Analyzing the Utilization of the Emergency Response Teams at the University of Michigan Hospital

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Executive Summary

The University of Michigan Hospital is opening a new area that will be dedicated to Neuroscience and Adolescent Psychiatry. Due to this upcoming addition, the Associate Service Chief for the Emergency Department anticipated the need for additional Emergency Response (ER) coverage for the new area, and decided to use the opportunity to re-evaluate the ER system for the entire hospital. The Associate Service Chief for the Emergency Department was unsure of what improvements needed to be made to the current ER teams and systems, if any, and requested recommendations regarding the best approach for integrating the new area into the current system. The student team from the University of Michigan was asked to evaluate the current ER teams, identify opportunities for improvement in the system, and provide recommendations for an optimal ER integration strategy for the new Neuroscience area. The purpose of this report is to present the student team’s methods, findings, conclusions, and recommendations to ensure the emergency response teams at the University of Michigan hospital can handle the increased number of emergency calls generated by the hospital expansion.

Background

The University of Michigan hospital currently has the following emergency response teams in place:

- **Adult Arrest Team** – See Appendix D for a detailed description of the Adult Arrest Team.
- **Pediatric Arrest Team** – See Appendix E for a detailed description of the Pediatric Arrest Team.
- **Rapid Response Team (RRT)** - The RRT has two primary members, a surgical intensive care unit (SICU) nurse, referred to as the RRT nurse, and a respiratory therapist. The RRT responds to patients who have a critical event and require some form of emergency care anywhere within the University of Michigan hospital.
- **MERT** - The MERT team responds to minor incidents involving outpatients. The MERT team is comprised of an emergency medical technician (EMT) and a security guard.

The student team addressed issues surrounding the work loads, utilization, composition, and contact methods for the emergency response teams listed above.

Methodology

The student team performed the following tasks to assess the current state of and develop recommendations for the emergency response teams at the University of Michigan hospital.
• *Met with the client* - The student team met with the Associate Service Director for the Emergency Department to discuss the current concerns surrounding the emergency response teams and to define the goals of the project.

• *Interviews* - The student team interviewed 14 key hospital staff members to develop an understanding of the current state of the emergency response teams and to determine concerns of individual emergency response team members.

• *Observations* - The student team shadowed the RRT Nurse on two occasions. Student team members observed first hand some of the tasks the RRT nurse is responsible for on a daily basis and developed a better understanding of the role of the RRT at the University of Michigan hospital.

• *Data Collection* - The student team collected data from the Associate Service Director detailing the number of Arrest Team calls from January 2004 to November 2012 and the number RRT calls January 2011 to November 2012. Additionally, the Surgical Intensive Care Unit provided data detailing RRT call volumes by location throughout the hospital as well as work study data for the RRT nurse dating back to January of 2012. All of the data was entered into excel files to be sorted and analyzed.

• *Data Analysis* - The student team analyzed the above data using excel and Minitab software.

• *Findings and Conclusions* – After analyzing all available data, the student team obtained a variety of findings relating to current call volumes and utilization of the different emergency response teams. This information was used to predict the RRT and Arrest Team call volumes once the new Neuroscience Hospital opens.

• *Developed Recommendations* – Based on the findings and conclusions, the student team developed recommendations to create centralized call center, implement virtual/remote rounding, and educate the general care nurses about the various specialized teams and learning resources currently available at the University of Michigan Hospital. These recommendations will ensure the emergency response teams are utilized in the most efficient possible while maintaining the highest level of patient care.

**Findings and Conclusions**

After analyzing the data, the student team found that 293 Arrest Team calls occurred from January to June of 2012. The number of Arrest calls was higher than expected, but still relatively low overall. Additionally, the percentage of overlapping Arrest Team calls (situations where an additional Arrest Call was triggered while a call was already in progress) was only 3.8%. Based on these findings it was determined that the Arrest Team should be able to maintain quality patient care after hospital expansion.
The student team did determine the RRT, specifically the RRT nurse, as a position where improvements may need to be made to ensure quality patient care after the hospital expansion is complete. The student team found that from January to June of 2012 there were 681 RRT calls, 20% of which overlapped. Additionally, during on site observations of the RRT Nurse the student team found that a large portion of each shift (2-3 hours minimum) was spent visiting each of the units in the hospital to inquire about patients deemed to be at risk of have a critical event requiring emergency care. After analyzing the data from the RRT Nurse work studies, the student team found that this process, known as rounding, accounted for 20 to 28% of each shift. A large portion of this time was spent in areas outside of UH, where the student team found that 92% (638 out of 681 total calls) of all RRT and Arrest calls take place. Therefore, reducing the amount of time spent performing rounding will allow for the RRT Nurse to better respond to RRT and Arrest Team calls. On site observations and interviews also showed that there is concern over the use of the RRT Nurse as a “consultant”. Members of the administrative staff expressed concern that both rounding and nurse consults were causing the general care nurses to avoid using other specialized teams and hospital learning resources when they needed extra help in favor of contacting the RRT Nurse for assistance.

**Recommendations**

The team has developed the following recommendations:

*Create Central Call Center*

The student team recommends creating a central call center to handle all calls related to the Arrest Team, RRT, and nurse consult requests. The call center staff member will be provided with information clearly outlining when and how to contact the Arrest Team, RRT, and all available specialized teams and hospital learning resources. This will ensure the proper hospital resource is utilized for a given situation. A detailed future state flow chart is attached in the appendix.

*Improved Utilization of Existing Resources for Nurse Consult Situations*

The student team recommends providing information to general care nurses (GCN’s) on available resources throughout the hospital that can provide training or support in different situations. This information will allow for the GCN’s to obtain assistance when needed without contacting the RRT nurse for a nurse consult.

*Virtual/Remote Rounding*

The student recommends ending the current practice of rounding and moving to a virtual method to collect detailed information for at risk patients. By using e-mail (or faxing documents) the RRT nurse will be provided with the same information currently obtained through the rounding process while saving a substantial amount of time (currently rounding takes a minimum of 2 to 3 hours to complete).
Introduction

In 2014, the University of Michigan Hospital will be opening a new Neuroscience Hospital that will also be dedicated to General Medicine and Adolescent Psychiatry patients. Emergency Response Teams must have the personnel and capacity to respond to all incidents that occur within the boundaries of all areas of the University of Michigan Hospital. Thus, methods to integrate Emergency Response coverage for the new Neuroscience Hospital are now being considered. In the past, new areas, teams and processes have been incorporated into the existing Emergency Response system as needed. The Associate Service Chief of the Emergency Department has expressed concern that this ad hoc manner of expansion may have produced unnecessary complexity and waste within the system and its processes. Thus, the Associate Service Chief is taking advantage of this opportunity to re-evaluate the needs and processes of the entire Emergency Response System.

Currently, the Emergency Response task force spans the entire health system and encompasses several teams. Each team is comprised of several members representing various levels of Emergency personnel, and is responsible for responding to specific incidents that are stratified by patient type, incident location and type of emergency. Various contact methods are also used to dispatch the respective teams. These teams are not comprised of dedicated personnel, but rather its constituent members include as few as two and up to 25 full-time physicians, nurses, and other specialists who are on rotating schedules, and represent various areas of the hospital at large. While improving patient care is the primary objective, the Emergency Response System involves several stakeholders; each with a unique perspective and opinion regarding which best practices should be employed in order to achieve optimal patient care.

A student team currently enrolled in the University of Michigan’s Industrial & Operations Engineering Senior Design Course was asked to use historical data to conduct a detailed analysis of the current system, identify areas of waste both in process and staffing, and identify any other opportunities for improvement. This report will present the methods for evaluating the current state of the system, assessing the overall efficiency of Emergency Response efforts, and provide recommendations for the integration of the new Neuroscience Hospital into the current Emergency Response System.

