Analysis of the Interaction between Structure and Function on the Adult Psychiatric Inpatient Care Unit in Anticipation of Future Renovations

Final Report

Department of Psychiatry
The University of Michigan
Hospital Services Section

Client:
Janis Price, Section Administrator, Psychiatry

Coordinator:
Richard Coffey, Director of Program and Operations Analysis

Team Members:
Andrea Caic, Senior IOE Student
Caroline Chappell, Senior IOE Student
Lauren Safran, Senior IOE Student
Margarita Saieh, Senior IOE Student

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# TABLE OF CONTENTS

Executive Summary .................................................. 2  
Introduction and Background .................................. 5  
Goals and Objectives .............................................. 5  
Project Scope .......................................................... 6  
Approach and Methodology .................................... 6  
Current System ....................................................... 7  
Key Issues Affecting Project Execution .................... 9  
Findings and Conclusions ....................................... 10  
  High Percentage of Security Calls .......................... 12  
  Diverse Patient Milieu Observed During Rounds .......... 13  
  Inconsistent Nurse Flow Observed During Nurse Shadowing 14  
  High Percent Occupancy Indicated by Census Data .......... 14  
  Use of Chemical Restraints Indicated by Pharmacy Data ....... 16  
Key Personnel Interviews ..................................... 16  
  Daniel Maixner, MD .............................................. 16  
  David Knesper, MD .............................................. 17  
  Nurses and Unit Clerks .......................................... 18  
  Activity Therapist ............................................... 19  
  Facilities Management Representative .................... 20  
  Recipient Rights Advisor ..................................... 20  
  Risk Management Representative ............................ 21  
Visits to Other Hospitals ....................................... 21  
  St. Joseph Mercy .................................................. 22  
  Chelsea Hospital ................................................. 22  
Patient Aggression Illustrated by Restraint and Seclusion Uses 23  
Recommendations .................................................. 24  
  Separation of Patients in UH-9C ......................... 24  
  Additional Changes if Rooms in UH-9D are Acquired ...... 25  
  Characteristics of an Ideal Unit ............................ 25  
Implementation or Action Plan ................................ 26  
Appendix A: Cause and Effect Diagram .................... 28  
Appendix B: Current Unit Layout ............................ 29  
Appendix C: Patient Level Descriptions .................... 30  
Appendix D: Unit Layout with Changes in UH-9C .......... 31  
Appendix E: Unit Layout with Changes in UH-9C and UH-9D ....... 32  
Appendix F: Literature Cited .................................... 33
Executive Summary

The adult inpatient psychiatric unit at the University of Michigan Hospital (UH-9C) has been reduced from 54 to 22 beds. Now, all patients are located on one unit with no separation by diagnoses. There is a diverse mix of patients on the unit, including both highly aggressive patients and extremely sensitive patients. Some patients are intimidated by the more aggressive patients due to their close proximity. In response to this issue, the hospital is considering renovating UH-9C to provide patient separation. The student team was asked to analyze how UH-9C currently functions and to recommend ways to improve the unit. Therefore, the purpose of this project was to determine how function, structure, and processes can come together to accommodate a mix of diverse patients to create a flexible, comfortable, and healthy environment for the staff and patients on UH-9C.

Goals and Objectives

To analyze how UH-9C currently functions and determine areas of improvement, the goals of this project were to gain a thorough understanding of the unit’s operations and develop alternatives for renovations. These recommended alternatives will enable the unit to create flexible and comfortable accommodations for a diverse patient milieu. The three alternatives address each of the following scenarios:

• The unit remains on UH-9C only.
• The unit expands to include both UH-9C and UH-9D.
• The unit is moved to a new location and an “ideal” unit is created.

The goals of the alternative layouts are to:

• Provide an adaptable psychiatric unit that can accommodate a diverse patient population.
• Improve patient and employee satisfaction.
• Decrease staff injuries, security calls, repairs, restraints, and medications.

Approach and Methodology

The student team collected and analyzed information from numerous sources to develop layout alternatives for UH-9C. The methods the student team used are highlighted below.

• Observed key processes and activities
• Assembled data related to security calls, census, and restraints
• Interviewed key personnel
• Analyzed data related to security calls, census, and restraints
• Evaluated findings to develop layout alternatives

Current System

The student team identified the characteristics of the current situation on UH-9C through observations and data collection.

• Unit has 22 beds, 2 community rooms, 1 seclusion room, 1 dining room, and 1 laundry room
• Nurses access all areas of the unit in addition to spending time in the nurses’ station
• Nurses’ station has poor visibility
• Range of diverse patients in close proximity of each other
• Unit lacks separation of patients
• Unit lacks classification of patients by level of aggression
• Unit has no set protocol for room assignments or for dealing with aggressive patients

Findings and Conclusions

The student team analyzed numerous sources of data and information by summarizing the current status on the unit and prioritizing possible improvements. The analysis led to the following findings and conclusions:

• Findings show diverse patient mix on ineffectively designed unit
  o Visibility poor at the nurses’ station
  o Staff and patient movement is continuous
  o Nurses spend about 50% of their time in nurses’ station
  o Mix of staff opinions about staff and patient safety
  o Patient milieu is diverse on UH-9C
  o Patients can be aggressive on UH-9C
  o Patients are intimidated by aggressive patients in certain situations
  o Lack of standard protocol for dealing with aggressive patients
  o Nurses are assigned to about one to three patients
  o Separation utilized by other hospitals
  o UH-9D licensed for 11 additional adult psychiatric beds

• Conclusions emphasize need for renovations and new protocols for the unit
  o Nurses’ station should be redesigned to provide greater visibility of all areas of unit
  o Layout changes should be flexible to facilitate staff and patient movement between high traffic areas on unit
  o Nurses’ station needs redesign to provide greater visibility of all areas of unit
  o Changes on unit must be justified and explained to all staff members
  o Patients’ diverse needs must be addressed by possible separation
  o Aggressive patients should be separated from non-aggressive patients to prevent perceived or actual threats
  o Standard protocol for dealing with aggressive patients must be established and enforced
  o Changes in layout must be accompanied by staffing adjustments
  o Separation is used as a tool to prevent violent incidents
  o UH-9D could be used to increase size of unit and as a built-in mode of separation; beds could be used temporarily for displaced patients during remodeling of UH-9C
Recommendations for Renovations and Protocol Implementation

Based on the team’s findings and conclusions, the following recommendations were created, one set for only UH-9C, one if additional beds on UH-9D are acquired, and one if an ideal unit was created at a new location.

