IMPLEMENTING THE AMERICAN HEART ASSOCIATION 2020 GUIDELINES FOR CARDIAC ARREST IN AN URGENT CARE SETTING

by

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DEDICATION

I dedicate this work to all clinicians and medical staff who will one day encounter a cardiac arrest. May you feel calm and prepared, and supported by the systems of your workplace.

ACKNOWLEDGEMENTS

I would like to acknowledge the tireless support of my husband, Cody Freeborn, whose words of encouragement have meant a very great deal to me throughout this work.

TABLE OF CONTENTS

TABLE OF CONTENTS CONTINUED

LIST OF FIGURES

Figure Page

ABSTRACT

This quality improvement project seeks to match a clinic's preparedness for cardiac resuscitation with current American Heart Association standards. Through a review of current literature, this project describes several key actions in the management of cardiac arrest, which include having an emergency preparedness plan, staff competency and trainings, the provision of rapid defibrillation, the administration of resuscitation medications, and the importance of data registry for continuous improvement to processes. Recommendations for the clinic have been developed based on the literature review and an analysis of the setting. Recommendations will be shared with the clinic's leadership and advise the development of detailed Standard Operating Procedures which translate the American Heart Association guidelines into this practice setting. Recommended actions include staff BLS and ACLS trainings, continuous short interval trainings, and the acquisition of useful, non-expired equipment. Data collection consists of an auditing of staff certifications and available resuscitation equipment and medications, as well as protocols in place. Results: 100% of medical staff were BLS trained, and 100% of providers were ACLS trained. 100% of resuscitation medications and crash cart equipment was updated, with exception of the defibrillator. 0% of SOPs were adopted into practice. Conclusion: The declination of SOPs is predicted to greatly affect the sustainability of outcomes related to this project. Although there is value in the AHA BLS and ACLS trainings, without continued short interval trainings these skills are likely to decay in a matter of months. Further, there is no policy to direct staff to be retrained again in two years when certifications expire. Although an updated checklist for equipment was provided to the clinic manager, no policy is in place for routinely outdating medications and replacing them or ensuring that equipment is in a functional state. Use of motivational interviewing with key stakeholders may encourage behavioral changes to improve health outcomes, and thus further the outreach of a quality improvement endeavor.

CHAPTER ONE

BACKGROUND AND SIGNIFICANCE

Medical emergencies occur in the outpatient setting, and one of the most time-sensitive emergencies is OHCA (out of hospital cardiac arrest). OHCA is defined as "cessation of cardiac mechanical activity that occurs outside of the hospital setting and is confirmed by the absence of signs of circulation" (McNally, et al, 2011). Being prepared for cardiac arrest should be part of every organization's emergency preparedness plan (Institute of Medicine, 2015).

Rapid and coordinated prehospital management of an OHCA event is essential to patient survival (Ong, et al 2018). Strategies to improve cardiac arrest outcomes exist; this knowledge must be strategically implemented and practiced. Guidelines are continuously updated by the AHA (American Heart Association) to promote best outcomes and survival. Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) trainings prepare healthcare providers in the management of OHCA emergencies to promote optimal patient outcomes.

This project takes place at an urgent care facility near Anchorage, Alaska. The clinic provides primary and urgent care to patients with acute and chronic illness and injury. Staff includes five providers and two certified medical assistants, as well as three front desk and office administrators. Clinic leadership (the physician-owner) recognizes that both personnel and equipment are underprepared for an emergency event requiring cardiovascular resuscitation.

Clinical Problem

Annually, there are approximately 350,000 persons in the United States who experience OHCA (The Cardiac Arrest Registry to Enhance Survival, 2015). Approximately 4.6% of these occur in a non-hospital healthcare facility, such as an urgent care clinic, and these have a survival

rate of 16% (Institute of Medicine, 2015). The survival rate of OHCA varies based on setting, with “place of public transportation” and “place of recreation” having the highest survival rates (42.1% and 29.5%, respectively) (Institute of Medicine, 2015).

In the state of Alaska in 2019, out of a population of 611,330 a national registry reported 394 OHCA events- a prevalence of 61 per 100,000 (Cardiac Arrest Registry to Enhance Survival, 2019). Survival rates for OHCA vary throughout the nation. In 2018, the national OHCA overall survival rate was approximately 10%, and Alaska had a 13% survival rate (Shin & Levy, n.d.). The variation in outcomes between settings and locations is due in part to modifiable factors that contribute to resuscitative effort’s successes or failures.

Early cardiopulmonary resuscitation and defibrillation have “the greatest impact on survival” for a cardiac arrest victim (Ong, Perkins, & Cariou, 2018). National data reflects that in situations of OHCA, less than 40% of adults receive CPR, and fewer than 12% have an automated external defibrillator applied before EMS arrival (American Heart Association, 2020). In the state of Alaska, 73% of reported OHCA cases received CPR by a bystander, but an AED was utilized in only 2.7% of cases (Cardiac Arrest Registry to Enhance Survival, 2019). Patient outcomes are improved when those at the scene, including medical professionals, can confidently follow up-to-date evidence-based treatment guidelines (American Heart Association, 2020).

Intervening in the pathology of a cardiac arrest is a time sensitive effort. Ilkhanoff and Goldberger (2012) discuss that a patient may have acute concerns the day of an event, then their cardiac rhythm suddenly deteriorates first into ventricular tachycardia, then ventricular fibrillation. These are shockable rhythms. Without rapid intervention, these rhythms then

deteriorate into pulseless electrical activity or asystole and are less likely to be revived. With each minute of untreated ventricular fibrillation, the likelihood of survival decreases by 7-10%.

As the nation continues to endure the COVID-19 pandemic, patients are avoiding the emergency room and delaying care. According to Jeffery et al. (2020), this includes patients with serious medical conditions: infections, stroke, and myocardial infarction. Patients are neglecting emergent care out of concern for exposure to the virus and contributing to overwhelming hospital capacity. Both Emergency rooms and Urgent care clinics are seeing more severely ill patients and should be prepared for emergencies and rapid deterioration (LaBlank et al., 2019; Jeffery et al., 2020).

Needs Assessment

"Reflection on how effectively and efficiently emergencies could be managed in any practice setting will identify gaps in preparedness and begin the process of needs assessment for the office" (LeBlanc, Murrey, Staple, & Chan, 2019). With the goal of identifying such gaps, further discussion with the organization's providers reveals several barriers to optimization of resuscitative efforts. These include a lack of intention to utilize a defibrillator, lack of up-to-date training to perform cardiopulmonary resuscitation, and lack of a policy guiding actions for this type of emergency.

