Trauma Setup

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Abstract

Trauma is the leading cause of death for people under 44 years of age and a leading cause of death worldwide making it a massive public health problem (Tobin et al, 2013). As anesthesia providers, we must be equipped to manage trauma cases, as this public health epidemic does not seem to be ending. A good trauma setup is crucial in order to maintain order in the midst of chaos. In order to prevent missing a step in the trauma setup, checklists have proven to be useful. They have been proven to decrease patient morbidity and mortality by assuring a checks and balance system. This capstone project identified the importance of a trauma setup checklist geared toward the anesthesia provider to prevent missing critical steps in the trauma setting.

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Problem

Trauma is a major hazard to the immediate and frequently long-term health of individuals. It is described as a physical injury to human tissues and organs occurring acutely from the environment that exceeds the body's tolerance. Despite education and public awareness, trauma remains the first leading cause of death for people under 44 years of age and a leading cause of death worldwide. The Nurse Anesthesia Program (NAP) at Adventist University of Health Sciences (ADU) does have a trauma lecture focusing on the pathophysiology and a liver transplant call rotation, the problem is that we have limited exposure to a standardized OR trauma setup at a level 1 trauma center. A trauma setup is significant because trauma occurs quickly and without notice. It has been shown that when anesthesia providers have a standardized trauma set up, shortcuts are prevented and critical steps are not missed (Faircloth & Ford, 2013). A trauma setup standardization forces consistency and familiarity, leading to safer patient care (Faircloth & Ford, 2013). We would like to identify a standardized setup to help students and classmates if they decide to work in a trauma facility.

Review of Literature

Trauma is one of the leading causes of death worldwide according to "A Review Article: Trauma System Development" by Lendrum and Lockey (2013). In the 1970's, it became known that a centralized trauma systems would decrease the mortality rate from serious injuries and would ultimately improve outcomes. Lendrum and Lockey (2013) assessed the importance of developing a trauma system setup specifically in retaining experienced trauma personnel. The article discussed the significance of maintaining hospital checklists and protocols for trauma situations. Stating that patients benefit from a hospital facility that has experienced staff and sufficient resources to provide for trauma patients (Lendrum & Lockey, 2013).

"Implementing a Perpetual Anesthesia Setup Standardized for the trauma room in a Level 1 Trauma Center" by Faircloth and Ford (2013) identified the importance of a standardized anesthesia setup in trauma situations. They found that equipment prepared in advance improved outcomes. Caring for the trauma patient presents a unique challenge to the anesthesia provider because multiple systems can be affected at one time. Having a standardized anesthesia trauma setup was found to alleviate stress on the anesthesia provider and allow for a patient centered focus (Faircloth & Ford, 2013).

According to Faircloth and Ford (2013), the variance created by anesthesia providers setting up a trauma room differently can compromise care because essential items may be missing from the setup. As a trauma can occur at any time, anesthesia providers may be assigned to a trauma case without having time to adequately assess the room setup. A provider's tendency toward shortcuts, especially when faced with an emergency situation, can lead to serious outcomes because critical items or steps may be overlooked. Thus when a standardized setup is

implemented it provided guidelines to the anesthesia provider to prevent overlooking essential equipment (Faircloth & Ford, 2013).

According to the Joint Commission Journal on Quality and Patient Safety, a fundamental goal of safety is to "reduce non-evidence-based variation and standardize clinical practice patterns on the basis of scientific evidence. Standardization forces consistency; in turn, consistency leads to familiarity with a system and safer patient care. Faircloth & Ford (2013) concluded that anesthesia is a dynamic practice that requires constant evaluation and reevaluation to create safeguards. While change is not always warranted, analyzing a system and seeking cost-saving measures can be beneficial for both the patient and the department. Standardization provides consistency and a universal system, which improves patient safety and can lead to departmental cost savings (Faircloth & Ford, 2013).

In the article "A Checklist for Trauma and Emergency Anesthesia" checklists have been shown to decrease patient morbidity and mortality by assuring that the health care provider does not overlook some important aspect of care (Tobin et al, 2013). The algorithms promulgated by the Advanced Trauma Life Support and Advanced Cardiac Life Support courses are checklists. The checklist assures that critical steps are not missed. Missing a critical step can be deadly. Checklists have been shown to decrease inpatient complications and death. Standardized checklists can be especially useful during emergencies. Tobin et al., 2013 concluded that the institution of a trauma and emergency anesthesia checklist improved communication in the care of critically ill patients requiring an anesthetic (Tobin et al., 2013).