- **UH-9C**
  - Implement three-tiered unit
    - Tier 3: Locked unit for aggressive or violent patients
    - Tier 2: Locked unit for non-aggressive patients
    - Tier 1: Open unit
  - Separate tiers with heavy duty doors that can be locked and unlocked as needed
  - Install satellite nurses’ station in tier 3
  - Renovate current nurses’ station to increase visibility

- **UH-9C and UH-9D**
  - Implement three-tiered unit
  - Expand tier 2 to include both sides of the existing unit
  - Maintain tier 3 layout recommendation
  - Implement remaining recommendations described for UH-9C

- **Ideal Unit**
  - Place unit on ground floor
  - Ensure good visibility of all areas
  - Construct a secure, enclosed garden
  - Use durable, sound-proof double doors with observation panels for separation of patients
  - Install a game or recreation room
  - Implement and enforce standard protocols
Introduction and Background

Adult Inpatient Psychiatry at the University of Michigan Hospital has seen a substantial reduction in the number of beds available for patients. Previously, there were three adult inpatient units with a total of 54 beds. By the year 2000, these units were integrated into one inpatient unit with 22 beds located at the University Hospital, floor 9, unit C (UH-9C). This reduction in the number of inpatient hospital beds was partially a result of insurance companies cutting benefits for mental health patients. Also contributing to this reduction was an improvement in medical treatments that decreased the average length of stay for inpatients and increased outpatient care. In addition, recent shutdowns of numerous state psychiatric hospitals have resulted in a high influx of inpatients in UH-9C. UH-9C is also experiencing high acuity in its inpatients, since not all the hospitals are suitable for accommodating these high acuity patients with severe psychiatric illness. There is also a diverse milieu in UH-9C, including both highly aggressive, reactive patients and frail, extremely sensitive patients. The close proximity of this diverse range of diagnoses creates potentially volatile and dangerous situations for the patients and staff. To prevent these situations, the hospital is considering renovating UH-9C to provide patient separation.

The student team was asked to analyze how UH-9C currently functions and to recommend ways to improve the unit as part of the renovation plans. Therefore, the purpose of this project was to determine how function, structure, and processes can come together to accommodate a mix of diverse patients to create a flexible, comfortable, and healthy environment for the staff and patients in UH-9C. The student team has completed this project and this report presents the team’s final findings, conclusions, and recommendations.

Goals and Objectives

To analyze how UH-9C currently functions and determine areas of improvement, the goals of this project were to gain a thorough understanding of the unit’s operations and develop alternatives for renovations. These recommended alternatives will lead to the unit’s flexible and comfortable accommodation of a diverse patient milieu. Although staffing changes are outside of the project’s scope, each alternative the student team developed must be accompanied by staffing changes to maintain a comfortable workflow and equal work distribution for nurses and the involved staff. The three alternatives address each of the following scenarios:

- The unit remains on UH-9C only.
- The unit expands to include both UH-9C and UH-9D.
- The unit is moved to a new location and an “ideal” unit is created.

This final report and oral presentation to be delivered on December 12, 2005 provide new layout diagrams for each of the layout alternatives for the Adult Inpatient Psychiatric Unit that will:

- Provide an adaptable psychiatric unit that can accommodate a diverse patient population.
- Improve patient and employee satisfaction.
- Decrease staff injuries, security calls, repairs, restraints, and medications.
Project Scope

This project included analysis and recommendations for the adult inpatient unit on UH-9C at the University of Michigan Hospital.

This project excluded analysis of outpatient psychiatric care in addition to any psychiatric care or consultations given on other units of the hospital. The pediatric psychiatric unit was also outside the scope of this project.

Approach and Methodology

The following section presents the detailed methodology the team followed to achieve the previously stated goals and objectives. Many of these activities were done simultaneously.

Observed Key Processes and Activities

The team made observations of the main processes in the unit to gain a better understanding of how the unit functions and to identify potential areas of improvement. These observations took place between October 3, 2005 and November 14, 2005 and are detailed below.

- Rounded with a group of physicians for one session to observe patients firsthand
- Shadowed nurses from each of three shifts to observe nurses’ daily activities
- Attended one community meeting to observe the patients in the unit

Assembled Relevant Data

Some sources of data had been previously collected and were given to the team for analysis. The team received data containing the following information.

- Data on security calls
- Data on patient restraints and seclusions
- Data containing census information
- Data on use of Haldol and Intramuscular Ativan as chemical restraints

Interviewed Key Personnel

To obtain different perspectives on UH-9C’s situation, the student team interviewed the following key personnel.

- Nurses from each shift (approximately nine in total)
- Physician, Dr. Daniel Maixner
- Physician, Dr. David Knesper
- Unit clerk from each shift (2 in total, no clerk on night shift)
- Activity therapist, K Hoelscher
- Representative from Department of Design and Construction, Samir Karim
- Representative from Recipient Rights, Gwyn Schuon
- Representative from Risk Management, Juliette Larsen
Analyzed Relevant Data

The team analyzed the data received to identify potential areas of improvement for the unit.

- Studied floor plans of UH-9C to understand current structural layout of the unit
- Examined staff and patient flow by using floor plans and observations to find key areas of potential improvement
- Created cause and effect diagram to determine root causes of patient and staff dissatisfaction with the current unit layout (See Appendix A for cause and effect diagram)
- Estimated average percent occupancy on the unit using current volume data

Evaluated Multiple Sources of Information

Three layout alternatives were developed through the evaluation of different sources.

- Considered aesthetic and ergonomic issues
- Consulted with personnel from newly remodeled psychiatric units to gather information on the advantages and disadvantages of their new layouts
- Conducted a literature search on healthcare databases to acquire further background information on psychiatric inpatient care units
- Conducted a literature search on engineering and architecture databases to find examples of other remodeled psychiatric units

Current System

The student team developed a summary of the current system on UH-9C through observations and interviews. This current system was considered when developing future recommendations for the unit.

Nurses

The student team observed, interviewed, and shadowed nine nurses to understand their current workflow. Through this process of shadowing, the following observations were made.