To identify areas to improve in the current emergency response system, the student team:

- Became familiar with the various roles and responsibilities of each team and member
- Gained a high-level understanding of the entire Emergency Response System
- Examined micro-level processes and interactions in problem areas of the larger system
- Performed root-cause analyses to identify problem sources

To achieve the goals and objectives outlined above the student team:

- Interviewed key members of multiple response teams
- Interviewed members of administration who oversee the processes
- Examined historical data pertaining to incident frequency and location
• Predicted demand for the new Neuroscience Hospital
• Explored several alternative methods to satisfy Emergency Response demands

After performing the topics mentioned above, the student team developed recommendations to:

• Improve utilization of the emergency response teams at the University of Michigan Hospital
• Incorporate the new Neuroscience Hospital into the Emergency Response System

Background

The Emergency Response Teams at the University of Michigan Hospital currently respond to all emergency incidents that involve outpatients, inpatients, staff, and visitors in the University Hospital, C.S. Mott Children’s Hospital (Mott), Cardiovascular Center, Cancer Center, public areas (cafeterias, Radiology, Diagnostics, waiting rooms, therapeutic rooms, etc.), Towsley Medical Education Building, and the Taubman Center. These areas currently contain 521 inpatient beds that the emergency response teams are responsible for covering.

With the opening of the new Neuroscience Hospital the emergency response teams will need to provide coverage for 109 inpatient beds in a new location. Due to a move to more single patient rooms throughout the University of Michigan Hospital the new Neuroscience Hospital will only result in an incremental increase of 17 total inpatient. However, the new location presents a variety of challenges for the different emergency response teams as the majority of the emergency response team members are located in the main hospital area.

The Emergency Response System is comprised of several teams including Adult and Pediatric Arrest Teams, a Rapid Response Team, and the Medical Emergency Response Team. The constituent teams and their respective functions are detailed below.

Adult Arrest Team

The Arrest team responds to all incidents that involve individuals who have stopped breathing, whose heart has stopped, or whose condition is so urgent that it requires the manpower and expertise that only this team is readily equipped to provide. This team is comprised of two Resident Interns, a Hospitalist, an Anesthesiologist, a nurse from the Surgical Intensive Care Unit (RRT nurse), a Pharmacy representative, an EKG technician, an phlebotomist, one or two respiratory therapists, and up to a dozen other individuals who may or may not be members of the patient’s Primary Care Team (see Appendix D for detailed list of Arrest team members and responsibilities). To call in an Arrest incident, hospital personnel must dial 911 from a house phone. A hospital dispatcher then receives the call and pages Arrest Team personnel with the call route through Ann Arbor Police dispatch. In patient rooms, pushing a blue emergency button also notifies all Arrest Team members via a pager message that includes the location of the arrest.
**Pediatric Arrest Team**

Similar to the Adult Arrest Team, the Pediatric Arrest Team responds to pediatric patients who enter into cardiac arrest. The team has a similar composition to the Adult Arrest team (see Appendix E for detailed description of Pediatric Arrest Team members and responsibilities) and works primarily in the Mott’s Children’s Hospital. However, the Pediatric Arrest Team is responsible for responding to pediatric patients throughout the entire University of Michigan Hospital campus.

**Rapid Response Team (Medical Emergency team)**

A subset of the Arrest Team, the Rapid Response Team handles inpatients who are not in Cardiac or Respiratory Arrest, and consists of a SICU nurse (referred to as RRT nurse), a Respiratory Therapist, a Surgical Intensive Care fellow or Hospitalist, and in most cases (85%) the patient’s Primary Care team.

**Medical Emergency Response Team (MERT)**

This team responds to outpatients and visitors who are not in arrest, and is made up of a paramedic from the Emergency Department and a Security Officer. Dialing 141 from a House Phone reaches hospital dispatch who will notify the appropriate team.

**Current Issues**

Since the Emergency Response teams are not comprised of dedicated individuals whose sole responsibility is responding to hospital emergencies, all team members are forced to abandon daily responsibilities in order to respond to emergency incidents. Understanding that doctor and nurse utilization carries an associated cost, the student team also sought to determine the minimal level of expertise necessary to adequately handle each type of response. The student team wanted to ensure that all process and team recommendations do not interfere with the current standard and expectation that team members should always feel comfortable calling any emergency response team, as it is often a matter of life and death.

Additionally, interviews of personnel representing a cross-section of all current Arrest team roles were performed to gain better understanding of the environment that is created by deploying such a large response team. Historical data was analyzed to determine what roles, if any, could be re-assigned or eliminated to reduce crowding. Interviews also revealed how having multiple hotlines and teams affects response times (see Figure 9 in Appendix A for current emergency call system flow chart). Several alternatives will be explored including a single team, a single number, zone-based teams, and a tiered response system.
Data Collection and Analysis

In defining the current state, the student team conducted interviews, observed hospital staff, and collected historical data from multiple sources. These data collection methods are described below in detail.

Interviews

The student team interviewed 14 key hospital staff members including a Surgical Intensive Care Unit (SICU) Nurse who serves on the Rapid Response Team (RRT) and the Arrest Team a minimum of 4 times a month, the Patient Safety Manager from the Office of Clinical Affairs, the Clinical Nurse Specialist for the Surgical Intensive Care Unit, the Administrative Director of Healthcare, the Associate Professor of Internal Medicine who is a CPR Committee Member, the Chief Resident of Internal Medicine, a faculty member from Anesthesiology who is a sitting member of the CPR Committee, and the Associate Hospital Director of Operations and Clinical Services. By meeting with these key individuals, the student team gained an understanding of how the RRT and Arrest Teams function in the hospital. In each interview the student team asked the individual about RRT and Arrest team call frequency, methods and criteria for calling the RRT or Arrest Team, and concerns surrounding response time for emergency events in various areas of the hospital. The questions were not identical for each interview, as the roles and responsibilities of the different individuals being interviewed altered their understanding and perspective on the emergency response system. Additionally, the student team was able to ask questions about staff utilization, hospital budgets, and other organizational concerns during interviews with administrative personnel.

Upon completion of the interviews the student team reviewed the responses and developed a word document outlining the concerns voiced by the different emergency response team members. This information was then used to develop a current state map of the emergency response team contact methods. Additionally, this outline allowed for the important issues to be identified when the student team began developing recommendations for the client.

Observations

The student team shadowed the RRT Nurse assigned to the RRT and Arrest Team on two occasions for a total of 9 hours. The student team recorded the key tasks performed by this individual during a typical shift and observed the demands placed on RRT and Arrest Team members by the expansive area of the hospital they must cover during responses. Additionally, the student team interacted with other hospital employees and gained insight regarding the different thoughts and opinions held by these employees regarding the RRT and Arrest Team.

After the observations were complete the student team debriefed to discuss the experience and the tasks that were observed. This information was combined with the RRT Nurse utilization data to develop a clear understanding of the current responsibilities of the RRT Nurse as well as to investigate possible areas for improvement moving forward.
Historical Data

Quantitative data has been collected from the Surgical Intensive Care Unit, the client, and through a literature search performed by the student team. The information obtained from each source as well as the analysis methods are discussed in the following subsections.

Surgical Intensive Care Unit

The student team obtained data regarding work/time studies of the SICU Nurse assigned to the RRT and Arrest Team (referred to as the RRT Nurse) for the months of January, May, and June. This information was provided by the Clinical Nurse Specialist for the Surgical Intensive Care Unit and shows a detailed breakdown of which tasks are being performed by the SICU Nurse during a typical shift along with the duration of each task. Using excel, pie charts were developed showing the overall utilization of the SICU Nurse during both the day and night shifts.

Main Cardiac Arrest Database

The client provided data from the Main Cardiac Arrest Database regarding Arrest Team calls from January 2004 through October 2012. The data provided included the Arrest Team call date, location, time, and duration. The Arrest Team call data was sorted in excel to include only the information for calls occurring between January 2012 and June 2012. After sorting the data, further analysis was performed using excel. Additionally, Minitab was used to create histograms and determine the mean call quantities based on different constraints.

Rapid Response Database

Data from the Rapid Response Team (RRT) database regarding RRT calls from January 2011 through October 2012 was also obtained from the client. The data was sorted using excel to cover the same time period as the Arrest Team call data (January 2012 thru June 2012). Minitab was used to create histograms detailing call frequencies. The RRT call data was then combined with the Arrest Team call data. This was an important part of the data analysis because the SICU Nurse serves on both the RRT and Arrest Team so in order to determine SICU Nurse utilization combining the data was necessary. Additionally, excel was used to create graphs and further analyze the data.

