

**TeamSTEPPS® Implementation at a Free Standing Ambulatory Surgical  
Center for Anesthesia Critical and Adverse Event Training**

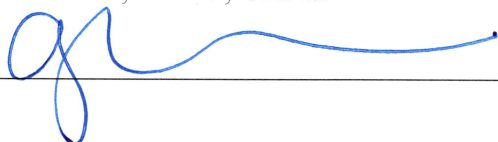
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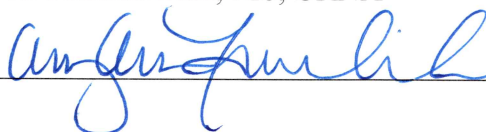
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TEAMSTEPPS AND ANESTHESIA ADVERSE EVENT TRAINING

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### Abstract

**Purpose:** The purpose of this scholarly project was to evaluate if there was a change in ambulatory surgical center staff non-technical skills attitudes, perceptions, and knowledge following the implementation of staff team training for anesthesia critical events based on TeamSTEPS®.

**Methods:** The non-technical skills attitudes, perceptions, and knowledge of the peri-operative staff at Madison Avenue Surgical Center were assessed utilizing pre- and post-intervention attitudes and perceptions surveys and pre- and post-intervention knowledge assessments. The intervention consisted of six narrated Microsoft® PowerPoint presentations modeled after TeamSTEPS® 2.0 training. TeamSTEPS® tools and strategies were reinforced with simulation scenarios covering malignant hyperthermia and advanced cardiac life support. Survey and assessment data were analyzed to assess for changes in non-technical skills attitudes, perceptions, and knowledge in participating ambulatory surgery center staff.

**Results:** The categories of leadership, team structure, situation monitoring, mutual support, and communication were evaluated. All categories demonstrated an increase in attitudes and perceptions, except attitudes concerning leadership and situation monitoring, and perceptions related to mutual support and communication. Overall increases were seen in the non-technical skills knowledge categories of team structure, situation monitoring, mutual support, and communication. A decrease in leadership knowledge was demonstrated.

**Conclusion:** This research project demonstrates TeamSTEPS®' utility in out-patient surgical centers for anesthesia critical events. An overall increase in attitudes, perceptions, and knowledge occurred post-TeamSTEPS® implementation. TeamSTEPS® 2.0 is a low cost, easily modified and implemented training program for health care organizations.

**Data Sources:** Cochrane Library, Google Search, CINAHL, and PubMed databases.

**Keywords:** Anesthesia critical events training, teamwork training, peri-operative, ambulatory surgical centers, TeamSTEPS®.

## **Introduction**

Advances in anesthesia have afforded increased patient safety and convenience. Despite this, anesthesia remains an inherently high-risk environment for patients.<sup>1</sup> Although uncommon, critical events in anesthesia can be devastating and result in adverse outcomes. Preventing anesthesia complications is the focus of anesthesia and peri-operative providers and has the attention of the federal government.

Research in anesthesia adverse events has been performed to better prepare anesthesia providers for low-occurrence/high-risk anesthesia events. A retrospective closed claim review determined that 43% of medical errors were the result of poor team coordination.<sup>1</sup> The Institute of Medicine (IOM) report titled *To Err is Human: Building a Safer Health System* concluded that errors occur due to faulty systems, processes, and conditions.<sup>2</sup>

The importance of non-technical skills (NTS) has been recognized and researched in high risk disciplines such as aviation, nuclear power plants, and the military.<sup>3</sup> Team training has been utilized to improve attitudes, perceptions, and knowledge in disciplines inside and outside of healthcare.<sup>1</sup> Medical crisis teams have improved quality, safety, and cost-effectiveness by adopting communication and teamwork training that targets preventable patient harm.<sup>4</sup>

The Agency for Healthcare Research and Quality (AHRQ) has identified the need for increased patient safety in all areas of patient care, including peri-operative care.<sup>5,6</sup> Research in organized team training in outpatient surgical centers on anesthesia high-risk, low-occurrence adverse events can help close the gap in team training knowledge.<sup>4</sup> Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) development by the AHRQ utilizes evidence based teamwork and communication to provide an educational framework for

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healthcare professionals.<sup>7</sup> This program provides health care professionals with training focused on communication, leadership, situational monitoring, and mutual support.<sup>5</sup>

It was hypothesized that educating ambulatory surgical center peri-operative staff regarding non-technical skills utilizing the TeamSTEPPS® framework will improve non-technical skills attitudes, perceptions, and knowledge. The aim of this scholarly project was to educate ambulatory surgical center peri-operative staff on non-technical skills based on TeamSTEPPS® modules to improve attitudes, perceptions, and knowledge to enhance teamwork during anesthesia crisis management. The purpose of this research is to answer the following questions: 1) does interdisciplinary critical incident training using TeamSTEPPS® improve the non-technical skills knowledge of ambulatory surgical centers peri-operative team members; and 2) does interdisciplinary critical incident training using TeamSTEPPS® improve the non-technical skills attitudes and perceptions of ambulatory surgical centers peri-operative team members?

### **Literature Review**

Medical errors can be defined as “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim.”<sup>2</sup> Areas at high risk for medical errors include intensive care units, emergency rooms, and operating rooms.<sup>2</sup> In addition to patient injury or death, associated productivity loss and disability costs caused by medical errors reach as high as \$17 and \$29 billion a year.<sup>2</sup>

Critical anesthesia events include local anesthetic systemic toxicity (LAST) with hemodynamic collapse, hemorrhagic shock, malignant hyperthermia (MH), cardiac arrhythmias with hemodynamic instability, tension pneumothorax, hypoxia, hypoventilation, and airway obstruction.<sup>8</sup> Anesthesia critical events, although rare, pose life-threatening risks when poorly

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managed.<sup>8</sup> Not only are anesthesia providers at risk for inadequate preparedness, many peri-operative staff members (registered nurses, surgical techs, surgeons, and certified nurse aids) have little or no training for these events.

Breakdown of team processes and communication have been found to cause more medical errors than the lack of clinical knowledge.<sup>1,2</sup> Human factors that contribute to medical errors include poor communication, lack of situational awareness, ineffective team interactions, and deficient cognitive skills.<sup>3</sup> Additional causes include medication errors, long delays, no call for help, and lack of leadership.<sup>9</sup> Staff education on critical events in anesthesia should focus on addressing and eliminating these human factors and causes.<sup>9</sup> The utilization of team training successes in high-risk industries such as aviation, nuclear power, business, industry, and the military have been adopted in the healthcare field with documented improvement in patient care outcomes.<sup>10</sup>

Non-technical skills (NTS) are defined as cognitive and personal resources to include situational awareness, decision-making, teamwork, and leadership.<sup>11</sup> Evaluation of incident reports, observational studies, simulation, and attitudes and perceptions questionnaires have linked non-proficiency of these skills to medical errors.<sup>11</sup> Non-technical skill proficiency can improve cost effectiveness, efficiency, and patient safety.<sup>4,11</sup>

Advancements in surgical and anesthesia techniques have allowed for more complex surgeries and patients to be cared for in ambulatory surgical settings.<sup>6</sup> Ambulatory surgical centers are a growing resource in healthcare, surpassing hospital-based centers and encompassing 63% of all surgical procedures performed.<sup>12</sup> This growing and well-established niche in healthcare possesses reduced staff size with varied staff experience. Staff educational resources and opportunities can be inadequate, exacerbated by staff turnover.

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Ambulatory surgical centers (ASCs) are included in the Agency for Healthcare Research and Quality (AHRQ) U.S. Department of Health and Human Services guidelines for clinical practice improvement.<sup>5</sup> The AHRQ supports “research designed to improve the quality of health care and address patient safety and medical errors.”<sup>5(p2)</sup> Ambulatory surgical centers recognize patient safety and quality care as a concern.<sup>5</sup>

Traditional methods of educating healthcare providers to manage adverse peri-operative events include lectures and assigned reading. These methods have been utilized in many educational mediums. Although lectures and reading can improve crisis management in anesthesia adverse events, more advanced methods of learning have been researched in an attempt to decrease human error and increase patient safety in anesthesia.<sup>7</sup>

Critical event checklists and cognitive aids have been utilized in best practice events, such as emergency protocols for advanced cardiac life support (ACLS) and malignant hyperthermia (MH).<sup>13</sup> Improvements were seen in teamwork and non-technical skills when cognitive aids were available.<sup>13</sup> Cognitive aids have been also shown to improve adherence to best practice routines, teamwork, and non-technical skills.<sup>13</sup>

Simulation training has been researched extensively in the literature. Simulation includes mannequin simulators, computer simulators, and full body mannequin simulators interfaced with a computer system.<sup>8</sup> Simulators allow hands-on management of high acuity rare events and allow for crisis resource management.<sup>8</sup> Advanced computer-controlled mannequins can allow for a highly realistic interactive medical environment.<sup>14</sup> Although the research reports mixed results of simulated anesthesia provider performance, simulated instruction allows providers to practice their skills outside of patient care. Repeating simulation training of adverse events every 1 to 2 years is recommended.<sup>8,14,15</sup>