- Spend 50% of time moving through the halls talking to, checking on, and caring for patients
- Spend 50% of time in the nurses’ station performing tasks such as monitoring patients, getting medications, making phone calls, doing paperwork, and meeting with other staff members
- Have poor visibility of back end of the hallways from the nurses’ station (includes many patient rooms, the small community room, and the kitchen)
- Frustrated by the poor setup of the nurses’ station
- Assert there is too much equipment in front of the nurses’ station windows
- Assigned to one to three patients each
- Need access to the community rooms, nurses’ station, and dining room
• Assert that access to medication room is difficult due to its small size

Patients

The student team utilized interviews and observations to understand the current activities of the patients.
  • Belongings are searched upon arrival
  • Items that are permissible are locked in patient’s room
  • Items that are prohibited are removed (such as cigarettes, lighters, and knives)
  • Patients range from highly aggressive and reactive to frail and depressive
  • No patient separation
  • Average length of stay is nine to ten days

Visitors

The student team utilized interviews and observations to understand the current visitor guidelines.
  • Visitors must sign in upon arrival
  • Visitors are searched for prohibited items
  • Items that are prohibited and intended for the patients are confiscated

Layout

The student team utilized observations and analyzed floor plans to understand the current layout on UH-9C. The floor plan of the current unit can be seen in Appendix B.
  • 1 locked unit, 9th floor, unit C (UH-9C)
  • 22 available beds (6 double rooms, 10 single rooms)
  • 6 medically equipped rooms
  • 1 seclusion room with wood floors, reinforced windows, window screens, bathroom outside seclusion room, camera and microphone to desk
  • 1 small community room with piano, TV, table, chairs, couches, windows
  • 1 large community room with fish tank, TV, puzzles, table, chairs, couches, dry erase board, carpet, windows, magazines, games
  • 1 laundry room
  • 1 dining room for meals and activity therapy
  • 1 nurses’ station
  • 1 staff area as a break room
  • 1 record room
  • 1 interview room
  • 1 entrance with numerous signs
  • Reinforced windows
  • No televisions in patient rooms
  • Each patient room has a bed and a dresser
  • Gym used for physical release located outside the unit
  • UH-9D licensed for 11 beds but currently utilized as office space
Processes

The student team interviewed staff, attended a community meeting, and rounded with staff to understand the current processes.
- No set protocol for how patients are assigned to rooms other than availability and same sex assignment for double rooms
- No consistent protocol for dealing with aggressive patients
- No classification of patients by level of aggression
- Patient privileges are awarded according to a tri-level system described in Appendix C
- Patients attend community meetings one to three times per week
- Staff rounds to meet individually with patients to discuss progress & issues (7 days a week)

Key Issues Affecting Project Execution

In the project proposal, the student team discussed initial issues to consider while conducting the project. New issues arose during the course of the project. All of these key issues are listed below.

Issues from Proposal

The Psychiatry Section Administrator, Janis Price, provided the student team with the following initial issues to consider during the study.

- Safety of patients and staff
- Patient and staff comfort and satisfaction
- Aesthetics of the unit
- Flexibility of the unit layout
- Workflow of the staff

Issues after Project Execution Started

While conducting staff interviews, the student team encountered the following new issues.

- Opposing opinions of key staff
  Throughout the interview process, the student team learned that different staff divisions have opposing ideas for the remodeling of the unit and the treatment of the patients. For example, some of the nursing staff feels that all the patients should be kept in one large group. They feel that keeping the more aggressive patients with the frail, depressed patients will motivate the aggressive patients to correct their behavior and help them to calm down more quickly. On the other hand, the doctors and some other staff (including some nurses and activity therapists) feel that when a patient is being aggressive, that patient should be separated immediately from the group to calm the aggressive patient
down and protect the non-aggressive patients from harm or disruption. These differing opinions were considered by the student team in their final recommendations.

- Complexity of final decisions
The opposing opinions of the key staff showed the student team that the final recommended layout will not please all involved parties. Therefore, the student team focused primarily on the safety of the patients and staff before the other key issues such as comfort and satisfaction.

- Time constraints
To deliver recommendations in a final report on December 12, 2005 as planned, the student team determined that any data collected on the status of unit UH-9C (such as number of patient and staff injuries and number of security calls) will be preliminary, benchmarking pieces of data, since more time is required for approval and full implementation of the recommendations. The student team did not have the necessary time or resources to measure the effectiveness of their recommendations.

- Acquisition of additional beds
Although the current Adult Inpatient Psychiatric Unit is only located in the unit on UH-9C, some of the unit's key staff are considering asking hospital administration for permission to use the beds on unit UH-9D as an Intensive Treatment Unit. The rooms on UH-9D that were once part of the psychiatry unit are now used as offices. Although it is currently unknown whether the administration will allow the Adult Inpatient Psychiatry Unit to expand from UH-9C into UH-9D, the student team created two alternative layouts; one if the beds on UH-9D are acquired and one if they are not.

Findings and Conclusions

The table below highlights the primary findings and conclusions reached by the student team. A more detailed description of the findings and conclusions from each data source follows the table. These findings and conclusions are demonstrated graphically in a cause and effect diagram found in Appendix A.
<table>
<thead>
<tr>
<th>Findings</th>
<th>Conclusions</th>
<th>Security Data</th>
<th>Rounding Observations</th>
<th>Nurse Shadowing</th>
<th>Census Data</th>
<th>Pharmacy Data</th>
<th>Dr. Maiher Interview</th>
<th>Dr. Knesper Interview</th>
<th>Activity Therapist Interview</th>
<th>Facilities Dept. Interview</th>
<th>Recipient Rights Interview</th>
<th>Risk Management Interview</th>
<th>Visit to St. Joseph Mercy</th>
<th>Visit to Chelsea Hospital</th>
<th>Restraint &amp; Seclusion Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor visibility at the nurses’ station</td>
<td>Nurses’ station should be redesigned to provide greater visibility of all areas of unit</td>
<td></td>
<td>X</td>
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<tr>
<td>Continuous movement of staff and patients on unit</td>
<td>Layout changes should be flexible to facilitate staff and patient movement between high traffic areas on unit</td>
<td></td>
<td>X X</td>
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<tr>
<td>Nurses spend about 50% of their time in nurses’ station</td>
<td>Nurses’ station needs redesign to provide greater visibility of all areas of unit</td>
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<tr>
<td>Mix of staff opinions about staff and patient safety</td>
<td>Any changes on unit must be justified and explained to all staff members</td>
<td></td>
<td>X</td>
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<tr>
<td>Diverse patient milieu on unit</td>
<td>The diverse needs of different types of patients need to be addressed by possible separation</td>
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<td>X X</td>
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<tr>
<td>There are aggressive patients on unit</td>
<td>Separate aggressive patients from non-aggressive patients to prevent perceived or actual threats</td>
<td></td>
<td>X X</td>
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</tr>
<tr>
<td>Some patients are intimidated by aggressive patients</td>
<td>Separate aggressive patients from non-aggressive patients to prevent perceived or actual threats</td>
<td></td>
<td>X X</td>
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</tbody>
</table>
Lack of standard protocol for dealing with aggressive patients