Several providers are not comfortable using the available defibrillator for a code situation and have concerns that resuscitation equipment and medications within the crash cart are outdated. In the event of a cardiac arrest situation, one clinician described that they would limit their interventions to provide chest compressions only until EMS arrived. Providers further discuss that they usually maintain BLS training, but with the pandemic, most have allowed this

certification to lapse. The purpose of this project is to implement AHA guidelines for managing cardiac arrest which are not currently being utilized at this clinic.

CHAPTER TWO

LITERATURE REVIEW

Preparedness Program and Equipment

Emergency preparedness alleviates the anxiety of managing low frequency issues, facilitates maintenance of necessary medications and equipment in functioning condition, and can identify issues with a system prior to an actual emergency. Medical offices should develop an appropriate plan to meet both public expectations and professional obligations for managing medical emergencies (LeBlanc et al., 2019). Being prepared for medical emergencies can reduce the risk of worse patient outcomes (and malpractice lawsuits) arising from poor emergency care received in an office setting (Rothkopf & Wirshup, 2013). Elements of an emergency preparedness plan include equipment acquisition and maintenance, protocols, and training (LeBlanc et al. 2019).

Design of an emergency preparedness plan should be informed by the location, and should consider proximity to emergency services (Leblanc, et al. 2019, Rothkopf & Wirshup, 2013). Other considerations include demographic characteristics and practice profile (LeBlanc et al. 2019). Rothkopf and Wirshup (2013) advise that when deciding whether to include a particular item in practice, such as a defibrillator or AED, to consider staff's ability to use the item appropriately. Systems should be in place to ensure medication and equipment are checked periodically for expiration dates and function (LeBlanc et al., 2019).

Guidelines

Guidelines inform the processes of healthcare providers and organizations for cardiac arrest event management. The American Heart Association (AHA) is a national and global leader

in resuscitation research and dissemination, with focus groups who explore relevant topics and produce comprehensive meta-analyses of systematic reviews of the current evidence. The AHA produces BLS and ACLS training guidelines every ten years with the latest publication in 2020. The Institute of Medicine (2015) advocates for the development of "standardized protocols, education standards, and training curricula", as the first steps to adopting "practices that have demonstrated a positive effect on saving lives from cardiac arrest" (p. 380). Policies that promote the standards outlined in AHA guidelines improve patient outcomes and save lives.

Standard Operating Procedures

Rao, Radhakrishnan, and Andrade (2011) define standard operating procedures (or SOPs) as "a procedure or set of procedures for the performance of a given action or for a reaction to a given event" (para. 1). These standards are not universal but strive instead to describe the unique operating procedure of a smaller unit- for example, a clinic. SOPs are more specific than guidelines, as they detail the management of a single condition with rigid criteria. Clinical practice guidelines consist of the evidence summary and the detailed instruction for application of that evidence into patient care; SOPs can facilitate adherence to guidelines. Guidelines require local adaptation to suit local circumstances, and to achieve a sense of ownership. SOPs align clinical practice guidelines with the "local realities at the point-of-care" (Rao, Radhakrishnan, & Andrade, 2011, para. 8).

Use of Checklists

Checklists can be used to ensure transfer of current recommendations into daily practice, as this tool has been demonstrated to lead to significant changes in adherence with current guidelines. Various areas of medicine have adopted this practice, including Surgery and

Emergency Medicine. Haynes et al. (2009) found that the use of checklists can reduce surgical mortality by up to 40%. In a 2015 study, Kerner et al. demonstrated increased adherence with current guidelines for the management of coronary artery disease, asthma, and COPD by the implementation of checklists in the pre-hospital emergency setting.

Management of Cardiac Arrest

In the event of cardiac arrest, responders have the crucial responsibility to initiate the Chain of Survival for OHCA as described by the AHA (2020). The Chain of Survival includes 6 components: Activation of the emergency response system, high-quality CPR, defibrillation, advanced resuscitation, post-cardiac arrest care, and recovery. Upon recognition of a cardiac arrest victim, the Adult Cardiac Arrest Algorithm (Appendix A) emphasizes immediately starting CPR, attaching an AED, and providing oxygen (AHA, 2020). The AED will then indicate whether the rhythm is shockable and advise to give a shock or not. Ilkhanoff and Goldberger (2012) and Nolan et al. (2020) discuss that rates of survival are positively impacted as time to first shock is reduced.

McNally et al. (2011) found that survival is increased when patients were found in a shockable rhythm, such as ventricular tachycardia or ventricular fibrillation. If the patient is not found in such a rhythm, the Adult Cardiac Arrest Algorithm advises epinephrine administration (2020). There is a strong recommendation for epinephrine administration during cardiac arrest, as this positively impacts the achievement of ROSC (return of spontaneous circulation) and survival to hospital discharge (Merchant, et al., 2020; Nolan et al., 2020).

Education: BLS/ACLS

The AHA provides a policy statement with guiding principles on the worldwide implementation and quality improvement efforts for CPR and BLS training for healthcare providers. The AHA (n.d.) states, “BLS should be included as a critical aspect of healthcare systems emergency preparedness protocols” and further, that “BLS should be integrated as an essential health service within a comprehensive approach to strengthening healthcare systems” as a whole (Guiding Principles #6 and #3). This speaks to the need for organizations to integrate these trainings, as well as the equipment to offer such services. Individuals are also recommended to adhere to such trainings, as the AHA advocates that it is “imperative that healthcare providers undergo adequate CPR, BLS and resuscitation training” (para. 4). The Institute of Medicine (2015) advocates for required CPR and AED trainings for healthcare providers, to promote a culture of action that prepares and motivates responders who witness cardiac arrest to respond with immediate action.

The BLS and ACLS guidelines provided by the AHA are designed for North American healthcare providers seeking up-to-date summaries as well as in-depth information on resuscitation sciences and gaps in current knowledge. This training is relevant to persons functioning with or without access to resuscitation drugs and devices, working either within or outside the hospital (Panchal, Bartos, Cabañas, et al., 2020). The International Liaison Committee on Resuscitation emphasizes that effective education of resuscitation providers is an essential component for good resuscitation outcomes (Burg, et al, 2020). Merchant, et al. (2020) recommend BLS and ACLS, with 78 “strong” recommendations, but the data is mixed, with 57 “moderate” recommendations and 89 “weak” recommendations for these trainings, as well as 15

studies of “moderate” strength of evidence that found no benefit to these trainings, and 11 with “strong” level of evidence that found harm.