University of Michigan Neuroscience Hospital

The client provided information regarding the new Neuroscience Hospital in the form of a PowerPoint that detailed the project plan. The PowerPoint detailed what patient types would be housed in the new Neuroscience hospital and provided the quantity of beds that each area would contain. This information was combined with the RRT and Arrest Team call data to analyze the current and estimated future workloads on the RRT and Arrest Team.
Literature Search

The student team examined a previous IOE 481 student report that analyzes and evaluates the current workload of RRT nurses. Unfortunately, the scope of the project was focused only on the utilization of the RRT nurses and not on the entire hospital system as a whole. However, the report provided useful background information and gave the student team context. The student team additionally examined literature and data regarding the methods that other hospitals nationwide have adopted to manage their emergency response teams.

Findings and Conclusions

After collecting and analyzing all quantitative and qualitative data, the student team developed various findings and conclusions that will be explained in detail in the sections, below.

Qualitative Findings

As mentioned in previous sections, a large portion of the student team’s data collection revolved around collecting qualitative data through interviews and observations. The following sections summarize the qualitative findings and conclusions that often drove the direction of the quantitative analysis and findings.

Interview Findings

The student team primarily used the interviews to recognize many common issues and concerns with the emergency response teams within the hospital. Additionally, the student team used the information gathered to paint a picture of the current state. The following points summarize these issues, concerns, and current state realizations:

- Various Arrest Team members reported that crowding is often an issue during Arrest Team calls because it is common that other hospital staff stop by the event location to help

- Administrative staff and Arrest Team members stated that Arrest Team call volumes are relatively low and the Arrest Team meets a high standard in response times to arrests

- Arrest Team members reported that often times Arrest Team members are unfamiliar with each other during a response, are confused about who is in charge, or are unaccustomed to the working styles of others

- The RRT nurse conducts “rounding” twice a day during which she walks around to all units of the hospital where the Adult Arrest Team or RRT responds. She checks in with the charge nurses of each unit to get information on any at-risk patients who may require an emergency response at
some point in the near future. Additionally, she may check in on specific patients to assess their conditions.

- Administrative Staff members are concerned about the effectiveness of rounding performed by the RRT nurse. It is difficult to measure the value of rounding and the administrative staff believes it may negatively impact nurses who begin to rely on the RRT nurse for help with tasks they should be learning how to do themselves. This help is commonly referred to as a “consult”. The administrative staff also believe consults and rounding may be taking away valuable time from the RRT nurse’s duties.

- The RRT nurse reported that a lack of beds often cause delays when responding to additional RRT calls because the RRT nurse cannot leave the first patient until the patient has been transported to an appropriate location and bed. These delays can sometimes last for up to 3 hours.

- All Arrest Team and RRT members reported that there are multiple methods to contact each of the emergency response teams and this causes confusion when attempting to contact the correct team. The various methods are explained further in the current call methods flowchart, which can be found in Appendix A.

- Arrest Team members and the RRT Nurse reported that it can often be difficult for emergency response team members to find the response locations, especially in the basement areas.

- Administrative Staff members expressed that general care nurses throughout the hospital seem unaware of the many educational resources or specialized teams available to aid in non-urgent tasks. Many general care nurses currently have consults with the RRT nurse when she stops by their respective unit on her RRT rounds.

**Observation Findings**

The student team identified the following key findings after observing the RRT nurse while she rounded, responded to RRT calls, and performed consults:

- The rounding process is time consuming and physically demanding. The rounding process requires 2 to 3 hours to complete and requires the RRT Nurse to walk between 3 and 4 miles. This is performed once by the daytime shift RRT nurse and once by the nighttime shift RRT nurse.

- The RRT nurse carries a backpack or similar sized bag containing a variety of supplies the team may need for an emergency response.
• The charge nurse in a given unit is not always available when the RRT nurse stops by during the rounding process. The RRT nurse waits until she becomes available or the RRT nurse comes back to the unit later when the charge nurse is available.

• Navigating the hospital can be very confusing. The emergency response team members use their own judgment to determine the best route to an emergency location. Stairs are often favored over elevators because there are access issues to certain elevators.

• The RRT nurse conducts consults to help general care nurses both on official consult calls, as well as during her rounds to the general care nurses’ units. The RRT nurse consults have become an informal helping and teaching tool for the general care nurses who may be lacking skills in certain areas.

Analyzing the Goals of RRT Nurse Rounding and Consults

As noted in the Interview Findings section, the RRT nurse performs rounding twice daily and often stops in units to assist general care nurses for consultations. The general care nurses are often unaware of the other various learning resources and specialized teams available within the hospital to help them.

To further understand the goals of rounding and consultations, the student team performed a “Five Why’s Analysis”, which is a qualitative method used to find a root cause or meaning of a process. The first question the student team asked about the process was, “Why aren’t unit nurses aware of available resources?” The answer to this question and the next four “Why’s?” can be found in Figure 6, below.
Figure 1: “Five Why's Analysis” that Determines Why Nurses are Unaware of Hospital Resources

The analysis revealed that during rounding the RRT nurse advertises that general care nurses should reach out to her if they need any assistance because “That’s what they’re there for”. Because rounding occurs twice daily, general care nurses become accustomed to seeing the RRT nurse and feel comfortable asking her any questions. Interviews and observations revealed that general care nurses receive a consult by either calling the RRT nurse or waiting for her to round. The “Five Why’s Analysis” determined that the goal of rounding and the reason that the general care nurses are unaware of available resources is for the RRT nurse to gain more information about at-risk patients who have the potential to become Rapid Response patients. The RRT nurse wants general care nurses to feel comfortable reporting problem patients and other issues, so she advertises her expertise and willingness to help during her rounds. The RRT nurse enjoys being helpful and believes that making herself available to the general care nurses ultimately improves patient care.
Additionally, the RRT nurse utilization data (which will be explained in detail in following sections) showed that the RRT nurse spends a significant 20-28% of each shift rounding. The student team performed a second “Five Why’s Analysis” to investigate this issue further. The process is summarized below in Figure 7.

**Figure 2: “Five Why's Analysis” that Determines Why RRT Nurse Spends 4-6 Hours Rounding Per Day**

1. **The RRT nurse spends 2-3 hours twice a day walking around the hospital**
2. **Why?** RRT Nurse needs to round
3. **Why?** The RRT nurse needs to communicate with unit nurses
4. **Why?** To gather information about at-risk patients who may need Rapid Response
5. **Why?** To determine whether or not preventative measures can be taken to prevent RRT calls
6. **Why?** To increase patient survival outcomes

Observations and interviews revealed that the ultimate goal during rounding is to improve patient outcomes by gaining as much information on potential RRT patients prior to RRT emergencies. The RRT nurse feels that the best way to do this is to speak in-person with the charge nurse or general care nurses from each unit so that they can inform her of at-risk patients.
Quantitative Findings

The student team used data collected from various sources to determine findings and report conclusions about the current state of the hospital. The data was also analyzed to project and prepare for the future state of the hospital with the addition of the Neuroscience Hospital being added in 2014. It is important to note that the following assumptions were held when developing the quantitative findings and conclusions:

- All data analyzed spans from January 1, 2012 through June 30, 2012
- “Arrest Team” and all references to arrests refer to responses in UH or locations where the adult arrest team responds in Mott (7th and 9th floors)
- “RRT” and all references to rapid responses refer to responses in UH or locations where the adult RRT responds in Mott (7th and 9th floors)
- Intensive Care Units (ICUs) in UH and locations in CVC were considered when predicting RRT demand in the Neuroscience hospital because although the perception is that ICUs and CVC do not use this team, the data shows that these locations have a high usage of the RRT

Call Frequency

The first step in defining the current state was understanding the true frequency of calls. Using data collected from post-event reports, the student team determined the frequency of calls per day. The number of Adult RRT calls per day ranges from 1 to 12 calls with a mean of 4.3 calls. The number of arrest team calls per day ranges from 1 to 9 calls with a mean of 1.8 calls. Below, Figure 1 displays how often the RRT is called during a typical day and Figure 2 displays how often the arrest team is called during a typical day.