| Lack of standard protocol for dealing with aggressive patients | Establish and enforce standard protocol for dealing with aggressive patients |   |   | X | X | X |
| One nurse assigned to about 1-3 patients | Changes in layout must be accompanied by staffing changes |   |   | X | X | X |
| Separation utilized by other hospitals | Separation is used as a tool to prevent violent incidents |   |   | X | X | X |
| UH-9D licensed for 11 additional adult psychiatric beds | UH-9D could be used to increase size of unit and as a built-in mode of separation; beds could be used temporarily for displaced patients during remodeling of UH-9C |   |   | X | X | X |

High Percentage of Security Calls

The total percent of security calls to the Adult Psychiatry unit and the University Hospital based on bed days for the fiscal year 2005 is shown below in Figure 1.

![Chart showing security calls](chart.png)

Figure 1. Percent Security Calls to Adult Psychiatry vs. University Hospital Based on Bed Days FY2005
Findings
The prominent findings from analyzing Figure 1 and discussing it with some involved personnel are listed below.

- Figure 1 illustrates that there was a higher percentage of security calls on UH-9C than on the rest of the inpatient units in the University Hospital combined. UH-9C had 132 security calls in the fiscal year of 2005 and since UH-9C is only a 22 bed unit, their percent of calls per bed is higher than any other unit in the hospital.
- A discussion with Perry Spencer, Security Operations Manager, revealed that data in Figure 1 only includes cases when security is called to apply restraints. It does not include when other staff members apply restraints.
- Some staff members believe that the data in Figure 1 reveals a significant problem while others do not. The staff members that believe it is a problem think that having security present on UH-9C for any circumstance is disrupting and intimidating for the patients. The student team agrees that the presence of security is intimidating to patients, which causes them to feel unsafe.

Conclusions
The higher percentage of security calls led to the following conclusions.

- Too many security calls are made to UH-9C. This condition exposes the whole unit to intimidating situations. Some separation of the patients could decrease the number of security calls non-aggressive patients would witness.
- There should be a standard protocol that addresses the situations in which security should be called.

Diverse Patient Milieu Observed During Rounds

The following findings and conclusions were based on the student team’s observations on October 3, 2005 from 8:15 a.m. to 10:15 a.m. of the team meeting between key staff on the unit (physicians, residents, nurses, activity therapists, pharmacist, and social worker) and each patient individually. These team meetings are held in one of the community rooms on the unit and are done in place of traditional rounding, in which a group of physicians and residents walk to each patient room to discuss the patient’s condition. However, this traditional rounding technique was used for patients that could not leave their rooms.

Findings
The student team observed the following while attending rounds.

- Rounds begin every morning at 8 a.m. and last approximately two hours.
- Rounding team consists of physicians, interns, residents, nurses, the pharmacist, the social worker, and the activity therapists.
- Mobile patients who are permitted to leave their rooms are brought to the small community room on UH-9C to ask and answer staff questions.
- If the patient is unable leave his or her room, the staff team meets with the patient in the patient’s room.
- Patients ranged from quiet, depressed older women to aggressive, excitable young men.
- Two excitable patients interrupted the team meeting by walking uninvited into the community room.
Conclusions
Observing the rounds led the student team to conclude the following.

- The new layout should allow the nurses to have more visibility of and control over the patients.
- The staff encourages the patients to be active and interact with the other patients and staff, which should be considered in the new layout.
- The community rooms are used often by all patients, which should be considered in the new layout.
- The new layout should include aspects that accommodate all types of patients; loud, excitable patients that need more room to move and quiet, frail patients that need privacy.

Inconsistent Nurse Flow Observed During Nurse Shadowing

The following findings and conclusions are a result of the student team accompanying two nurses on some of their daily activities on each shift. The findings are not divided into separate shifts, but are a summary of the important observations made by the student team.

Findings
The student team observed the following while shadowing nurses.

- Frequent activity on the unit from the movement of patients, staff, and visitors.
- Each nurse does not seem to have a set flow that he or she follows continuously. Instead, each nurse periodically checks on each of his or her patients according to the patient’s status and need for supervision. Throughout the day, the nurses react to and address situations that arise with each of their patients and assist in their therapy. The nurses also keep detailed records of the patients’ mental and medical status as well as their activities.
- Nurses are assigned to one to three patients each.
- Nurses spend a lot of time in the nurses’ station monitoring patients, getting medications, making phone calls, doing paperwork, and meeting with other staff members.

Conclusions
The student team’s observations of and discussions with the nurses led to the following conclusions.

- Any new separations within the unit should be secure enough to keep patients where they are supposed to be, but easy to get through for staff members.
- More visibility must be added to the nurses’ station so nurses can complete work in the nurses’ station while supervising patients.
- Any changes in the layout must be accompanied by changes in staffing so that one nurse is not overwhelmed with too many acute patients at once.

High Percent Occupancy Indicated by Census Data

The following findings and conclusions were based on data received by the student team from client Jan Price. The data was a file containing average patient volumes by month for the fiscal years 2004, 2005, and the first quarter of 2006. The student team calculated the average number of inpatients for each fiscal year and the average percent occupancy for all three years.
Findings
The following findings are a result of the analysis of the census data for UH-9C for fiscal year 2004 to the first quarter of fiscal year 2006.

- Table 1 provides the average number of inpatients per fiscal year, including the first quarter of the fiscal year 2006.
- Table 1 also provides the percentage of days spent at 100% occupancy for each fiscal year.

Table 1. Average Number of Inpatients & Percentage of Day and at 100% Occupancy by Fiscal Year

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Number of Inpatients on UH-9C</th>
<th>% of Days at 100% Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>18.51</td>
<td>7%</td>
</tr>
<tr>
<td>2005</td>
<td>19.14</td>
<td>8%</td>
</tr>
<tr>
<td>2006</td>
<td>19.14</td>
<td>22%</td>
</tr>
</tbody>
</table>

- The provided census data did not give information on the acuity of patients on the unit.
- Figure 2 illustrates the number of patients on the unit in any given month from the fiscal years 2004, 2005, and first quarter of 2006.