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The use of simulation in medical training can assist in teaching technical proficiency as well as NTS.<sup>16</sup> When utilizing simulation training, it is recommended to follow the three phases of scenario development, measurement development, and debriefing.<sup>16</sup> While simulation is a form of instruction, it is not a form of technology.<sup>16</sup> Low or no technology approaches to simulation training are effective for teaching technical and non-technical skills such as teamwork, interpersonal, and communication skills.<sup>16</sup> Measurable learning objectives for simulation training include performance, conditions, and standards.<sup>16</sup>

Adaptive coordination is the process of organizing teams, activities, and responses to better integrate, synchronize, and complete tasks.<sup>9</sup> Focusing on building teamwork has been proven essential, as adverse events can originate more from flawed teamwork than from lack of clinical skills.<sup>9</sup> Organizations can utilize adaptive coordination to develop team training programs to improve important components of anesthesia adverse event management, such as organized team joint task execution (delegating tasks, asking for help), task management (coordination of actions or tasks), and information management (coordination of information that is relevant for task execution).<sup>9</sup> Process adaptation in teams is especially important in ambulatory surgical centers where resources are limited.<sup>13</sup> This involves converting time spent on coordination of information management to task management, and consolidating roles such as team leader and tasks.<sup>13</sup>

TeamSTEPPS® was developed by the AHRQ and the Department of Defense (DOD) after roughly 30 years of medical and nonmedical team training performance and research.<sup>17</sup> This formalized approach to teaching teamwork has been pioneered by industries such as aviation and the military. Team training was developed to address patient safety concerns and healthcare quality by utilizing tools and strategies for communication and teamwork skills.<sup>17</sup> In November



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of 2006, TeamSTEPPS® was introduced to the public sector and has since been implemented at military, urban, rural, and academic hospitals.<sup>17</sup>

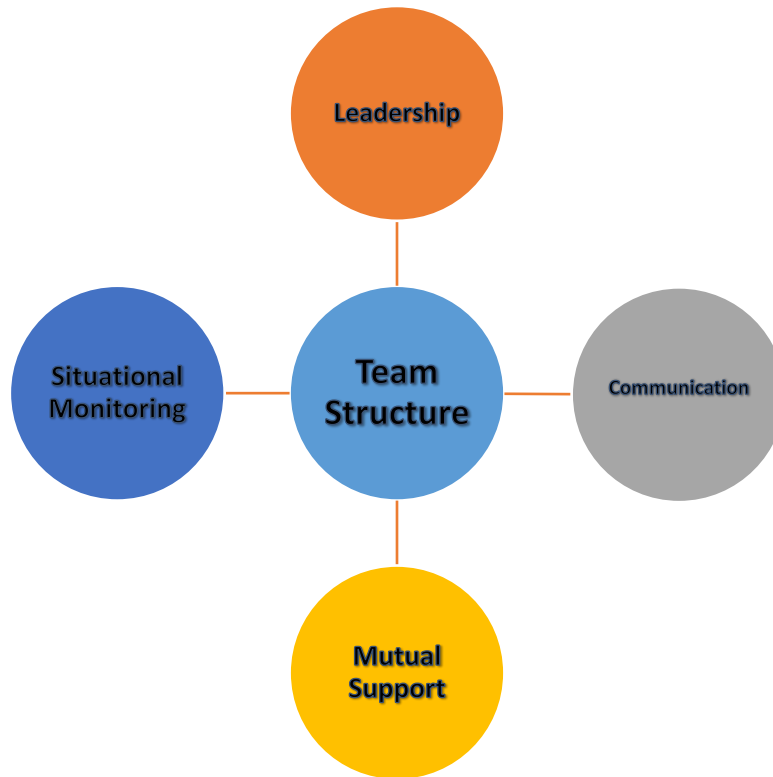
The TeamSTEPPS® training program is an evidence-based teamwork system developed to educate staff on teamwork skills and behaviors. A meta-analysis of team training research demonstrated a positive relationship between team training and improved patient safety outcomes.<sup>1</sup> The learning modules focus on improving collaboration and communication in health care institutions with the goal of increasing patient safety. Utilizing these educational methods, TeamSTEPPS® materials supply trainers with the resources needed to coach other staff members. These materials include traditional classroom teaching, case study analysis, role playing, coaching exercises, Microsoft® PowerPoint presentations, simulation, and video vignettes.<sup>17</sup>

The methods taught in TeamSTEPPS® training educate staff on clarifying team roles and responsibilities, provide tools and strategies, and cultivate the teamwork competencies of leadership, situational monitoring, mutual support, and communication (*Figure 1*).<sup>1,17</sup> The result is a team approach via a shared mental model and mutual respect despite differing health care roles or hierarchy. Patient safety is increased by including patients in the health care team and encourages voicing concerns in lieu of assigning individual blame.<sup>17</sup>

Documented successes of TeamSTEPPS® implementation have occurred at a variety of healthcare settings. These include clinical nursing floors, obstetrics, emergency rooms, mental health facilities, and operating room environments.<sup>17</sup> Successes include improved team performance, processes, and patient safety culture.<sup>1</sup> Studies in a meta-analysis demonstrated a substantial increase in skills, attitudes, and behaviors following TeamSTEPPS® implementation.<sup>17</sup> Staff reported improvements in provider and patient attitudes toward

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teamwork and increased employee satisfaction.<sup>17</sup> The inclusion of patients and their families in team huddles and care planning has facilitated an increase in patient engagement in their care process and increased patient satisfaction.<sup>17</sup>



**Figure 1.** Conceptual Model of TeamSTEPPS® Modules<sup>1</sup>

Skills and results post-TeamSTEPPS® implementation include reduced errors in the emergency department (ED); increases in the quality and quantity of pre-surgical procedure briefing; improved role clarity among team members; reduction of retained foreign objects; improved error avoidance rates; increases in properly timed administration of prophylactic measures; and improved environment for reporting and discussing surgical errors.<sup>17</sup> Nursing units reported improved SBAR (situation, background, assessment, recommendation) communication among all units, reduction of adverse drug events, and improved medication reconciliation on admission and discharge.<sup>17</sup> Facility-wide reductions in the occurrence and

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severity of adverse events, incorrect dosage orders, protocol errors, and supply shortages were noted.<sup>17</sup>

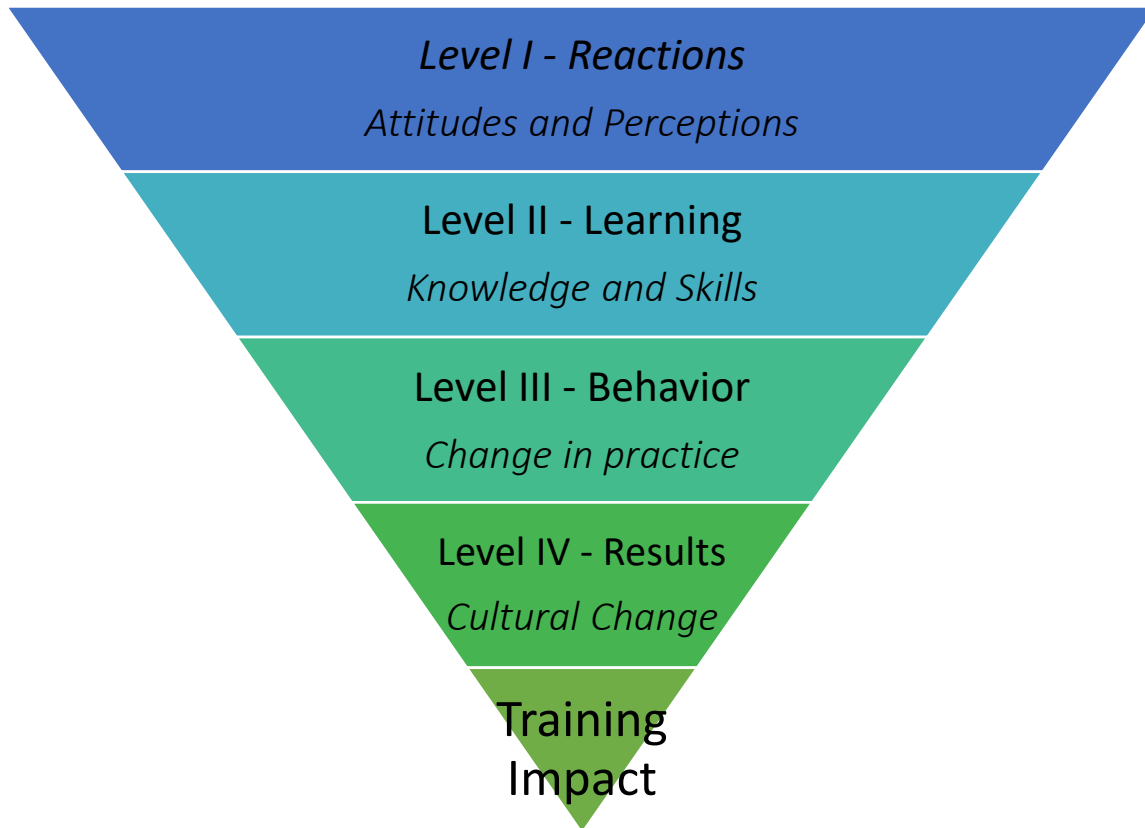
No studies were found assessing ambulatory surgical center peri-operative staff knowledge gaps in teamwork and non-technical skills training for anesthesia high-risk/low-occurrence adverse events. Considerations unique to smaller facilities, such as outpatient surgical centers, make implementation and data extraction challenging. Small facilities lack resources such as funding, time, and the ability to adopt patient safety strategies due to organizational and technological constraints.<sup>17</sup> The organizational and cultural uniqueness of ambulatory surgical centers creates a challenging environment for TeamSTEPS® implementation. In addition, the ability to assess patient safety effects post-training is limited by smaller case/census volumes and the rarity of adverse events.<sup>17</sup>