"The effects of safety checklists in medicine: a systematic review" by Thomassen et al (2014) stated that modern medicine has led to an increased risk to the patient and that 5-10% of hospitalized patients are susceptible to an adverse event. Many of these adverse events have been

preventable. Thus creating reason for implementing safety checklists. The article was a systematic review to summarize medical literature in regards to safety checklists and patient outcomes. According to Thomassen et al (2014), safety checklists were defined as an additional tool to ensure that an operation, procedure, or task was performed correctly by checking that all-important preparations were completed prior to the event (Thomassen et al, 2014).

The review consisted of 34 studies in which 22 of the studies were completed in the operating room setting. Although the uses of checklists have been questioned stating that checklists decreased focus on the patient, this review found no evidence of this occurring. The article found that when implementing a checklist, those involved in completing the checklist should embrace the idea or failure may occur. In conclusion, the review found that safety checklists are effective in many clinical settings and have reduced mortality and morbidity. Checklists strengthen guideline compliance, improve human factors, reduce adverse events, and have no negative effects on patient safety issues (Thomassen et al, 2014).

In the article, "Using Advanced Simulation for Recognition and Correction of Gaps in Airway and Breathing Management Skills in Pre-hospital Trauma Care" by Barsuk et al (2005) was a prospective study that used two video-recorded simulated pre-hospital scenarios to assess common errors made during critical emergency situations specifically in airway and breathing management. All participants had taken the Advanced Trauma Life Support (ATLS) course and were aware of the specific trauma checklists from the course. The study had two groups a pre-intervention group and an intervention group. Prior to the scenario, the intervention group was prepped with a 45-minute simulation training in airway management using a computerized patient simulator; whereas, the pre-intervention group did not receive airway simulation training

prior to the scenario. The results showed that the intervention group had less common mistakes than the pre-intervention group (Barsuk et al, 2005).

This study showed that using a computerized patient simulator provided a safe environment for training. It also showed that simulation of trauma scenarios provided a basic skill set and was an adequate means to test the trauma skill set. Mistakes were debriefed and recommendations were made. The participants' felt that the realism of the simulated trauma scenarios were beneficial (Barsuk et al, 2005).

"The Performance and Assessment of Hospital Trauma Teams" article by Georgiou and Lockey (2010) found that a video review of trauma team resuscitation identified more errors than a review of medical notes. Video has been shown to be more efficient in reviewing and allows for immediate correction. Georgiou & Lockey (2010) found that video review identified poor team organization that resulted in significant increase in errors.

After video review, simulators have been used to facilitate educational goals such as communication, cooperation and leadership, which have already been identified as crucial qualities in trauma resuscitation. A study of the use of an advanced human patient simulator (HPS) showed it to be a useful and reproducible tool for assessment of the trauma team, with the necessary use of video within the simulator to review team performance. HPS also allowed exposure of the team to scenarios infrequently encountered in real life and provided a controlled, safe environment to learn from errors (Georgiou & Lockey, 2010).

An article in the American Society of Anesthesiology Newsletter stated that "clear evidence that cognitive aids improve our clinical performance promotes efforts at development."

Project Description

This project consisted of a thorough review of current literature in the field of anesthesia trauma setup. With this research, a comprehensive PowerPoint module and Trauma Checklist Pamphlet were created to serve as an educational tool for current and future SRNAs. In addition to the review of literature and comprehensive PowerPoint module, a criterion for a standard setup for a trauma anesthesia case was also presented. The sample size consisted of 22 junior SRNAs. During the clinical conference class, a learning module was presented to the entire SRNA class. A pre-lecture simulated scenario was performed by ten SRNA volunteers to establish baseline knowledge of a trauma anesthesia setup. The remaining students stayed in the classroom watching the simulated scenario developing live of the ten SRNA's perform the lab scenario. After presentation of the learning module content, the simulated scenario was performed with the same ten volunteer students, maintaining the same sequence and conditions to evaluate established learning objectives. Ten SRNA volunteers were isolated from the rest of the class; two students participated as anesthesia providers in each group. The independent variables were a PowerPoint lecture and lab scenario. The dependent variables were the pre-lecture test, the post-lecture test, and a statistical analysis of the results. A data analysis consisted of a t-test for paired sample to compare scores from the grading rubric. This capstone project was submitted to ADU's SRC. Their comments and concerns were addressed and approval was granted on August 13th, 2015.

