hung too low, and equipment often hit the stations while being moved in or out of rooms. Because the hanging isolation stations were not successfully implemented, the hospital is still using non-standard containers to store isolation materials. The IOE 481 team was asked to find a standard storage container and to develop a standard procedure to restock the isolation materials for isolation rooms.

Methodology
The team met informally with 40 nurses, techs, and unit hosts from 28 units in the University Hospital (UH), Mott, and Cardiovascular Center (CVC) and discussed different methods used to store and restock isolation materials. Additionally, the team developed and distributed an electronic survey, via SurveyMonkey, to caregivers on all the UH General Care (UH GC), UH Intensive Care (UH ICU), Mott, and CVC units that might be affected by the study to gauge their feelings on the current isolation container solutions. The team also corresponded with hospitals in the University Health Consortium (UHC) and cold called 10 US hospitals to better understand how other systems store and restock their isolation materials. Based on the interviews and observation, the team developed process maps for the various procedures used to move and restock isolation containers in the different parts of the hospital.
The team also obtained the prices of the different isolation material storage container alternatives and examined the cost of having different teams take ownership for the restocking processes, for example, unit caregivers versus MS staff.

Using three different methods, the team validated how frequently isolation materials were used on each of the units. First, the team observed specific units and tallied the number of times someone put on isolation materials. Second, the team monitored how the inventory levels of gowns stocked outside isolation patient rooms changed throughout the day. Last, the team used historical data, from May 2009 through November 2009, of the number of patients in isolation and compared this to the number of gowns ordered per unit to derive the number of gowns used per patient day in isolation.

**Findings**

The overall feedback from the internal surveys suggests that 91% of caregivers feel having a container directly outside the patient room is a good reminder to put on isolation materials before entering an isolation patient room. The survey also indicated the number of gowns used per isolation patient differs greatly across different areas of the hospital. The survey results also showed that stocking out of isolation materials (outside of isolation rooms) is somewhat common. Responses from the two written response questions helped the team focus on specific aspects of the current process to improve – aesthetics and sanitization of the cart. The literature search and cold calls revealed that most hospitals use a cart system for supplying isolation materials to caregivers. Of the 10 hospitals the team cold-called, 8 had their MS department responsible for restocking materials.

While developing the process maps, the team discovered that most units do not have an established policy for who is responsible for moving, restocking, and cleaning the containers.

Isolation carts commonly used in UM Hospital cost between $350 and $750 more than wall-hanging isolation stations. The team also analyzed how much it would cost different departments to restock the isolation material storage containers. Having MS restock the containers would require about 4.9 hours of time, or a cost of about $26,800 per year. Having each unit restock their own containers would cost about $55 per year across the hospital.

The three different methods the team used to explore isolation material revealed the UH ICUs use about 70 gowns per isolation patient per day, the UH GC floors, the general care CVC floors, and Mott use about 30 gowns per isolation patient day, and the CVC ICU uses about 45 gowns per isolation patient day. The team also found that the number of isolation patients on each unit varies significantly throughout the hospital.

**Recommendations**

The team recommends UM Hospital purchase two different sized isolation carts to hold isolation materials. The size of the container each unit should receive depends on the historical isolation material demand. UH ICU units on floors 4, 5, 6, 7, and 8 should receive the large carts. Also, MS should own 12 small carts in case a unit sees an unusually high number of isolation patients. These carts should be visually different than the other carts so it is clear that it needs to be
returned to MS when no longer in use. It is recommended that a total of 181 carts are purchased; 34 large and 147 small. At $907 for each large cart and $565 for each small cart, the expected cost to purchase all the carts is $114,000.

Each of the carts should contain disposable gowns, two sizes of latex gloves, masks, goggles, bleach wipes, alcohol wipes, hand sanitizer, a trash can, and two copies of each isolation sign. The carts should also be labeled with its unit and an identification number (1, 2, 3 etc) to make locating, tracking, and counting carts simple. The outside of each drawer should be labeled with the drawer contents to make finding and restocking specific items easy. The standard layout of the carts is shown in Figure 10 to Figure 13 on page 32. This standard layout is default for the manufacturer (smallest drawer on top, largest on bottom). However, if it is possible to adjust this configuration then the ideal setting would be to have the gown drawer(s) on top and the safety stock drawer on bottom.

The carts should have drawer dividers in each drawer to keep the materials organized according to the layout in Figure 15 on page 34. The dividers would cost approximately $250 per cart. Also, on top of the cart there should be glove box holders, a holder for a bottle of hand sanitizer, and a small trash can. These accessories on top of the cart would cost $110 per cart.

Restocking should occur two different ways. First, a full restock should be done by an MS staff member once every day. The staff member will fill all isolation supplies in each cart to capacity, including contact precaution signs. The staff member will also be responsible for wiping down the surface of the carts with bleach wipes for sanitation purposes. The team found that a full restock done by MS, as opposed to a caregiver, results in a cost-savings of about $28,000 and it is important for caregivers to direct their attention to patient care.

Second, during each shift the charge nurse on each unit will assign an employee to monitor inventory levels using the indicator system. A small, circular magnet on all the drawers that contain isolation materials that is green on one side and red on the other should be used to indicate when a maintenance restock is needed. Throughout the day, if a nurse sees that a drawer is running low on materials, the nurse will turn the magnet over to show red, and the caregiver designated by the charge nurse will restock the drawer. The units should not need to restock drawers very often, but the system allows for the units to accommodate the variability in the number of isolation materials used for each patient. The team recommends piloting this system on one unit and monitoring its effectiveness. If the pilot reveals the system as ineffective, the nurse in charge of the patient’s room should restock that cart.

Each unit will store their own isolation carts, even when they are not in use. Each area of the hospital has a different floor plan; some offer ample storage for carts, and others offer none. To account for these differences each area of the hospital will store unused carts slightly different. UH GC and UH ICU units should turn around the cart at the patient room to show a sign fixed to the back reading: “Not In Use”. The CVC has storage space at the end of the hallway to store isolation carts. There is storage space available in Mott for isolation carts. Because it would be difficult for MS to know when carts should be delivered or removed from in front of an isolation patient room, the patient’s head nurse is responsible for delivering or removing the cart from in front of an isolation patient room.
INTRODUCTION
The University of Michigan (UM) Hospital, a world class facility located in Ann Arbor, Michigan, has been experiencing a steady increase in the number of patients requiring isolation, and the UM Hospital anticipates that this volume will continue to increase. Patients can be put in isolation for several reasons, including being diagnosed with Clostridium difficile (C. diff), Methicillin-resistant Staphylococcus aureus (MRSA), or more recently, the H1N1 virus. To prevent these and other communicable diseases from spreading, health care providers entering rooms of patients in isolation are required to wear isolation materials, such as disposable cover gowns, gloves, and masks. Visitors of isolated patients are also advised to wear these protective garments. Because a large number of patients are in isolation, a large quantity of isolation materials is required for patient interactions. Currently isolation materials are stored just outside the isolation patient rooms but there is no standardized storage model for these items within the UM Hospital. Many units have adopted their own policies and procedures to address the storage and restocking policies. Even within a single unit, nonstandard containers are often used to store isolation materials. For example, plastic tote carts, old carts that have been repurposed, and overbed tables have all been observed as storage containers for isolation materials. The UM Hospital would like to standardize isolation material storage.

Materiel Services (MS) requested that an IOE 481 team develop a standard set of isolation material storage containers and processes for storing and restocking isolation materials. MS also requested a list of items and quantities required for isolations as well as a cost analysis of the current and recommended states.

The team analyzed the current processes associated with storing and restocking isolation materials used by various units at the UM Hospital. The team performed a literature search and contacted other institutions to obtain information on what other health care providers have found to work well. The team has formulated a plan to standardize the containers and process for restocking isolation materials. To attain this goal, the team interviewed staff, gathered and analyzed materials usage statistics, and quantified the cost associated with various solutions. The belief is that standardizing isolation material storage containers and the restocking process will help the UM Hospital ensure the health and safety of care providers, patients, and visitors. The project has been completed and the purpose of this report is to present our analysis, findings, conclusions, and recommendations.

BACKGROUND
The UM Hospital treats patients with a variety of communicable diseases that require the patient to be put in isolation. To prevent communicable diseases from spreading, health care providers entering rooms of patients in isolation are required to wear isolation materials, such as disposable cover gowns, gloves, and masks. Visitors of isolated patients are also advised to take similar precautions. There are different levels of isolation, which are communicated through colored signs posted on the outside of patient rooms. Depending on the level of isolation, a person entering a patient room may not be required to wear every type of isolation material. The isolation materials are stored in various containers outside an isolated patient’s room so anyone entering the room can easily access the materials. An example of this accessible location in the UM Hospital is shown in Figure 1. Throughout the hospital, this area outside a patient’s
A room where an isolation material storage container may exist can be referred to as a “bay.” Currently, most units are unsure who is responsible for placing and removing the isolation material storage container from the bay.

![Diagram of hallway with two patient rooms and an isolation material storage container between them.]

Not all areas of the hospital are arranged as shown in Figure 1. Some areas simply have bays with the doorframe flush with the wall, and other areas have sliding glass doors leading to the patient rooms. Any hospital room can house an isolation patient and one adjacent room may house an isolation patient while the other does not (for example, in Figure 1, if Room 1 has an isolation patient, Room 2 may or may not).

Currently, no standardized process for storing and restocking the isolation materials outside patient rooms exists. In addition, at least seven different types of containers are used to store isolation materials throughout the hospital, such as plastic totes, old repurposed carts, and overbed tables. Some of these containers are shown in Figure 2.
Previously, the UM Hospital attempted to standardize the storage of isolation materials and tested the use of isolation stations that hung on a patient’s door. The hanging isolation stations looked similar to the one shown in Figure 3.
As noted by the MS Director and the MS Specialty Carts Supervisor, the hanging isolation stations hung too low, and hospital bed arms and other devices often hit the stations while being moved in or out of rooms. Because the hanging isolation stations were not successfully implemented, the hospital is still using non-standard containers to store isolation materials. Therefore, the team was asked to find a standard storage container and to develop a standard procedure to restock the isolation materials for isolation rooms. Since each area of the hospital (UH General Care, UH Intensive Care, Mott, and Cardiovascular Center) has different needs, standardizing a storage container for each area was considered.

**KEY ISSUES**
The following key issues drove the need for this project:
- Non-standard isolation material storage containers throughout the hospitals
- Unclear procedures for who is responsible for bringing an isolation storage container to a room when needed
- Unclear procedures for who is responsible for removing an isolation storage container from a room when it is no longer needed
- Unclear who cleans carts
- No established procedures for restocking isolation materials
- No benchmark number of supplies to stock
- No benchmark number of isolation supply containers to have on a unit
- Uncertainty in what containers comply with fire codes

**GOALS AND OBJECTIVES**
The primary goals of this project were to select a standard isolation material storage container and to develop a standardized process to restock the appropriate materials in an organized fashion in the storage containers.

To achieve this goal, the team completed the following tasks:
- Interviewed and surveyed personnel familiar with the current processes
- Received feedback from the University Health Consortium (UHC) participants, a network of hospitals, about their current isolation material storage systems and the level of standardization in their hospital processes
- Completed a search for literature discussing isolation cases
- Cold called hospitals comparable to UM to discuss their isolation storage policies
- Observed and noted quantitative and qualitative aspects of the current process at UM Hospital
- Developed process maps for the current processes (each unit handles isolation materials differently)
- Analyzed the cost of maintaining current isolation materials processes compared to alternatives
- Reviewed fire code regulations to ensure recommendations are in compliance
After completing these tasks, the team developed recommendations to:

- Standardize isolation material storage containers according to the needs of the departments. For example, because the needs of an ICU differ from the needs of a unit in Mott, the team considered providing one type of standard storage container for all ICU units and one type of standard storage container for all Mott units.
- Standardize the process for restocking isolation material storage containers.
- Develop process maps for the recommended processes.

Secondary goals of this project that will result by accomplishing the primary goals are:

- Establish isolation materials system that is aesthetically pleasing and looks organized, clean, and professional.
- Increase compliance with the isolation precaution policy in the UM Hospital System by presenting materials in a more organized and readily available manner through standardization.

**PROJECT SCOPE**

The project scope included:

- Isolation materials process in UH General Care (UH GC), UH Intensive Care (UH ICU), Mott, and Cardiovascular Center (CVC) units.
- Isolation material storage containers and materials for inpatient rooms.
- Policies and procedures for restocking isolation material storage containers.

The project scope excluded:

- Outpatient rooms or ancillary areas.
- Raw material procurement done by Materiel Services.
- Policies to ensure that people follow the contact precaution guidelines.

**EXPECTED IMPACT**

The outcome of this project will affect processes associated with isolation material restocking and isolation material container storage on the unit floors of UH GC, UH ICU, CVC, and Mott. The processes of Materiel Services will also be impacted.