### **Theoretical Model**

The theoretical model of learning for TeamSTEPS® is based on Kirkpatrick's techniques for evaluating training programs.<sup>18</sup> Reasons for evaluating training programs include guiding improvement, determining if a program should be continued or dropped, and to justify the existence of the training department.<sup>18</sup> Four levels of evaluation are described: level 1 – reaction; level 2 – learning; level 3 – behavior; and level 4 – results (*Figure 2*).<sup>18</sup>

Level 1 – reaction evaluates how the participants respond to the training by their attitudes or perceptions, or “customer satisfaction”.<sup>18</sup> Level 2 – learning pertains to participants' change in attitudes, knowledge, and skills post instruction.<sup>18</sup> A change in behavior (level 3) indicates at least one of these objectives was met.<sup>18</sup>

Kirkpatrick emphasizes that in order for a change in behavior to be measured, training programs must not bypass the first two levels (reaction and learning).<sup>18</sup> Measuring results, level



**Figure 2.** Kirkpatrick Evaluation Model<sup>18</sup>

4, can be difficult when evaluating topics such as leadership, communication, motivation, and decision-making.<sup>18</sup> In settings with low-occurrence events, such as anesthesia adverse events in ambulatory surgical centers, measuring changes in knowledge, attitudes, and perceptions are more feasible primary endpoints.

TeamSTEPPS® instruction employs the principles of the adult learning model, which is based on the premise that adults perform best when they are involved in their learning.<sup>1</sup> The six main adult learning characteristics are self-direction, utilization of knowledge and life experiences, goal-orientation, relevancy-oriented, practicality, and collaboration.<sup>19</sup> The acronym CPR addresses the importance of *content* relevance, learner *participation*, and *reinforcement* in classroom training.<sup>1</sup> The utilization of instructional Microsoft® PowerPoints followed by hands-

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on, interactive simulation with actual or realistic scenarios meets the needs of the adult learner and ensures the transfer of training.<sup>1</sup>

### **Methodology**

Approval was obtained from the University of Michigan-Flint Institutional Review Board for this research to be conducted (*Appendix A*). Administrative approval for research to be performed at Madison Avenue Surgical Center (MASC) was obtained (*Appendix B*). All peri-operative ambulatory surgical center (ASC) staff nurses and support staff (nurse assistants, scrub techs, managers, and surgeons) were invited to participate in pre- and post-intervention attitudes and perceptions surveys and knowledge assessments, TeamSTEPPS® training, and simulation scenarios. Only the data from participants who consented and completed the training were analyzed. Informed consent was obtained from all participants (*Appendix C*). Participants were informed of study details, their rights as research subjects, and the right to refuse to participate or to withdraw from the study at any time without repercussions. No individually identifiable information was collected from the participants or utilized in this research. Pre- and post-intervention surveys and assessments were kept in a secured location and destroyed post-project completion by the primary investigator. Education was performed by the researcher, a certified registered nurse anesthetist (CRNA) who had completed the TeamSTEPPS® 2.0 Train-the-Trainer modules. The researcher is an independent contractor to MASC.

Participants were asked to complete a pre-intervention attitudes survey (T-TAQ), a pre-intervention perceptions survey (T-TPQ), and a learning benchmarks quiz provided by TeamSTEPPS® 2.0 curriculum tools and strategies (*Appendices D-F*). Six narrated Microsoft PowerPoint® presentations were then made available to participants. After each participant completed the six Microsoft® PowerPoint modules, scripted anesthesia crisis scenarios

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TeamSTEPS Core Modules	Objectives	Tools and Strategies
Team Structure	<ul style="list-style-type: none"> <li>• Discuss the benefits of teamwork and team structure in anesthesia crisis event management</li> <li>• Define a “team”</li> <li>• Identify the role of patients and their families as part of the peri-operative care team</li> </ul>	
Communication	<ul style="list-style-type: none"> <li>• Describe how communication affects team processes and outcomes during anesthesia crisis events</li> <li>• Define effective communication</li> <li>• Identify communication challenges</li> <li>• Identify TeamSTEPS® tools and strategies that can improve a team’s communication</li> </ul>	<ul style="list-style-type: none"> <li>• Check-Back</li> <li>• Handoffs</li> <li>• SBAR (Situation, Background, Assessment, Recommendation)</li> <li>• Call-Out</li> </ul>
Leading Teams	<ul style="list-style-type: none"> <li>• Describe how peri-operative leadership affects team processes and outcomes</li> <li>• Identify different types of team leaders during critical anesthesia events</li> <li>• Describe the activities involved in successfully leading teams during critical anesthesia events</li> <li>• Describe the tools for leading teams</li> </ul>	<ul style="list-style-type: none"> <li>• Briefs</li> <li>• Huddles</li> <li>• Debriefs</li> </ul>
Situational Monitoring	<ul style="list-style-type: none"> <li>• Discuss how situation monitoring affects peri-operative team processes and outcomes in anesthesia critical events</li> <li>• List components of STEP mnemonic</li> <li>• Explain situation awareness and identify undermining conditions</li> <li>• Define a shared mental model and how it is cultivated within a team</li> </ul>	<ul style="list-style-type: none"> <li>• STEP (Status of the patient, Team members, Environment, Progress toward goal)</li> <li>• I’MSAFE (Illness, Medication, Stress, Alcohol and Drugs, Fatigue, and Eating and Elimination)</li> </ul>
Mutual Support	<ul style="list-style-type: none"> <li>• Describe how mutual support affects peri-operative team processes and outcomes</li> <li>• Discuss specific strategies to foster mutual support (task assistance, feedback)</li> <li>• Identify specific tools to facilitate mutual supports (advocacy and assertion, two-challenge rule, collaboration)</li> <li>• Describe conflict resolution strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Task Assistance</li> <li>• Feedback</li> <li>• Advocacy and Assertion</li> <li>• Two-Challenge Rule</li> <li>• Conflict Resolution               <ul style="list-style-type: none"> <li>○ CUS (Concerned, Uncomfortable, Safety)</li> <li>○ DESC Script (Describe, Express, Suggest, Consequences)</li> </ul> </li> </ul>

**Table 1.** TeamSTEPS® Core Modules, Objectives, Tools, and Strategies<sup>10</sup>

(Appendix G) were simulated and evaluated utilizing standardized MH and advanced cardiac life support (ACLS) rubrics (Appendices H-I). Non-technical skills were reinforced via these high-

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risk/low-occurrence anesthesia adverse events simulations. Simulation scenarios were developed based on the core TeamSTEPPS® concepts of team structure, leadership, situational awareness, mutual support, and communication (*Table 1*).<sup>5</sup> Post-intervention, the TeamSTEPPS® 2.0 T-TAQ and T-TPQ surveys and learning benchmarks quiz were again completed by participants. Data collected from the surveys and quizzes were analyzed to determine if improvements in participant NTS attitudes, perceptions, and knowledge occurred.

Communication was focused on teamwork skills per the TeamSTEPPS® curriculum and included situation background assessment and recommendation (SBAR), handoff, call-outs, check-backs, and I'm SAFE checklist (illness, medication, stress, alcohol/drugs, fatigue, and eating/elimination).<sup>1</sup> Leading teams included the tools of briefs, huddles, and debriefs. Situational monitoring assessments included cross-monitoring and STEP (status of the patient, team members, environment, and progress toward the goal).<sup>1</sup> Mutual support was demonstrated by utilization of CUS (concern, uncomfortable, safety), two-challenge rule, feedback, and DESC script (describe the specific situation, express your concerns about the action, suggest other alternatives, consequences).<sup>1</sup>

Low-fidelity simulation was utilized due to cost and resource constraints. Scenarios consisted of theoretical patients and utilized scripts, triggers, and rubrics (*Appendices G-I*). Necessary airway and medical equipment was present. Performance in simulated scenarios was designed to augment the Microsoft® PowerPoint TeamSTEPPS® tools and strategies training as well as satisfy quarterly facility drills.