Evaluation

As identified, the SRNA's of ADU-NAP have limited experience in the preparation of a trauma setting. A thorough literature review has been conducted showing that trauma is a leading cause of injury and death. When a critical event occurs, there is often little or no warning. Without proper knowledge and experience, one may feel limited when placed in an unfamiliar trauma situation. Even with proper knowledge, skill and equipment, it is easy to forget critical items when things are not going well. The overall success of the trauma simulation will depend on each individual that participates.

When the project was complete, the objective was to know whether an anesthesia trauma setup is pertinent to practice. We found that the presentation improved the knowledge of a standardized trauma OR setup in our sample group. We gained an understanding on a standardized trauma setup for the anesthesia provider. This capstone was completed to inform the junior SRNA class of the importance of a standard anesthesia trauma setup and the benefits of a visual aid trauma checklist. The information was disseminated through a pre-simulation scenario, a post-simulation scenario, a PowerPoint presentation, and a trauma checklist pamphlet. Measurable outcomes were assessed based on the enhancement of knowledge of the entire junior SRNA class at ADU-NAP specifically related to the understanding and acknowledgement of a standardize trauma setup. Also, a standardized grading rubric was used to assess the junior SRNA's who participated in the trauma scenario before and after the PowerPoint presentation. Each competency was worth 1 point for a total of 22 points. The evaluations were calculated by a statistician to assess the results of the simulation before and after the PowerPoint presentation. The goal was for the entire junior SRNA class to have an enhanced awareness and understanding of the details when preparing for a trauma case.

Results and Conclusions

When a critical event occurs, there is often little or no warning. Events happen quickly, and a previously routine procedure can rapidly become life threatening. The initial response to a critical event may determine the outcome (Ruskin, 2014). This capstone project was created to enhance awareness of the importance of a trauma setup checklist to the Junior SRNA class. As discussed in the project description a pre lecture simulated scenario, the PowerPoint Presentation, and the post-lecture simulated scenario were presented to the Junior SRNA class. The results were then calculated by a statistician. Due to the small sample size, a non-parametric test was employed to analyze the data. Statistical significance was found with a p of 0.039 ($p < 0.05$) signifying a significant increase between the pre-test scores and the post-test scores among the Junior SRNA class.

This capstone project identified the significance of a trauma setup checklist geared toward the anesthesia provider to prevent missing critical steps in the trauma setting. Our Trauma Setup Checklist was validated using a simulated scenario. The SRNAs performed statistically better after they were introduced to trauma setup while they were allowed to use a standardized checklist during the simulation. Emergency readiness requires that the caregiver have the knowledge, skills, and equipment required to resolve the problem, but it is easy to overlook critical items when things are not going well. The use of checklists that have long been used in aviation and can help us to quickly establish treatment solutions in healthcare (Ruskin, 2014).

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Appendix A

Before Patient Arrives	Each Competency worth 1 point each
1. Room Temp 25 C or higher	
2. Warm IV Line	
3. Machine Check	
4. Airway Equipment	
5. Emergency Medications	
6. Blood Bank (assess for PRBC, FFP, Platelet availability)	
Patient Arrival	
1. Patient identified for trauma surgery	
2. Blood Bank- type & screen stat	
3. IV access, Fluid Management, & Antibiotic	
4. Place Monitors (BP, ECG, SaO2)	
5. Pre-oxygenation	
Induction	
1. Opioid, Sedative	
2. Neuromuscular Blockade	
3. Intubation - + ETCO2 (Surgeon starts)	
4. Anesthetic	