Unfortunately, BLS and ACLS course completion does not translate into adequate performance of resuscitation skills after the trainings, as the physical skills tend to lapse within a few months. Training of healthcare workers should be based on the scientific evidence which links improved knowledge and skills with better patient outcomes (AHA, n.d.)

Education: Short Interval Training

Guidelines agree with the implementation of “in situ” simulation-based resuscitation training in addition to traditional training (AHA, 2020). (“In situ” means that the training happens in actual clinic or patient care areas). It is reasonable to conduct in situ simulation-based resuscitation training in addition to traditional training. Such trainings have demonstrated superior learning and patient outcomes when used in combination with traditional BLS and ACLS. High-dose, low frequency (traditional BLS and ACLS training) do not sustain provider CPR competence alone, as skills decay within 3-12 months following training (Dudzik,et al., 2019). Providers need more frequent assessment and reinforcement of resuscitation skills to maintain competency (AHA, 2017). Low-dose, high-frequency training sessions (or “booster” sessions) more than double providers’ retention of high-quality CPR skills (AHA, 2020). Resuscitation Quality Improvement (which provides an interactive code practice with a mannequin) has demonstrated efficacy in maintaining provider competency and is appropriate in settings that see frequent cardiac arrest, but the cost of such a program is high and not recommended for a setting in which cardiac arrest is very low frequency (AHA, 2017).

To apply this evidence into practice, an affordable option is clinic-driven "mock codes" undertaken by staff in short intervals of time. Herbers and Heaser (2016) recommend mock codes as an efficient way to practice resuscitation skills and teamwork, and with implementation, found significantly improved response times and increased staff confidence. The Institute of Medicine (2013) recommends supportive systems, operations and processes that are continuously refined through team training, skill building, systems analysis and information development for continuous improvement.

Education: Outreach Visits

In a review of evidence from published implementation science literature, Educational Outreach Visits, Audit and Feedback, Provider Reminders, and Provider Incentives are noted methods for implementing general clinical practice guidelines (Chan, et al., 2017). Of value are the educational outreach visit and the audit and feedback methods, which were found to be effective in improving both processes of care and clinical outcomes. The audit and feedback method has been excluded from this project, as this setting uses paper charting and does not have recorded, cumulative cardiac arrest data to date.

Education outreach visits include the use of a trained person to meet with providers in their practice settings to give information with the intent of changing the provider's practice. The information given may include feedback on the performance of the providers. Chan, et al, found educational outreach visits to be an effective method for improving processes of care and clinical outcomes. AHA (2017) reports strong evidence for the recommendation to use real-time feedback during resuscitation training. According to Garrow, et al. (2020), in-clinic trainings have the potential to improve patient safety.

Registry of Cardiac Arrest Event

Guidelines emphasize the importance of collecting both patient and process outcomes of cardiac arrest events to inform future quality improvements at the organizational, community, and national level (AHA, 2017). Both team feedback and system feedback are strongly recommended by the AHA (Panchal, Bartos, Cabañas, et al. 2020; Berg et al. 2020). Structured processes of evaluation and data collection, which observe opportunity for improved practices, positively impact future resuscitation successes for out-of-hospital settings (Panchal, Bartos, Cabañas, et al., 2020, Berg et al., 2020). Monitoring and reporting quality-of-care metrics and patient outcomes through quality improvement efforts saves more lives (AHA, n.d.).

In conclusion, the implementation of a preparedness program can improve clinic preparedness for emergency events such as OHCA. Utilizing a checklist provided by the American Academy of Family Physicians and adapting this to the unique clinic demographics can bring emergency equipment up to date. The implementation of a standing operating procedure for maintaining the equipment in a ready state will ensure a continued state of preparedness. Regarding training of staff, evidence supports BLS and ACLS for healthcare staff, as well as additional short interval training and outreach education. Lastly, guidelines suggest the development of a registry to collect and analyze processes and patient outcomes in the event of OHCA. These processes demonstrate significant impact on survival from cardiac arrest, and adherence would decrease the gap between current and optimal process outcomes (AHA, 2017). Guidelines can be adapted to specific settings through the use of SOPs to support adherence.

CHAPTER THREE

FRAMEWORK AND AGENCY DESCRIPTION

Framework: Iowa Model

This project was guided by the Iowa Model (see appendix B) and began with identification of a clinical problem, via a catalyst- the clinic owner. The owner identified an issue with the crash cart, expressing concern for outdated medications and equipment. Further discussion led to expanding and defining the problem: the staff and equipment of the clinic were underprepared for management of a cardiac arrest event. Cardiac arrests are low frequency in this setting- a potential barrier to allocating resources to this cause. However, OHCA events are high risk for poor outcomes (such as death and severe neurological deficits). BLS was declared a priority. This project was formulated to provide BLS to the patient community. The purpose of this quality improvement project was to implement the American Heart Association guidelines for cardiac resuscitation in an urgent care setting.

Following the Iowa Model, once the project was identified as a priority, a project team was formed. The main partnership for change was between this graduate student and the physician owner. Each of the clinic's providers and medical support staff were also considered stakeholders and their points of view were solicited and incorporated into the project's development. The team also included the office manager, who gave insight into the clinic's culture regarding policy. The office manager also played an important role in arranging equipment and training updates. Lastly, a community expert educator was recruited to provide a Healthcare Provider BLS and ACLS combined education course (see Appendix D).

Next existing evidence was analyzed. Evidence on cardiac arrest management is continuously being updated by national and world leaders of resuscitation: The American Heart Association and the International Liaison Committee on Resuscitation. These organizations utilize topical teams to provide comprehensive and up-to-date meta-analyses on many concerning aspects of the topic of resuscitation. The results are graded based on strength of evidence, and gaps in the literature are also identified. The literature supported fostering a culture of action by adhering to biannual BLS and ACLS training, utilizing education outreach, creation, and implementation of high frequency/low interval trainings such as quarterly "mock codes", and ensuring resuscitation equipment and medication availability. The quality improvement aspects of the project were further informed by the Institute for Healthcare Improvement, which advocates for the creation of an iterative process for continuous improvement.