A standardized set of processes that units must follow for obtaining, stocking, and using isolation containers will be developed. The new processes will remove the ambiguity about who is responsible for stocking the containers and will help ensure the containers are placed in front of a patient’s room when needed. Establishing responsibility will prevent much of the misuse, confusion, and many of the mistakes that currently surround the isolation material storage containers. Standardizing the materials stored in the containers and where each of the materials should be stored within the container will also make using the containers easier. Standardization might also increase compliance with caregivers wearing materials when entering isolation patient rooms.
METHODOLOGY
To make accurate final recommendations, the team needed to get qualitative as well as quantitative information. The team wanted to get a good numeric representation of the current state while receiving valuable insight and information from the staff in order to develop a more robust recommendation.

Internal Survey
The team developed and distributed an eight-question survey electronically, via SurveyMonkey, to UM Hospital the staff that is impacted by isolation materials on all the UH GC, UH ICU, Mott, and CVC units. Respondents submitted feedback in October and November 2009. The questions selected for the survey focused on giving the team a better understanding for isolation material usage, staff tendencies and traits, and general satisfaction with the current isolation material processes. The team has analyzed the survey feedback and used the results to estimate isolation material usage. The qualitative feedback was noted to be sure that the final recommendations account for the needs and concerns of those using the isolation material storage containers regularly. The survey can be found in Appendix A.

External Survey
The team corresponded with hospitals in the UHC via email on October 14, 2009 sent by the Director of Value Analysis at the University of Michigan Hospital and Health Systems on behalf of the team, to better understand how other systems store and restock their isolation materials. The team created a short survey asking about how isolation materials are handled in other hospital systems to benchmark different isolation materials processes. Responses were received in October 2009. A copy of the survey can be found in Appendix C.

Interviews
In addition to surveying hospital staff, the team interviewed hospital staff in Nursing, MS, Safety Management Services, and Environmental Services. The purpose of these interviews was to better understand the current system. The team interviewed various leaders in the aforementioned departments, as well as the staff who work with the current system on a daily basis. Interviews took place between September and December 2009. The topics covered in the interviews were:
- Isolation material restocking processes
- Isolation material storage container cleaning process
- Fire code & safety rules pertinent to the project
- Isolation materials required in container according to Infection Control
- Isolation material container storage

Literature Search
A literature search was conducted to search for studies and best practices around:
- Isolation material storage containers
- Storage containers that function similar to isolation materials containers
- Stocking and maintenance of isolation material storage containers or similar containers
The team searched through online article databases and the University of Michigan Library system and found around 10 quality publications that touched on topics surrounding isolation and patient equipment, but none of these publications provided detailed data or discussion about the topics listed above. A few publications confirmed specific hospitals used carts for their isolation containers, but beyond that the literature search did not result in the amount of detailed information the team had hoped for.

**Cold Calling**
The team called other hospital systems across the United States during October and November 2009 to benchmark findings and data to help formulate recommendations. The team asked the hospital systems questions regarding the type of isolation material storage container at that hospital, who owned and stored those containers, who restocked them, and the size of the hospital. The relevant information for each hospital can be found in Appendix E. The team contacted the MS Department (called Central Services in some systems) for the following hospitals to discover their current isolation materials processes:

- Ohio State University Health System (Columbus, OH)
- North Shores University Health System (Evanston, IL)
- Beth Israel Deaconess Medical Center (Boston, MA)
- Duke University Hospital (Durham, NC)
- Alta Bates Summit Medical Center (Berkley, CA)
- Mayo Clinic Hospital System (Rochester, MN)
- University of California Los Angeles (Los Angeles, CA)
- Johns Hopkins (Baltimore, MD)
- Mount Sinai (New York, NY)
- Kings County Hospital (New York, NY)

**Process Mapping**
The team created two current process maps, based on informal staff interviews, for the various procedures used to move and restock isolation material storage containers on the units throughout the hospital. UH GC, UH ICU, and CVC had similar processes, so they share a single process map. Mott had significant variation in personnel responsibilities and was mapped by itself. The team determined that a process map of how MS restocks new isolation supply containers was not needed because this is a simple process that happens infrequently. While developing the process maps, the team discovered that most units do not have an established policy for many of the process map steps. The completed process maps can be found in Appendix G.

**Cost Analysis**
To perform an overall cost analysis for the isolation materials, the team obtained the prices of various isolation container alternatives. These alternatives include a wall-mounted isolation materials container and multiple sizes and styles of metal carts. In addition to the cost of the container, the team accounted for the cost to restock the container. To determine the cost for MS to restock the container, the team measured the duration of time for a person to walk around the hospital to all units in scope as well as the average time spent to restock a container.
**Isolation Material Usage Data**

The team monitored how often isolation materials are used with three different methods. First, the team observed a specific unit for two hours and tallied the number of times someone put on isolation materials. This observation allowed the team to determine how many gloves, gowns, and other isolation materials are used in a shift, while observing who goes into the room and when. The team collected 10 hours of data using this method representing 5 different units.

Second, the team observed the changing inventory levels of the gowns throughout the day. An initial inventory of each isolation storage container in 12 units was taken at the beginning of a shift. Every two to three hours the inventory was counted again to measure how many gowns had been used. This usage observation was conducted for a total of 12 units for approximately one shift per unit.

Third, the team derived the gown usage from existing isolation patient data and gown ordering data. The team obtained data from Infection Control regarding the number of patients in isolation broken down by unit going back to May 2009, and the team obtained data from MS regarding the number of gowns ordered by each unit going back to May 2009. The team used this information to determine how many gowns are used per patient per day in each unit.

**Number of Isolation Patients**

The team developed a two faceted approach to establish the number of isolation patients across the hospital and within each of the units. First, the team went to the hospital for one week from September 27 – October 3, walked through each of the units within scope, and counted the number of isolation patient rooms. Next, the team contacted Infection Control and was given around 200 days of historical isolation patient data. Each day of data contained a list of each patient in isolation, what unit each of the patients was on, and the reason the patient was in isolation. The data examined spanned from May 1, 2009 – November 11, 2009. The team compared its collected data to the reports from Infection Control to ensure the numbers in the report were accurate. Knowing the number of isolation patients in the hospital was critical to develop a recommendation for the number of isolation storage containers required.

**FINDINGS**

The team followed the aforementioned methodology and used a number of tools to analyze the information. For the survey results, the team quantified the results to better understand what responses were popular. To look at the isolation patient data the team used Excel charts and functions to better understand the information.

**Internal Survey Results: Current System Is Inefficient**

To understand the current state of the isolation material processes in the UM Hospital, the team analyzed the results of the SurveyMonkey survey. Questions one and five have been omitted from the team’s analysis because the results of the questions do not directly influence the final recommendation. Results from all questions can be found in Appendix B.
**Question 2: Isolation Containers Outside Isolation Patient Rooms Remind Caregivers to Wear Isolation Materials**

As shown in Figure 4, 91% of all survey respondents from across all units felt that having the isolation container directly outside the patient room reminded them to wear isolation materials before entering the room.

![Pie chart showing 91% Yes, 9% No](image)

**Figure 4. Staff Feels the Isolation Container Outside Isolation Rooms is a Good Reminder**

Collected by IOE 481 Team 1, October 2009, N=215

As shown in Table 1, the UH ICUs had significantly fewer staff report that the isolation material storage container outside the contact precaution room reminded them to wear isolation materials. This is likely due to half of the UH ICU units keeping an isolation material storage container outside all patient rooms at all times, regardless of whether the patient in the room was in isolation or not. The UH ICU units also tend to keep equipment in the hallways, so the caregivers are accustomed to seeing items outside the patient rooms, desensitizing them to the effect of isolation material storage containers seen in other departments.

<table>
<thead>
<tr>
<th>Does the Isolation Container Remind You to Put On Isolation Materials?</th>
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<tr>
<td>Majority %:</td>
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<tr>
<td>Majority Response:</td>
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**Table 1. Isolation Container Outside Isolation Room is Not as Good a Reminder in UH ICU**

Collected by IOE 481 Team 1, October 2009, N=215

**Question 3: The Average Number Of Times Staff Enters A Specific Patient’s Room During A Shift Varies Between Departments**

This was an important question because the results allowed the team to estimate how many isolation materials each unit is expected to use per patient isolation day. As seen in Table 2, caregivers tend to enter patient rooms more frequently in UH ICU and CVC units than in UH GC
or Mott units. The results are not surprising considering the elevated care required by ICU and CVC patients.

Table 2. Number of Times Per Day Caregivers Enter Room Varies
Collected by IOE 481 Team 1, October 2009, N=216

<table>
<thead>
<tr>
<th>How many times in a shift do you enter a single patient’s room?</th>
<th>Majority %:</th>
<th>UH GC</th>
<th>UH ICU</th>
<th>CVC</th>
<th>Mott</th>
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<tr>
<td>Majority Response:</td>
<td></td>
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<tr>
<td>11-15 times per shift</td>
<td>36%</td>
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<tr>
<td>20+ times per shift</td>
<td>58%</td>
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<tr>
<td>20+ times per shift</td>
<td>37%</td>
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<td>1-5 times per shift</td>
<td>37%</td>
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More than 50% of care providers in the UH ICUs reported that they enter a patient’s room more than 20 times in one shift. This differs significantly from the responses from other units. Figure 5 shows the responses from the UH ICUs.

How many times on average during a shift do you go into a specific patient's room?

![Pie chart showing room entry frequency]

Figure 5. ICU Caregivers Frequently Enter Patient Rooms
Collected by IOE 481 Team 1, October 2009, N=42

For the UH GC units, the reported average number of times a care provider entered a patient’s room during a shift varied between one to five times, to more than 20 times. The majority of care providers in the UH GC units reported entering the room between 11 and 15 times in one shift while generally it was less common to enter a room only one to five times during a shift. Thirty-seven percent of the Mott survey respondents reported they enter patient’s rooms 1-5 times per shift, while 32% reported entering 6-11 times.
Question 4: Individual Isolation Material Storage Containers Are Running Out Of Materials Occasionally

For this question, respondents were asked to rank on a scale of 1 to 6 how often during a shift, the isolation containers run out of materials. A response of 1 indicated the unit never ran out of materials while a response of 6 indicated the unit very often ran out of materials. Across all respondents, the average ranking was 2.96, indicating respondents occasionally find isolation storage containers on their units running out of materials. Similar to the question asking how many times caregivers entered the patient rooms, the responses to this question varied greatly between departments. Mott units very rarely ran out of materials while UH GC, UH ICU, and CVC units reported running out occasionally. The team investigated the isolation storage containers and restocking policies used in Mott to see how they differed from other departments in the hospital and attribute the low stock-out rate to the Mott unit hosts and techs frequently monitoring and restocking isolation containers. Table 3 summarizes the responses.

Table 3. UH GC and CVC Run Out of Materials More Frequently

<table>
<thead>
<tr>
<th></th>
<th>UH GC</th>
<th>UH ICU</th>
<th>CVC</th>
<th>Mott</th>
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</thead>
<tbody>
<tr>
<td>How often do the isolation storage containers run out of materials?</td>
<td><strong>Average:</strong> 3.23</td>
<td>2.63</td>
<td>2.96</td>
<td>1.8</td>
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<td></td>
<td>on scale of 1-6 (6 being &quot;Very Often&quot;)</td>
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Question 6: The Current Isolation Materials Process Is Working Fairly Well

The team asked caregivers if they felt the processes currently used to restock and distribute isolation materials worked well. On a scale of 1 – 6, with a response of 6 indicating the process is working “very well”, the average score across all units was 4.4. These results were promising; the caregivers feel that although not perfect, the system is working. With these results, the team saw potential to build a new system around the existing infrastructure and further explored what particular aspects of the current system were liked and which were disliked. In the UH ICUs, for example, the average score reported was 4.53 and 29% of the respondents said the processes worked very well. Despite such a high score, 21% of UH ICU respondents rated the current process as 3, and 21% rated the current process as 4. Further exploring the data, the team found that the respondents that rated the process as working “very well” were all from Unit 5D. A summary of the question results is shown in Table 4.

Table 4. Current Restocking Process Leaves Room for Improvement

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<tr>
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<th>UH GC</th>
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<tr>
<td>How well is the current process working?</td>
<td><strong>Average:</strong> 4.43</td>
<td>4.53</td>
<td>4.44</td>
<td>3.81</td>
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<td>on scale of 1-6 (6 being &quot;Very Well&quot;)</td>
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Question 7: Caregivers Like Certain Aspects Of The Current Process

The team asked two open-ended questions in the survey. The first asked about what the staff liked about the current process. Of the 114 responses, 46% of them stated that they liked the convenience of having all of the isolation materials right outside the patient’s room. Around 10
of the respondents reiterated that seeing an isolation material storage container outside of the patient room is a good reminder to wear isolation materials before entering. Three respondents noted that it easy to overlook the contact precaution sign posted on the outside of the door, especially when the door is open. Eleven respondents commented that the system works only because the techs or unit host are constantly restocking the materials. Although many of the isolation material storage container processes work, they require a substantial amount of effort from caregivers to maintain. Across all the units, 12 respondents said they liked the large capacity of the isolation material storage container on their unit. Looking deeper into the data the team found that all these responses came from units that have containers storing more than 60 gowns. Finally, a single respondent commented that having a tall isolation material storage container, that didn’t require bending to access materials, was much appreciated.