Objectives for this project focus on levels I and II of the Kirkpatrick model (*Table 2*) for evaluating training programs due to time and practicality constraints.<sup>18</sup> Primary endpoints measured three outcomes: non-technical skills attitudes, perceptions, and knowledge. Pre- and

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post-implementation surveys on attitudes, perceptions, and knowledge measured reactions and learning (Kirkpatrick levels I-II) associated with TeamSTEPS® assessment and implementation at MASC regarding anesthesia high-risk/low-occurrence adverse events.<sup>18</sup> Level I measures attitudes and reactions, evaluating if participants liked the training or found it useful.<sup>18</sup> Level II measures learning, assessing the perceived effectiveness of a learning intervention.<sup>18</sup>

Participants are more likely to learn if they react favorably to a training program.<sup>18</sup> Reactions to training programs can be increased by giving the participants desire to change, knowledge of what and how to do it, providing the right climate, and rewarding them for changing.<sup>18</sup> Recruiting management and immediate supervisors to fully support TeamSTEPS® implementation can greatly increase the success of the training and conversion of learning into behavior and results.<sup>18</sup> It is difficult to measure results such as leadership, communication, motivation, time management, empowerment, decision making, or managing change.<sup>18</sup>

Kirkpatrick Level	Definition	Objective and Measurement
Level I Reaction	Measures how those who participate in the program react to it  Customer satisfaction	<b>T-TAQ, T-TPQ Surveys</b> <b>Positive reaction and satisfaction:</b> <ul style="list-style-type: none"> <li>• Affects future training programs</li> <li>• Make or break training programs</li> <li>• More motivated to learn</li> <li>• Attitudes changed</li> </ul>
Level II Knowledge	The extent to which participants change attitudes, improve knowledge, and/or increase skill as a result of attending the program	<b>Knowledge Benchmark Quiz</b> <b>To evaluate learning, specific objectives must be determined:</b> <ul style="list-style-type: none"> <li>• Knowledge is increased</li> <li>• Skill is improved</li> </ul>

**Table 2.** Kirkpatrick Levels I & II<sup>18</sup>



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### Results

All seven of the staff members at MASC volunteered to participate in this pilot study and completed all phases. Pre-intervention surveys and quiz were completed between June 19 and July 6, 2018. Malignant hyperthermia and ACLS drills were performed August 30, 2018, with all staff in attendance. Post-intervention surveys and quiz were completed by all participants between August 30 and September 10, 2018.

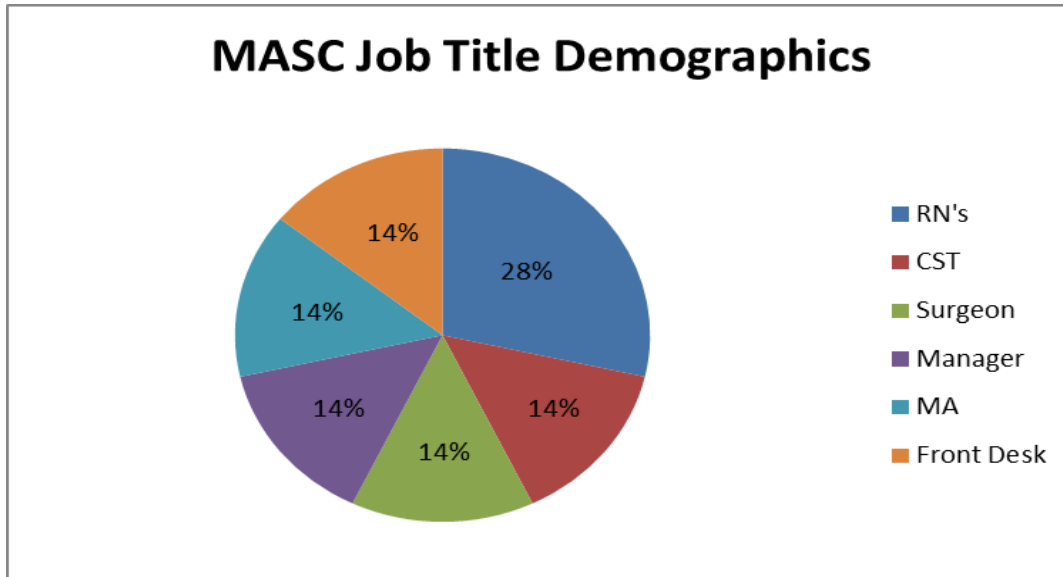
Descriptive statistics were utilized to evaluate study results. Direct result correlation was limited due to the lack of tracking individual results. Categorical and overall mean and percent change were calculated. The small sample size and anonymity of results limited the use of standardized statistical testing.

### Demographics

Participants included part-time and full-time employees with varying job titles and experience (*Table 3*). Participants included a surgeon, a surgical assistant (CST), an operating room registered nurse (RN) circulator, a pre-op/post-op RN, a medical assistant (MA), a front

Demographic Variables	Values	Percentage N = 7
<b>Gender</b>	Female	71%
	Male	29%
<b>Years of Experience</b>	1-5	28.6%
	6-10	14.3%
	11-20	42.8%
	21-30	14.3%
<b>Age (in years)</b>	>30	14.3%
	31-40	28.6%
	41-50	42.8%
	50+	14.3%
<b>FTE</b>	Full Time	71%
	Part Time	29%

**Table 3.** Madison Avenue Surgical Center demographic data



**Table 4.** Madison Avenue Surgical Center job title demographic data

desk person, and a manager (*Table 4*). MASC has been open for a year and a half.

Attitudes & Perceptions

Level I of program evaluation (or reaction), was measured utilizing pre- and post- attitude and perception surveys regarding staff perceptions of NTS.<sup>18</sup> Reactions can make or break a training program.<sup>18</sup> Positive reactions do not ensure that learning will occur, but negative reactions diminish the amount of learning that takes place.<sup>18</sup> Assessment in the form of surveys determine if TeamSTEPPS® modified for ASCs can positively affect participants' NTS attitudes and perceptions.

Non-technical skills attitudes and perceptions were broken down into the categories of team structure, leadership, situation monitoring, mutual support, and communication. Responses were measured according to a 1-5 point Likert scale. All categories demonstrated an increase in attitudes and perceptions, except attitudes concerning leadership and situation monitoring, and perceptions related to mutual support and communication (*Tables 5 & 8*). There was an overall

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increase in participants' NTS attitudes by 3.76% and NTS perceptions by 2.39% respectively

(Tables 5 & 6).

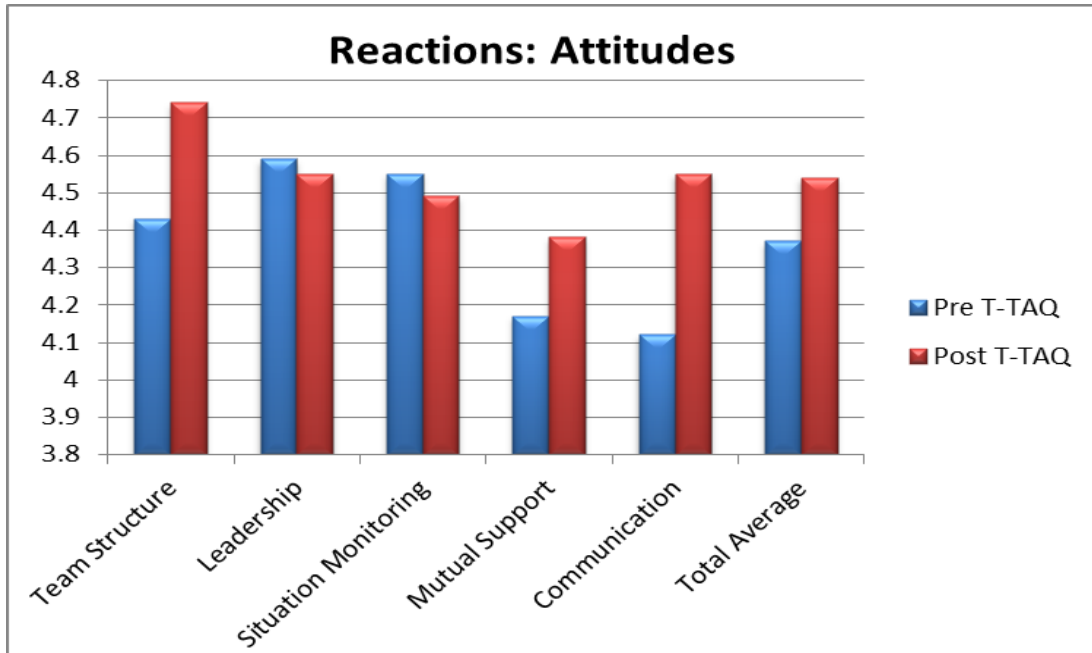
Reaction: Attitudes	Pre T-TAQ	Post T-TAQ	Percent Change
<b>Team Structure</b>	4.43	4.74	6.54%
<b>Leadership</b>	4.59	4.55	-0.87%
<b>Situation Monitoring</b>	4.55	4.50	-1.11%
<b>Mutual Support</b>	4.17	4.38	4.79%
<b>Communication</b>	4.12	4.55	9.45%
<b>Total Average</b>	4.37	4.54	3.76%