The following phase of the Iowa Model- "The Design of the Change"- applies the analysis of existing evidence into a practice change. Steps for designing the practice change include the following:

- Verify preferences
- Consider resources, constraints, and approval
- Develop localized protocol
- Create an evaluation plan
- Collect baseline data
- Develop an implementation plan
- Prepare clinicians and materials
- Promote adoption

- Collect and report data (University of Iowa Hospitals and Clinics, 2015).

The preferences of the project's key stakeholders were discussed throughout the design phase. There were several conflicting opinions between the clinic physician owner and other providers. For example, all stakeholders, except the owner, were enthusiastic about the recommendation for an AED, while the owner was hesitant on this recommendation due to the availability of a functional defibrillator already in-clinic. Further, the owner desired that all providers be ACLS certified, but some of the providers felt that ACLS was beyond the scope of this practice setting.

The project was formally presented to the owner in December 2021. Ultimately, the project design followed the owner's choices as the ultimate decision maker. The project proposal included the development of localized protocols (SOPs). The provider/owner did not choose to adopt this suggestion. An abridged plan was developed as a team (between the office manager, the owner, and this student writer) and included the following three goals:

1. A BLS and ACLS training for providers and staff
2. Obtain up-to-date, appropriate equipment for the crash cart and remove extraneous items
3. Creation of a new inventory checklist for the crash cart

The clinic owner decided not to get an AED and to instead utilize the functional, though complex Lifepak 11 defibrillator (a model from 1994). For this option, providers needed training on the LifePak 11 defibrillator, and required the ACLS skills of rhythm recognition and energy dosing. The education outreach session was thus designed to include ACLS to provide clinicians

with the skills necessary to use the LifePak 11 to provide defibrillation appropriately to a patient in cardiac arrest (and respond to other rhythms appropriately as well).

The evaluation of the project's success was captured in a simple pre/post intervention audit tool (see Appendix E). Baseline data was collected in January. Implementation planning began with the proposal of the project, as approval and feedback from the owner was critical for planning and involved coordination with the clinic manager. First, the clinic was prepared for a BLS/ACLS training and certification day. Materials for the crash cart were then organized. Expired and inappropriate items were removed. A list of necessary items for emergency preparedness were given to the office manager to be ordered. The post-evaluation took place in March.

Agency Description: Strengths, Weaknesses, Opportunities, and Threats

The project took place in a small urgent and primary care clinic in a suburb of Anchorage, Alaska. The target population for the project was the clinic itself, with anticipated impact on the care provided to adults suffering from cardiac arrest. Stakeholders included five providers (three MD's, one of which is the owner of the clinic, as well as one nurse practitioner and one physician assistant). There were also two certified medical assistants, one office manager, and two front desk staff. The clinic was with distinct strengths, limitations, opportunities, and challenges at the time of implementation.

Strengths. The clinic and staff were noted to have a few traits (as described by Chan et al. 2017) as facilitators to general guideline compliance, including involved stakeholders and leadership support. The quality improvement need had been identified by the owner/key stakeholder, who was engaged in the cause and valued the project as a priority. The owner was

willing to spend funds to improve the clinic's level of preparedness for cardiac events and appreciated the idea of an education outreach session hosted in the clinic.

Weaknesses. The clinic also had several "barriers to adherence" (as observed by Chan et al. 2017). The clinic had been short staffed for a long time and had been functioning with only one medical assistant instead of the par of two for many months. Clinicians shared skepticism of the traditional model of ACLS trainings (giving the example of day-long courses). Chan et al., (2017) site "higher age of the clinician-" this barrier was applicable to this clinic setting at the time of implementation as well. The clinic lacked other noted facilitators: there is not a culture that utilizes protocol, and they do not utilize electronic guidelines systems.

The clinic recommended that all providers maintain BLS certification, but job descriptions did not include the requirement of any certifications beyond the provider's license and degree. The clinic did not previously provide training for the staff or reimbursement for the training- requiring that staff pay for the training out of pocket. All had BLS trainings sometime in the past, but several providers have discussed that the COVID-19 pandemic had created a barrier to attending BLS trainings, and that they were not current with their certification. The physician-owner desired that all providers be current in ACLS training as well. Providers have discussed barriers to this more skilled level of training, expressing attitudes that this advanced scope is unnecessary for the setting.

Opportunities. Certification training was an opportunity for improvement. At the time of project implementation, all providers previously had BLS certification, and all except one had previous ACLS certification. However, provider certifications were all out of date at the time of initiating the project. One of the medical assistants had never had BLS, the other was current in

her certification. The certification training provided the additional benefit of an opportunity to promote end-user involvement through its in-situ format. End-user involvement was cited by Chan et al (2017) as a facilitator as well. Another easy opportunity for improvement included obtaining physical, up to date AHA guidelines for the clinic. Chan et al. (2017) sited having physical guidelines as another facilitator to guideline adherence.

Threats. A concerning barrier to achieving rapid defibrillation was that the current defibrillator had been viewed by providers as outdated, and the skills of rhythm interpretation and energy dosages were not maintained. Before the ACLS training, providers at the clinic did not plan to utilize the current defibrillator available at all during a code situation.

The clinic already had a working defibrillator, which required some skills and knowledge to operate properly. This was a barrier to getting an AED, which walks the individual through the steps required. But even with appropriate training, the usability of this equipment was limited. The clinic's LifePak 11 was from 1994 and had an aged battery- meaning it would need to be plugged into an electrical outlet to ensure sufficient energy to supply repeated shocks. The pacing pads in the crash cart did not match the defibrillator, and no adaptor was available to allow for "pacing" (which may be appropriate in the situation of bradycardia). This LifePak 11 uses paddles instead of pads, and the electrical course is monophasic- not biphasic. This means that the paddles need to be placed correctly and firmly applied on the chest, or the shock may go only between paddles and not through the patient.

The project itself created its own threat with competing priorities. A new AED was proposed, but the education outreach session may have competed with the new AED for funding, and the owner opted for the education session. The ACLS training did include the skills

necessary to utilize the defibrillator on hand. A community member (a paramedic who offers BLS/ACLS/PALS training through their own business) was identified who offered a personalized, in-situ education session which included both BLS and ACLS recertification, which could all be done in person, at the clinic, and in one day. The cost was paid for by the owner, who had previously encouraged his clinicians and staff to pay for their own trainings, though these were not requirements of the jobs.

Another barrier included hesitancy to add to staff's workload. Recognizing that the office manager is already overtasked, the owner may not have been willing to add to her burden with the incorporation of proposed processes/SOP's, such as overseeing the maintenance of the crash cart, facilitating quarterly "mock codes", and implementing the use of a registry to record events to her workload.