![Frequency of RRT Calls](image)

Figure 3: Frequency of RRT Calls per day through June 2012
Another area the student team wanted to investigate was how often RRT responses overlapped with other RRT responses and how often arrest team responses overlapped with other arrest team responses during 2012. The purpose of this analysis was to determine how often backup teams are needed and if the creation of new teams or a tiered team system should be considered. The team also investigated how often both types of responses overlapped with each other because the SICU nurse is on both the RRT and Arrest Team. The goal was to determine if the SICU nurse’s responsibilities (when on duty as RRT nurse) are realistic and if there is a need for an additional RRT nurse based on her utilization on both teams.

The student team obtained the date, time, and duration for the arrest responses from January through June, 2012. The “overlapping” rate was calculated by determining if a call was placed for a response during the response for a previous call. The student team found that adult arrest responses only overlap with each other 3.6% of the time, or 8 out of 221 times. Note that the average arrest response time (27 minutes) was used when duration information for an arrest response was unavailable.

Unfortunately, no duration information was available for the RRT responses, so the student team estimated that a typical RRT response would take one hour. Under this assumption, the student team found that two RRT responses overlap 15% of the time, or 115 out of 780 times. The student team found that the overlapping rate for both emergency teams is 19.5%, or 196 out of 1001 times.

The student team concludes that the arrest team responses rarely overlaps with other arrest team responses, RRT responses occasionally overlap with other RRT responses, and both response types overlap 1/5 of the time. The later two rates indicate that the RRT nurse may be overextended and unable to respond to all calls right away. These findings are in line with the qualitative information the student team gathered through interviews and observations.
**Calls by Time of Day**

The student team was interested in learning the most common time of day (grouped by hour) for a RRT call to occur, which would help paint a picture of the current state for the RRT and the RRT nurse. To do this, the team examined the RRT call data and assigned each call an “hour” value based on the hour in which the call occurred. The student team used this to understand the distribution of when RRT calls occurred by hour. The results of this analysis are displayed in Figure 5.

![Figure 5: Comparing RRT Call Frequency by Hour](image)

The student team found that the highest volume of calls occurred at 8 AM on any given day, with 8% of calls taking place within this hour. The next highest occurrences were at 9 and 10 AM with 6% of calls taking place within each of these hours, followed by the third highest occurrences at 7 AM, 6 PM, and 7 PM with 5% of calls taking place within each of these house. The hourly RRT call volumes and call percentages can be found in Table 1, below.
Table 1: RRT Call Volume and Call Proportions for January-June 2012

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<td>3%</td>
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<tr>
<td>16</td>
<td>33</td>
<td>4%</td>
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<tr>
<td>17</td>
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<td>4%</td>
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<tr>
<td>18</td>
<td>36</td>
<td>5%</td>
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<tr>
<td>19</td>
<td>37</td>
<td>5%</td>
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<tr>
<td>20</td>
<td>30</td>
<td>4%</td>
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<tr>
<td>21</td>
<td>30</td>
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<tr>
<td>22</td>
<td>30</td>
<td>4%</td>
</tr>
<tr>
<td>23</td>
<td>38</td>
<td>5%</td>
</tr>
</tbody>
</table>

Interestingly, these times fall in line with the typical rounding times of the RRT nurse. This could be occurring for a variety of reason. The first, most obvious reason is that RRT type situations inherently occur during these times and can be explained by patients’ sleeping schedules, for example. A second reason could be that as new nurses arrive for their shifts, they become overwhelmed with certain situations and call the RRT for help. A third reason could be that general care nurses with patients having semi-urgent situations simply wait for the arrival of the new RRT nurse. Lastly, some of these RRT calls may be consults that are misrecorded as RRT calls. Many other factors could explain the reasoning behind the outcome of call volume by hour and the student team can merely speculate unless further analysis is conducted.

A similar analysis was conducted to understand the distribution of Arrest calls by hour on a typical day. The goal was to identify any patterns or specific hours that had a relatively large number or small number of Arrest calls. Figure 6, below, displays the distribution of Arrest calls by time of day.
The Arrest call data by hour does not show any significant patterns besides a slight dip in activity during nighttime hours, which was expected based on information the student team gathered during interviews. The hours with the highest percentages of Arrest calls is 10 AM and 2 PM, with 7% of all calls occurring within each of these hours. The hours with the lowest percentages of Arrest calls is 3 AM and 7 PM, with 2% of calls occurring within each of these hours. The hourly Arrest call volumes and call percentages can be found in Table 2, below.
Table 2: Arrest Team Call Volume and Call Proportions for January - June 2012

<table>
<thead>
<tr>
<th>Hour</th>
<th>Call Volume</th>
<th>Call Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12</td>
<td>5%</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>4%</td>
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<tr>
<td>2</td>
<td>6</td>
<td>3%</td>
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<tr>
<td>3</td>
<td>4</td>
<td>2%</td>
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<tr>
<td>4</td>
<td>10</td>
<td>5%</td>
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<tr>
<td>5</td>
<td>6</td>
<td>3%</td>
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<tr>
<td>6</td>
<td>7</td>
<td>3%</td>
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<tr>
<td>7</td>
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<td>4%</td>
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<tr>
<td>23</td>
<td>10</td>
<td>5%</td>
</tr>
</tbody>
</table>

Calls by Location

The student team investigated the RRT and Arrest Team call frequencies by location throughout the hospital. After analyzing the combined RRT and Arrest Team call data the student team found that 628 out of 681 total calls (92%) took place between floors 4 and 8 in the main hospital area. The high percentage of calls between floors 4 and 8 is an important finding because this shows that the majority of the calls that the RRT Nurse is responding to for both types of emergencies are occurring relatively close to the SICU (5D), where the RRT nurse resides. Figure 3, below, shows the breakdown of call volumes by hospital location.
Figure 7: RRT and Arrest Team Call Volumes by Area from January 1 through June 30, 2012

*SICU Nurse Utilization*

The student team also obtained work study data for the SICU nurse, who is also referred to as the RRT nurse because she serves on the RRT and Arrest team. The student team calculated the percentage of time the SICU Nurse spent performing various tasks during a typical shift. The results are summarized below in Figure 3 and Figure 4.
As shown above in Figures 3 and 4, the SICU Nurse serving on the Rapid Response and Arrest Teams spends the majority of each shift rounding and assisting in the SICU. Additionally, 1 to 5% of each shift is spent performing nurse consultations. After performing on-site observations the student team believes
that the amount of time spent performing nurse consults is greater than shown above as these activities occur casually during rounding.

Capacity and Demand Analysis

A report outlining the plans for the Neuroscience Hospital provided the student team with details regarding current and projected patient bed allocations for the University Hospital (UH) as well as the new building. Data collected from Arrest and Rapid Response Calls between the months of January 2012 and June 2012 provided information regarding observed call volumes. After understanding the services currently assigned to UH hospital beds and the expected capacity and patient mix for the Neuroscience hospital, the student team performed demand calculations and extrapolated for future conditions. The details of this analysis are outlined in the sections below.

Capacity

Between UH, CVC, and the adult Bone Marrow Transplant (BMT) in Mott, there are currently 656 adult patient beds. Of these, 99 are ICU beds and 36 belong to Operating Rooms (OR). For the purposes of this analysis, both ICU and OR beds are not being considered since a local response generally suffices in the event of an emergency for these areas. Thus, only 521 of the total available beds are used for demand calculations. The Neuroscience Hospital is slated to have 142 adult patient beds. Again subtracting the 25 ICU and 8 OR Beds, there will be 109 beds that will need Emergency Response coverage in this area. The majority of these patient beds will be moved over from UH, but 17 of them will be incremental to the current demand. Accordingly, future UH will house 429 adult patient beds, assuming that beds will not be backfilled after the shift to the Neuroscience Hospital. These calculations are outlined below in Figure 10.