**Table 5.** Pre- and immediate post-intervention T-TAQ attitude mean scores and percent change

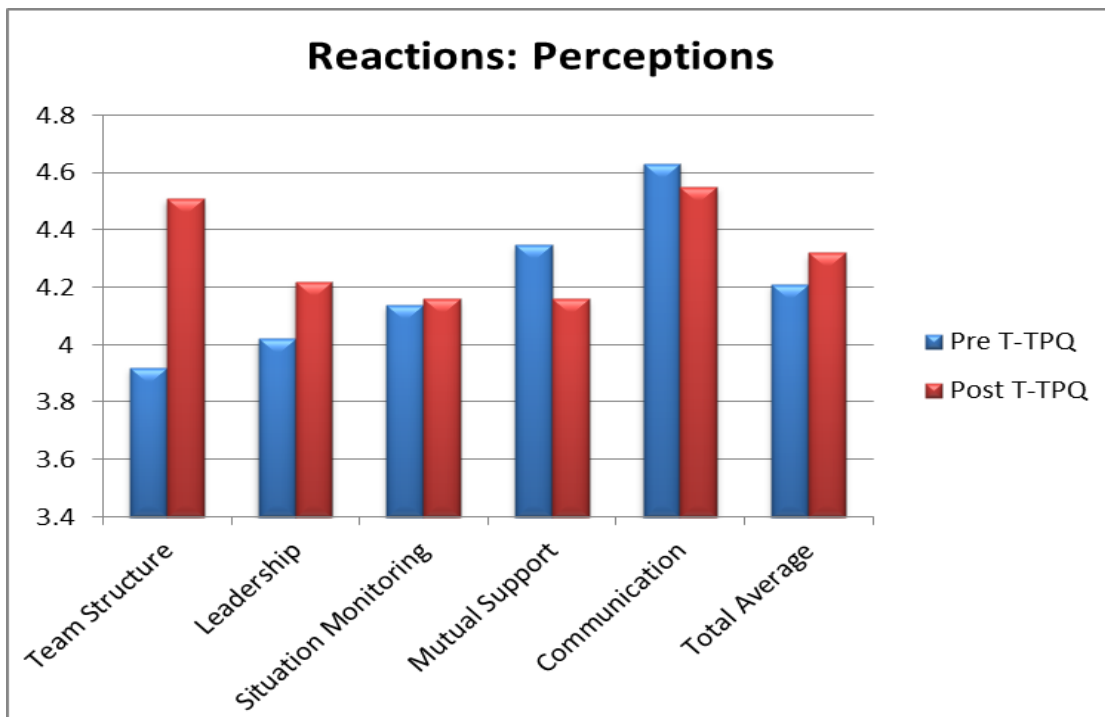
Reaction: Perceptions	Pre T-TPQ	Post T-TPQ	Percent Change
<b>Team Structure</b>	3.92	4.51	13.08%
<b>Leadership</b>	4.02	4.22	4.74%
<b>Situation Monitoring</b>	4.14	4.16	0.48%
<b>Mutual Support</b>	4.35	4.16	-4.56%
<b>Communication</b>	4.63	4.55	-1.75%
<b>Total Average</b>	4.21	4.32	2.39%

**Table 6.** Pre- and immediate post-intervention T-TPQ perception mean scores and percent change

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**Table 7.** Pre- and immediate post-intervention attitude mean scores



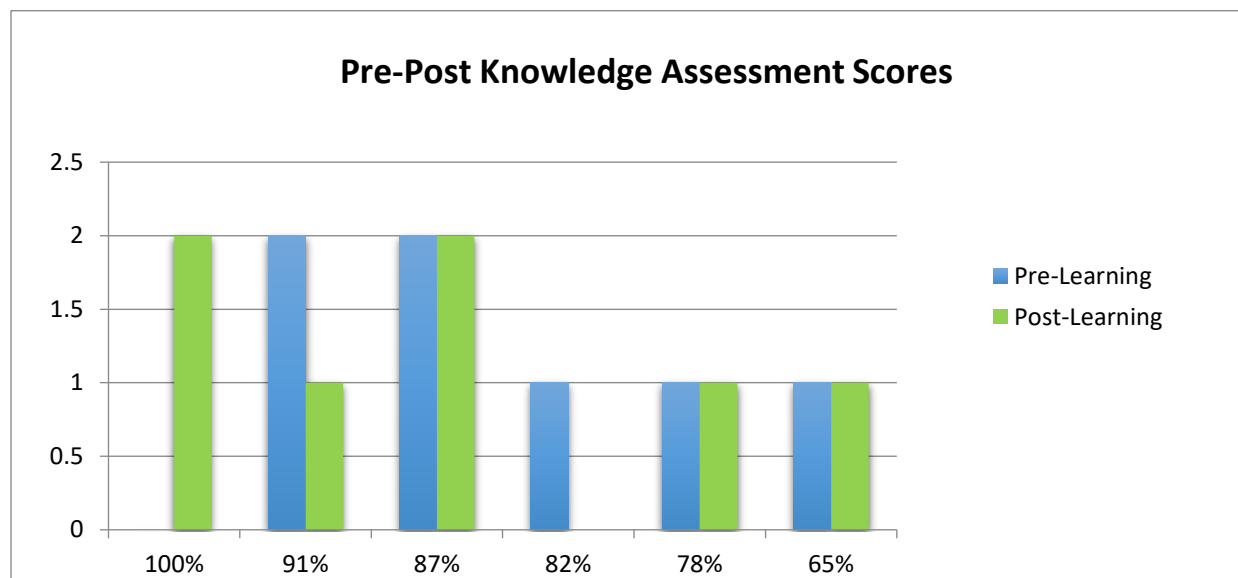
**Table 8.** Pre- and immediate post-intervention perceptions mean scores

## TEAMSTEPS AND ANESTHESIA ADVERSE EVENT TRAINING

### Knowledge

Level II (learning), assesses increases in knowledge.<sup>18</sup> If participants already know the presented content, a comparison is necessary.<sup>18</sup> An increase in test scores demonstrates learning has occurred as a result of the training.<sup>20</sup> A pre- and post-evaluation of learning was performed on the concepts of team structure, leadership, situation monitoring, mutual support, and communication.

A net gain of six correct answers on the 23 question quiz was realized with a 4.28% increase in learning benchmarks post-training. Post-knowledge assessment versus pre-knowledge assessment demonstrated increases in scores from 83.23% to 86.97%. Two participants scored 100% versus zero pre-assessment; one participant scored 91% versus two; and two participants scored 87% versus three. One participant scored 78% and 65% each both pre- and post-assessment (*Table 9*). Overall increases were seen in the categories of team structure, situation monitoring, mutual support, and communication. A decrease in leadership knowledge was demonstrated.



**Table 9.** Pre- and post-knowledge assessment scores

### **Discussion**

The results of this scholarly project suggests TeamSTEPPS®' utility in out-patient surgical centers as a low cost, easily modified and implemented training program to improve the attitudes, perceptions, and knowledge related to NTS of peri-operative staff. An overall increase in NTS attitudes, perceptions, and knowledge occurred post-TeamSTEPPS® implementation. These improvements can be viewed as training successes which future education programs can build upon. TeamSTEPPS® 2.0 tools and strategies modules are easily obtained and modified to enhance peri-operative staff NTS training in high-risk/low-occurrence anesthesia adverse events.

This study's greatest strength exists in its 100% participation, allowing for group matching. Madison Avenue Surgical Center consists of a small number of widely varied positions. This represents a typical demographic for TeamSTEPPS® implementation at other outpatient surgical centers.

TeamSTEPPS® 2.0 training is specific to healthcare organizations with this study's content modified for ambulatory surgical centers. Analyzing changes in NTS attitudes, perceptions, and knowledge can guide facilities and TeamSTEPPS® researchers in evaluating program successes, failures, or underperformances.<sup>18</sup>

### Limitations of Study

There were multiple limitations to this study. No control group existed, limiting the ability to assess if the changes that took place were due to the implemented TeamSTEPPS® training.<sup>18</sup> Madison Avenue Surgical Center is a small organization, and like many ASCs, a control group was impractical. Thus the net gain in NTS knowledge scores, attitudes, and perceptions cannot be isolated to the training that was implemented.

## TEAMSTEPPS AND ANESTHESIA ADVERSE EVENT TRAINING

This pilot study consisted of a small sample size and lacks generalizability to other groups or populations.<sup>7</sup> Although simulation was used to perform mock crisis scenarios, a performance test was not recorded. Simulated environments differ from actual settings in which emergencies occur, and participants may perform differently.<sup>8</sup> Behavior and results were not studied or recorded.

Data in this study involved participants giving candid responses regarding their training, but often responses are subject to social desirability bias or may be influenced by recent interaction with the trainer.<sup>20</sup> None of the participants offered written comments. Results of this research would be enriched by eliciting comments from the participants in either a survey or an interview format utilizing open-ended questions.<sup>20</sup>

### Suggestions for Future Research

Future research should evaluate TeamSTEPPS® NTS tools and strategies education of ASC staff during simulations. Evaluation of simulation scenario performance pre- and post-TeamSTEPPS® implementation would provide additional data in the form of skills improvement.<sup>20</sup> Simulation scenario performance can be measured utilizing standardized rubric outcomes and measures. A pre- and post-intervention simulation is essential to measure any performance and educational outcome improvements.<sup>20</sup>

Simulation-based training can be accomplished safely and cost effectively.<sup>8,20</sup> Examples are exercise case studies, situational case studies (complex, decision, and critical-incident case studies), and role playing.<sup>20</sup> These can be evaluated utilizing a go/no go scale, a performance scale, or anonymous self-assessments.<sup>20</sup>

Research would benefit from a longer duration to assist in completing phases III and IV; behavior and results.<sup>18,20</sup> A change in behavior displays that learning has occurred.<sup>18</sup> Although a

## TEAMSTEPPS AND ANESTHESIA ADVERSE EVENT TRAINING

change in behavior was not evaluated in this study, a change in behavior cannot occur without learning.<sup>18</sup>