**Question 8: Caregivers Dislike Certain Aspects of the Current Process**

The second open-ended question asked what the caregivers would like to change about the process. There were 121 responses to this question, which is about the same number of respondents that answered Question 7. Figure 6 shows the seven most popular responses. The three most popular responses showed that the respondents felt the current storage containers look “unprofessional” or “cheap”, dislike the lack of standardization throughout the hospital, and would like a new type of isolation material storage container. Some respondents noted that a new isolation material storage container was desired because the current solution did not provide adequate storage for isolation materials. Respondents also felt that the current restocking system should be changed so that caregivers are not spending too much time away from patients.

![Figure 6. Most Caregivers Are Concerned with Aesthetics and Cart Sanitization](https://via.placeholder.com/150)

*Figure 6. Most Caregivers Are Concerned with Aesthetics and Cart Sanitization*

*Collected by IOE 481 Team 1, October 2009, N = 121*
**External Survey Results**

The team only received three responses from hospitals within the UHC. The responses can be found in Appendix D. The team addressed three main elements in the survey:

1. The type of isolation material storage container used at that hospital
2. Who is responsible for restocking the containers and
3. The amount of variation between units as far as an isolation material container.

The team found that two of the hospitals that responded use carts and one uses wall-mounted isolation stations. Similarly, two of the hospitals held each unit responsible for restocking the isolation containers, while one hospital had Environmental Services conduct the restocking. Finally, all three hospitals stated that they do not have any variation of isolation material storage containers between units.

**Interviews**

**Restocking – Nurses**

Many nurses have stated they would prefer to have the units restock the isolation material storage containers so they can assure the frequency and quality of the restock. Some nurses have expressed a strong opinion that restocking should be done by MS so that the caregivers can focus on patient care.

**Restocking – Materiel Services**

Materiel Services would prefer to have the units continue restocking the isolation material storage containers. One reason for this is that MS feels they are already overwhelmed with the amount of work they have to complete at the hospital.

**Cleaning – Nurses**

In the team’s interviews with nursing staff, they received different feedback on cleaning the isolation storage containers in different units. A nurse in the UH GC was unsure if they were cleaned at all, while a nurse on a unit in Mott stated that Environmental Services cleaned the isolation storage containers. Some nurses said they thought the isolation material storage containers were cleaned, but were unsure of when they were cleaned or who was responsible for cleaning them.

**Cleaning – Materiel Services**

Materiel Services was unsure if and when the units cleaned their isolation storage containers, but stated they believed the isolation storage containers should be cleaned whether it was after every patient was discharged or on a schedule.

**Cleaning – Environmental Services**

Environmental Services stated they do not currently clean the isolation material storage containers in the hospital. They did say they will clean things people ask them to clean, but currently are not assigned to clean isolation material storage containers hospital-wide. They felt it was not unreasonable for them to be responsible for cleaning the isolation material storage containers, but that an analysis of the labor, resources, and time required for this additional
responsibility would need to be conducted before they would be assigned to clean the isolation material storage containers.

**Fire Code & Safety – Safety Management Services**
The fire code states that objects hanging on the wall in the hospital cannot protrude from the wall more than 4”. It also states that objects sitting in the hallway cannot be in the hallway for more than 30 minutes without being used. A major criterion for choosing an isolation material storage container is choosing a container that is not made of combustible materials. Also, any container that sits on the ground must have swivel wheels that are big enough for the container to be easily moved. The wheels should also be covered so they do not collect dust and lint, and the wheels should be soft if it sits on a hard floor and hard if the cart sits on carpet.

**Infection Control**
Infection control provided the team with data on the specific items that belong on an isolation material storage container. Items that are necessary for an isolation material storage container are:

- Disposable gowns
- Two sizes of latex gloves
- Masks
- Goggles
- Bleach wipes
- Alcohol wipes
- Hand sanitizer

**Container Storage – Nurses**
Storage for isolation material storage containers varied in different parts of the hospital. The UH GC and ICU currently keep isolation storage containers in the hallways if they can. They have very little storage space on their units. The CVC and Mott store their isolation material storage containers in storage rooms on their units. In CVC and Mott, the nurses would prefer to continue storing their isolation storage containers in the storage rooms in each unit. In the UH, there is very little room to store the isolation material storage containers, but many nurses also like having them on the units to access them immediately when they need them. Some nurses want to store the isolation material storage containers in MS to get rid of the storage problems on the UH units, while others want to maintain control of and easy access to the isolation material storage containers.

**Container Storage – Materiel Services**
Materiel Services is adamant that they have no room to store isolation material storage containers and pointed out that it would increase their workload to constantly be moving isolation storage containers to units when they are needed. They also pointed out that if they were to be stored in the hallways of MS that it would violate the fire code since they would not be in active use for patient care while in MS. MS was also concerned about the plans currently being implemented to move MS to a new part of the hospital. It is not certain how space constraints will change for MS in its new location. MS is currently in the midst of moving so recommendations around the storage of isolation material storage containers in MS could be obsolete due to changes in a matter of weeks or months after the team makes their final recommendations.
**Literature Search**
The team conducted a literature search and looked at over 10 published works. The main outcome of the search confirmed that many other hospitals use an isolation cart system. There were no publications specifically on isolation material storage container systems.

**Cold Calling**
To understand how other hospital systems use and maintain an isolation material storage container system the team called 10 hospitals from across the United States. Eight of those hospitals use carts as isolation storage containers. Of the hospitals that use carts, five of them have Materiel or Central Services own and store them, and four of those hospitals have Material or Central Services stock the carts. The three hospitals where isolation carts are not owned by Material or Central Services have their units responsible for restocking the carts. The Mayo Clinic, which has 2036 hospital beds, has a separate department restock carts even though the carts are owned by Central Services. The Ohio State University Health System was the only hospital the team spoke with that had a hanging isolation station system. Their hanging isolation stations are restocked by their Distribution Services department, as opposed to Material or Central Services. The two hospitals that did not use a cart system both use carts at rooms where a hanging isolation station or a cabinet could not be placed. See Appendix E for a complete list of cold call findings.

**Process Mapping**
The information in the current state process maps was collected by the team through informal interviews of the staff and observations. The current state process maps of the UH GC, UH ICU, CVC, and Mott can be found in Appendix G. The team determined that the units in UH GC, UH ICU, and CVC had very similar processes that could be represented by one process map. The process used in Mott Hospital is represented in its own process map. The maps show the current process for the arrival of an isolation container to a patient’s room, its use, and its removal from a patient’s room. In both current state maps, there is ambiguity as to who is responsible for restocking the container, what happens to the storage container when it is no longer in use, and who is responsible for cleaning the containers. The ineffective communication and lack of clear responsibilities were the most significant inefficiencies in each process map.

**Cost Analysis**
**Cost of Container**
Isolation carts are more expensive than wall-hanging isolation stations. According to the Director of MS in the Ohio State University Health System, the wall-hanging isolation station he uses is $150. Metal isolation carts that the team has found in the University of Michigan Hospital cost between $500 and $1200, depending on the exact model and vendor.

For the cart option, the team also looked into purchasing drawer dividers, hand sanitizer holders, garbage cans and glove box holders for each cart to keep the materials organized. After looking into multiple vendors and a variety of options, the team estimates the cost to purchase drawer dividers is $250 per cart and the cost to purchase the hand sanitizer holders, garbage cans, and glove box holders is $110 per cart.
Cost for Materiel Services to Restock Isolation Carts
The team has also analyzed the cost for MS to restock the carts. The team found that to completely fill an empty cart takes approximately 7 minutes (5 minutes to restock the gown drawer with 150 gowns, 2 minute for the other materials). The team focused on the gown restocking because it represented the most significant portion of time to restock. The aforementioned information results in a rate of:

\[
5 \text{ minutes/150 gowns} \times 15 \text{ gowns/1 box} = 0.5 \text{ minutes/box}
\]

Based on the gown ordering data, the largest average number of gowns a unit has used in one cart in one day is 90 (6 gown boxes) in Unit 8D. This worst-case scenario would result in a total restocking time of:

\[
6 \text{ gown boxes/cart} \times 0.5 \text{ minutes/box} \times 6 \text{ carts on each unit on average} \times 28 \text{ units} = 8.4 \text{ hours}
\]

This result is a gross overestimate because not every cart would need 90 gowns upon restock. A more realistic average would be 40 gowns needed per cart (or 2.67 boxes). This realistic average results in a total restocking time of 3.7 hours.

In addition to this restocking time, the employee would have to walk to the carts to restock them. The team timed themselves walking through the hospital at a slow, steady pace. Starting from the MS Department and walking through all the required units takes approximately 1.2 hours. Therefore, this total process would take 1.2 + 3.7 = 4.9 hours. Based on a full-time MS employee’s wage of $15/hr, this would cost $73.50 every day. In the end, appointing MS to be responsible for restocking isolation carts throughout the hospital would result in an annual cost of $26,828.

Cost for Units to Restock Isolation Carts
Using the same rate as above (0.5 minutes/box) and the same number of gowns needed per cart (2.67 boxes), the total restocking time for an employee on the unit would be:

\[
2.67 \text{ boxes/cart} \times 0.5 \text{ minutes/box} \times 6 \text{ carts on average per unit} = 8.01 \text{ minutes/unit}
\]

The employee must also walk around the unit to every cart. Based on the team’s time study this would take approximately 2.7 minutes per unit. Therefore, the total time to restock the carts on the unit would be 2.7 + 8.01 = 10.7 minutes. The average hourly wage of a caregiver who would be in charge of the restocking is $30.12, so every day it would cost each unit approximately $5.38 to restock the isolation carts. This results in an overall cost of $5.38/unit * 28 units = $150.54 per day, or $54,947 annually.

Cost for Units to Restock Wall-Hanging Isolation Stations
The wall-hanging isolation stations used in the Ohio State University Health System can hold 15 gowns. Using the average of 40 gowns used per cart per day, the restock frequency requirement would be 2.7 times per day. Based on this information the team will not consider giving MS responsibility of restocking wall-hanging isolation stations because it is unrealistic to have them
restock throughout the hospital 3 times every day. Therefore the team will only determine the
cost of giving the responsibility of restocking the wall-hanging stations to the unit.

In this calculation the person restocking will only put 1 box of gowns in the wall-hanging station.
Using the same averages as above, the restocking time for one day would be:

\[
(1 \text{ box/station} \times 0.5 \text{ minutes/box} \times 6 \text{ stations per unit}) \times 2.7 \text{ times/day} = 8.1 \text{ minutes per unit}
\]

Again, the employee must walk to every station, and they must walk 2.7 times every day, which
would be a total walking time of 2.7*2.7 minutes per unit = 7.29 minutes per unit. Therefore, the
total time to restock wall-hanging stations on the unit would be 8.1 + 7.29 = 15.39 minutes every
day. In the end, this method would cost each unit approximately $7.73 to restock the wall-
hanging isolation stations every day. This would be an overall daily cost of $216.32 and an
annual cost of $78,957.

**Isolation Material Usage Data**

As mentioned in the Methodology section, the team obtained usage data using three different
methods: 1) Two-hour on-site observations, 2) Gown usage observations, and 3) Gown data
derivation. The average usage data obtained with the two observation methods turned out to be
53.5 gowns per patient per day. The derivation using the number of isolation patients combined
with the number of gowns ordered resulted in an average of 40 gowns per patient per day. The
difference between these two averages can be explained by the fact that the observations took
place during the day shifts, which are busier than the night shifts. As a result, the observation
data showed a higher daily usage of gowns because it did not account for the minimal usage
during the night shift.