![Figure 2. Average Number of Inpatients by Month for fiscal years 2004-2006](image)

- Some other statistics from this data are:
  - Lowest recorded volume for 2004-2006: 15.90 patients
  - Average patient volume for 2004-2006: 18.79 patients
• Although there is no data on the number of aggressive patients on the unit at any given time (there is no rating system or diagnosis data that labels patients as “aggressive” or “frail”) the consensus among all interviewed staff members on the unit is that there are typically two to three aggressive patients on the unit.

Conclusions
After reviewing the analysis of the census data, the student team made the following conclusions.
• Table 1 and Figure 2 show that UH-9C is currently running at 85-90% of the 22 bed capacity. This statistic is important to consider in any future changes to the unit, since these changes should still allow the unit to run at this capacity with the same or better quality of service and safety.
• Any changes recommended for the unit should take into account that on average, two to three patients on the unit are considered aggressive. The remodeled unit should accommodate the aggressive and frail patients with the same or better quality of service and safety that the unit currently provides.

Use of Chemical Restraints Indicated by Pharmacy Data

The following findings and conclusions were based on data obtained from the pharmacy on the use of the chemical restraints Intramuscular Ativan and Haldol. These medications are used both individually and in combination with one another to chemically restrain excessively aggressive patients.

Findings
The student team analyzed data taken from the automated pharmacy system, Omnicell.
• Table 2 below shows the summary statistics about the uses of Ativan and Haldol on UH-9C.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Ativan Users</td>
<td>181</td>
</tr>
<tr>
<td>Total Haldol Users</td>
<td>41</td>
</tr>
<tr>
<td>Repeat Users of Ativan (within one day)</td>
<td>13</td>
</tr>
<tr>
<td>Repeat Users of Haldol (within one day)</td>
<td>8</td>
</tr>
<tr>
<td>Combination Ativan and Haldol Users</td>
<td>12</td>
</tr>
<tr>
<td>N= 255</td>
<td></td>
</tr>
</tbody>
</table>

Conclusions
After reviewing the analysis of the data on the number of users of Ativan and Haldol, the student team made the following conclusions.
• Since Haldol and Ativan, especially in repeated or combination usages, are administered in response to aggressive behavior, the numbers above illustrate there are aggressive patients on UH-9C. This situation could pose a threat to the other patients on the unit.
• If a large number of patients are aggressive enough to need to be medically restrained, then these patients are aggressive enough to hurt or intimidate other patients.
• These aggressive patients should be separated from other patients.
Key Personnel Interviews

During the interviews, key personnel were asked questions about which types of quantitative data can be used in the analysis of this problem, their desired outcomes from this project, and their perception of the problem.

Daniel Maixner, MD
The following findings and conclusions were based on an interview with Dr. Maixner, the Director of Inpatient Psychiatry on UH-9C.

Findings
The following findings were the major inputs from Dr. Maixner.
• Provided anecdotal information about the severity of the problem with aggressive patients on UH-9C by citing recent incidents of violence on the unit, including a nurse being kicked by a patient and another nurse having his hand broken by a patient.
• Shared his idea of converting the current space on UH-9C into a three-tiered unit. The first tier would be about four to five beds within a locked unit for the most aggressive and dangerous patients. Once under control, the patients would graduate to a larger locked unit in which they could interact with other patients who were sociable, but could not be on an open unit yet. Finally, patients would graduate to a nine-bed open unit.
• Discussed the psychiatric staff’s desire to acquire UH-9D for additional beds and possible uses for the space.

Conclusions
After reviewing the comments from Dr. Maixner, the student team made the following conclusions.
• The incidents of violence on the unit show that there is a problem.
• Patient separation would keep non-aggressive patients safe from the aggressive patients.
• Standard protocol would help staff handle violent situations.
• The nurses’ station should be able to see every area of the unit to anticipate dangerous situations.
• The team will base their recommendations on Dr. Maixner’s idea of a three-tiered unit.
• The student team needs to develop floor plans with and without UH-9D.

David Knesper, MD
The following findings and conclusions were the result of an interview with Dr. Knesper that took place on October 31, 2005.

Findings
The following findings were the major inputs from Dr. Knesper.
• Confirmed that there is a perceived problem with patient safety in the unit, and any perception of an unsafe unit needs to be addressed. Also confirmed that renovations to address this problem will take place.
• Informed the team that residents in the unit have complained about safety to the National Residency Program.
• Provided the team with guidelines for presenting its recommendations, given different scenarios like the acquisition of UH-9D and moving to a different area of the hospital in several years.

Conclusions
After reviewing the comments from Dr. Knesper, the student team made the following conclusions.
• The team decided to resume the data collection relevant to its recommendation for patient separation instead of only searching for more data to prove that a problem exists.
• The team needs to present three recommendations, each for a particular scenario.
  o The first will be for renovating UH-9C.
  o The second will be for renovating UH-9C and UH-9D.
  o The third will be an ideal design of a new space which can be used when the psychiatric inpatient unit moves in approximately the year 2012.

Nurses and Unit Clerks
The following findings and conclusions were based on interviews with several nurses (around three) and one clerk from each of the three shifts (day, evening, and midnight). There is no clerk on the midnight shift. The findings are not separated by each individual nurse or clerk; instead, the main points from all of the interviews are presented below.

Findings
The following findings were the major inputs from the nurse and clerk interviews.
• Unit clerks felt safe; however, the day shift clerk had previous experience with violent and aggressive psychiatric patients at another unit.
• There were differing opinions on the separation of aggressive patients from frail patients. Some nurses were absolutely against patient separation, some nurses were conditionally interested in patient separation if changes in staffing were made, and some were in favor of patient separation.
• Nurses stated that if a separation was made, staffing would have to be modified.
• Nurses stated that the separation would need to be flexible, so that patients would only be separated if necessary.
• Nurses commented that the separation of aggressive patients from the milieu may be difficult because it is hard to tell who is going to be violent until an incident occurs.
• One nurse commented that nurses can “tune out” loud outbursts and small incidents that may be affecting patients or their families more severely.
• Nurses stressed the need for the establishment of consistent protocols for working with aggressive patients while others discussed a protocol that was already in use.
• One nurse suggested separating the elderly patients from the milieu, instead of separating the violent patients.
• Nurses commented on the poor visibility from the nurses' station. From the nurses' station, nurses are unable to see the back end of the hallways, which include many patient rooms, the small community room, and the kitchen.