<table>
<thead>
<tr>
<th>Neuro Adult Patient Beds</th>
<th>= 142 beds (including 25 ICU &amp; 8 OR beds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current UH Adult Patient Beds</td>
<td>= 656 beds (including 99 ICU &amp; 36 OR beds)</td>
</tr>
<tr>
<td>Future UH Adult Patient Beds</td>
<td>= (656 beds – (142 Neuro. beds – 17 Incremental beds)) = 531 beds</td>
</tr>
</tbody>
</table>

Figure 10: Capacity Calculations for Current and Future State

Demand

Between the months of January 2012 and June 2012, there were 160 Arrest calls and 1,281 RRT calls recorded. Dividing these volumes by the number of UH beds and days, the rate of calls per bed per day is 0.00169 for Arrests and 0.01351 for Rapid Response. Multiply this number by the number of current beds in UH, to reveal that the current Emergency Response demand per day for UH is 0.879 Arrest calls and 7.038 Rapid Response Calls. This current rate was then used to calculate the expected calls per year in both UH and the new Neuroscience Hospital after the Neuroscience Hospital opens. These results are shown below in Figure 7. The detailed calculations and results are shown in Figure 10 in the appendix.
Summary of Findings and Conclusions

The findings and conclusions described above can be summarized as follows:

- Interviews with key hospital staff members revealed that there are concerns regarding emergency response team contact methods, utilization of the SICU Nurse, and the concept of general care nurse becoming deconditioned due to the availability of SICU Nurse consults.
- Observations of the SICU Nurse supported the notion that a large portion of each shift is dedicated to rounding. It is difficult to determine the benefits of this practice and the area over which rounding occurs results in a good portion of each shift being spent outside of the main hospital area.
- The number of Adult RRT calls per day ranges from 1 to 12 calls and averages at 4.3 calls. The number of arrest team calls per day ranges from 1 to 9 calls and averages at 1.8 calls.
- 92% of the total RRT and Arrest Team calls occur between floors 4 and 8 in the main hospital area.
- Analysis of the SICU Nurse utilization reveals that a large portion of time is spent rounding to obtain data on patients deemed likely to have a critical event.
- The use of 5 Why’s analysis allowed for an investigation as to why the SICU Nurse spends a large portion of each shift rounding and why the general care nurses are unaware of the different specialized teams and learning resources available at the University of Michigan Hospital.
- Analysis of the current hospital system revealed that there are .879 Arrest Team calls and 7.038 RRT calls per day. This data was used to calculate the expected demand after the new Neuroscience Hospital opens. This information is shown in Figure 12 in the appendix.
Recommendations

After performing qualitative and quantitative analyses on the collected data, and taking all of our findings and conclusions into account, the student team has developed a set of primary recommendations. These recommendations can be integrated into the hospital system to more effectively utilize the hospital’s resources while maintaining patient health and safety.

Central Call Center

With regard to the current call system, interviews and observations revealed that (1) Having multiple contact methods is a source of confusion for many, (2) Lack of information makes incident locations difficult to find, and (3) The SICU Nurse currently wears several pagers since he/she is on multiple teams, and can be contacted via different avenues. The student team recommends the implementation of a Central Call Center (CCC) in order to mitigate these concerns.

The CCC will serve as a dispatch hub through which all emergency calls will be routed. While the ideal situation would make use of a single Emergency number for all types of incidents, the student team recommends that legacy numbers such as 141 and 911 all be routed to the CCC and gradually discontinued as hospital staff members become accustomed to using a single number. The call center will handle all calls related to the Arrest Team, RRT, MERT, and nurse consult requests. A flow chart depicting the future state of the emergency calling system is shown in Figure 7, attached in the appendix.

The dispatching duty will be assigned to a small team of existing Full-Time Employees (FTE), made up of either clerks or Survival Flight Team paramedics. These FTEs currently cover similar tasks and would be a low cost option for implementing this system. Whoever is chosen to man the CCC would be provided with flowcharts and straightforward information clearly outlining the criteria to trigger the Arrest or RRT Teams.

The CCC’s paging system should be updated with more specific location information so that responding emergency team members will be better informed about their destinations. The system should also be able to discern that a single pager, specifically the SICU Nurse’s pager, belongs to multiple teams, thus eliminating the need to carry several devices.

The use of the CCC will ensure that the appropriate hospital resource is contacted for the correct situation, and in the most efficient manner possible. In addition to creating a more efficient emergency calling system, CCC staff members will be provided with lists and descriptions of all hospital learning resources and other specialty teams so that he or she may use them to help nurses in need of a nurse consult. This will help to alleviate the nurse consulting responsibilities of the RRT nurse so that he or she may better utilize their time in responding to RRT calls. Screening all nurse consult requests will result in the RRT, specifically the SICU nurse, being used only when necessary. This ensures that the RRT is able to handle an increase in calls brought on by the addition of the Neuroscience Hospital.
Improved Utilization of Existing Hospital Resources for Nurse Consults

The student team’s findings suggest that general care nurses (GCNs) do not take full advantage of available hospital resources such as specialized teams, educational resources, and the like. Rather, GCNs rely heavily on the SICU Nurse for consultations during rounding. These consults often address issues rooted in unfamiliarity with a procedure, and lack of training, experience, or confidence with regard to patient care concerns. Furthermore, the analysis of emergency calls by location revealed that 92% of all calls occur between floors 4 and 8 in the main hospital area.

In order to decrease the SICU Nurse workload, and reduce the amount of time that the SICU Nurse spends outside of the high volume area, the student team recommends implementing a program to educate the GCNs about the resources currently available at the University of Michigan hospital. Documentation should be provided regarding the responsibilities of each specialized team as well as the method by which to contact each specialized team.

Additionally, GCN’s should be provided with descriptions and contact information for all of the available educational resources throughout the hospital. This will allow for GCN’s to obtain any additional training (or re-training) necessary to perform a difficult or unfamiliar task. In the event that a GCN is unable to determine the correct resource to contact, or the GCN would like assistance (or a second opinion) in dealing with a patient, the GCN should contact the clinical nurse specialist (CNS) on duty in the unit.

The student team recognizes that this recommendation will result in clinical nurse specialists (CNSs) being utilized in a situation where they are not as experienced as the SICU Nurse. However, the decreased work load on the SICU Nurse serving on the RRT carries a far greater benefit, and will allow for a high level of patient care when responding to RRT calls as the hospital expands. Additionally, the SICU Nurse will still be available to respond to nurse consult requests in the event that no other resource is available or capable of responding to the situation. The goal is to alter the culture so that the SICU Nurse is used as a last resort rather than a first responder for non-emergent consult situations.

Virtual/Remote Rounding

The current rounding process used by the SICU Nurse serving on the Rapid Response Team (RRT) requires 2 to 3 hours to complete. Of these 2 to 3 hours, at least 50% of the time is spent in areas outside of the main hospital area (floors 4 thru 8) where 92% of all emergency calls occur. Therefore, reducing the time spent rounding will allow for the SICU Nurse to better respond to the majority of RRT and Arrest Team calls. In order to reduce this time requirement the student team recommends replacing the current rounding process with Virtual rounding.

The Virtual Rounding method will utilize existing communications technology that is available to all staff members throughout the hospital including (e.g. email). Charge Nurses from each department in the hospital will e-mail information regarding patients deemed to be at an increased risk of becoming critical. By using e-mail, the SICU Nurse will obtain the same information currently obtained through physical
rounding while saving a substantial amount of time. In the event that the SICU Nurse would like to discuss a patient in more detail a simple phone conversation will be used to obtain clarification.

The student team acknowledges that this recommendation will result in decreased face to face interaction between GCN’s and the SICU Nurse while increasing the work load of the charge nurse (CN) in each unit slightly. However, the 2 to 3 hours of shift that will be freed up for the SICU Nurse will ensure the SICU Nurse is able to handle the increased RRT and Arrest Calls when the hospital expands. Additionally, as mentioned above the SICU Nurse will be able to respond to meeting requests in extreme situations where a face to face discussion is required to clarify patient information or provide a second opinion on the best course of action for a patient.

**Additional Recommendations**

*SWAT Team Member for Arrest and RRT Teams*

The student team believes further consideration should be given to the idea of training a SWAT Team member to serve on the Arrest Team in favor of the SICU Nurse. Since SWAT Team members are trained to work with both adult and pediatric patients this solution would give more flexibility to the Arrest Team moving forward and would allow for the SICU Nurse to focus solely on the RRT. Unfortunately this option was identified to late in the project so further investigation is necessary to determine if this recommendation is truly feasible.