5. OG tube Placement	
6. IV and/or A-line, CVC (if needed)	
Resuscitation	
1. Obtain Baseline lab-work	
2. Assess MAP & Vital Signs	
3. Monitor Urine Output (color, sediment, amount)	
4. Consider PRBC & FFP (early); Tranexamic Acid if <3 hours after injury (1 gm over 10 min x1 then 1gm over 8 hours)	
5. Consider Calcium Chloride 1 gm IV, Hydrocortisone 100 mg IV, Vasopressin 5-10 units	
Total Points Possible (22)	

Appendix B

ADU NAP CAPSTONE PROJECT – INFORMED CONSENT

Our names are Maria Wagner and Natalie Brown. We are MSNA students in the Nurse Anesthesia Program (NAP) at Adventist University of Health Sciences (ADU). We are doing a Capstone Project called *Trauma Setup*. Dr. Manuel Tolosa is supervising this project. We would like to invite you to participate in this project. The main purpose of this form is to provide information about the project so you can make a decision about whether you want to participate.

WHAT IS THE PROJECT ABOUT?

The purpose of this project is to inform the audience on a trauma setup.

WHAT DOES PARTICIPATION IN THIS PROJECT INVOLVE?

If you decide to participate in this project, you will be asked to complete an anonymous pre-assessment, attend a classroom presentation, and then complete an anonymous post-assessment. The assessment will assess the understanding and importance of a trauma setup. Your participation by attendance at the presentation and completion of the survey is anticipated to take approximately

WHY ARE YOU BEING ASKED TO PARTICIPATE?

You have been invited to participate as part of a convenience sample of students currently enrolled in the ADU NAP. Participation in this project is voluntary. If you choose not to participate or to withdraw from the project, you may do so at any time.

WHAT ARE THE RISKS INVOLVED IN THIS PROJECT?

Although no project is completely risk-free, we don't anticipate that you will be harmed or distressed by participating in this project.

ARE THERE ANY BENEFITS TO PARTICIPATION?

We don't expect any direct benefits to you from participation in this project. The possible indirect benefit of participation in the project is the opportunity to gain additional knowledge about a *Trauma Setup*.

HOW WILL THE INVESTIGATORS PROTECT PARTICIPANTS' CONFIDENTIALITY?

The results of the project will be published, but your name or identity will not be revealed. To maintain confidentiality of assessments, the investigators will conduct this project in such a way to ensure that information that is submitted without participant's identification. Participants will volunteer for the lab scenario in which they will be graded according to a rubric competency. Numbers will be placed on the top of the grading rubric to assess the differences between the pre lab scenario and the post lab scenario. Information will be submitted to the statistician according to the numbers. Thus, the investigators will not have access to any participants' identities.

WILL IT COST ANYTHING OR WILL I GET PAID TO PARTICIPATE IN THE PROJECT?

Your participation will cost approximately an hour and a half of your time at most, but will require no monetary cost on your part. You will not be paid to participate.

VOLUNTARY CONSENT

By signing this form, you are saying that you have read this form, you understand the risks and benefits of this project, and you know what you are being asked to do. The investigators will be happy to answer any questions you have about the project. If you have any questions, please feel free to contact Maria Wagner at maria.wagner@my.adu.edu or Natalie Brown at natalie.shaw@my.adu.edu. If you have concerns about the project process or the investigators, please contact the Nurse Anesthesia Program at (407) 303-9331.

_____ _____

Participant Signature **Date**

_____

Participant Name (PRINTED LEGIBLY)

Appendix C
Power Point in PDF

Trauma Setup

Natalie Brown SRNA & Maria Wagner SRNA
Project Mentor: Tiffany Benton CRNA; JLR
Committee Chair: Dr. Manuel Tolosa CRNA,DNAP
Nurse Anesthesia Program, Adventist University of Health Sciences

Case Scenario

A 25 year-old male pedestrian was crossing the intersection and hit by a car. He was thrown 30 feet into the air per girlfriend who was at the scene. Patient initially able to walk at the scene but then collapsed. Patient became unconscious and CPR initiated at the scene per EMS. Unable to establish an airway at the scene. Estimated arrival to the Emergency Department 5 minutes. Upon arrival to the ED, he was immediately rushed to surgery for an exploratory surgery. He has no significant history per girlfriend.