Additionally, the clinic lacked a culture of protocols to guide the actions of the clinicians. The owner discussed that his providers value their autonomy and chose to work in a culture that doesn't "micro-manage". Job descriptions were reviewed and are clear, but very brief- only about half a page of text. The clinic had used a structured checklist in the past to maintain emergency equipment but had abandoned this practice as it was not being performed regularly. The attitude against policy implementation proved an impassable barrier in the development and implementation of SOPs.

Project Design

The wide scope of this project was a facilitator of adherence to guidelines, as it encompassed a variety of interventions to support the goal to close the noted gap in practice. SMART goals for this project included both clinic and staff goals that were specific, measurable,

achievable, relevant, and time bound. Proposed interventions include process changes (outlined in SOPs), and preparing both equipment and staff by renewing BLS/ACLS certification in an Educational Outreach Visit, and medication and equipment revisions.

A formal proposal of the project took place with the office manager and the clinic owner in December 2021. This included a review of the literature and guidelines, emphasizing the importance of rapid defibrillation. Then specific interventions were proposed.

Some of the interventions were approved, and others were not. The Four SOPs were discussed but were not adopted into practice at the time of implementation per the key stakeholder's preference. The proposed SOPs included the following:

1. Management of a cardiac arrest event as advised by the AHA guidelines.
2. A process for maintaining resuscitation medications and equipment in ready, routinely ensuring they are functional and not expired, through utilization of a checklist (see Appendix G).
3. Provider competency
    a. BLS training for all medical staff
    b. Short-interval training program (i.e. quarterly mock code trainings)
    c. ACLS training for clinicians (may be added/removed as appropriate)
4. A process for collecting, cumulating, and processing data of cardiac arrest events utilizing a registry form for continuous process improvements

The first SOP would have emphasized compliance with AHA guidelines, detailing the immediate actions to take in a cardiac arrest encounter. This clinic receives fast responses from Emergency Management Services, with typical arrival times approximately 5 minutes after a call

to 911. To prepare for a cardiac arrest, the clinic team would have outline actions for cardiac arrest management in this 5-minute timeframe. This SOP would have followed the AHA Chain of Survival: Calling 911, beginning CPR, and rapid defibrillation. More specific actions would have been further specified in line with the Adult Cardiac Arrest Algorithm (See Appendix A).

The second SOP would have addressed the crash cart, with specific staff members tasked to routinely observe the crash cart for out-of-date medications and to ensure the continuous function of the AED. The office manager would have led this process change.

The third SOP was proposed to outline the requisition of BLS training (and possibly ACLS training). This brief would also have described a system to perform mock codes on a quarterly basis. This was proposed to be developed by 01/2022.

The fourth SOP was proposed to ensure the use of a standardized form to collect data from a cardiac arrest event. The Utstein Guideline is used by Cardiac Arrest Registry to Enhance Survival, a national registry which uses data collected from cardiac arrest events, including patient and process outcomes, to identify areas needing improvement. Part C of the Utstein Guidelines is sufficient for the clinic's purposes (See Appendix C) to record details of events. In the event of cardiac arrest this form will be used to evaluate provider actions (initiation of CPR and time lapse to defibrillation). It was proposed that a team be formed for the purpose of annually evaluating these forms to observe process outcomes and identify areas needing improvement. This team was to be established by 02/2022.

Although the SOP's were not adopted into practice, many of the actions outlined in them were. The clinic needed to redesign their preparedness plan, which included updating equipment

and medications. The leadership team reviewed the literature and recommendations and adapted a list by the American Academy of Family Physicians (see Appendix F).

An AED was not acquired, as the physician owner opted to use the current defibrillator on hand. A BLS/ACLS training took place in 02/2022 to teach the skills required to operate the current defibrillator. Non-expired resuscitation medication and equipment (epinephrine and oxygen) were in place 02/2022. Resuscitation equipment (new bag-valve masks, oxygen tubing) as well as *Handbook of Emergency Cardiovascular Care 2020* were requested to be ordered by the office manager. Other extraneous and expired equipment have been removed from the crash cart. A new inventory list was created for the clinic.

Staff required updated BLS and ACLS certifications and attended an Education Outreach session to achieve this. Providers and medical assistants attended an all-day in-clinic training which provided traditional BLS/ACLS training and recertification for all providers, and BLS recertification for the CMA's. The training included BLS and ACLS manuals that staff kept. Although the training contained components of the traditional biannual model, it was performed in-situ by a community expert, a paramedic who traveled to the clinic and incorporated the equipment on hand to train the providers. Staff received live feedback on their resuscitation skills. This was completed in 02/2022 (cost to the clinic was $1,500, see Appendix D).

With exception of goals the owner did not agree to (writing and adopting SOPs) the implementation phase of the project achieved 100% of its goals by the end of March.

Human Research Protection

The providers and the clinic were the subjects of the intervention for this project, although patients may benefit indirectly in the future. All medical staff and the owner of the

clinic received a copy of a consent form, which outlined the details of the intervention and the pre-post data collection process. Participation in this study was voluntary. Potential direct and indirect benefits and harms were reviewed. These forms were not signed, and anonymity was maintained. No identifiers were collected throughout this project.

Measures and Instruments

The subject of this project was a small clinic with a total of seven medical staff. Inferential statistics would require a larger sample size and statistical power; this project was therefore limited to descriptive statistics. To demonstrate a successful outcome, the project audited clinic staff and equipment before the intervention and again afterward. (See Appendix E). The audit included the number of all medical staff who were currently BLS certified and the number of providers currently ACLS certified. Availability of resuscitation medications and equipment was described, and the presence SOP's regarding OHCA were also accounted for. This description is a nominal level of measurement, categorical, and is exhaustive (i.e. certification is current, yes or no, equipment/medication is present or not present).

Data Collection Plan

In January of 2022, an initial audit described the clinic in terms of staff and equipment preparedness for the management of an OHCA. This data was collected from staff by self-reporting, collected verbally by this author. All medical staff were asked about their BLS certification status, and the clinicians were be questioned about their ACLS certification status. The author also physically assessed the availability of appropriate resuscitation medications (epinephrine and oxygen), as well as IV equipment and oxygen tubing. The functionality of the defibrillator was also assessed. The existence of protocols or SOPs regarding OHCA were

reported by the office manager and the clinic owner. Post-intervention, data was collected again in a similar fashion in March of 2022.