*Tiered Response System*

The student team’s findings regarding the anticipated emergency response demand in the Neuroscience Hospital does not warrant the need for dedicated teams in that area. However, emergency response teams will have to travel 10-15 minutes in order to reach the Neuroscience Hospital in the event of an incident. Thus, the student team is recommending that the Neuroscience Hospital implement an elevated response team consisting of local GCNs, hospitalists, and intensivists who can maintain patient vitals until the appropriate team arrives to the incident location. This would avoid incremental staffing while maintaining favorable patient outcomes.

*MICU & SICU Nurses Share Rounding Responsibilities*

Interviews revealed that RRT Nurse rounding is so time consuming due to the size and layout of the hospital. The reason that the SICU Nurse is on the emergency response teams is that she has the skills and experience to deal with most situations. MICU Nurses, however, have a very similar skillset. If a MICU and a SICU Nurse were to share the rounding responsibilities, each covering a different area of the hospital, this would significantly decrease the time required to complete the rounding process.
Expected Impact

The student group will present its findings in such a way that enables stakeholders and decision makers to better visualize the complexity of Emergency Response operations. The systematic and procedural recommendations have been developed using both quantitative and qualitative supporting data. The recommendations aim to address inefficiencies in the current Emergency Response system, and ensure that Emergency Response teams are able to effectively manage the anticipated increase in demand (both in quantity of patients and geography) that will accompany the opening of the new Neuroscience Hospital. The student team has stratified its recommendations by (1) those solutions that are easy to address or require minimal deviation from current operations; and (2) more substantial changes that will dramatically alter the current structure by requiring reorganization, training, or additional personnel.

Simple, low cost fixes

Both virtual/remote rounding and better utilization of hospital resources fall in to this category. Each is discussed further below.

*Virtual/Remote RRT Nurse Rounding*

This will increase the RRT Nurse’s capacity to handle RRT responsibilities, and mitigate the risk of departmental nurses becoming deconditioned as a result of consults. Departmental nurses will better utilize existing resources that have paid, dedicated personnel whose responsibility it is to handle many of the issues and tasks that the RRT Nurse currently assists with during rounding and consults.

*Improved Utilization of Existing Hospital Resources for Nurse Consults*

By utilizing the available specialized teams and learning resources at the University of Michigan hospital the RRT nurse will no longer need to respond to a high volume of nurse consult requests allowing for an increased focus on responding to RRT and Arrest Team calls. Additionally, this will allow for general care nurses to build relationships with other specialized hospital staff members. By building these relationships the general care nurses will have a larger network of people to turn to in the event that they need assistance of any kind and this will result in an increased likelihood that they can get assistance quickly whenever it is needed.

More substantial fixes

The move to a central call center is the most substantial change recommended. This will eliminate any apprehension or judgment time required when determining which team to summon for varying situations. The call center can be reached by a single number, dispatch appropriate response teams, and direct general care nurses to appropriate hospital resources. Creating a central call center will require the identification and training of a staff member to serve as the dispatcher but the cost associated with this
should not be substantial. This recommendation does provide the best option for addressing the concerns outlined above in the report without requiring a large amount of additional staff or equipment.
Figure 12: Flow Chart Depicting the Current State of the Emergency Call System
Appendix B

Figure 13: Flow Chart Depicting the Recommended Future State Emergency Call System
Table: Emergency Response Demand Calculations by Location

<table>
<thead>
<tr>
<th>Category</th>
<th>Daily Demand</th>
<th>Annual Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current UH Arrests</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demand/day = 0.00169 calls/bed/day * 521 beds = <strong>0.879 calls per day</strong></td>
<td>Annual Demand = 0.879 calls/day * 365 days/yr. = <strong>320.879 calls per year</strong></td>
</tr>
<tr>
<td></td>
<td>Demand/day = 0.00169 calls/bed/day * 109 beds = <strong>0.184 calls per day</strong></td>
<td>Annual Demand = 0.18392 calls/day * 365 days/yr. = <strong>67.132 calls per year</strong></td>
</tr>
<tr>
<td><strong>Future UH Arrests</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demand/day = 0.00169 calls/bed/day * 429 beds = <strong>0.724 calls per day</strong></td>
<td>Annual Demand = 0.724 calls/day * 365 days/yr. = <strong>264.217 calls per year</strong></td>
</tr>
<tr>
<td><strong>Current UH RRT</strong>:</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Demand/day = 0.01351 calls/bed/day * 521 beds = <strong>7.038 calls per day</strong></td>
<td>Annual Demand = 7.038 calls/day * 365 days/yr. = <strong>2569.038 calls per year</strong></td>
</tr>
<tr>
<td><strong>Neuroscience RRT</strong>:</td>
<td></td>
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<tr>
<td></td>
<td>Demand/day = 0.01351 calls/bed/day *109 beds = <strong>1.473 calls per day</strong></td>
<td>Annual Demand = 1.473 calls/day * 365 days/yr. = <strong>537.476 calls per year</strong></td>
</tr>
<tr>
<td><strong>Future UH RRT</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demand/day = 0.01351 calls/bed/day * 429 beds = <strong>5.796 calls per day</strong></td>
<td>Annual Demand = 5.796 calls/day * 365 days/yr. = <strong>2115.389 calls per year</strong></td>
</tr>
</tbody>
</table>

Figure 14: Emergency Response Demand Calculations by Location
UMHCC POLICY 03-01-025 CARDIOPULMONARY RESUSCITATION - Exhibit B

ADULT ARREST TEAM

MEMBERS AND RESPONSIBILITIES

UNIVERSITY OF MICHIGAN MEDICAL CENTER

UMHCC, TAUBMAN, MED INN AND TOWSLEY

I. POLICY STATEMENT

The adult arrest team initially responds to all adult/pediatric paged arrests in UMHH, Taubman, Med Inn and Towsley. The pediatric team will secondarily respond to all pediatric paged arrests in UMHH, Taubman, Med Inn, and Towsley buildings. The adult team will secondarily respond to all other paged adult arrests in C.S. Mott Children’s Hospital and Von Voigtlander Women’s Hospital.

II. POLICY/PROCEDURE PURPOSE

Each member of the Cardiac Arrest Team has specific responsibilities. These responsibilities are delineated to ensure each member understands his/her role so the arrest team response proceeds effectively and efficiently.

III. DEFINITIONS

Adult Arrest - any cardio-pulmonary arrest of a patient over 18 years of age and all other patients within the University of Michigan Medical Center with a problem felt to benefit from the expertise of a trained individual.

IV. APPOINTMENT OF MEMBERS/CONSULTANTS

A. Team Leader
   The Senior Medical Resident, appointed and assigned rotation by the Chairman, Department of Internal Medicine.

B. Cardiology Fellow
   Appointed and assigned rotation by the Chief of Cardiology.

C. Cardiology Resident On-Call (Consultant)
   The Cardiology Resident/Wilson Service on-call resident, appointed and assigned rotation by the Chief of Cardiology.

D. Anesthesiology Resident
   The Senior Anesthesiology Resident on call, appointed and assigned rotation by the Chairman, Department of Anesthesiology.

E. Nurse
   Appointed and assigned by Directors of Nursing.

F. Pharmacist/Intern or Pharmacy Resident
   Appointed and assigned rotation by the Director of Department of Pharmacy Services.

G. EKG Technician
   Appointed and assigned rotation by the Clinical Supervisor of the EKG Lab.

H. Respiratory Therapist and/or Technician (2)
   Appointed and assigned rotation by the Division of Respiratory Therapy.
I. Social Work  
Appointed and assigned rotation by the Director of Social Work

J. Materiel Services  
Appointed and assigned rotation by the Director of Materiel Services.

K. Phlebotomist  
Appointed and assigned rotation by Health System Pathology Department.

L. Trauma Service Chief Resident (Consultant)  
Appointed and assigned rotation by Chief, Trauma Service.

M. Emergency Consult Resident (Consultant)  
Appointed and assigned rotation by Chief, Trauma Service.

N. Medical Emergency Response Technician  
Appointed and assigned by the Emergency Department Associate Chief.

O. Security Officer  
Appointed and assigned by the Director, Hospitals Security Services

P. Hospitalist Attending  
Appointed and assigned rotation by the Chief of General Medicine.

Q. Communication Specialist  
Appointed by UMH Paging and Information Services

V. RESPONSIBILITY OF MEMBERS

A. Team Leader  
The Senior Medical Resident in Hospital will act as Team Leader, and consult with the Cardiology Fellow assigned to the Cardiac Arrest Team for that day, as necessary. The Trauma Chief Resident will assume team leader responsibility when responding to a traumatic arrest.