### **Conclusion**

Patient care can be compromised when a limited number of staff and experience creates the environment for miscommunication and lack of cross monitoring. Non-technical skills training provides cognitive skills to improve healthcare providers' performance. Training programs such as TeamSTEPPS® help healthcare workers with varying levels of training work together to ensure safe patient care.<sup>1</sup>

Measuring participants' NTS attitudes, perceptions, and knowledge reflects the effectiveness of a learning program.<sup>18</sup> Programs such as TeamSTEPPS® need to be evaluated to help justify their existence, to determine if this should be implemented and continued, and to gather information to help improve future training programs.<sup>18</sup> Evaluating participants' learning is a reflection of both the instructor and the material.<sup>18</sup>

Stakeholders in training programs must remain realistic about changes accomplished.<sup>20</sup> Full competency from participants is not to be expected, and the lack thereof is not indicative of failure of the training program.<sup>20</sup> Expectations from training programs should be in line with realistic goals related to the time and effort spent.<sup>20</sup>

Information gained from current and future research of programs such as TeamSTEPPS® 2.0 is essential to help support continued application of TeamSTEPPS® at organizations such as outpatient surgical centers and reinforcement of behaviors taught.<sup>20</sup> Utilization of the training materials and information available at [www.ahrq.gov/teamstepps](http://www.ahrq.gov/teamstepps) are available to organizations wishing to increase patient safety.<sup>1</sup> TeamSTEPPS® core curriculum consists of ready-to-use tools and strategies to improve communication and teamwork skills



## TEAMSTEPPS AND ANESTHESIA ADVERSE EVENT TRAINING

based on 20 years of research on teamwork skills, backed by the Department of Defense's patient safety department and the Agency for Healthcare Research and Quality.<sup>21</sup>

# TEAMSTEPS AND ANESTHESIA ADVERSE EVENT TRAINING

## Appendix A. University of Michigan – Flint IRB Approval Letter



Flint Institutional Review Board • 530 French Hall, 303 E. Kearsley St, Flint, MI 48502 • phone (810) 762-3383 • fax (313) 593-0526 • research@umflint.edu

To: Emily Munns

From:

Kazuko Hiramatsu

Cc:

Amy Franckowiak  
Gena Welch  
Emily Munns

Subject: Notice of Exemption for [HUM00148383]

### SUBMISSION INFORMATION:

Title: TeamSTEPS® Implementation at a Free Standing Ambulatory Surgical Center for Anesthesia Critical and Adverse Event Training  
Full Study Title (if applicable): TeamSTEPS® Implementation at a Free Standing Ambulatory Surgical Center for Anesthesia Critical and Adverse Event Training  
Study eResearch ID: [HUM00148383](#)  
Date of this Notification from IRB: 6/18/2018  
Date of IRB Exempt Determination: 6/18/2018  
UM Federalwide Assurance: FWA00004969 (For the current FWA expiration date, please visit the [UM HRPP Webpage](#))  
OHRP IRB Registration Number(s): IRB00000248

### IRB EXEMPTION STATUS:

The IRB Flint has reviewed the study referenced above and determined that, as currently described, it is exempt from ongoing IRB review, per the following federal exemption category:

#### EXEMPTION 3(i)(A) and/or 3(i)(B):

Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and at least one of the following criteria is met:

(A) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

(B) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation;

Note that the study is considered exempt as long as any changes to the use of human subjects (including their data) remain within the scope of the exemption category above. Any proposed changes that may exceed the scope of this category, or the approval conditions of any other non-IRB reviewing committees, must be submitted as an amendment through eResearch.

Although an exemption determination eliminates the need for ongoing IRB review and approval, you still have an obligation to understand and abide by generally accepted principles of responsible and ethical conduct of research. Examples of these principles can be found in the Belmont Report as well as in guidance from professional societies and scientific organizations.

### SUBMITTING AMENDMENTS VIA eRESEARCH:

You can access the online forms for amendments in the eResearch workspace for this exempt study, referenced above.

### ACCESSING EXEMPT STUDIES IN eRESEARCH:

Click the "Exempt and Not Regulated" tab in your eResearch home workspace to access this exempt study.

A handwritten signature in black ink, appearing to read "Kazuko Hiramatsu".

Kazuko Hiramatsu  
Chair, IRB Flint

**Appendix B.** Madison Avenue Surgical Center Acceptance Letter



Dear Emily Munns, University of Michigan, Flint, and Doctorate of Nurse Anesthesia program,

This letter is to inform you that Madison Avenue Surgical Center (MASC) is approving Emily Munns' request to perform research at this facility by implementing staff education based on Team STEPPS education focused on communication, leadership, situational monitoring, and mutual support for low occurrence/high risk anesthesia adverse events. The administration and staff will support you in your research development, implementation, and dissemination. Please contact me for any questions or concerns.

Regards,

A handwritten signature in black ink that reads "Lori Ellsworth RN". The signature is written in a cursive, flowing style.

Lori Ellsworth, RN Clinical Administrator

## TEAMSTEPS AND ANESTHESIA ADVERSE EVENT TRAINING

### Appendix C. Invitation to Participate in Anesthesia Critical Event Project/Informed Consent

Dear Participant,

The objective of this research is to educate ambulatory surgical center peri-operative staff on anesthesia critical event management using TeamSTEPS® to improve knowledge, confidence, and teamwork.

Participation will consist of a pre and post survey, an organizational patient safety culture survey, and a pre and post quiz on team structure, communication, situational monitoring, and mutual support. Training consists of six narrated Microsoft® PowerPoint presentations, followed by ACLS and MH simulation competency training utilizing the teamwork tools and strategies taught in the power points. The power points will take approximately 15-20 minutes each. Total time invested is approximately 2 ½ hours with ACLS and MH to follow on a designated day.

Additional data that will be collected and analyzed in this study includes participant demographic and education data.

Risks are minimal for involvement in this study. There are no direct benefits for participants; it is hoped that through your participation, researchers will learn more about teamwork training at ambulatory surgical centers. Participants will be compensated for their time that exists outside of scheduled working hours.

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All data will be concealed, and no one other than the primary investigator and advising faculty will have access to them. The data collected will be securely stored on encrypted devices and/or in password protected databases until the primary investigator deletes it.

Participation in this research study is voluntary. You have the right to withdraw at any time or refuse to participate entirely without jeopardy to your employment or academic status, GPA, or standing with the university. If you desire to withdraw, please notify the principal investigator, Emily Munns, at emunns@umflint.edu.

If you have questions regarding this study, you may contact advising faculty: Dr. Gena Welch at 810-762-5981 or welchg@umflint.edu; or Amy Franckowiak at 810-424-5628 or amyburro@umflint.edu.

You may also contact the University of Michigan-Flint Institutional Review Board (IRB) Research Compliance Specialist, Mary Mandeville, 810-762-3383, irb-flint@umflint.edu. University of Michigan-Flint IRB ID: HUM00148383.

*I, (print your name) \_\_\_\_\_, agree to participate in this research study.*

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Appendix D. TeamSTEPS® Teamwork Perceptions Questionnaire<sup>21</sup>



**TeamSTEPS Teamwork Perceptions Questionnaire (T-TPQ)**

**Instructions:** Please respond to the questions below by placing a check mark (✓) in the box that corresponds to your level of agreement from *Strongly Agree* to *Strongly Disagree*. Please select only one response for each question.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Team Structure</b>						
1.	The skills of staff overlap sufficiently so that work can be shared when necessary.					
2.	Staff are held accountable for their actions.					
3.	Staff within my unit share information that enables timely decision making by the direct patient care team.					
4.	My unit makes efficient use of resources (e.g., staff supplies, equipment, information).					
5.	Staff understand their roles and responsibilities.					
6.	My unit has clearly articulated goals.					
7.	My unit operates at a high level of efficiency.					
<b>Leadership</b>						
8.	My supervisor/manager considers staff input when making decisions about patient care.					
9.	My supervisor/manager provides opportunities to discuss the unit's performance after an event.					
10.	My supervisor/manager takes time to meet with staff to develop a plan for patient care.					
11.	My supervisor/manager ensures that adequate resources (e.g., staff, supplies, equipment, information) are available.					
12.	My supervisor/manager resolves conflicts successfully.					
13.	My supervisor/manager models appropriate team behavior.					
14.	My supervisor/manager ensures that staff are aware of any situations or changes that may affect patient care.					

PLEASE CONTINUE TO THE NEXT PAGE



# TeamSTEPPS® 2.0

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Situation Monitoring</b>						
15.	Staff effectively anticipate each other's needs.					
16.	Staff monitor each other's performance.					
17.	Staff exchange relevant information as it becomes available.					
18.	Staff continuously scan the environment for important information.					
19.	Staff share information regarding potential complications (e.g., patient changes, bed availability).					
20.	Staff meets to reevaluate patient care goals when aspects of the situation have changed.					
21.	Staff correct each other's mistakes to ensure that procedures are followed properly.					
<b>Mutual Support</b>						
22.	Staff assist fellow staff during high workload.					
23.	Staff request assistance from fellow staff when they feel overwhelmed.					
24.	Staff caution each other about potentially dangerous situations.					
25.	Feedback between staff is delivered in a way that promotes positive interactions and future change.					
26.	Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit.					
27.	When staff have a concern about patient safety, they challenge others until they are sure the concern has been heard.					
28.	Staff resolve their conflicts, even when the conflicts have become personal.					