CHAPTER FOUR

EVALUATION

Results

Participants. The project was evaluated using pre- and post- descriptive studies. The sample included 5 clinicians: 3 physicians, 1 nurse practitioner, and 1 physician assistant. One of the providers is age 55-65, and the other four are >65 years old. One of the providers has been practicing for 5-10 years in their current discipline; another of the providers had been practicing for 10-15 years; and the other three had been in this current discipline for greater than 30 years. Three of the clinicians work <20 hours per week at this location; one works between 20 and 30 hours, and one works about 40 hours per week. All clinicians provide primary and urgent care services to patients of all ages across the lifespan.

The sample also included 2 medical assistants. One has been practicing only 1 year; the other has been a medical assistant for over 10 years. One is age 25-35, the other is age 35-45.

Outcome and Process Measures. The outcome measures of this project included an audit of staff certifications, equipment, the development of a checklist for equipment, and initiation of four protocols. Results describe each of these measures as a percentage of compliance before implementation of the project and after implementation (see graph below).

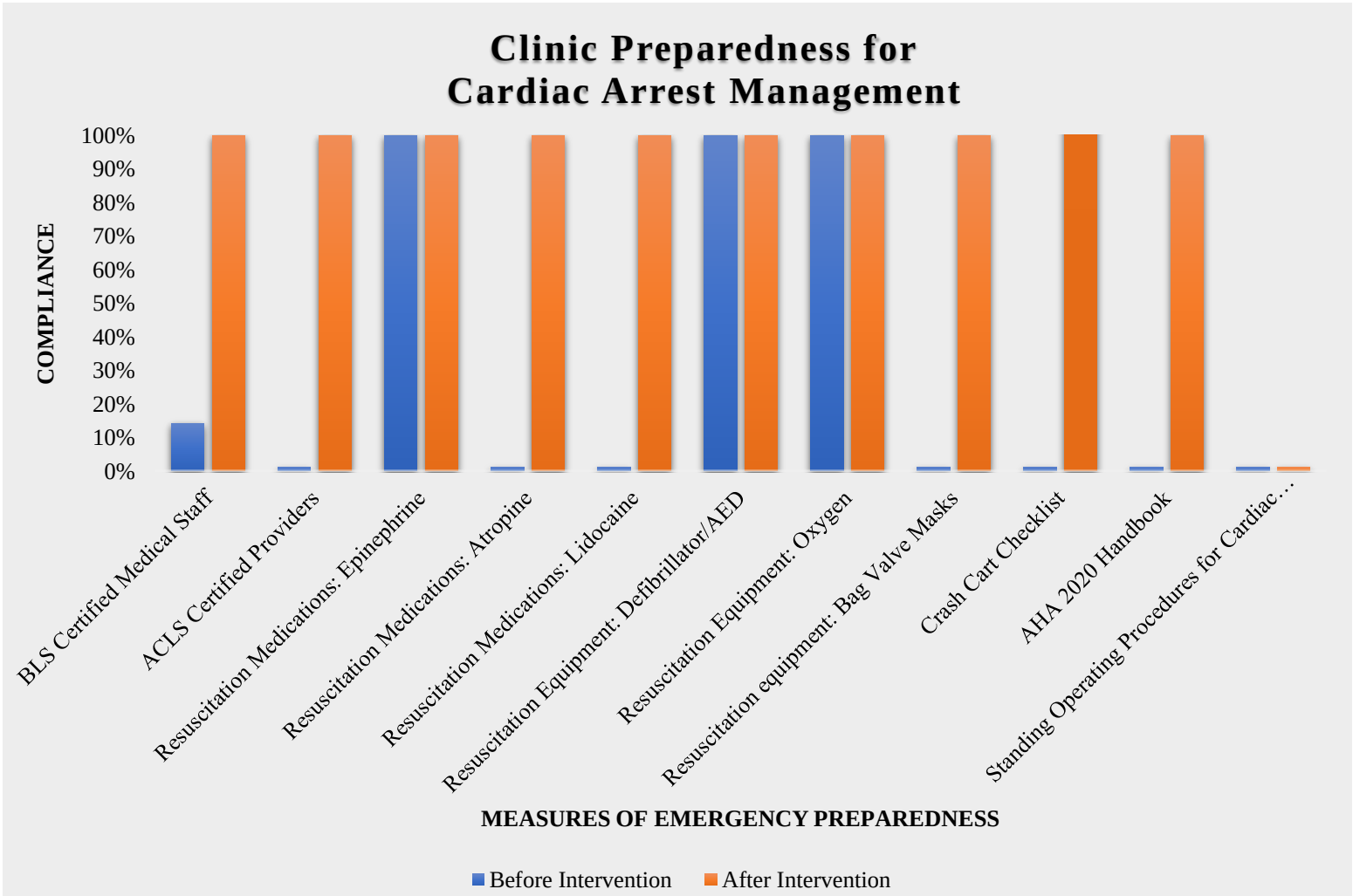

Figure 1. Pre-implementation and post-implementation audit measures of clinic-wide compliance with recommendations for emergency preparedness.

The process measures completed to facilitate these outcomes included the following:

1. The project was proposed to Clinic Leadership in December 2021.
2. The pre-implementation survey was completed in January 2022.
3. A BLS and ACLS training for providers and staff was completed in February 2022.
4. Appropriate equipment and medications for the crash cart were obtained. After the resuscitation training, the owner opted to expand the formulary for resuscitation medications to include lidocaine and atropine in addition to epinephrine. Extraneous items were removed from the crash cart in February 2022.
5. A new inventory checklist for the crash cart was completed in March 2022.
6. Post-implementation survey was completed in March 2022.

Discussion

This project began with a concern the clinic owner shared about the status of the crash cart. With further discussion among clinicians, a greater problem was identified- that the clinic was not prepared to offer cardiac resuscitation according to the AHA guidelines. Although very low frequency in this setting, cardiac arrest is high risk for poor outcomes, and becoming prepared to manage this was identified as a clinic priority. The project evolved into the creation of an emergency preparedness plan with a focus on preparing staff and equipment to provide BLS and ACLS.

Initially, one out of seven medical staff were BLS certified, and zero out of five providers were current with their ACLS certification. Prior to implementation, there were outdated medications and equipment stocked in the crash cart; after implementation there were 0 outdated medications. Prior to implementation the selection of resuscitation medications was limited to epinephrine; after implementation the clinic was stocked with epinephrine, lidocaine, and

atropine. Prior to implementation there were expired bag valve masks, after implementation there were new bag valve masks.