Description

Ten SRNA's will volunteer to participate in a clinical lab scenario in which they will setup for a trauma. Two SRNA's will go at a time and will be evaluated per a competency form. The remaining Junior SRNA's will view the scenarios. After the pre-lab scenario, a PowerPoint Presentation will be presented and the volunteers will participate in the post-lab scenario to assess for improvements.

Why is this Important?

Students in the Nurse Anesthesia Program (NAP) at Adventist University of Health Sciences(ADU) have limited clinical exposure to a standardized trauma setup at a level 1 trauma center. We would like to identify a standardized trauma setup.

A trauma setup is significant because trauma occurs quickly and without notice. It requires astute vigilance and adaptability. Research has shown that when anesthesia providers have a standardized trauma set up, shortcuts are prevented and critical steps are not missed. A trauma setup standardization forces consistency and familiarity, leading to safer patient care (Faircloth & Ford, 2013)

Intended Learner:

ADU-NAP Junior SRNA class

Project Outcomes:

- Determine whether an anesthesia trauma setup checklist is pertinent to practice.
- Emphasis the benefits of a visual aid checklist use in clinical practice.
- Improve the knowledge and understanding of a standardized trauma OR setup.

Literature Review

The Effects of Safety Checklists in Medicine: A Systematic Review

Purpose:

A systematic review to assess safety checklists in medicine

Findings:

Safety checklists improved communication, reduced adverse events, improved adherence to standard procedures, and reduced morbidity and mortality. None of the literature supported a decrease in patient safety or quality of care.

Implementing a Perpetual Anesthesia Setup Standardization for the Trauma Room in a Level 1 Trauma Center

Purpose:

Trauma creates a dynamic environment leaving little room for error. Significant variability can occur among anesthesia providers trauma setup. Standardization allows for consistency and reliability among providers. This study focused on examining a standardized anesthesia trauma setup

Findings:

The study showed that a standardized trauma setup is beneficial for both the anesthesia provider and the patient. It improved consistency, patient safety, and decreased cost.

A Checklist for Trauma and Emergency Anesthesia

Purpose:

Initiate a discussion about what should be on a trauma anesthesia checklist, providing a basis for a definitive document.

Findings:

The institution of a trauma and emergency anesthesia checklist can improve communication in the care of critically ill patients requiring an anesthetic. The challenges of producing strong prospective data in the trauma population make definitive suggestions difficult; however, a well-referenced guide to the emergent induction and operation resuscitation of these critically ill patients can serve as a tool to evaluate benchmarks for care.

A Review Article: Trauma System Development

Purpose:

This review examined the international development of major trauma care delivery and the components of a modern trauma system.

Findings:

Centralization of resource and expertise as part of a managed clinical system for the provision of trauma care reduces mortality after serious injury by 15-25%. The gradual improvement in quality is likely to occur as pre-hospital and trauma triage protocols mature, inter-hospital transfer protocols evolved and the trauma centers became more organized, experienced and better resourced.

Before the Patient Arrives

1. Warm the room to 25 Celsius or higher
2. Obtain a warm IV line (blood/fluid warmer)
3. Machine Check
4. Airway Equipment
5. Emergency Medications
6. Blood Bank (assess for PRBC, FFP, Platelet availability)

Patient Arrival

1. Patient identified for surgery
2. Baseline labs obtained with Type & Screen
3. Obtain IV access/CVL/Arterial Line
4. Provide Appropriate Fluid Management/Antibiotic
5. Place Monitors
6. Pre-Oxygenate

The Ryder Cognitive Aid Checklist for Trauma Anesthesia

- https://www.youtube.com/watch?v=_h8h9g_905I

Induction

1. Choose Medications (opioids, sedatives)
2. Neuromuscular blockade
3. Intubation (ensure +ETCO2)
4. Choose Anesthetic
5. OG Tube Placement
6. IV, Arterial Line, CVL not placed could also place now

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Resuscitation

1. Obtain Lab-work
2. Assess MAP & vital signs
3. Monitor Urine Output
4. Consider PRBC, FFP, Platelet (*Remember transfusion protocol 1:1:1);Tranexamic Acid if <3hrs after injury can administer 1G over 10 min, then 1G over 8 hours
5. Consider Sodium Bicarbonate, Calcium Chloride, Hydrocortisone, Vasopressin

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