1. Duties:  
   a. Direct the arrest occurring at sites designated by the CPR Committee for which Adult Team is responsible (Exhibit A).
   b. Consult with senior staff when appropriate.
   c. Ensure completion of accuracy of the Cardiac Arrest record sheet.
   d. Review the organization, procedures and outcome of each cardiac arrest with members of the team immediately at the conclusion of the arrest.
   e. Discuss any unsatisfactory aspects of arrests with the CPR Chairman within 24 hours of the arrest.
   f. Assumes responsibility for, or delegates responsibility for maintaining communication with the family.
   g. Signs arrest flow sheet.
1. Duties:
   a. Assist the Team Leader and act as Team Leader until the Senior Medical Resident arrives.
   b. Perform the essential CPR procedures under the supervision of the Team Leader.
   c. Signs arrest flow sheet when appropriate.

D. Anesthesiology Resident
1. Duties:
   a. Manage and/or supervise the management of all airway problems at a cardiac arrest.
   b. Signs arrest flow sheet when appropriate.

E. Nursing
See table in Exhibit B for Nursing responses to specific areas.
1. Duties:
   a. In patient care areas, assist nursing staff on the scene.
   b. Initiate and assist with CPR; assist in the performance of necessary procedures, e.g.
      defibrillation, noninvasive pacing, airway maintenance, IV and/or central line insertion,
      etc.
   c. The arrest team nurse will delegate to an individual to assist with completion of the arrest
      flow sheet, and obtaining signatures for all individuals actively involved in arrests as
      appropriate. The arrest team nurse will assist with ensuring the delivery of the flowsheet
      to the CPR committee.
   d. In UH patient care areas (floors 4-9), nurses on unit where arrest occurs initiate CPR, call
      the code, bring the Arrest Cart/Defibrillator to the scene and ensure delivery of flow sheet
      to CPR Committee.

F. Pharmacist/Pharmacy Department
In-patient pharmacist from University Hospital Pharmacy
1. Duties:
   a. Respond to all adult arrests and pediatric arrests in UH, until a pediatric pharmacist
      arrives.
   b. Prepare all drug therapies for medications needed during the arrest.
   c. Review with the cardiac arrest Team Leader all drugs used during the cardiac arrest and
      insure the accuracy of the drug information recorded on the cardiac arrest record sheet.
      Once verified, the pharmacist should sign the CPR flowsheet.
   d. Locate and transport "rover" cart to arrest location, where appropriate. After arrest ends place a
      yellow lock on the drug box and secure back into the arrest cart. If a drug box is brought to the arrest by
      the pharmacist, they are responsible for returning the drug box to pharmacy themselves.

G. EKG Technician
1. Duties:
   a. Bring 12 lead EKG machine to the site of the arrest.
   b. Set up patient’s EKG leads and monitor the patient’s EKG.
   c. Record, if possible, 12 leads EKG strip for the patient’s chart and Division of Cardiology.

H. Respiratory Therapist and/or Technicians (2)
Therapist or Technician On-Call
A. Duties:
   a. Assist with BLS.
   b. Maintaining Airway.
   c. Pulmonary toilet.
   d. Ventilation.
   e. Cardiac compression.
f. Sign arrest flow sheet.

I. Social Work
   1. Duties:
      a. Assess family presence and need. If family members are present: provide emotional support and act as liaison to medical team for information, education. If family members are not present: identify next of kin and facilitate contact with them to advise re: code.
      b. Maintain communication between family and medical team re: status of code and patient response.
      c. Social Work will provide emotional support, information and education.
      d. Presence when Arrest Team Leader meets with family, if requested.
      e. Social Work will collaborate with Spiritual Care and Security to identify and prioritize needs and most appropriate interventions with family/next of kin.
      f. Social Work will act as liaison between Code Team Leader and family as well as family and spiritual care.

J. Material Services
   1. Duties:
      a. Secure drug box from Pharmacy Service.
      b. Deliver arrest cart and re-stock arrest cart after each arrest.
      c. Ensure proper monitoring of materials on the arrest cart on a monthly basis.
      d. Check defibrillator daily.
      e. Maintain teaching arrest cart and related supplies.

K. Phlebotomist
   1. Duties:
      a. Proper phlebotomy services as directed by the Arrest Team Leader.
      b. Transports specimens to the appropriate laboratory and will be dismissed by the Team Leader when not needed.

L. Trauma Service Chief Resident
   1. Duties:
      a. Assume team leader responsibility for traumatic arrests.
      b. Signs arrest flow sheet as appropriate.

M. Emergency Consult Resident (Consultant)
   1. Duties:
      a. Respond to calls for surgical assistance at non-traumatic arrests.
      b. Signs arrest flow sheet as appropriate.

N. Medical Emergency Response Technician
   1. Duties:
      a. Apply AED if first on scene and defibrillate when indicated.
      b. Perform BLS.
      c. Assist with locating supplies & cart contents.
      d. Record
      e. IV insertion
      f. Assist Cardiac Arrest Team as needed

O. Security Officer
   1. Duties:
      a. As requested by Arrest Team leader, assist the Arrest Team in "crowd control" and scene management.
P. Hospitalist Attending
   1. Duties:
      a. Take a supervisory role while allowing the senior medical resident to act as the team
         leader.
      b. Provide educational feedback to the team leader (senior medical resident) during and
         immediately after CPR procedures.

Q. Communication Specialists (Survival Flight Communication)
   1. Duties:
      a. Receive arrest alert.
      b. Page Arrest Team members.
      c. Maintain log of arrest activity.
      d. For trauma arrests, contact Trauma Chief Resident

*A competent Nurse will respond, as an Arrest Team member, to all areas described in the CPR Policy, this Nurse is
appointed and assigned by the Directors of Nursing.*

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(Revisions endorsed by NEC on 2/18/08)

Arrest Team Responsibilities reviewed 1/19/2012
UMHHC POLICY 03-01-025 CARDIOPULMONARY RESUSCITATION - Exhibit D

PEDIATRIC ARREST TEAM MEMBERS AND THEIR RESPONSIBILITIES
For THE UNIVERSITY OF MICHIGAN MEDICAL CENTER
C.S. Mott Children’s Hospital and Von Voigtlander Women’s Hospital

I. POLICY STATEMENT

The pediatric arrest team initially responds to all adult/pediatric paged arrests in C.S. Mott Children’s Hospital and Von Voigtlander Women’s Hospital. The adult team will secondarily respond to all adult paged arrests in C.S. Mott Children’s Hospital and Von Voigtlander Women’s Hospital. The pediatric team will secondarily respond to paged pediatric arrests in all other hospital locations.

Neonatal Intensive Care Unit arrests are normally handled by internal staff.

II. POLICY/PROCEDURE PURPOSE

Each member of the Pediatric Cardiac Arrest Team has specific responsibilities. These responsibilities are delineated to ensure each member understands his/her role so the arrest team response proceeds effectively and efficiently.

III. DEFINITIONS

Pediatric Arrest - any cardio-pulmonary arrest of a patient under 18 years of age, or followed by a Pediatric Primary Care Service.

IV. APPOINTMENT OF MEMBERS/CONSULTANTS

A. Three Medical Staff Members
   To include the Senior Resident and two HOI on the General Pediatric Service.

B. Nurses
   - Up to three nurses from the patient unit for patient care areas.
   - A nurse from the Pediatric Critical Care Unit will respond to all paged arrests in C.S. Mott Children’s Hospital and Von Voigtlander Women’s Hospital. He/she will also respond to paged pediatric arrests in all other University Hospital locations.