Outcomes with Literature Insight. The project proposed a multifaceted emergency preparedness plan and included "essential elements" as proposed by LeBlanc et al. (2019): Equipment acquisition and maintenance; protocols; and training. The project utilized a list of emergency equipment suggested by the American Academy of Family Physicians (2007) which was adapted for the setting. These choices led to appropriately training the staff for the lifesaving equipment and medications on hand. To sustain this level of preparedness, the design of the proposed project included SOPs to maintain the clinic in a ready state (which were omitted from implementation).

The project achieved several of its outcome measures, including ACLS and BLS trainings for providers and medical staff through an in-clinic education outreach resuscitation training session. Education outreach visits are an effective method for improving processes of care (Chan et al. 2017). In-clinic trainings have the potential to improve patient safety (Garrow et al. 2020). The American Heart Association discusses that BLS and ACLS trainings are imperative for the healthcare provider (n.d.). The Institute of Medicine (2015) advocates for healthcare providers who are motivated to respond to a cardiac arrest with immediate action through the preparation of cardiac resuscitation trainings.

According to the American Heart Association Chain of Survival (2020) for outpatient cardiac arrest, defibrillation is a key link, and should be implemented as rapidly as possible. In our setting, EMS is likely to arrive with their AED between 5 and 15 minutes after a call. This is a significant delay in terms of rapid defibrillation and positive patient outcomes/achieving ROSC. Ilkhanoff and Goldberger (2012) and Nolan et al. (2020) discuss that rates of survival are

positively impacted as time to first shock is reduced. The ability for the clinic to provide defibrillation was emphasized to the owner in the project proposal and was agreed to be a priority. The owner opted out of purchasing a new AED, and instead paid for the training for clinicians to become familiar in the skills necessary to utilize the defibrillator on hand.

Unfortunately, some of the key process changes were not adopted by leadership, including the practice of "Mock Codes". According to Dudzik et al. (2019), the biannual model of BLS and ACLS trainings is insufficient to maintain physical resuscitation skills in a deployable state, as these skills decay after 3-12 months. Due to the low frequency of cardiac arrest events, practice trainings are recommended to occur more frequently, with proposed timeframes of quarterly or semi-annual mock codes. This leaves the providers of this clinic vulnerable to BLS and ACLS skill decay before these skills become necessary.

The SOP to address the evaluation and data collection of Cardiac Arrest Event was not adopted into the practice either. According to Panchal, Bartos, Cabañas, et al., 2020 and Burg et al., 2020, structured processes of evaluation and data collection observe opportunity for improved practices and positively impact future resuscitation successes for out of hospital settings. According to the AHA (n.d.), monitoring and reporting quality of care metrics and patient outcomes through quality improvement efforts saves lives.

LeBlanc et al. 2019 advised to adapt emergency equipment to a clinic's unique demographics and location. The current emergency equipment was analyzed, and missing equipment was identified and obtained. A checklist was discussed (as one of the four proposed SOP's) but the clinic owner did not choose to adopt this, which contrasts with the recommendations of the literature. According to LeBlanc et al 2019, systems should be in place

to ensure medication and equipment are checked periodically. The use of checklists has been shown to increase adherence with guidelines (Kerner et al 2015).

SOPs consist of an evidence summary and detailed instruction for application of that evidence into patient care, and facilitate adherence to guidelines (Rao, Radhakrishnan, & Andrade, 2011). The proposed SOPs were not adopted by the key stakeholder. These would have served as an outline for many facets of an enduring preparedness plan, including Mock codes, education/certification renewal, routine for checking the crash cart, and an action plan for management of cardiac arrest; instead, these were excluded from the plan. According to the Institute of Medicine (2015), the development of "standardized protocols, education standards, and training curricula" are the first steps toward an evidence-based practice standard. The SOPs would have served as a detailed, comprehensive guide to action for emergency preparedness, both throughout the lifetime of project implementation and beyond. "Improvements in practice are neither sustainable nor measurable without corresponding changes in organizational arrangements (and) organizational and professional culture…" (American Association of Colleges of Nurses, 2006, p.10). Without adoption of these SOPs, the remaining adopted actions stand alone, and the longevity of the project's improvements are compromised.

Lessons Learned

Throughout the implementation of this project, I struggled to communicate with the leadership of the clinic. The owner did not provide me with a direct contact for himself, instead opting that I communicate with him through the office manager, and if I needed to speak to him directly, I could physically stop by on Fridays when he is at the clinic for a face-to-face chat. These meetings involved that I wait for an appropriate time to be seen among the patients, as the setting is a "walk in clinic." I did come by for meetings on several Fridays, and most of the time

I was able to catch the owner quickly. Other times patients had been waiting for hours to be seen, so it was necessary that I wait as well.

I encountered other challenges when contacting leadership via the office manager. For myself, email is a great way to exchange ideas and make plans. But the clinic manager was generally delayed and sometimes unresponsive to email. When information was exchanged in email, it seemed to create confusion as it didn't appear to get read through properly. For an example: for the BLS/ACLS combined course, the medical staff who had never been certified had to first complete an online portion through the AHA. This meant that they received an e-book and would not receive a physical book like the rest of the students. Although I felt that this information was clearly outlined in writing, I was asked repeatedly about books for the online students.

Once I recognized that email was an ineffective method of communication, I switched to calling and leaving voice messages or physically coming by the clinic to make face-to-face conversations happen. I repeated information from emails via these methods. This appeared to smooth confusion and misunderstanding. Even in this highly technologically connected age, when much of the culture checks their email continuously, it may be that some people do not check their emails every day or may not process information well via email. There are generational differences between this student author and the office manager; this generational difference may fuel variation in the use of email as a primary form of communication.

Throughout the timeline of project implementation, it became clear that I would be required to take an authoritative approach to designing and implementing the BLS/ACLS training session. Initially, I approached the clinic with the idea of having a training within a range of dates and requested their feedback. This did not bring about any action or response

(which could have been due to the method of communication being email**).** I then made an "announcement" that the training was happening at a certain date and time, and outlined all the necessary steps forward. It was to this direct approach that I eventually got a response and was able to lead the clinic to a successful in-situ AHA resuscitation training. Stating when a training would happen, rather than asking for feedback, allowed others the security of a leadership position in this DNP student. With the incredible staff turnout for the training day, I feel that the clinic may be ready for more leadership toward practice improvement opportunities like this.