• Nurses and clerks commented on the poor setup of the nurses' station. The medication room is very small and difficult to access. There is too much equipment at the front of the nurses' station in front of the windows.

• Nurses voiced the need for more communication and teamwork between staff members.

• Nurses commented on the need for more space in which the patients can relax and move around, because patients were calmer when they had more space.

• Nurses commented on the need for aesthetic changes to make the unit more "welcoming and homey."

• Nurses shared that they missed "the porch," which was a group of chairs in front of the nurse's station where patients and staff could talk in an informal manner. It was recently removed due to fire code issues.

• Nurses stated that patients prefer private rooms over semi-private rooms.

Conclusions
After reviewing the comments from the nurses and clerks, the student team made the following conclusions.

• Any recommendations for a new layout must be justified and fully explained to all staff members to avoid intra-staff conflict.

• Any change in layout must be accompanied by a change in staffing.

• Any new separations within the unit should be flexible, meaning that certain beds can be separated when needed, but added back in to the general milieu of beds when not needed. A locked set of doors may be the best approach.

• The nurses' station needs to be redesigned as soon as possible. More visibility needs to be added, perhaps with a wrap-around nurses' station with (cordless) blinds over some windows that could be closed for private staff meetings. The clutter of office equipment needs to be removed from the front of the nurses' station.

• Any new separations within the unit must be accompanied by a specific protocol to establish what type of patient is placed where and for how long.

• A consistent protocol for handling aggressive patients must be established. This protocol must be shared with and followed by all staff members who would be regularly trained on the protocol.

• Any new separations within the unit must provide space for the patients in each area to be move freely and access some sort of common area.

• Regardless of layout changes, aesthetic changes should be made on the unit, which could include more welcoming signs in the entryway and different paint colors in the rooms and hallways.

• The separation of the geriatric patients from the rest of the patients instead of the separation of the aggressive patients should be considered.

• A community area in direct sight of the nurses' station should be implemented.

• Private rooms should be utilized instead of semi-private rooms whenever possible.

Activity Therapist
The following findings and conclusions are a result of an interview with K Hoelscher, an activity therapist for the patients on UH-9C.

**Findings**
The following findings were the major inputs from the interview with K Hoelscher.

- Activity therapist shared numerous anecdotes about patients fearing other patients in the group activities. One incident included an aggressive patient having to be removed from a group and three other patients “begging” her not to let the aggressive patient back into group.
- There are communication problems between the nurses and the activity therapists. Activity therapists need to be warned about previous aggressive tendencies of patients before patients arrive at group activities.
- Activity therapist felt that room confinement should be used more often for aggressive patients; letting an agitated patient wander will only increase their agitation.
- Group rooms and the dining room are too far from the nurses’ station and can not be supervised by the nurses in the nurses’ station, which creates a very dangerous situation for patients and staff in those rooms.
- Activity therapist felt that the staff tolerates too many patient disturbances and that the rest of the unit has the “right to be in the hospital and not feel threatened.”

**Conclusions**
After reviewing the comments from K Hoelscher, the student team made the following conclusions.

- Separation of the aggressive patients from the frail patients should at least be an option on the unit.
- A standard communication protocol between all staff members about the status of every patient should be implemented.
- The nurses’ station should be renovated to provide more visibility of all the areas on the unit.
- Patient safety and satisfaction should be considered in the final recommendations above all other considerations.

**Facilities Management Representative**
The following findings and conclusions are a result of an interview with Samir Karim, The Senior Architect and Medical Facilities Planner.

**Findings**
The following findings were the major inputs from the interview with Samir Karim.

- Provided several floor plans for UH-9C and UH-9D.
- Provided information on the number of beds licensed for psychiatry use. There are 33 licenses, with 22 in UH-9C and 11 in UH-9D. The patient rooms in UH-9D are currently being used as offices, but can be converted to patient rooms in less than 24 hours and therefore still keep their licenses as psychiatric patient rooms.
- Explained regulations regarding patient rooms and facilities and provided contact information for the Michigan Department of Public Health.
- Provided the team with a list of current inventories on UH-9C.
Conclusions
After reviewing the comments from Samir Karim, the student team made the following conclusions.

- The student team developed floor plans with and without UH-9D.
- Temporary use of UH-9D should be considered during renovations of UH-9C.

Recipient Rights Advisor
The following findings and conclusions were based on an interview with Gwyn Schuon, Advisor to the Board of Recipient Rights on October 14, 2005.

Findings
The following findings were the major inputs from the interview with Gwyn Schuon.

- Provided the team with history about the trend of state hospitals closing down.
- Emphasized the increase in severity and persistence of patient behavior on UH-9C from 1998-2005.
- Discussed the range of behaviors, diagnoses, social classes, and voluntary or involuntary status that contribute to the volatile nature of patients on UH-9C.
- Shared anecdotal information about patients' complaints about the treatment and lack of safety on the unit.
- Informed the team that patients often exaggerate situations, so patient complaints should be investigated and not necessarily be taken as fact.
- Suggested ideas for renovations based on her visits to other area hospitals.
- Discussed security issues.

Conclusions
After reviewing the comments from Gwyn Schuon, the student team made the following conclusions.

- Patients sometimes feel threatened and unsafe on the unit so separation of patients should be considered.
- Visiting other hospitals' units would provide insight for possible renovations to UH-9C.
- Patient safety should be the primary concern when considering renovations.

Risk Management Representative
The following findings and conclusions were based on an interview with Juliette Larsen of Risk Management on October 17, 2005.

Findings
The following findings were the major inputs from the interview with Juliette Larsen.

- Noted that in 2004, UH-9C had more security calls than all other floors in the hospital combined (based on percentages of security calls by bed days as seen in Figure 1).
- Discussed the security risks due to contraband items being brought into the unit.
- Commented that the space for the nurses' station on UH-9C is too small and that a larger station should be considered in redesign.

Conclusions
After reviewing the comments from Juliette Larsen, the student team made the following conclusions:

- Security on UH-9C is an issue and must be considered as a priority in redesign.
- There should be a better system to ensure that visitors and patients do not bring contraband items onto the unit.
- The nurses’ station should be redesigned.