Figure 7 below shows the daily gown usage per patient broken down by unit. The ICUs are on
the left and they are generally higher than other units throughout the hospital (CVC 4 is also an
ICU). Figure 7 shows that UH GC Units and Mott Hospital Units use a very similar number of
gowns per patient per day.
Figure 7. Significant Variation Exists in Number of Gowns Used Per Isolation Patient
Graph prepared by IOE 481 Team 1, December 2009

Number of Isolation Patients
Although the data gathered in the team’s week isolation patient observation study was a small sample size and not an accurate representation of the number of isolation patients the hospital sees over the course of many months the team compared our data to the Infection Control data from the same days to see if their data was accurate. The Infection Control data and the team’s study matched, so the team is confident that the historical data is an accurate representation of isolation patients. The team analyzed the data in Microsoft Excel and looked for any trends in the data by plotting the number of isolation patients in each of the units across time. Figure 8 shows a sample plot of UH GC Unit 6C. In the plot, there are no obvious trends in the data. The number of isolation patients fluctuates, but the team didn’t see a general increase or decrease over time. The other unit’s data was similar, though the number of patients in isolation differed; in unit 4B, for example, the maximum number of isolation patients seen in one day was 7.
Next, the team developed percentiles for each of the units based on historical data. By analyzing the data and talking with Infection Control, it was concluded that the number of isolation storage containers should cover up to the 85th percentile of isolation patients. Table 5 shows a breakdown of the 50th – 100th percentile of isolation patients per unit. To verify that the 85th percentile is sufficient for each unit, the team conducted further analysis.

For further analysis, the team considered if it had implemented an isolation materials storage container system that covered the 85th percentile of isolation patients in each unit on May 1, 2009. Looking at this hypothetical situation, the team found that the number of carts for each unit had to be tweaked because some units would have run out of carts more than 15% of the time. Therefore, the team increased the number of carts for the units that ran out of carts more than 15% of the time. After running the analysis again, the team found that the maximum number of units that would have run out of carts on a given day was 10. This translates to the number of carts in units across the hospital being sufficient 93% of the time overall; and no single unit would run out of carts more than 15% of the time.
### Table 5. Percentile of Patients in Isolation Varies Between Units

*Table prepared by IOE 481 Team 1, December 2009*

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<tr>
<th></th>
<th>50%</th>
<th>55%</th>
<th>60%</th>
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<th>75%</th>
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<td>7</td>
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</tr>
<tr>
<td><strong>Mott</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>8</td>
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</tr>
</tbody>
</table>

**CONCLUSIONS**

After collecting data and analyzing the findings, the team can make the following conclusions regarding the isolation materials container, the restocking process and associated costs, the usage of isolation materials, the number of patients in isolation and storage of the isolation materials container.
**Isolation Material Storage Container: Most Hospitals Use Carts**

Based on the survey results, the team concludes that the staff thinks that an isolation cart is a very effective method, but the many of the carts currently in the hospital are not effective. Also, after talking with representatives from 10 hospital systems the team found that 8 of the 10 hospitals use some type of isolation cart. Using a cart seems to be a widely accepted alternative because it holds more isolation materials, and it is easy to move from room to room. The team also developed a set of negative and positive aspects for using carts, plastic totes, a wall hanging device, and other isolation materials storage containers. The lists can be found in Appendix F. From the analysis, the positive aspects of the cart far outweighed the negative aspects. For the plastic totes and wall hanging device, the positive aspects did not clearly outweigh the negative aspects.

**Restocking Process: Materiel Services is Cheapest Option and Nursing is Responsible for Patient Care**

Based on the cost analysis, the team concludes that it is much more expensive to give the restocking responsibilities to each unit. The caregivers that would be responsible for restocking on each unit have a significantly higher hourly wage than MS staff which results in a higher overall cost. The team has also considered the survey comments from the nursing staff regarding their desire to focus on patient care without having to worry about restocking isolation carts.

**Isolation Materials Usage: Most Usage in Intensive Care Units**

Looking at the results for the gown usage observations and the data analysis, the team concludes that different units in the hospital utilize gowns at different rates. In many units of UH General Care, caregivers only enter the patient rooms an average of about 30 gowns per day, while the UH ICUs enter a patients room an upwards of 90 times per day, on average. To account for this variation, different units will require different sized storage containers or will need to be restocked at different intervals. The team will take these facts into account when making a final recommendation.

**Number of Isolation Patients: Large Variability**

Looking at the results from the Infection Control isolation patient data, the team verified that the number of patients varies greatly throughout the units in the hospital. The team also found significant variability in the number of isolation patients on a single unit from day-to-day. To account for the variability across units each unit will receive a unique number of carts. To account for the day-to-day variability in the number of patients in isolation on a single unit, the team decided to provide carts to account for the 85th percentile of cases seen on a single unit. Because some isolation patients are housed in adjacent rooms, not every isolation patient requires a personal isolation storage container. Units in UH GC, UH ICUs, and Mott share isolation containers when there are isolation patients in adjacent rooms, but units in CVC do not share. Room assignment in UM Hospital is random, so there is no guarantee that two isolation patients will be housed in adjacent rooms. Through observation, it is estimated that three isolation storage containers are required for every four isolation patients in each area of the hospital besides CVC.
The team also found that the maximum number of extra carts needed in one day throughout the hospital was 10. Extra carts are needed on occasion because the team only plans to account for the 85th percentile of isolation patients instead of providing a cart for the 100th percentile of isolation patients.

**Isolation Container Storage: Unique to Each Area of Hospital**
The team concludes that storage will vary between areas of the hospital. However, the one element that all areas will have in common is that MS will not store carts that are not in use. There is no room in the MS Department to store isolation material storage containers for each unit when not in use.

**RECOMMENDATIONS**
After analyzing the data and making conclusions, the team is developed a set of recommendations to alleviate the issues found in the current isolation material storage containers and restocking processes. First the team recommends a standard isolation cart to be used throughout the hospital. Second, the team recommends MS be responsible for restocking and cleaning the carts on the units. Last, the team recommends each hospital area adopt a different storage procedure for the carts.

**Isolation Materials Container: Use Carts**

**Layout and Type of Container**
The team recommends using carts to hold isolation materials. The feedback from the literature search, cold calling, the UHC surveys, and the storage container pros/cons list all suggested a cart system is the ideal storage container solution in UM Hospital.

Because there is significant variation in the number of isolation materials care givers per isolation patient use on each unit, the team recommends purchasing two different types of carts to accommodate the differences. First, a small cart, pictured in Figure 9 is recommended. The cart features four drawers and dimensions of 34.5”H x 18.5W x 18”D. The default manufacturer configuration features a 3” top drawer, two 6” middle drawers, and a 9” bottom drawer. Ideally, the cart would have the two 6” drawers on top, the 3” drawer second from bottom, and the 9” drawer on bottom. If the manufacturer can customize the cart, this configuration is recommended. The following recommendations are made based on the manufacture’s default configuration. The cost of the cart is about $565. The small cart is already used in the hospital so the team was able to assemble a sample of the recommendations. The team recommends the cart is stocked as follows:

- **Top of cart (pictured in Figure 10)**
  - One box of medium gloves in holder
  - One box of large gloves in holder
  - One container of bleach wipes
  - One box of alcohol wipes
  - One bottle of hand sanitizer in holder
  - One garbage can

- **Top drawer (pictured in Figure 11)**
  - One-hundred isolation masks
- Fourteen contact precaution signs
  - Two pink, droplet precaution signs
  - Two green, contact precaution signs
  - Two red, protective precaution signs
  - Two yellow, respiratory precaution signs (surgical mask required)
  - Two blue, respiratory precaution signs (N95 mask required)
  - Two salmon, enhanced contact precaution signs
  - Two purple, pandemic flu signs
- One inventory sheet
  - Contains list of required materials to be stored in the cart and what drawers the materials belong in
- Middle two drawers (pictured in Figure 12)
  - Filled entirely with blue isolation gowns
  - Capacity is 128 gowns
- Bottom drawer (pictured in Figure 13)
  - Two boxes of medium gloves
  - Two boxes of large gloves
  - One container of bleach wipes
  - Two boxes of alcohol wipes
  - Two Bottles of hand sanitizer
  - Two boxes of masks
  - Ten pairs of goggles

*Figure 9. Recommended Small Isolation Cart*
Photograph taken by IOE 481 Team 1, December 2009
Figure 10. Top of Recommended Small Isolation Cart
Photograph taken by IOE 481 Team 1, December 2009

Figure 11. Top Drawer of Recommended Small Isolation Cart. Green line is divider locations
Photograph taken by IOE 481 Team 1, December 2009

Figure 12. Middle Drawers of Recommended Small Isolation Cart. Green line is divider locations
Photograph taken by IOE 481 Team 1, December 2009
Second, a large cart, pictured in Figure 14 is recommended. The cart features three drawers and dimensions of 41.5”H x 29.5W x 20”D. The default manufacturer configuration features a 6” top drawer and two 12” bottom drawers. Ideally, the cart would have one 12” drawer on top, the 6” drawer in the middle, and one 12” drawer on bottom. If the manufacturer can customize the cart, this configuration is recommended. The following recommendations are made based on the manufacturer’s default configuration. The cost of the cart is about $907. The team recommends the cart is stocked as follows:

- **Top of cart**
  - One box of medium gloves in holder
  - One box of large gloves in holder
  - One box of alcohol wipes
  - One container of bleach wipes
  - One bottle of hand sanitizer in holder
  - One garbage can

- **Top drawer**
  - One-hundred isolation masks
  - Fourteen contact precaution signs
     - Two pink, droplet precaution signs
     - Two green, contact precaution signs
     - Two red, protective precaution signs
     - Two yellow, respiratory precaution signs (surgical mask required)
     - Two blue, respiratory precaution signs (N95 mask required)
     - Two salmon, enhanced contact precaution signs
     - Two purple, pandemic flu signs
  - One inventory sheet
     - Contains list of required materials to be stored in the cart and what drawers the materials belong in

- **Middle drawer**
  - Filled entirely with blue isolation gowns
  - Capacity is 225 gowns
• Bottom drawer
  o Two boxes of medium gloves
  o Two boxes of large gloves
  o Two boxes of alcohol wipes
  o One container of bleach wipes
  o Two Bottles of hand sanitizer
  o Two boxes of masks
  o Ten pairs of goggles

![Image ofRecommended Large Isolation Cart](http://www.medicus-health.com/isolation-carts-economical.aspx)

*Figure 14. Recommended Large Isolation Cart*


Unfortunately, the team did not have access to one of the large isolation carts to assemble a sample stocking layout, but the layout should be similar to the smaller cart.

Each of the carts should be labeled on the outside with the unit the cart is from, an identification number (1, 2, 3, etc), to make locating and counting carts easy. The outside of each cart drawer should be labeled with the drawer contents to make finding and restocking specific items easy. The inside bottom of each drawer should be separated by dividers, or if dividers are not implemented, marked off with tape or paint to identify which materials belong in each space. An example is shown in Figure 15.
Table 6 shows a breakdown of how many and what type of cart the team recommends for each unit. Caregivers in the UH GC, CVC, and Mott units enter a single isolation patient room an average of around about 30 times per day. Even if adjacent isolation rooms are pulling materials from the same small cart, the cart should stock out very infrequently. Therefore, small carts should be purchased for the UH GC, CVC, and Mott units. Caregivers in the UH ICUs, on the other hand, enter a single isolation patient room an average of around 60 times per day. To ensure that carts do not run out of materials, large carts should be purchased for the UH ICUs.
Table 6. Number and Type of Isolation Cart Recommended is Unique to Each Unit

Calculated by IOE 481 Team 1, December 2009

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type of Cart</th>
<th>Number of Carts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UH GC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4B</td>
<td>Small</td>
<td>4</td>
</tr>
<tr>
<td>4C</td>
<td>Small</td>
<td>7</td>
</tr>
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<td>5B</td>
<td>Small</td>
<td>10</td>
</tr>
<tr>
<td>5C</td>
<td>Small</td>
<td>8</td>
</tr>
<tr>
<td>6B</td>
<td>Small</td>
<td>10</td>
</tr>
<tr>
<td>6C</td>
<td>Small</td>
<td>12</td>
</tr>
<tr>
<td>7B</td>
<td>Small</td>
<td>6</td>
</tr>
<tr>
<td>7C</td>
<td>Small</td>
<td>8</td>
</tr>
<tr>
<td>8B</td>
<td>Small</td>
<td>12</td>
</tr>
<tr>
<td>8C</td>
<td>Small</td>
<td>8</td>
</tr>
<tr>
<td><strong>UH ICU</strong></td>
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<td></td>
</tr>
<tr>
<td>4D</td>
<td>Large</td>
<td>2</td>
</tr>
<tr>
<td>5D</td>
<td>Large</td>
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</tr>
<tr>
<td>6D</td>
<td>Large</td>
<td>11</td>
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<tr>
<td>7D</td>
<td>Large</td>
<td>4</td>
</tr>
<tr>
<td>8D</td>
<td>Large</td>
<td>8</td>
</tr>
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<td><strong>CVC</strong></td>
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<td>CVC5</td>
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<td><strong>Mott</strong></td>
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<td>4WEM</td>
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<tr>
<td>4WWM</td>
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</tr>
<tr>
<td>5E3</td>
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<td>3</td>
</tr>
<tr>
<td>5E Moderate Care</td>
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<tr>
<td>5W2</td>
<td>Small</td>
<td>6</td>
</tr>
<tr>
<td>5MSD</td>
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<td>1</td>
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<tr>
<td>6M</td>
<td>Small</td>
<td>10</td>
</tr>
<tr>
<td>7M</td>
<td>Small</td>
<td>6</td>
</tr>
<tr>
<td>PCTU</td>
<td>Small</td>
<td>2</td>
</tr>
<tr>
<td>PICU</td>
<td>Small</td>
<td>5</td>
</tr>
</tbody>
</table>

Additionally, based on the finding that if our recommended carts had been used from May 1 to November 11, 2009 a maximum of ten extra carts would be needed across all units, the team recommends that MS store and own 12 small carts. The team included two additional carts as a precaution. If a unit has more isolation patients than carts, they can contact MS to bring one of their carts to the unit. The MS carts should be visually different from the carts on the units so they are easy to find and are unlikely to be mistaken for a unit owned cart.
It is recommended that a total of 181 carts are purchased; 147 small and 34 large. Throughout the hospital, there are 275 possible locations outside patient rooms to place a cart being used for an isolation patient. If all recommended carts are in use, 60% of the possible locations would be utilized.