PLEASE CONTINUE TO THE NEXT PAGE



# TeamSTEPPS® 2.0



		Strongly Disagree				
		Disagree				
		Neutral				
		Agree				
		Strongly Agree				
<b>Communication</b>						
29.	Information regarding patient care is explained to patients and their families in lay terms.					
30.	Staff relay relevant information in a timely manner.					
31.	When communicating with patients, staff allow enough time for questions.					
32.	Staff use common terminology when communicating with each other.					
33.	Staff verbally verify information that they receive from one another.					
34.	Staff follow a standardized method of sharing information when handing off patients.					
35.	Staff seek information from all available sources.					

Appendix E. TeamSTEPS® Teamwork Attitudes Questionnaire (T-TAQ)<sup>21</sup>

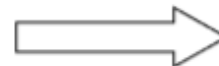


**TeamSTEPS Teamwork Attitudes Questionnaire (T-TAQ)**

**Instructions:** Please respond to the questions below by placing a check mark (✓) in the box that corresponds to your level of agreement from *Strongly Disagree* to *Strongly Agree*. Please select only one response for each question.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>Team Structure</b>						
1.	It is important to ask patients and their families for feedback regarding patient care.					
2.	Patients are a critical component of the care team.					
3.	This facility's administration influences the success of direct care teams.					
4.	A team's mission is of greater value than the goals of individual team members.					
5.	Effective team members can anticipate the needs of other team members.					
6.	High performing teams in health care share common characteristics with high performing teams in other industries.					
<b>Leadership</b>						
7.	It is important for leaders to share information with team members.					
8.	Leaders should create informal opportunities for team members to share information.					
9.	Effective leaders view honest mistakes as meaningful learning opportunities.					
10.	It is a leader's responsibility to model appropriate team behavior.					
11.	It is important for leaders to take time to discuss with their team members plans for each patient.					
12.	Team leaders should ensure that team members help each other out when necessary.					

PLEASE CONTINUE TO THE NEXT PAGE







# TeamSTEPPS® 2.0

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>Situation Monitoring</b>						
13.	Individuals can be taught how to scan the environment for important situational cues.					
14.	Monitoring patients provides an important contribution to effective team performance.					
15.	Even individuals who are not part of the direct care team should be encouraged to scan for and report changes in patient status.					
16.	It is important to monitor the emotional and physical status of other team members.					
17.	It is appropriate for one team member to offer assistance to another who may be too tired or stressed to perform a task.					
18.	Team members who monitor their emotional and physical status on the job are more effective.					
<b>Mutual Support</b>						
19.	To be effective, team members should understand the work of their fellow team members.					
20.	Asking for assistance from a team member is a sign that an individual does not know how to do his/her job effectively.					
21.	Providing assistance to team members is a sign that an individual does not have enough work to do.					
22.	Offering to help a fellow team member with his/her individual work tasks is an effective tool for improving team performance.					
23.	It is appropriate to continue to assert a patient safety concern until you are certain that it has been heard.					
24.	Personal conflicts between team members do not affect patient safety.					

PLEASE CONTINUE TO THE NEXT PAGE



# TeamSTEPPS® 2.0



		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>Communication</b>						
25.	Teams that do not communicate effectively significantly increase their risk of committing errors.					
26.	Poor communication is the most common cause of reported errors.					
27.	Adverse events may be reduced by maintaining an information exchange with patients and their families.					
28.	I prefer to work with team members who ask questions about information I provide.					
29.	It is important to have a standardized method for sharing information when handing off patients.					
30.	It is nearly impossible to train individuals how to be better communicators.					

Please provide any additional comments in the space below.

**Thank you for your participation!**

Appendix F. TeamSTEPS® Learning Benchmarks<sup>21</sup>

## TeamSTEPS® 2.0

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### TeamSTEPS Learning Benchmarks

**INSTRUCTIONS:** These questions focus on medical teamwork and communication and their effect on quality and safety in patient care. For each of the following, please circle the letter next to the one best answer.

1. A nurse is called to the phone to receive a telephone order from the doctor about a patient she is taking care of today. After clearly establishing the patient and physician identities, the BEST procedure for the nurse would be:
  - a. Listening to the order, calling the pharmacist, writing the details on the order sheet, and bringing the drug to the bedside.
  - b. Refusing to take this telephone order and indicating that she can't be sure of the physician's thought process.
  - c. Listening to the order, repeating back what the doctor said, and then writing it down in the patient's medical record.
  - d. Listening to the order, asking the charge nurse how to spell the drug's name, asking the family member if that was in the plan for today, and carrying out the order.
  - e. Listening to the order, writing it on the order page, reading the order back to the physician, and seeking his verification of the order's accuracy.
2. A nurse is very concerned about a baby he is taking care of and feels it would be best to have the attending pediatrician come to the bedside immediately to evaluate. Checking around the unit, he locates the pediatrician, but she is busy dictating a consultation. The nurse's BEST action is to:
  - a. Wait quietly, but tap his foot rhythmically to indicate urgency.
  - b. Quickly explain the infant's worrisome appearance and state, "I need you right now!"
  - c. Walk away, planning to check back in a few minutes.
  - d. Interrupt, shake her shoulder, and pull her quickly toward the crib.
  - e. Leave his pager number with the clerk with instructions to have her call.
3. A surgeon, anesthesiologist, nurse, and technologist are in the OR for a complicated case, which will start shortly. The surgeon, as team leader, should:

## TEAMSTEPS AND ANESTHESIA ADVERSE EVENT TRAINING

- a. Go scrub and tell the circulating nurse to “get the ball rolling.”
- b. Reassure the new team that she had plenty of experience with tough cases like this one and not to worry, and say, “I’ll tell you what you need to know.”
- c. Introduce herself, briefly describe the situation, plan, and potential pitfalls and ask for input from the team members.
- d. Explain the need for extra speed during this complicated case and set expectations for rapid turnover between cases.
- e. Pull out the x rays and textbook and explain the details of the surgery to the rest of the crew, emphasizing the strict need for following protocols.

### **Questions 4, 5, 6, and 7 are linked:**

4. The team is making great progress with the procedure until the nurse recognizes that the doctor is clearly making a dangerous mistake asking for a dose that is 10 times the usual dose! Very concerned, she asks the doctor if he’s sure that is what’s wanted. Giving her a nasty look, he growls, “Well, that’s what I asked for, isn’t it?...”. Confident that the dose is way off base, her next action should be to:
  - a. Walk away and indicate discouragement at being treated so rudely.
  - b. Say loudly, “That’s a huge mistake, Doctor; nobody uses a dose like that!”
  - c. Not say anything for fear of making the doctor even angrier.
  - d. Ask the secretary to put in a stat pager to the nursing supervisor.
  - e. Say, “I’m very concerned about the safety of that dose, Doctor; it’s much higher than I’ve ever seen given.”
5. For the real-life situation in question 4 above, a nurse in the same circumstances, but NOT confident and NOT positive that the dose is too high, but still very concerned about the patient’s safety, should take the following course of action:
  - a. Walk away and indicate discouragement at being treated so rudely.
  - b. Say loudly, “That’s a huge mistake, Doctor; nobody uses a dose like that!”
  - c. Not say anything for fear of making the doctor even angrier.
  - d. Ask the secretary to put in a stat page to the nursing supervisor.
  - e. Say, “I’m very concerned about the safety of that dose, Doctor; it’s much higher than I’ve ever seen given.”
6. The doctor on this procedure team (questions 4 and 5), upon being challenged by the nurse about the potentially dangerous medication dose, and realizing she is right, should respond by:
  - a. Demanding that this nurse be replaced immediately.
  - b. Saying, “You’re right. Thanks for watching my back; it’s been a bad day.”
  - c. Saying, “I’m the doctor; do what I say.”
  - d. Calling his partner on his cell phone to discuss the case.
  - e. Telling the worried patient, “Sometimes these dosages are confusing.”

## TEAMSTEPPS AND ANESTHESIA ADVERSE EVENT TRAINING

7. If the doctor, in fact, is correct in his dosage (question 4) and the nurse was incorrect in her memory of the proper medication dosage, when this is suspected, the doctor's BEST action would be to:
  - a. Call the pharmacist and ask her to send a package insert to review.
  - b. Let the nurse know, in no certain terms, how it is inappropriate to challenge a senior physician.
  - c. Request that the nurse be sent for retraining and put a notation in her file.
  - d. Stop action, verify the correct dose, and thank the nurse for her concern regarding patient safety.
  - e. Call the team together afterward and have the nurse explain her mistake.
  
8. A night nurse is concerned about the changing circumstances for an inpatient and knows it will be necessary to call and awaken the covering physician. Getting his thoughts and information together, he plans to structure the phone call using a proven structured communication technique, SBAR. He plans to introduce himself, identify the patient, and describe:
  - a. Situation, Background, Assessment, Recommendations
  - b. Sleep, Bathroom Activities, Results
  - c. Systems, Background, Alimentary, Respiratory
  - d. His pleasant memories of summer vacation at the S-BAR Ranch
  - e. Social Background, Assurance, Reassurance
  
9. In the ambulatory clinic, the primary care team is evaluating a patient who likely will need an urgent referral to a specialist. Continuity of care and patient safety are usually enhanced by all of the following EXCEPT:
  - a. Considering the specialist to be part of the treatment team and sharing information.
  - b. Withholding the reason for referral from the patient to decrease fear.
  - c. Using a structured and detailed handoff document.
  - d. Creating a reminder for seeking the lab and consultation results.
  - e. Instructing the patient to call if he hasn't yet been seen in a certain timeframe.
  