**Visits to Other Hospitals**

To get different perspectives on psychiatric care, gather benchmarking data, and see different types of layouts, the student team visited two area hospitals.

**St. Joseph Mercy**
The student team visited the adult inpatient psychiatric unit at St. Joseph Mercy Hospital in Ann Arbor, Michigan on November 7, 2005. The team was given a tour of the unit and discussed issues on the unit with the nurse manager, Carol Schaffer.

**Findings**
The following findings are from the team’s visit to St. Joseph Mercy Hospital.

- The student team was provided with the current floor plan layouts. The current unit had 24 beds with 13 beds on one hallway and 11 beds on the other hallway. The entire unit was locked but access was permitted between both hallways. A nurses’ station was located at the entrance which was also the intersection between the two perpendicular hallways. The nurses’ station was very open and provided visibility of all patient rooms.
- Patients were separated to a primarily geriatric side and a non-geriatric side, so the more aggressive patients tended to end up on the non-geriatric side.
- Patients were split into four teams that participated in activities together. Team separation was based on low-functioning versus high-functioning patients.
- Physical restraints and the seclusion room were rarely used.
- The nurse manager provided floor plans for the new unit to be built in the next two years. The new unit will be one long hall with each side still separated into a geriatric and non-geriatric side with a four bed section on each side that has the possibility of being locked when separation of the patients in those rooms is necessary.

**Conclusions**
After reviewing the observations at St. Joseph Mercy Hospital, the team made the following conclusions.

- The idea of having a flexible unit with the possibility of a locked section of beds for aggressive patients, when necessary, should be considered for UH-9C.
- Separation of patients by age should be considered for UH-9C.
- A system of grouping patient teams for activities based on their behavior should be considered.
- All areas of the unit should be visible from the nurses’ station.

**Chelsea Hospital**
The student team visited the adult inpatient psychiatric unit at Chelsea Hospital in Chelsea, Michigan on November 17, 2005. The team was given a tour of the unit and the opportunity to discuss issues with doctors and nurses on the unit.

Findings
The following findings are from the team’s visit to Chelsea Hospital.

- The unit had 24 beds with half of the beds on a locked side and half on an unlocked side. Generally, the unlocked side housed the geriatric and voluntarily admitted patients while the locked side housed the involuntarily admitted patients.
- Both sides had a recreation room with television and games, along with access to an enclosed outdoor courtyard area.
- The open side had a kitchen and skylight room, which also served as group meeting spaces.
- The nurses’ station was open and easily accessible at the entrance to the unit with good visibility down both sides of the unit.
- Medical restraints were administered more frequently than physical restraints.
- Physical restraints and the seclusion room were rarely used.
- Nurses stated that having an open and closed side helped with patient independence and de-escalation.

Conclusions
After reviewing the observations at Chelsea Hospital, the team made the following conclusions.

- Having patients separated into one locked side and one unlocked side was considered to be a success at Chelsea and should be considered in possible renovations to UH-9C.
- Safety of both patients and staff must always be the primary concern on a psychiatric unit.
- Nurses’ stations should be made accessible and welcoming with direct visibility of as many patient rooms as possible.
- Rooms can be used for multiple purposes when space is an issue, such as using the dining room for group meetings as well as meals.
- Incidents of escalation requiring physical restraint or seclusion may be reduced with a separation of patients. However, benchmarking the data is not an exact comparison since Chelsea limits the level of aggression of patients which they accept.

Patient Aggression Illustrated by Restraint and Seclusion Uses

The following data reflects the number of seclusions and physical restraints administered by staff on UH-9C from October 2004 to August 2005. Table 2 illustrates the averages, maximum, and minimum for both seclusions and restraints.

Findings
The raw data containing details about the use of restraints and seclusions was analyzed by the student team and the following table was created.

Table 2. Number of Restraints and Seclusions Used from October 2004-August 2005
<table>
<thead>
<tr>
<th>Statistic</th>
<th>Restraints</th>
<th>Seclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Number of Uses</td>
<td>2.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Maximum Recorded Number of Uses</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Minimum Recorded Number of Uses</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Conclusions**

After reviewing the restraint and seclusion data, the team made the following conclusions.

- Although there were months where seclusions or restraints were not used, an average of at least two seclusion and restraint uses per month shows that there were patients on the floor that were aggressive enough to necessitate physical restraint and seclusion.
- The aggressive patients should be separated from the other patients to prevent the incidents that lead to restraints and seclusions from affecting the other patients.

**Recommendations**

The following recommendations are a culmination of the student team's research and analysis of the current state of the unit and how it could be improved. There are three alternative recommendations: if improvements can be made to UH-9C only, if the beds on UH-9D are acquired as part of the unit, and if a new, ideal unit is created at a new location.

**Separation of Patients in UH-9C**

This first set of recommendations deals with the separation of patients if the unit remains its current size and at its current location.

**Modifications Needed in the Current System of UH-9C**

The following modifications should be applied to the unit, regardless of the implementation of any layout changes:

- The nurses’ station must be renovated to increase visibility. Add windows to the back end of the nurses’ station. Install windows made of reinforced glass, with cordless blinds on the inside to allow for private meetings. Relocate office equipment blocking the front windows.
- Install convex mirrors in front of the dining room and small community room to facilitate constant observation of patients in areas with limited visibility.
- Establish and enforce a standard protocol for dealing with aggressive patients.
- Improve the aesthetics of the unit.

**Layout Changes for Separation of Patients**

Modifications to the layout of the unit to accommodate the separation of patients by aggression level are described below.

- Implement a three-tiered unit. A diagram of this three-tiered version of UH-9C is presented in Appendix D.
  - Tier 3 is for aggressive patients that need to be separated from the milieu.
  - Tier 2 is for patients that are not a threat to other patients, but still need to be in a locked unit.
  - Tier 1 is for patients that are able to be in an open unit.
• Tier 3 has two sets of double doors to enclose 0, 2, or 4 rooms.
• Separate tiers using heavy-duty locked doors that minimize sound but have large, reinforced glass windows to allow visibility. The doors in tier 3 could be locked when separation is needed, or pulled open when some or all of tier 3 is not needed.
• Utilize the gym as a large area for patients in tier 3 to release tension under supervision of a nurse.
• Convert room 9458 into a seclusion room, and convert the current seclusion room (9149) into a patient room.
• Install a small nurses’ satellite station in tier 3 to facilitate patient observation.
• Accompany these layout changes with staffing changes.