The expected cost to purchase the carts is about $114,000. It is also recommended that drawer dividers, hand sanitizer holders, and glove box holders are purchased for each cart to keep the materials organized. The expected cost to purchase drawer dividers for 181 carts is about $45,250. The expected cost to purchase drawer dividers for 181 carts is about $45,000. The expected cost to purchase one hand sanitizer holder, one garbage can, and two glove box holders for each of the 181 carts is about $20,000. The total expected cost to implement the recommendations is about $179,000. Table 7 summarizes the implementation costs. Appendix I contains purchasing information.

Table 7. Total Implementation Cost Expected To Be $179,000

<table>
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<th>Item</th>
<th>Unit Cost</th>
<th>Number Required</th>
<th>Total Cost</th>
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<td>Cart</td>
<td>Varies</td>
<td>181</td>
<td>$114,000</td>
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<td>Small Cart</td>
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<tr>
<td>Large Cart</td>
<td>$907</td>
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<tr>
<td>Drawer Dividers</td>
<td>$250</td>
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<td>$42,250</td>
</tr>
<tr>
<td>Cart Top Accessories</td>
<td>$110</td>
<td>181</td>
<td>$45,000</td>
</tr>
<tr>
<td>Hand Sanitizer Holder</td>
<td>$6</td>
<td>181</td>
<td>$1,100</td>
</tr>
<tr>
<td>Garbage Can</td>
<td>$8</td>
<td>181</td>
<td>$1,450</td>
</tr>
<tr>
<td>Glove Box Holder</td>
<td>$48</td>
<td>362</td>
<td>$17,000</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$179,000</strong></td>
</tr>
</tbody>
</table>

Restocking and Cleaning Process: Done by Materiel Services

The recommendation for the restocking and cleaning process is to have the MS Department do one major restock per day, seven days a week. Nursing should restock the carts on their units as needed.

Materiel Services

A full restock should be done by a MS staff member once per day, including a restock of any missing contact precaution signs. The MS staff member will leave the MS Department and walk to every unit. Once on the unit, the staff member will load a transportation cart with isolation supplies from the unit’s clean room and walk around to each of the carts. The staff member will fill all isolation supplies in each cart to capacity. The staff member will also be responsible for wiping down the surface of the carts with bleach wipes for sanitation purposes. The MS staff member assigned to restocking will be given a checklist containing all the carts in the hospital to keep track of carts, and ensure all carts are restocked.

Nursing

The individual units should perform a maintenance restock if needed. The team recommends the units pilot a system where during each shift the charge nurse on each unit will assign an employee to monitor inventory levels using the indicator system described below; when needed, the designated employee will restock only the drawers that are going to run out.
If the pilot study finds the indicator system is not effective the team recommends the patient’s head nurse be responsible for the maintenance restock.

**Restock Indicator System and Restocking Points**
There should be a small, circular magnet on all the drawers that contain isolation materials that is green on one side and red on the other. When the MS staff member restocks the cart, the staff member will make sure all the magnets display green. Throughout the day, as the caregivers use the materials they will keep an eye on how many materials remain in the drawers they are using. If a caregiver notices that there are only 20-25 gowns, two to three goggles, one stack of masks, no boxes of gloves, no bottles of Hand sanitizer, no boxes of alcohol wipes, or no containers of bleach wipes remaining in a drawer, the caregiver will turn the appropriate magnet over to show red. Once the staff member designated by the charge nurse to restock notices the red magnet, he will refill the appropriate drawer. The team does not anticipate the units will need to restock drawers very often, but this system allows for the units to accommodate the variability in the number of isolation materials used by individual patients.

**Delivering and Removing Carts from Isolation Room**
On each of the units, the patient’s head nurse is responsible for delivering or removing the cart from in front of an isolation patient room. In certain situations, such as when an isolation patient is discharged and another isolation patient will be moving into the same room, the head nurse may want to leave the cart outside the room. It is also common that a patient who has already been admitted to the hospital requires isolation for a portion of his stay and a cart needs to be delivered to the room. It would be difficult for MS to know when carts should be delivered or removed from in front of an isolation patient room so it is recommended the responsibility be given to the patient’s head nurse.

**Isolation Cart Storage: Use Storage Area or Turn Around**
The team found that the MS Department does not have room to store isolation carts. Therefore, the team recommends that the units keep the isolation carts even when they are not in use. Each area of the hospital has a different floor plan; some offer ample storage for carts, and others offer none. To account for these differences each area of the hospital will store unused carts slightly different. Future state process maps can be found in Appendix H.

**UH General Care**
The UH GC Units have storage for no more than two carts in their clean rooms. The team recommends when a cart is not in use, it should be turned around at the patient room to show a sign fixed to the back reading: “Not In Use”.

**UH ICUs**
The UH ICUs have storage have no room for cart storage in their clean rooms. Similar to the UH GC units, the team recommends when a cart is not in use, it should be turned around at the patient room to show a sign fixed to the back reading: “Not In Use”.

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**Cardiovascular Center**
The CVC has storage space at the end of the hallway to store isolation carts. This is where they already store various carts, so the isolation carts will fit in well.

**Mott**
There is storage space available in Mott for isolation carts. Therefore, when a patient is discharged, the caregivers should roll the isolation cart into the storage room.

**Follow Up Projects**
Throughout the project, the team encountered feedback from surveys, interviews, and observations about aspects surrounding isolation materials storage containers that were not in scope of the project. The team believes two follow up studies to this project would benefit the UM Hospital. First, the possibility of a cart sterilization process should be considered. Hospital staff are concerned that isolation material storage containers are not cleaned thoroughly enough and contribute to spreading disease. Infection Control should be included in this follow up to assess the recommended cleaning process further, and to help make recommendations for any further cleaning or sterilization. Second, some caregivers asked about the possibility of using disposable instruments, such as stethoscopes and thermometers, with isolation patients. The caregivers said that it is difficult to clean non-disposable instruments after using them with isolation patients and are concerned that the non-disposable instruments contribute to the spread of disease. A project exploring the possibility using disposable instruments and looking into the feasibility of utilizing protective covers for non-disposable instruments is recommended. Additionally, the team recommends the units pilot a system where during each shift the charge nurse on each unit assign an employee to monitor inventory levels using an indicator system (as described previously).
APPENDIX A: SURVEY DISTRIBUTED TO UH GC, UH ICU, MOTT AND CVC UNITS

UMHS Isolation Materials Survey (UH-GC)

UH - Isolation Materials Survey

We would like to better understand how each of the units in the University of Michigan Health System use isolation materials. With the results from this survey we hope to improve your access to isolation materials in the future.

If you have any questions please contact Tim Rose at timrose@umich.edu or 734-936-7035

1. What unit of the hospital are you in? (i.e. "UH-68", "CVC-4", "Mott-5", etc.)
   
2. Does the isolation container outside the contact precaution room remind you to put on the isolation materials?
   - Yes
   - No

3. How many times on average during a shift do you go into a specific patient's room?
   - 1-5
   - 6-10
   - 11-15
   - 16-20
   - 20+

4. During a shift, how often do the isolation containers run out of materials?
   
5. How well do you feel you understand the meaning of the colors on the contact precaution signs?
   - Not Well
   - Very Well

6. Is the current isolation materials process working?
   - Not at all
   - Very Well

7. What do you like about the current isolation materials process?

8. What is one thing you would change about the current process (i.e. type of container, location of container, re-stocking process, etc)?

   [SurveyMonkey.com](http://www.SurveyMonkey.com) "Surveys Made Simple."
### APPENDIX B: SURVEY RESPONSES FROM UH GC, UH ICU, MOTT, AND CVC UNITS

<table>
<thead>
<tr>
<th>Unit</th>
<th>Sample Size</th>
<th>Question/ Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question 1.</strong></td>
<td></td>
<td>What unit of the hospital are you in? (i.e. &quot;UH-6B&quot;, &quot;CVC-4&quot;, &quot;Mott-5&quot;, etc.)</td>
</tr>
<tr>
<td>UH ICU</td>
<td>43</td>
<td>Text response. See below for responses.</td>
</tr>
<tr>
<td>UH General Care</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>Mott</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>CVC</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

**Question 2.** Does the isolation container outside the contact precaution room remind you to put on the isolation materials?

<table>
<thead>
<tr>
<th>Unit</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH ICU</td>
<td>71.4%</td>
<td>28.6%</td>
</tr>
<tr>
<td>UH General Care</td>
<td>97.7%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Mott</td>
<td>83.3%</td>
<td>16.7%</td>
</tr>
<tr>
<td>CVC</td>
<td>96.2%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

**Question 3.** How many times on average during a shift do you go into a specific patient's room?

<table>
<thead>
<tr>
<th>Unit</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>16-20</th>
<th>20+</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH ICU</td>
<td>0.0%</td>
<td>7.1%</td>
<td>16.7%</td>
<td>16.7%</td>
<td>59.5%</td>
</tr>
<tr>
<td>UH General Care</td>
<td>6.2%</td>
<td>26.4%</td>
<td>38.0%</td>
<td>15.5%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Mott</td>
<td>36.8%</td>
<td>31.6%</td>
<td>15.8%</td>
<td>0.0%</td>
<td>15.8%</td>
</tr>
<tr>
<td>CVC</td>
<td>7.7%</td>
<td>26.9%</td>
<td>15.4%</td>
<td>11.5%</td>
<td>38.5%</td>
</tr>
</tbody>
</table>

**Question 4.** During a shift, how often do the isolation containers run out of materials?

<table>
<thead>
<tr>
<th>Unit</th>
<th>Never</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH ICU</td>
<td>26.2%</td>
<td>9.5%</td>
</tr>
<tr>
<td>UH General Care</td>
<td>4.7%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Mott</td>
<td>31.8%</td>
<td>31.0%</td>
</tr>
<tr>
<td>CVC</td>
<td>15.4%</td>
<td>23.5%</td>
</tr>
</tbody>
</table>

**Question 5.** How well do you feel you understand the meaning of the colors on the contact precaution signs?

<table>
<thead>
<tr>
<th>Unit</th>
<th>Not Well</th>
<th>Very Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH ICU</td>
<td>2.3%</td>
<td>62.8%</td>
</tr>
<tr>
<td>UH General Care</td>
<td>0.8%</td>
<td>43.4%</td>
</tr>
<tr>
<td>Mott</td>
<td>11.8%</td>
<td>12.5%</td>
</tr>
<tr>
<td>CVC</td>
<td>3.8%</td>
<td>26.9%</td>
</tr>
</tbody>
</table>

**Question 6.** Is the current isolation materials process working?

<table>
<thead>
<tr>
<th>Unit</th>
<th>Not at all</th>
<th>Very Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH ICU</td>
<td>0.0%</td>
<td>28.6%</td>
</tr>
<tr>
<td>UH General Care</td>
<td>0.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Mott</td>
<td>0.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>CVC</td>
<td>0.0%</td>
<td>7.7%</td>
</tr>
</tbody>
</table>

**Question 7.** What do you like about the current isolation materials process?
**Question 8.** What is one thing you would change about the current process (i.e. type of container, location of container, restocking process, etc)?

<table>
<thead>
<tr>
<th>UH ICU</th>
<th>UH General Care</th>
<th>Mott</th>
<th>CVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>67</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

Text response. See below for responses.

<table>
<thead>
<tr>
<th>UH ICU</th>
<th>UH General Care</th>
<th>Mott</th>
<th>CVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>67</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

Text response. See below for responses.