10. After an unsuccessful effort by the code team, the most helpful pathway toward team performance improvement involves:
  - a. The leader telling everyone what they did wrong.
  - b. Meeting as a team to debrief the events.
  - c. Explaining the protocol deviations.
  - d. Blaming the people who made the mistakes.
  - e. Attending the autopsy.
  
11. During closure of a complex surgical case, the sponge count comes up one short after two careful counts. The surgeon ignores the request by the circulating nurse to help find a

## TEAMSTEPS AND ANESTHESIA ADVERSE EVENT TRAINING

solution and continues the closure. The BEST action for the concerned circulating nurse would be to:

- a. Explain the current hospital policy and required actions.
  - b. Page the medical director.
  - c. Call the operating room supervisor.
  - d. Scream at the doctor to stop the closure.
  - e. Convince the anesthesiologist to make the surgeon respond.
12. The new resident working in the clinic is having real difficulties interacting with the nurse (who has been working there for a decade). The nurse is telling her what to do, but in front of the patients. The BEST course of action for the resident is to:
- a. Tell the nurse to stop undercutting her.
  - b. Ask the nurse for a quick meeting to discuss the issue of giving criticism in front of patients.
  - c. Tell the clinic manager to have a talk with the nurse.
  - d. Complain to the attending that the nurse is hypercritical and ineffective.
  - e. Just let the patients know that the nurse is having a bad day.
13. The technologist is setting up for a procedure and notices that the doctor seems to be on the wrong side of the patient and may be making a mistake. The doctor has often been short tempered around the nurses and techs and doesn't take suggestions very well. The BEST action for the technologist is to:
- a. Call for a supervisor to come into the room.
  - b. Quietly observe and hope that the doctor notices.
  - c. Let the patient and doctor figure it out.
  - d. Ask the doctor if he knows what he is doing.
  - e. Call for a "time-out" to verify the procedure.
14. A nurse working in the Emergency Department overhears the doctor on the team make a misstatement about a sick patient, a comment that could result in a medical error and poor outcome. The nurse's correction of the misstatement is BEST interpreted as:
- a. A breach of etiquette in the Emergency Department.
  - b. An interference in the doctor's business.
  - c. An action of cross-monitoring that makes teamwork safer.
  - d. An action the doctor will likely get defensive about.
  - e. A wrong-headed approach to teamwork.
15. In the interest of patient care quality and safety, it is expected and mandatory that:
- a. Conflict be avoided at all costs.
  - b. People always do the right thing.
  - c. Members speak up if they are concerned.

## TEAMSTEPPS AND ANESTHESIA ADVERSE EVENT TRAINING

- d. Leaders not make mistakes.
- e. Everyone agree with the plan.

**INSTRUCTIONS:** For each question in the series below, use your knowledge of medical communication, teamwork, and patient care quality and safety to select the one BEST answer.

B-1. The attribute **LEAST likely** to be found in a medical team that is functioning in a HIGHLY EFFECTIVE manner is:

- a. Adaptability.
- b. Complacency.
- c. Trust.
- d. Respect.
- e. Information sharing.

B-2. Research about the **causes of errors** in health care delivery frequently focuses on :

- a. Outdated equipment.
- b. Incompetent providers.
- c. Ineffective communication.
- d. Lack of caring.
- e. Stupidity.

B-3. Who is **the leader** in medical teams?

- a. Doctor.
- b. Nurse.
- c. Supervisor.
- d. Depends on circumstances.
- e. Patient.

B-4. The best **communication tool** or method to get critical information to the whole team during an emergency or complex procedure is:

- a. Call-out.
- b. Check-back.
- c. Write it on the white board.
- d. Write it in the orders.
- e. Time-out.

B-5. The main reason **hierarchy** can be a problem in a medical team setting is that:

- a. The team leader may be obnoxious.
- b. Members having important information may not speak up or be heard.
- c. The nurse and doctor may disagree.
- d. Patients may be upset at the team being bossed around.

## TEAMSTEPS AND ANESTHESIA ADVERSE EVENT TRAINING

- e. It results in significant pay inequality.

B-6. A **shared mental model** is key for medical team members primarily because:

- a. They need to have vision.
- b. They all need to have the same understanding of the plan.
- c. A mind is a terrible thing to waste.
- d. Otherwise, leaders may go adrift.
- e. Otherwise, patients will be confused.

B-7. The following are **human factors problems** that research has identified as contributing to medical errors EXCEPT:

- a. High workload.
- b. Fatigue.
- c. Distractions.
- d. Friendships in the workplace.
- e. Conflict and anger.

B-8. The BEST method of **conflict resolution** for medical teams in the workplace is:

- a. Compromise.
- b. Accommodation.
- c. Avoidance.
- d. Collaboration using the DESC script.
- e. Dominance.



**Appendix G. ACLS and MH Scenarios**

ACLS Scenario

During a routine tummy tuck, the nurse anesthetist notes the patient's heart rhythm is 29 beats per minute. The nurse anesthetist cycles the noninvasive blood pressure and the patient's blood pressure is now 64/32. The nurse anesthetist calls out to the OR team the patient's heart rhythm and blood pressure and requests additional help.

Malignant Hyperthermia Scenario

A post-operative breast augmentation patient is in phase 1 PACU when the recovery room nurse notes tachycardia on the EKG monitor. The patient had received a general anesthetic with inhaled anesthesia gas. The nurse takes the patient's temperature and it has risen from 97.5 to 100.4. The nurse suspects MH and calls for additional help.

**Appendix H. Malignant Hyperthermia Rubric**

**Malignant Hyperthermia Patient Assessment and Treatment Rubric**

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

<i>Clinical Performance Steps</i>	<i>Check if Done Correctly</i>	<i>Comments</i>
<b>Recognition:</b>		
Conducts initial evaluation of malignant hyperthermia patient – unexplained increase in ET <sub>CO2</sub> , unexplained tachycardia, unexplained increase in oxygen requirement		
<b>Immediate Management:</b>		
Stop all trigger agents (anesthesia vapors, etc)		
Call for help, allocate specific tasks (action plan in MH kit)		
Install clean breathing system if under anesthesia and hyperventilate with 100% O <sub>2</sub> high flow		
Maintain anesthesia with intravenous agent		
Abandon surgery as soon as possible		
<b>Monitoring and Treatment:</b>		
Give dantrolene 2.5 mg/kg immediate iv bolus. Repeat 1 mg/kg boluses as required to max 10 mg/kg		
Initiate active cooling avoiding vasoconstriction		
TREAT: Hyperkalemia: calcium chloride, NaHCO <sub>3</sub> <sup>-</sup> , glucose/insulin  Arrhythmias: magnesium/amiodarone/metoprolol AVOID calcium channel blockers- interaction with dantrolene  Metabolic acidosis: hyperventilate, NaHCO <sub>3</sub> <sup>-</sup>  Myoglobinemia: forced alkaline diuresis (mannitol/furosemide + NaHCO <sub>3</sub> <sup>-</sup> ) May require RRT later  DIC: FFP, cryoprecipitate, platelets		
Check plasma CK as soon as able		

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<b>Follow-up:</b>		
Continue monitoring in ICU, repeat dantrolene as necessary Monitor for renal failure and compartment syndrome Repeat CK Consider alternative diagnoses (sepsis, pheochromocytoma, thyroid storm, myopathy) Counsel patient and family members Refer to MH unit		

<b>Assessment of Student Performance</b>	<b>Pass</b>	<b><u>Needs Remediation</u></b>
<b>Instructor Signature:</b> _____		<b><u>Date:</u></b> _____

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**Appendix I. ACLS Rubric**

**Advanced Cardiac Life Support Patient Assessment/Treatment Rubric**

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

<i>Clinical Performance Steps</i>	<i>Check if Done Correctly</i>	<i>Comments</i>
<b>TEAM LEADER:</b>		
Ensures high-quality CPR at all times		
Assigns team members roles		
Ensures that team members perform well		
<b>Bradycardia Management:</b>		
Starts oxygen if needed, places monitor, starts IV		
Places monitor leads in proper position		
Recognizes symptomatic bradycardia		
Administers correct dose of atropine		
Prepares for second-line treatment		
<b>VF/Pulseless VT Management:</b>		
Recognizes VF		
Clears before ANALYZE and SHOCK		
Immediately resumes CPR after shocks		
Appropriate airway management		
Appropriate cycles of drug-rhythm check/shock-CPR		
Administers appropriate drug(s) and doses		
Immediately resumes CPR after rhythm checks		
<b>Post-Cardiac Arrest Care</b>		
Identifies ROSC		
Ensures BP and 12-lead ECG are performed, O <sub>2</sub> saturation is monitored, verbalizes need for endotracheal intubation and waveform capnography, and orders laboratory tests		
Considers therapeutic hypothermia		

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<b>Assessment of Student Performance</b>	<b>Pass</b>	<b><u>Needs Remediation</u></b>
<b>Instructor Signature:</b> _____		<b><u>Date:</u></b> _____

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