Additional Changes if Rooms in UH-9D are Acquired

In the case that additional beds are acquired in UH-9D, the modifications recommended for UH-UH-9C should be implemented as well as the following recommendations.
• Implement the three-tiered unit system as previously described. However, the open unit for tier 1 patients will be located in the space acquired on UH-9D. Tier 3 will remain unchanged on UH-9C and the locked unit for tier 2 patients will be extended to include the remaining portion of UH-9C. A diagram of this modified three-tiered unit is presented in Appendix E.
• The nurses’ station renovations described above would still need to be made on UH-9C. The wall within the nurses’ station on UH-9D should be removed so that it is a wrap-around station.

Characteristics of an Ideal Unit

The following is a description of the key characteristics of an ideal Psychiatric Inpatient Unit if a new unit is made at a new location. Theses characteristics were taken from the book entitled Psychiatric Intensive Care, by Beer, Pereira, and Paton. A full citation for this book is found in Appendix F.

Layout
• The unit should be located on the ground floor. This location would ease admission of acute patients because the patients will not have to travel through the entire hospital when admitted. Also, the ground floor is safer because it discourages jumping out of windows.
• There should be an entrance to the unit without going through the entire hospital.
• There should be clear lines of sight, especially from the nurses’ station. This should be possible around corners (aligned windows or convex mirrors).
• Hallways should be three meters (ten feet) wide to allow for the comfortable circulation of patients and personnel.
• The ceiling should be three meters (ten feet) from the floor to give the feeling of space.
• The ceiling should be fitted with sky lights to allow increased natural light into the main hallways.
• There should be 30 square meters (323 square feet) of free access space per patient.
• Pipes, wires and heating should be hidden behind the walls.
• There should be a secure, enclosed garden. Staff must be present at all times when the garden is used.

Fire exits
• One option is for the fire exits to be secured on magnetic locks that unlock when the fire alarm is activated. These locks must be disconnected from the hospital’s fire alarm test procedure. A safety concern is that patients may activate the fire alarm to escape.
• Another option is to secure exits on lock and key. This option requires a clear procedure for evacuation.

Windows
• The unit should have as much natural daylight as possible.
• Polycarbonate, toughened glass should be used because it can withstand abuse.
• The window should not open more than 125 millimeters (0.5 inches).

Doors
• The doors should be durable against abuse and have good sound proofing.
• The doors should open both ways.
• Double doors should be used in the tier with aggressive patients. These doors would allow multiple staff to quickly access or leave the unit when a violent situation occurs.
• The doors should be fitted with polycarbonate observation panel for staff to see on the other side of doors.

Seclusion Room
• The room should have a single molded vinyl safety bed.
• The room should have a ceiling clearance that cannot be reached by jumping on the bed.
• Walls and floors should be lined with a welded seam vinyl surface.
• Doors should have observation panels made of double polycarbonate glass so staff can observe the whole room.
• There should be ventilation and heating on ceiling that is out of reach.
• The room should be able to withstand abuse.

Recreational Rooms
• Install a game or gym with exercise equipment
• Install an activities room with board games and art supplies
• Install a sitting room with a television and VCR or DVD player
• Allow access to the garden area

Standard Operational Procedure
• Describe a standard response to the situations that commonly occur.
• Keep the procedures simple and teach them to all staff members.

Implementation or Action Plan
To complete the changes recommended by the student team, the following steps should be taken.

- First, the unit staff should establish and enforce a standard protocol for dealing with aggressive patients. This protocol will need to be in use as soon as possible and will be used no matter what changes to the layout are made and when these changes are made.
- The unit staff should decide, with administration, whether UH-9D will be acquired for adult psychiatric inpatient use.
- If any significant change is made to the unit that requires closing some beds, the unit staff must decide where to temporarily relocate the patients in those beds.
- Research should be done on the exact type of doors that will be used to make the separations described in the recommendations.
- A new staffing plan should be devised that corresponds with any layout changes.
- A team should be assigned to address other issues affecting the remodeling of the layout, including architectural limitations, fire codes, and other government codes.

Following the implementation of these changes, further data should be collected to determine if the intended goals of these modifications (decrease in staff injuries, security calls, and restraints) were achieved.
APPENDIX A. Cause-Effect Diagram

Processes:
- Lack of standard protocol for dealing with aggressive patients
- No room assignment protocol

People:
- Diverse mix of patients
- High acuity patients

Facilities:
- No separation of patients by diagnoses
- Lack of visibility prevents nurses' from seeing activity on certain areas

Some patients feel intimidated by aggressive patients
APPENDIX B. Current Unit Layout
# APPENDIX C. Patient Level Descriptions

<table>
<thead>
<tr>
<th>LEVEL NAME</th>
<th>PATIENT RESPONSIBILITIES &amp; LEVEL DESCRIPTIONS</th>
<th>DESCRIPTION OF PERMITTED ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ward Status</strong></td>
<td>Orientation to unit&lt;br&gt;Initial diagnostic evaluation (admission assessment)&lt;br&gt;Initial contact with all team members&lt;br&gt;Individualized treatment plan initiated</td>
<td>Basic phone privileges; may have visitors&lt;br&gt;(unless otherwise indicated)&lt;br&gt;May attend some unit activities&lt;br&gt;(those that occur on the unit)&lt;br&gt;May go off unit with staff only for scheduled tests</td>
</tr>
<tr>
<td><strong>Level I</strong></td>
<td>Take prescribed medications consistently.&lt;br&gt;Be able to follow treatment plan.&lt;br&gt;Demonstrate behavioral control/better insight&lt;br&gt;Attend all scheduled activities and groups.</td>
<td>All of Ward Status privileges.&lt;br&gt;May attend off-unit scheduled groups and activities, such as walks, church, gym, cafeteria, and gift shop (must be accompanied by a staff member)</td>
</tr>
<tr>
<td><strong>Level II</strong></td>
<td>Show greater independence in performance of personal care activities and group participation.&lt;br&gt;Continue to attend all groups, take all meds, etc.&lt;br&gt;Work actively on goals and discharge plans.</td>
<td>All of Ward Status and Level I privileges.&lt;br&gt;May be eligible for off-unit passes (check with your doctor).</td>
</tr>
</tbody>
</table>
APPENDIX E. Three-Tiered Layout Design: UH-9C and UH-9D

Unit D

Unit C

Tier 1

Tier 2

Tier 3

= Locked Door
APPENDIX F. Literature Cited