**Text Responses from Question 1**

<table>
<thead>
<tr>
<th>UH ICU</th>
<th>UH General Care</th>
<th>Mott</th>
<th>CVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 D SICU</td>
<td>6c</td>
<td>whbc</td>
<td>CVC 5</td>
</tr>
<tr>
<td>7DN previously 6C</td>
<td>UH-6C</td>
<td>Birth Center</td>
<td>CVC 5</td>
</tr>
<tr>
<td>7D</td>
<td>UH-8C</td>
<td>WHBC</td>
<td>cvc5</td>
</tr>
<tr>
<td>6D</td>
<td>7BC</td>
<td>WHBC 4th floor</td>
<td>CVC-5</td>
</tr>
<tr>
<td>SICU</td>
<td>UH-8c</td>
<td>Chelsea FPC</td>
<td>CVC-5</td>
</tr>
<tr>
<td>UH-5D</td>
<td>7 B/C</td>
<td>5 west</td>
<td>cvc5</td>
</tr>
<tr>
<td>SICU 5D</td>
<td>UH-4b</td>
<td>Mott-5</td>
<td>cvc 5</td>
</tr>
<tr>
<td>5D - SICU</td>
<td>8c</td>
<td>Mott 5 West</td>
<td>cvc5</td>
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<tr>
<td>UH=5D</td>
<td>8B</td>
<td>Mott-5W</td>
<td>CVC 5</td>
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<tr>
<td>7DN-CCU</td>
<td>uh 7bc</td>
<td>Mott-5</td>
<td>cvc-5</td>
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<td>WHBC</td>
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<td>4 WHBC</td>
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<td>WHBC</td>
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<table>
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<tr>
<td>4c</td>
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</tr>
</tbody>
</table>
Text Responses From Question 7

**UH ICU**

Easily available

Easy to set up
close to rooms.
I like the ability to stock large amounts of material outside the pt's room, so that there is enough for everyone for the entire shift.
easy to understand signs, and protects other patients from being exposed from new bacteria

Convenient place right at the room entry
we set our isolation gowns and gloves on a bedside table outside of the room, we don't always have enough tables to go around if there are alot of pts on precautions, and it doesn't look professional in any way!
tables are large enough to accomodate large amount of supplies (gowns, multiple size gloves) cart outside each room has more than enough gloves gowns and masks stocked by the techs. I never run out and they are handy for staff and families
Items are always outside the patient room. Have space to keep patient specific potiental immediate need items outside room keeping them clean if not used.
We don't have containers...
The signage.
always run out
something available outside each pt. room.
Easy access to supplies.
Consistently stocked, lots of materials available, outside each patient room
Fewer germs on my scrubs when I go home.
It is frequently restocked
It works...supplies are outside the room.
different colored signs help identify different types of isolation
visible and up on the wall
We just got a new system that seems better
That in some of the units the tech round on the cantainers and make sure they are stocked.
i like our big drawers for gowns because we hardly run out during the day. we do not have the time to keep filling them up, so the more we have the better

accessibility
An isolation gown such as chemo gown that we/ I could use all night uless soiled. A little hook on the wall by the door so we hang our gown coming out of the room, and put on getting in to the room.
Chemo like gowns, are less hot than plastic; also, 

will decreased the amount of plastic waste.

Proximity, in sight - everything is available.

everything is right there outside and since our patients tend to end up in isolation for contact 
precautions once swabs are sent, it's nice to keep it there. We also glove before entering our patients' 
rooms (for all pts - precautions or not), so it's handy to have the drawers there with the different sizes 
of gloves

**UH General Care**

That it is all in one place.

I like the carts outside of each room. when they are in use they are facing forward. when they are not 
in use, they are turned backward with a sign stating "not in use"

Everything is right there. You don't have to run to the clean room to get supplies

The new carts.

I love the new carts on 6B. They are well-stocked, much more user-friendly, and organized! I also like 
that they're outside of every room now as well.

it works

stocked by unit staff at approp frequency (two to three times a day)

the quick availability of the supplies that are necessary.

everything is right there outside of the patients' room

The new carts at every patient doorway.

some nurses complain that plastic gowns are hot, but they are better than (reusable) cloth gowns 
because they stay around your neck. carts in front of each room are definitely necessary

The signs on the door relling what we nd to wear.

Having everything available (usually) in one spot for convenience.

I like the taller carts that don't make me bend over so much.

It has good information about each Isolations.

There is plenty of room in the carts to keep supplies so they are not constantly running out. Between 
nursing, doctors, med students and respiritory therapist going in and out of the patients room during 
the day it is easier to keep a well loaded cart, than worring about the cart always being empty. Our 
carts are hardly ever empty, except in the am and it is usually full before I can fill it.

usually what I need is there

I like that all the materials are setting outside the room before enter.

gowns and gloves being accesable

The bins are in a good spot right outside the door to the pt's room.

Visual reminder of need to change my practice by increasing the protection

N/A

Everthing is in one area and it is very neatly organized.

The materials are disposable.

A prefilled cart with all the materials needed inside.

Materials you need are available, most of the time. Does not leave alot of room for anything "extra" 
that shouldn't be in there to take up space.

They are aviable outside of the room.

Small size is easily stored. Multiple drawers allow for storage of various items.

Cart outside of the room

I used to work on 4BC and really didn't like the process there, now that I am at the CVC4 I really like 
the large size of the carts and think the stocking process is much better. The large carts almost never 
run out, and they are a much better reminder than the small set of drawers used on 4BC.

Not sure, there is not much room to store anything in the hallways or in the patient room.
carts are not standardized, and some are so small that you run out of needed materials too frequently.

It is easily accessible.

Not much. No standardization, nurses do the restocking, carts are poor quality and too small...

Multiple drawers for multiple supplies. Holds quite a bit of supplies.

Materials are accessible and do not violate fire codes, since the fire marshall doesn't care about infection control. Carts we have are on wheels and lightweight so they are easy to move from one location to another.

I don't it's a necessary evil.

Everything is outside the door.

That one is protecting themselves from each patient while at the same time protecting every other patient that is cared for.

Is there a process? the nurses usually do any set up, stocking, the unit usually provides the container they are outside of door

They are readily available and easy to find.

Pre-stocked carts

easy to follow

It is handy and easy to move

Nothing, those gowns make people hot and sweaty!

Isolation container is handy outside door

IT reminds you to put on the proper protection. The drawers we use are able to hold gloves and masks if needed as well as goggles. Everything we need!

MATERIALS AVAILABLE WITHOUT HAVING TO GO TO SUPPLY ROOM

Drawer for each item. Large amt of supplies

The 3 drawer bin works well but.....see below

The supplies are available outside the room.

I don't like it much because sometimes pt. is not isolation anymore the set up still outside the room

keeping sign up for housekeeping

its neater than before and contained

I like the drawers we have outside the room. It's roomy, so wedon't run out of gowns/gloves. It does take up space, though.

supplies kept together on cart, easily stored,

convenient

THE MATERIALS ARE READILY AVAILABLE, THEY ACT AS A REMINDER FOR PROPER ATTIRE

The signs remind me each time I go into a room--even though I know my patient may be neutropenic or ARP, I have a lot of patients and sometimes forget. I like the reminder! Everything I need is right there outside the room, and there is a lot of it. I sometimes have run low, but never run out.

If they are available, then convience is great

Supplies are conveniently located near the pt. room

Everything needed in a compact space

the signs remind you what to wear

That most of it is readily available most of the time

The color-coded signs and the carts with the gowns

convenient location
we don’t get many isolation patients.
Nothing specific, just appreciate the set up.
Easily accessible
I have no familiarity with inpatient isolation procedures but am performing them repeatedly in the outpatient setting. If there is a cart I am sure I’d use it but you guys just are not seeing this pandemic on the inpatient basis. I feel like I’m escaping it whenever I am in the hospital.
It is fine. Without our hosts it wouldn’t work.

As an attending I’m not up here all that much, but I definitely like having the carts or table outside of the room as it’s a clear reminder (and that’s the ways I’ve always seen it done in the past so I understand what it means to see the table).

We hardly ever see any isolation in L&D.
Honestly-not much
If carts are stocked, very easy to access and remember.

signage is clear, materials are always available
carts are kept stocked by our clerks at the beginning of each shift and then as needed
It’s nice there are bins outside each pt’s room.
close to the room, usually stocked with what I need.
we as nurses and techs use the supplies needed for isolation what about the docs and others who totally ignore the precautions. do the “bugs really know to stay inside the patient’s room?”

I think our totes are too large. They are hard to move and store and people pile up other materials in the drawers of the totes. All of the wheels also fell off, making them even more difficult to move.
right outside room is handy. I need to read the signs that are not green before entering because I do not remember what they stand for.

I like having the carts right outside the room. It definitely reminds you to gown up!! Without the totes, people don’t notice the signs (experience from other health systems) Its nice to have all the supplies you need BEFORE entering the pts room instead of going in to get gloves. Also, in an emergency situation, you don’t have time to run down the hall for PPE supplies so its VERY nice having the things you need right at the door. Our techs keep our totes nicely stocked!

We have big containers that we can keep stocked AND they serve as a reminder outside the door (in addition to the isolation sign on the door).

Text Responses From Question 8

Our totes are plastic and falling apart. It would be nice if we had totes similar to 8D’s, but taller that could serve a few more purposes than what we currently have...because they are falling apart.

Some sort of restocking process that isn’t dependent on patient-care staff might be nice. Our current system is to have our unit techs restock the pink tubs, but they have many other responsibilities. The floor I used to work on had 3-drawer containers that were much larger and ran out less often.

If we have a lot of isolation patients on the unit, the unit gets cluttered with bedside tables. Also, they have to be restocked frequently-it would be nice if our system held more so they didn’t have to be restocked so frequently.

our totes are always outside the room whether it is isolation or not. They are always stocked and readily available, so no changes needed, just fewer patients on precautions would be nice.

I would prefer to have it restocked (exchanged) by material services. Patient care techs must stop assisting with patient care in order to restock these. We also have to keep large supplies of these in
our par room in order to be able to stock the containers.

some type of cupboard or standardized set up would be nice.

Larger signs, cloth gowns that could be hung on a hook in the room and be reused by the RN (can use plastic gowns for others who don't go in room as much", a specific cart so we don't have to use our tables (since there are a limited number of them and we have a lot of isolation rooms)

the cart is cheap, (so far though it is holding up) would like a cart that is a little sturdier.

Would like to see a sturdier cart that is on wheels.

In the ICU we don't have containers but use bedside tables. It would be helpful to use containers because then materials are just hanging out and it is more organized. SO PLEASE get 7DN CICU containers!!!!

The wire shelving looks like a mess on our unit. This holds larger equipment.

container takes up room in an already crowded walkway. Container made of plastic - not too durable.

The SICU tech stock the isolation materials at every bedside. This is a waste of there time. There needs to be a centralized process.

waste of materials (blue gowns)

I resent it when there is no space for me to put my chart down on the bedside table outside of a pt. room because it is covered in isolation materials - gowns, boxes of gowns, and multiple boxes of each size of glove.

I wish we could keep our general supplies outside the room because we waste a lot of materials upon a pt's d/c

stocking

We have just changed systems so lets give this a chance

Some type of container that does not have to be opened. No drawers. Grab and garb would be better.

family members/visitors abiding by same rules...

Wish the carts were taller - more ergonomic w/ less bending for gowns.

Our tech staffing situation makes restocking an issue (especially on weekends) but our techs normally do a great job of restocking the supplies in the drawers

**UH General Care**

There definitely needs to be garbage cans with the cart. All the gowns are wrapped in plastic and there is not always a trash bin available.

Nothing.

Nothing I can think of!

taller and the width so it does not block doorway

big/takes up too much hallway space. But big is needed due to up to four pts in a room requiring those supplies

type of container should be standardized throughout the entire hospital. The carts should also be sanitized more oftened.

There needs to be better provisions for disposing of the plastic covering for the blue gowns. They fly all over the place. Also, it would be helpful if there were some disposable stethoscopes stored in the cart, as well.

Staff is mentioning that the carts are to wide. They could be taller and slimmer. No perfect world.

carts make a lot of noise, especially when closing the drawers and the (wheeled) cart hits the wall.

patients have complained that it makes a lot of noise inside the room as well.

Need somewhere to dispose of the H1N1 masks since you have to wear them out of the room

Make sure the re-stocking is consistently done q day for sure.

the carts on our unit are very large which helps with restocking issues, however a fire hazard and wc/stretcher burden. Smaller carts with a better restocking plan would be much better

Physicians complain that supplies are difficult to get at. One Physician asked that gowns, masks and
gloves of one size be placed in one drawer, and so on. Might be something to this idea — might save time. In which case, drawers are too deep and narrow in the carts we now use to accommodate this method of stocking.

Be sure waste baskets are placed outside each room also to discard packaging.

the service coordinators stock the carts, and have been doing a fine job. We need to have larger trash containers for the gown wrappers, and someone has to be responsible for emptying them.

why have all different kinds of masks in there? I hate opening the drawers. Also people leave them open and people bump into them. Can we have an open cart? Then you could see what’s inside, and things could be replaced when empty. Make a spot in supply room that is dedicated to isolation supplies.

location of container.

to not look sloppy

to have a designated place to throw away the plastic wrap that covers the blue gowns

to have all supplies needed i.e. eye protection, masks, gowns and gloves along with the spot to dispose of plastic wraps

It would be nice to have a little more space to place meds/IV tubing, etc that we are about to take into the room as these things must be put down while gowning up.