C. Anesthesiology Resident or CRNA

D. Pediatric Critical Care Fellow

E. Pediatric Hospitalist Attending

F. Pharmacist/Intern or Pharmacy Resident/Pharmacy Department

G. Respiratory Therapist and/or Technicians (2)

H. EKG Technician

I. Phlebotomist or STAT Messenger
J. Medical Emergency Response Technician

K. Security Officer

L. Social Work

* For Adult patients in C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital, the pediatric Arrest Team is the first responder. Secondary response from the Adult Arrest Team will include: an MFH Attending, Adult STCU RN, Adult Respiratory Therapist and/or technician.

V. RESPONSIBILITIES OF MEMBERS

A. Three Members of the Medical Staff
   - Senior resident identifies self as Arrest Team Leader.
   1. Duties:
      a. Diagnoses, prescribes, and administers treatment and medications. This also includes defibrillation, specimens, and procedures.
      b. Must ensure that all orders are carried out.
      c. Assumes responsibility for, or delegates responsibility for, maintaining communication with the family and Primary Care Service.
      d. Ensure completion of accuracy of the Cardiac Arrest record sheet.
      e. Signs arrest flow sheet.

B. Nursing
   - The principal contribution of Nursing is the prompt initiation of BLS. Upon being relieved of that responsibility by Respiratory Therapy, the nursing staff is primarily responsible for assuming the three major roles described below.
   1. Duties:
      a. Primary Care Nurse
         1) Initiator of BLS; transferring BLS to Respiratory Therapists and/or Technicians and other team members as they arrive.
         2) Assumes primary care of the patient performing assessments, vital signs, interventions, and medications administration as ordered by Arrest Team Leader.
         3) Assist Physician with patient procedures.
         4) Communicate assessments, vital signs, interventions, procedures and medication administration to the recorder.
         5) Signs arrest flow sheet.
      b. Arrest Cart Manager/Equipment Nurse
         1) Obtain arrest cart and bring to arrest site when arrest is on an inpatient unit.
         2) Provide and assist in placing arrest board.
         3) Attach patient to monitor with appropriate leads, patches, or pads.
         4) Place patient in appropriate mode for monitoring, cardioversion, defibrillation, pacing.
         5) Attach slave cable to patient bedside monitor if applicable.
         6) Ensure proper set-up and operation of equipment, i.e. suction, infusion pumps, arrest cart monitor.
         7) Operates cart monitor for needed functions as requested by Arrest Team Leader, i.e. monitoring, cardioversion, defibrillation, pacing.
8) Provide cart equipment needed for procedures, i.e., intubation, suctioning, blood draws, IV insertion, line insertion, NG insertion etc.
9) When requested assists Primary care nurse as able with patient related tasks i.e., obtaining vital signs, placing NGs/Foley's, blood draws, IV insertion, etc.

c. Recorder
1) Make contact and maintain communication with the Senior Resident Arrest Team Leader and Primary nurse.
2) Is responsible for recording all arrest related events on CPR flow sheet, i.e., pre-arrest status, assessments, vital signs, medications/IV fluids administered, labs done/results, interventions, procedures, and post-arrest information.
3) Signs arrest flow sheet and ensures other necessary signatures of arrest team members.
4) Ensures that all copies of arrest flow sheets are forwarded to the appropriate destination and stamps miscellaneous charge tickets with patient information and communicates with Material Services for arrest cart exchange.

d. Pediatric Critical Care Nurse
A nurse from C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital Pediatric Critical Care Units will be present during any pediatric arrest (see IV B). His/her role varies with the arrest location.
1) Pediatric Inpatient Unit: He/she acts as a consultant and does not assume primary responsibility assisting Primary Care Nurse in all duties as requested.
2) Pediatric arrests elsewhere in other Hospitals: He/she responds as described by the three major roles.

C. Anesthesiology Resident or CRNA
1. Duties:
   a. Assesses airway and manages as appropriate.
   b. Signs arrest flow sheet.

D. Pediatric Critical Care Fellow
1. Duties:
   a. Pediatric Inpatient Unit: He/She acts as a consultant and does not assume primary responsibility of the arrest.
   b. When requested, will assume Arrest Team Leader role and responsibilities as described in Senior Resident Role and Responsibilities
   c. Pediatric arrests elsewhere in other hospitals: He/She acts as Arrest Team Leader
   d. Assist in contacting Primary Service if not at bedside.
   e. Signs Arrest Flow Sheet

E. Pediatric Hospitalist Attending
1. Duties:
   a. Attending of record to arrest.
   b. Support Senior Resident and/or Pediatric Critical Care Fellow in Arrest Team Leader role.
   c. Assist in contacting Primary Service if not at bedside.
   d. Signs Arrest Flow Sheet
F. Pharmacist/Intern or Pharmacy Resident/ Pharmacy Department
   • Pediatric Pharmacist will respond to all adult/pediatric arrests in C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital. A Pediatric Pharmacist will secondarily respond to all other paged pediatric arrests in other Hospital locations.
   1. Duties:
      a. Drawing up all medications as needed, including compounding of any continuous infusions. If nurses are also drawing up medications, the pharmacist should double check all medications, calculations.
      b. Review with the Arrest Team Leader all drugs recorded on the CPR flow sheet to insure accuracy of the drug administration information recorded.
      c. Signs arrest flow sheet.
      d. Locate and transport "rover" cart to arrest location, where appropriate in B2, B1 1 and 2 University Hospitals, C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital, and public areas in Taubman Center, Towsley Center, Med Inn and Cafeteria.
      e. After arrest ends place a yellow lock on the drug box and secure back into the arrest cart. If a drug box is brought to the arrest by the pharmacist, they are responsible for returning the drug box to pharmacy themselves.

G. Respiratory Therapists and/or Technicians (2)
   • Therapist or Technician On-Call
   1. Duties:
      a. Perform BLS
      b. Assist with intubation and maintain airway.
      c. Administer Respiratory Therapies and Respiratory Medications as ordered by Arrest Team Leader.
      d. Signs arrest flow sheet.

H. EKG Technician
   • Will respond to all arrests in C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital.
   1. Duties:
      a. Perform 12 lead EKG, as requested, and will be dismissed by the Arrest Team Leader when not needed or task is completed.

I. Phlebotomist or STAT Messenger
   • Will respond to all arrests in C.S. Mott Children's Hospital and Von Voigtlander Women's Hospital.
   1. Duties:
      a. Will transport specimens, as required, and will be dismissed by the Arrest Team Leader when not needed or tasks completed.

J. Medical Emergency Response Technician (MERT)
   1. Duties:
      a. Apply AED if first on scene and defibrillate when indicated.
      b. Perform BLS.
c. Assist as requested by Arrest Team Leader or Primary Nurse, being dismissed when tasks completed or assistance is no longer needed.
d. Signs Arrest Flow Sheet as needed.

K. Security Officer
   1. Duties:
      a. As requested by Arrest Team Leader, assist the Arrest Team in “crowd control” and scene management.

L. Social Work
   1. Duties:
      a. Assess family presence and need. If family members are present: provide emotional support and act as liaison to medical team for information, education. If family members are not present, facilitate contact with them to advise re: code
      b. Maintain communication between family and medical team re: status of code and patient response
      c. Social Work will provide emotional support, information and education
      d. Presence when Arrest Team Leader meets with family, if requested
      e. Social Work will collaborate with Spiritual Care and Security to identify and prioritize needs and most appropriate interventions with family
      f. Social Work will act as liaison between Code Team Leader and family as well as family and spiritual care

IMPORTANT: The Pediatric Arrest Team is the primary responder to all cardio-pulmonary arrests of patients in the C.S. Mott Children’s Hospital and Von Voigtlander Women’s Hospital, and Pediatric cardio-pulmonary arrests in all other Hospital locations. The Primary service caring for the patient will be contacted about the arrest by designated personnel.
"A competent Nurse will respond, as an Arrest Team member, to all areas described in the CPR Policy; this Nurse is appointed and assigned by the Directors of Nursing."

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(Revisions endorsed by NEC on 2/18/08)

Arrest Team Responsibilities
Revised: 01/19/2012