It is often messy with the plastic bags that wrap the individual blue gowns, it would be nice to have a better way to contain the waste. I feel like the blue gowns don’t fit as well in the plastic containers that we have, but it’s just that they aren’t made exactly for each other.

The plastic totes are a good start but a dispenser/container specifically designed for the purpose and environment should be developed. Something that has a smaller footprint or hangs from a vertical surface might be good. Since clinicians are usually carrying supplies (e.g. meds, dressings) into the room, a surface or place to set sundries while donning gowns would be nice. Lastly, a waste receptacle in which to discard the packaging for said isolation supplies is really important.

Restocking

nothing

The stocking process

re-stocking process.

Disposable stethoscope on the cart — often find us running out of them or forget to bring one into the room the first time go in to see pt.

re-stocking process.

Garbage container needs to available next to the supplies.

A place to set supplies (i.e. meds) while gowning up.

Garbage becomes full quickly.

type of container.

I wish the signs said yellow maks or n-95. That would be more helpful

all rooms should have a cart system that looks more permanent, plastic tubs look cheap and have broken wheels on some carts and do not hold all the materials neatly... gloves multiple sizes, masks 2 types, googles, gowns. Restocking should be done by people that stock the outside cabinets but are often empty or half filled at best during shifts.

The isolation container is not big enough to house everything. Ex. gloves, glasses, face masks, etc. Needs to be more people friendly with easy access instead of an eyesore in front of a patients room cluttered with whatever we can fit on the isolation cart.

I think it might help for the containers to be standardized across the whole hospital. I think it would help for the physicians to notice the precautions better especially because some teams round all over the hospital, and I have seen teams go into rooms with out wearing gowns, just because I don’t think they notice.
Nothing, if its not broken, don't fix it. Stop by 5C and see what we have, low budget tote.

make all carts standardized and larger (I know that is two things but I just couldn't decide!!!)

I would like to see something that holds the materials so that it looks more organized. Often the gloves and gowns are falling on the floor.

The doctors seem to disregard the isolation materials and will 99% of the time enter an isolation room with no isolation materials on. This sends a mixed message to staff, visitors, and patients.

Standardize all of it.

Nothing.

If it had a couple more drawers, you could stock a little more. Wish there was a designated person to do the restock, because a crowd of docs will come and use all that is left and then the patient's light is on and needs help right away and we have to run and get stuff.

We often run out of gowns in our stock room. I don't think that is your domain though. Someone just forgets to reorder soon enough. The type of container is not always suitable, and generally not stocked with everything needed.

Nothing.

Container is too low, now big enough, not enough drawers for goggles and masks now.

Maybe provide more space on the top of the containers. It seems that there are always a lot of products (masks, gloves, bleach wipes, alcohol swabs, etc) on the top of the containers and no room.

carts are low to the ground. Need a place to set down meds, IV's, etc. while you put gown and gloves on.

A central area to call for an isolation cart, I don't think nursing has a problem restocking from our PAR cart, but it would be nice to see uniform carts on the units, instead of the mish mash each unit tries to put together

re-stocking process/location of container and some sort of container to place trash

The carts we use look cheap and unprofessional. We have no official waste process when we dispose of our gloves and gowns and if there is an extra available trash container it does not get emptied as often as it should causing over flow.

I would like it better if we had different containers to stock our isolation materials, our unit uses carts or tables and I think something with drawers would be better, it would be more organized as well as more contained.

nothing

would like easier carts to use; would be nice to have a cart outside of each private room

I like using the bedside 3 drawer dressers outside the room. They look nice, hold adequate amount of supplies and roll easily. Also are easy to clean. We restock our own prn.

stocking process, availability of items--bleach wipes, virex to clean items that need to be taken out of the room, better way to keep items of necessity like dressing supplies close by but not into pt room to avoid waste.

The only thing is to make sure the supply room has the items for the container when it needs to be refilled..

I would get a better looking cart maybe wood.metal.. not clear that looks dirty!

Sometimes the top of the drawers can get cluttered with things that don't need to be there. If there was a way to have slots on the top or something to decrease mess that may help.

RE-STOCK PROCESS AND TYPE OF CONTAINER

Built in trash. Not so bulky.

carts outside room too small. would be better if there was more space on top to have masks, goggles, etc.

There's no place to put the trash when you entering the room. Sometimes they put the very small plastic bags taped on them but they fill very fast!!

The carts are too low to the ground.
controls (lights/ call lights etc) are in back of bed and if patient accidentally hits call light or has a simple need that can be accomplished without gowns, we STILL have to gown JUST to shut off call light etc because this requires squeezing through, around and up against everything in the bed to reach out-of-way controls.

Type of container- needs more set up space, we use a 2-drawer reused rubbermaid like container that holds masks and gown, gloves are put on top and then there is no workspace for us to put our stuff on while we are dressing to go into the rooms

Size of container make it larger

Type of container, larger, more visible. To be stocked centrally.

Container is very unprofessional in appearance. We use plastic carts on 8B.

Get rid of boxes of gowns on top of carts.

already have drawers full. this would allow space to set meds while gowning.

THE CARTS ARE VERY CLUTTERED, WE NEED A TRASH DISPOSAL SYSTEM FOR THE WRAPPERS OF THE GOWNS, ETC.

MULTI-USE ITEMS NEED STORAGE AREA, TOO (N-95 MASKS, PAPR HOODS)

Most of them do not have a place to put trash (i.e. the plastic bags gowns come in, gloves that have accidentally dropped on the floor, etc) so a lot of times the areas outside isolation rooms look sloppy as people attempt to shove bits of garbage on top of the containers.

Need more supplies at bedside & someplace to dispose of waste outside rooms

There is nothing uniform about the containers, re-stocking is left to the person taking care of the pt.

Not every isolation room has a container for materials...I would like more containers available for EACH isolation room.

Needs to be restocked more frequently; containers are broken and unsightly

when our nursing servers are restocked, it would be nice for the isolation material totes to be restocked as well. also, it would be nice the the wording was bigger on the signs to remind the MDs to wear proper garb when entering precaution rooms.

More organized, more room

A larger cart would be helpful
cart, it looks cheap and disorganized.

Mott

The signage and difference in what staff needs to do is VERY confusing,

Do not really use it. Do not know. I guess make it more visible.

Empty trash more often

Would like container to be in a recessed cupboard in the wall outside pt room

We do not have an actual container on our unit making it necessary to gather supplies when an isolation patient comes it. Since we are a unit that very rarely (at least until H1N1) had patients in isolation.

On L&D, ability to wash hands after taking off garments within the room before leaving the room..probably having a way of washing outside of the room would work better, although difficult to achieve
nothing at this time

It would be helpful if the cards were taller so there is not so much bending.
The clerks don't do their jobs keeping them stocked.

Educating visitors
The restocking needs to take place more than just on our night shift. Often we come into an empty container and before we can continue we need to restock items. The containers are not ergonomic they are low to the floor and very small.

The gowns should always be placed in the top drawer since that is what is accessed most for easier body mechanics

wish they still had wheels.

very often it is the unit tech or nurse who is restocking th containers.

Restocking is done by the techs/unit host as needed but does not seem to be a frequent problem. I think that CVC5's totes are a better style.

The containers seem a bit grosse because they never get cleaned, just shuffeled from one space in front of a pt's room to another.

It would be nice to have a container that you could flip up a side if needed for extra space. Pandemic pts require conservation of masks/goggles and you definitely run out of room which in turn makes staff/family tape their brown bags to our unit walls.

The wheels on the containers have come off, and the containers are a little inconvenient to move about the unit. Also, they sometimes get cluttered w/clean-room items. Not a big deal, though.

our containers are very heavy and difficult to move around the unit. we need more of them

More Containers

APPENDIX C: SURVEY DISTRIBUTED TO THE UNIVERSITY HEALTH CONSORTIUM

The University of Michigan Hospitals and Health Centers is interested in benchmarking practice around management of isolation supplies. Please respond:
1. What method do you employ for providing isolation protective supplies at patient rooms?
2. Briefly describe your process for replenishing those supplies including who does the work and the frequency of replenishment.
3. Is there any variation in your method or process depending on patient population, room setup etc?
4. Any other comments you wish to share or likes or dislikes about your current system?

Please respond directly to: atgrif@umich.edu

APPENDIX D: SURVEY RESPONSES FROM THE UNIVERSITY HEALTH CONSORTIUM

Response 1
1. What method do you employ for providing isolation protective supplies at patient rooms? We use carts to stock the supplies and just roll them right outside the room
2. Briefly describe your process for replenishing those supplies including who does the work and the frequency of replenishment. The units stock them but patient equipment, retrieves, decontaminates & delivers them back.

3. Is there any variation in your method or process depending on patient population, room set up etc? None that I'm aware of

4. Any other comments you wish to share or likes or dislikes about your current system? There are no issues that I'm aware of.

AM

Note:
Source is unknown. The response was forwarded by the Value Analysis Director of the University of Michigan Hospital and Health Care Systems, who originally sent out the survey to the UHC. The forwarded email’s author could not be determined.

Response 2
Iso carts restocked by environmental aid, who checks volumes restocks from floor or from stores depending on how much we use. Checked every shift, carts are outside rooms so process does not change much.

Alisa Schantz, RN
Product Assurance Coordinator/RASMAS Recall Manager
Procurement Services
University of Iowa Hospitals & Clinics
Office: (319) 356-8103
Fax: (319) 356-1102
Pager: 2510
Alisa-Schantz@uiowa.edu
Response 3

We use ICP Medical PPE stations throughout our system hospitals. Flexible, easy to replenish, & install

James G Gleich R.N.
Manager, Supply Utilization
BJC HealthCare
314 362-5547
fax: 314 362 0876

APPENDIX E: COLD CALL FINDINGS

Ohio State University Health System (Columbus, OH)

- Has carts and wall-hanging isolation stations
- Wall-hanging isolation stations only hold 15 gowns
- Carts are used where it is not possible to hang an isolation station
- Distribution services cleans and stores carts when not in use
- Wall-hanging stations are built by a local plastics manufacturer and cost $150
- Has 960 beds

North Shores University Health System (Evanston, IL)

- Has cart system
- Owned by Materiel Services
- Stocked by Materiel Services
- Stocking requested from unit via computer
- Has 30 carts
- Use box to store materials when carts run out
- Contained on carts
  - Five info sheets
  - Stat rinse
  - Specimen transport bag
  - PDI wipes
  - Thermometer
  - Alcohol wipes
  - Stethoscope
  - Masks
  - Gloves (small, medium, large)
  - Disposable goggles
  - Disposable gowns (60)
  - Non-disposable gowns (10)
- Has 908 hospital beds
Beth Israel Deaconess Medical Center (Boston, MA)
- Has cart system
- Stocked by Materiel Services
- Has not experienced complaints with system
- Has 621 hospital beds

Duke University Hospital (Durham, NC)
- Has cart system
- Has 50 carts
- Run out of carts frequently
- Improvise with chairs or other items to store supplies when carts run out
- Clean carts after use
- Ordered to unit through computer system
- Has 924 hospital beds

Alta Bates Summit Medical Center (Berkley, CA)
- Has cart system
- Owned by Materiel Services
- Has 1200 hospital beds

Mayo Clinic Hospital System (Rochester, MN)
- Has cart system
- Owned by Central Services
- Stocked by separate department
- Stored in Central Services
- Has 200 carts
- Do not have storage problem due to frequent usage of carts
- Has 2036 hospital beds

University of California Los Angeles (Los Angeles, CA)
- Has cart system
- Owned by units
- Stocked by units
- Stored in supply room and nurses bring carts to room
- Cleaned by Environmental Services
- Has consistent cart types
- Has 520 hospital beds
Johns Hopkins (Baltimore, MD)
- Has cart system
- Owned by Central Services
- Stocked by Central Services
- Stored in Central Services
- Rules broken sometimes by units not returning carts
- Cleaned by Environmental Services

Mount Sinai (New York, NY)
- Has cart system
- Owned by individual units
- Stocked by individual units
- Stocked on a schedule
- Has 1171 hospital beds

Kings County Hospital (New York, NY)
- Cabinets on wall system
- Carts where cabinet cannot hang
- Stocked by individual units
- Cabinets 5” deep
- Tried over-door solution, did not work
- Reported restocking cabinets was inconsistent in frequency and quality
- Preferred carts over cabinets
- Has 627 hospital beds
## APPENDIX F: POSITIVE AND NEGATIVE ASPECTS OF ISOLATION MATERIAL STORAGE CONTAINERS

### UH GC

<table>
<thead>
<tr>
<th>Wheeled Cart</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>People have been using them or something similar, so the “transition” would be easy</td>
<td>Hard to see when the carts need restocking (need to open drawers to get a good look)</td>
<td></td>
</tr>
<tr>
<td>Visual reminder to caregivers to put on isolation materials</td>
<td>Bend down to get to lower level</td>
<td></td>
</tr>
<tr>
<td>Can hold a lot of materials</td>
<td>Expensive</td>
<td></td>
</tr>
<tr>
<td>Look more professional (than a plastic tote)</td>
<td>Some materials are never used (on the bottom shelves). This could be remedied by adopting a different restock point</td>
<td></td>
</tr>
<tr>
<td>Sturdy, do not break easily</td>
<td>Wider than the 11” column that separates the two rooms, so it sticks out a little bit</td>
<td></td>
</tr>
<tr>
<td>Can put them in the recessed area in front of the rooms so they will not be in the hallway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounted Wire Baskets</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stays out of the way</td>
<td>Less flexible in terms of location than a cart</td>
<td></td>
</tr>
<tr>
<td>Saves floor space</td>
<td>Less storage space than a cart – leading to very frequent restocking</td>
<td></td>
</tr>
<tr>
<td>No bending to access gowns/materials</td>
<td>Not an enormous amount of wall space (less than 11” wide), so baskets would not be very large</td>
<td></td>
</tr>
<tr>
<td>Minimizes likelihood of substocking/will not get cluttered</td>
<td>Not a great visual cue to put on isolation materials</td>
<td></td>
</tr>
<tr>
<td>Could be placed outside every room so nurses would never have to worry about having an isolation station available</td>
<td>Not easy to move from room to room if you need to</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plastic Totes</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear drawers make it easy to see what needs to be restocked</td>
<td>Break easily (wheels fall off, drawers crack, etc) and not very sturdy in general</td>
<td></td>
</tr>
<tr>
<td>Inexpensive</td>
<td>Don’t look professional</td>
<td></td>
</tr>
<tr>
<td>People have been using them or something similar, so transition would be easy</td>
<td>Do not hold a lot of gowns/materials leading to frequent restocking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very low to ground</td>
<td></td>
</tr>
</tbody>
</table>
### Wheeled Cart

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>People have been using them, so the “transition” would be easy</td>
<td>Many of the units already have a lot of equipment on the floor in the halls</td>
</tr>
<tr>
<td>Visual reminder to caregivers to put on isolation materials</td>
<td>Hard to see when the carts need restocking (need to open drawers to get a good look)</td>
</tr>
<tr>
<td>Can hold a lot of materials</td>
<td>Bend down to get to lower level</td>
</tr>
<tr>
<td>Look more professional (than a plastic tote)</td>
<td>Storage on unit can be difficult (in clean room, etc)</td>
</tr>
<tr>
<td></td>
<td>Expensive</td>
</tr>
<tr>
<td></td>
<td>Some material is never used (on the bottom shelves). This could be remedied by adopting a different restock point</td>
</tr>
</tbody>
</table>

### Mounted Wire Baskets

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a fair amount of open wall space</td>
<td>Less flexible than a cart</td>
</tr>
<tr>
<td>Some units “never have few enough isolation patients to remove the current carts”</td>
<td>Likely less storage space than a cart (especially important on ICU)</td>
</tr>
<tr>
<td>Easy to see what needs restocking with just a glance</td>
<td>One unit already uses some baskets, but uses a cart as well</td>
</tr>
<tr>
<td>No bending to get to lower levels</td>
<td></td>
</tr>
<tr>
<td>Minimizes likelihood of substocking</td>
<td></td>
</tr>
<tr>
<td>Stays out of the way</td>
<td></td>
</tr>
<tr>
<td>Saves floor space</td>
<td></td>
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### Plastic Totes

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<tbody>
<tr>
<td>Clear drawers make it easy to see what needs to be restocked</td>
<td>Seem to break easily (wheels fall off, drawers crack, etc)</td>
</tr>
<tr>
<td>Inexpensive</td>
<td>Don’t look very professional</td>
</tr>
<tr>
<td>Come in lots of different styles to fit the individual needs of each ICU (might now want this)</td>
<td>Might hold too much in some cases (how often does the bottom drawer of gowns get used)</td>
</tr>
<tr>
<td>People have been using them, so the “transition” would be easy</td>
<td>Many of the units already have a lot of equipment in the halls</td>
</tr>
</tbody>
</table>
## Wheeled Cart

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good visual reminder to put on isolation materials</td>
<td>Takes up a lot of space</td>
</tr>
<tr>
<td>Current Mott has space to store the carts</td>
<td>Unknown if there will be storage for carts in new hospital</td>
</tr>
<tr>
<td>More storage than wall option</td>
<td>Lower shelves rarely have materials used</td>
</tr>
<tr>
<td>Would have to be restocked less often</td>
<td></td>
</tr>
<tr>
<td>Good visual reminder to put on isolation materials</td>
<td>Takes up a lot of space</td>
</tr>
</tbody>
</table>

## Wall Mounted Device

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saves space</td>
<td>Art work gets in way</td>
</tr>
<tr>
<td>Will prevent isolation materials from getting lost in new cabinets</td>
<td>Cabinets in new hospital may get in way</td>
</tr>
<tr>
<td>Easier visual reminder than materials in cabinet</td>
<td>May be unnecessary due to cabinet space</td>
</tr>
<tr>
<td></td>
<td>If all wall fixtures are always refilled, it may increase price of all Mott rooms since isolation rooms have an increased price due to isolation materials needed</td>
</tr>
<tr>
<td></td>
<td>Since they will always be there, it may make it harder for caretakers to remember when they need to put on the isolation materials on</td>
</tr>
<tr>
<td></td>
<td>Would have to be restocked more often</td>
</tr>
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## Plastic Totes

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<td>Do not hold a lot of gowns/materials leading to frequent restocking</td>
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<td>Very low to ground</td>
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</table>
## Over Door

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saves space</td>
<td>Cannot be tested on new Mott doors</td>
</tr>
<tr>
<td>Will prevent isolation materials from getting lost in new cabinets</td>
<td>Current door has a metal thing on top that would make it difficult</td>
</tr>
<tr>
<td>Easier visual reminder than materials in cabinet</td>
<td>May be unnecessary due to cabinet space</td>
</tr>
<tr>
<td>If only on door when needed, it would take up less room in storage when not in use</td>
<td>If all door hanging fixtures are always refilled, it may increase cost of Mott rooms since isolation rooms are more expensive due to isolation materials needed</td>
</tr>
</tbody>
</table>

## CVC

## Wheeled Cart

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual reminder to caregivers to put on isolation materials</td>
<td>Many of the units already have a lot of equipment on the floor in the halls</td>
</tr>
<tr>
<td>Can hold a lot of materials</td>
<td>Hard to see when the carts need restocking (need to open drawers to get a good look)</td>
</tr>
<tr>
<td>Look more professional (than a plastic tote)</td>
<td>Bend down to get to lower level</td>
</tr>
<tr>
<td>Wheels (currently some plastic totes in CVC do not have wheels)</td>
<td>Expensive</td>
</tr>
<tr>
<td></td>
<td>Some material is never used (on the bottom shelves). This could be remedied by adopting a different restock point</td>
</tr>
</tbody>
</table>

## Mounted Wire Baskets

<table>
<thead>
<tr>
<th>PROS</th>
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<tbody>
<tr>
<td>There is a fair amount of open wall space</td>
<td>Less flexible in terms of location than a cart</td>
</tr>
<tr>
<td>Stays out of the way</td>
<td>Less storage space than a cart – leading to very frequent restocking</td>
</tr>
<tr>
<td>Saves floor space</td>
<td>Wall space is not in the perfect location to put a wall-mounted basket – it would be in an inconvenient location</td>
</tr>
<tr>
<td>No bending to access gowns/materials</td>
<td></td>
</tr>
<tr>
<td>Minimizes likelihood of substocking</td>
<td></td>
</tr>
</tbody>
</table>

## Plastic Totes

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear drawers make it easy to see what needs to be restocked</td>
<td>Break easily (wheels fall off, drawers crack, etc) and not very sturdy in general</td>
</tr>
<tr>
<td>Inexpensive</td>
<td>Don’t look professional</td>
</tr>
<tr>
<td>People have been using them, so the “transition” would be easy</td>
<td>CVC units already have a lot of equipment in the halls</td>
</tr>
</tbody>
</table>
APPENDIX G: CURRENT STATE PROCESS MAPS

UH/CVC General Care and ICU Current-State Process

**Order Cart**

1. Nurse Supervisor/Mgr
   - A patient is determined to need Contact Precaution?
     - YES
     - **Is an isolation cart available on Unit?**
       - YES
       - **Contact Materiel Services**
         - Extra cart in storage?
           - YES
           - **Order new cart**
           - Nurse Supervisor from Unit must specify what type of cart
         - NO
         - **DEFECT**
       - NO
       - **IMPROVISE**
       - Use unit host cart, chair, etc.
     - NO
     - **DEFECT**
   - **UNDEFLECT**
   - Unclear who is responsible (DEFECT)

2. Unit Host
   - Usually Jean Harris
   - **DEFECT**
   - **Unit 6B: Turn cart around (indicating not in use)**
   - Unit 6C: Put cart under desk in "satellite area"
   - CVC: Put cart in storage room

3. Nurse Aid
   - Place Cart outside room

4. Tech
   - Use materials upon entering patient's room

5. Nurse
   - **DEFECT**
   - Not sure exactly how to stock it, and not always sure what unit
   - **Stock cart and bring to appropriate room/unit**

6. Materiel Services
   - Extra cart in storage?
     - YES
     - **Order new cart**
   - **DEFECT**

**General Use and Re-stock**

- Use materiel upon entering patient's room
- Re-stock carts daily and as needed
- **DEFECT**

**Patient Discharged**

- Unclear who is responsible (DEFECT)
- **DEFECT**
- Unit 6B: Turn cart around (indicating not in use)
- Unit 6C: Put cart under desk in "satellite area"
- CVC: Put cart in storage room
- **DEFECT**
- Nurse Supervisor from Unit must specify what type of cart
Patient is determined to need precaution

Is there an isolation room with open bed?

Yes

Place patient in room that already has cart in front

No

Use material upon entering patient’s room

Is an isolation cart available in unit’s storage?

Yes

Place cart outside patient’s room

No

Not entirely clear as to who is responsible

Discharge

Materiel Services

Use and Re-stock

Order Cart

Stock cart and bring to unit

Extra cart in storage?

Generally Materiel Services does not store unused carts

Extra cart in storage?

Contact Materiel Services

Not entirely clear as to who is responsible

Extra cart in storage?

Generally Materiel Services does not store unused carts

Extra cart in storage?

Contact Materiel Services

Not entirely clear as to who is responsible

Extra cart in storage?

Generally Materiel Services does not store unused carts

Extra cart in storage?

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Generally Materiel Services does not store unused carts

Extra cart in storage?

Contact Materiel Services

Not entirely clear as to who is responsible

Extra cart in storage?

Generally Materiel Services does not store unused carts

Extra cart in storage?
APPENDIX H: FUTURE STATE PROCESS MAPS

Mott & CVC Future State Process Map

- Order Cart
  - Use materials upon entering patient's room (If less than 20 gowns or masks, or if there are no boxes of gloves remaining, contact Jean Harris)
  - Will not happen very often
  - Re-stock carts according to indicators

- Yes
  - Wheel cart to storage area
  - Full Re-stocking and cleaning day or every 2 weeks

- No
  - Contact Materiel Services
  - Wheel cart to storage area
  - Place cart outside room
  - Stock one of the extra carts and bring to appropriate unit/room
  - Contact Jean Harris

- A patient is determined to need Contact Precaution
  - Place Cart outside room
  - Will not happen very often
  - A patient is determined to need Contact Precaution
A patient is determined to need Contact Precaution

Full Re-stock and cleaning every day

Contact Materiel Services

Re-stock carts during day according to indicators

If less than 20 gowns or masks, or boxes of gloves remaining, switch appropriate indicator

Use materials upon entering patient's room

Is an isolation cart available on Unit?

Yes

Patient Discharged

Unit Host

Tech

Nurse

Superintendent

Materiel Services

Use and Re-stock

Order Cart
## APPENDIX I: PURCHASING INFORMATION

<table>
<thead>
<tr>
<th>Item</th>
<th>Model Number</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEF-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TEF-9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Also look into customization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Also look into customization</td>
<td></td>
</tr>
<tr>
<td>Hand Sanitizer Holder</td>
<td>9005-12</td>
<td><a href="http://www.utilitysafeguard.com/Purell-Hand-Sanitizers/9005-12/">http://www.utilitysafeguard.com/Purell-Hand-Sanitizers/9005-12/</a></td>
</tr>
</tbody>
</table>