For future quality improvement projects within a policy-hesitant organization, improved motivational interviewing (MI) skills in this DNP student might illicit change. "MI is a method for encouraging people to make behavioral changes to improve health outcomes" (Lundahl, et al, 2013, p.157). With developed MI skills, the owner may have purchased the AED and chosen to establish SOPs.

Limitations

This project is limited in terms of generalizability. The subject of this project was a small, privately owned clinic with a total of just seven medical staff. This small sample size limited the data collection and analysis to descriptive statistics only. Descriptive statistics only allow for summations about the specific people, objects, and setting measured. Therefore, the experience of this quality improvement project cannot be generalized to other populations.

Additionally, the timeframe of this project gave limits to the outcome measures. Ideally, the project would have evaluated the impact the quality improvements had on patients themselves. In this project, that would involve measuring at least one patient cardiac arrest event, the staff's response, and the patient's ultimate outcome. However, due to the low frequency of

cardiac arrests in this setting, the impact of the project on patient outcomes was unable to be captured.

The adoption of the project as proposed may have been limited by funding. An upgrade to an AED may have occurred if not for this limitation. Further, the clinic culture of "autonomy" allows for providers to practice without any clinic policy guiding their decision-making process. Both of variables impacted the outcome of the project.

Recommendations for Practice

The decision of whether to purchase an AED, and whether to provide BLS and ACLS training for staff were key decisions made by the physician owner at the proposal. The owner ended up making key decisions based on his preference. I had recognized a concern that these two investments may compete for resources. In hindsight, the benefit of providing a cost benefit analysis for the purchase of an AED and for the training day would have been helpful decision-making tools to offer. When a quality improvement plan involves a financial investment, a cost benefit analysis is an appropriate decision-making tool, and may be even more important to make use of in circumstances of various interventions competing for funds.

Recommendations for similar projects for the future include identifying a priority issue, applying guidelines and evidence from the literature to the local setting to develop the emergency preparedness plan, and making full use of motivational interviewing techniques to promote behavior changes in medical professionals and key stakeholders with change hesitancy.

Quality improvements and changes in practice must be seen by stakeholders as a priority. For example, this project's catalyst was a concern from the owner for the status of the clinic's crash cart. With further discussion, a greater problem was identified- that the clinic was not prepared to offer cardiac resuscitation according to the AHA guidelines. The owner agreed this

was a priority issue, and agreed to the development of an emergency preparedness plan emphasizing cardiac arrest management.

Emergency preparedness plans include equipment, staff training, and policy, and must be individually developed for the setting. This project focused education and resources on rapid defibrillation and activation of EMS: goals appropriate for a clinic with close proximity to EMS and hospital supports. Other clinics would create a modified plan based on their proximity to such services. A rural clinic may require more equipment, training, and policies to prepare the clinic and staff and support patients in cardiac arrest, in preparation for a greater wait for EMS. Equipment lists and trainings would be designed with this in mind.

Protocols should be developed to adapt guidelines to the local setting to sustain practice changes and equipment in a ready state. SOPs are a great way for an individual practice to translate guidelines into their unique setting if the stakeholders are amenable to this level of structure. However, this project encountered resistance to the implementation of SOPs, as the clinic does not currently make use of policy, and this would be a significant behavior and cultural shift for a policy-hesitant owner. Use of MI techniques may facilitate a change in perspective and impact an owner's decision to adopt policies or SOPs.

Conclusion

The purpose of this QI project was to implement the AHA guidelines for the management of cardiac arrest in an Urgent/Primary care clinic. A preliminary assessment was made, the literature was reviewed, and a change was designed as guided by the Iowa Model. The clinic was then prepared to manage a cardiac arrest event by two interventions: the creation of a checklist for equipment and medications (and obtaining what was lacking) and a resuscitation training day for staff. The project was successful at ensuring that all medical staff were BLS certified, and

providers were ACLS certified. Providers are prepared to utilize the available resuscitation equipment.

To ensure that this clinic remains prepared, SOPs would need to be adopted to “hard wire” change into clinic processes. SOPs would ensure maintenance of staff competency and crash cart readiness. A SOP would also address upholding the guidelines as providers manage a cardiac arrest event. Lastly, SOPs would outline a system for collecting and analyzing cardiac arrest data to provide key indicators for adherence and the identification of areas needing further improvement.

By implementing the AHA guidelines into this clinic practice setting, the team greatly improved compliance with best practice guidelines. This is hoped to one day positively impact both the process outcomes of cardiac arrest management, and patients’ outcomes. This has been a wonderful an opportunity for this DNP student to demonstrate abilities to lead at the highest level of clinical nursing practice by designing and enacting methods to improve quality of care, systems of care delivery, and patient outcomes.

CHAPTER FIVE

REFLECTION

DNP Essentials

Scientific Underpinnings for Practice. The scientific underpinnings of the DNP prepared practitioner include the foundational and advanced academic sciences; ethical, philosophical, and historical foundations; and nursing theories, which together create a connection for the application of natural and social sciences (American Association of Colleges of Nurses, 2006). Training in the natural and social sciences prepares the DNP student for their role as future clinicians and prescribers, but it our understanding of nursing theories that set our training apart from other types of providers. Nursing Theories provide a general framework for phenomena of caring, health, and being human.

As nurses, we apply these theories to partner with patients and guide interventions to desired outcomes. During my time as a DNP student, I applied Roy's Theory of Adaptation to a group project with the purpose of determining the benefit of yoga for cancer patients. This theory supports the assumption that adaptation is a goal of nursing, and it is adaptation that can free a patient's energy for other needs. In our noble pursuit of "optimal function of human beings", nursing action fundamentally seeks to make positive changes (American Association of Colleges of Nurses, 2006, p. 9). Nursing theories are a key part of the scientific underpinnings for advanced nursing practice and have been promoted throughout the coursework of this DNP program.

Study of the sciences including Pathophysiology, Pharmacology, and other foundational courses served as essential building blocks to identify disease and understand therapeutic effects

of medications, complementary therapies, and surgical interventions. It is the core scientific underpinnings that prepare us for our role as practitioners to diagnose and treat injury and disease. Knowledge gained in the Pathophysiology coursework served this DNP project with an firm understanding of cardiac arrythmias and the cascade of ventricular rhythms to asystole. A developed understanding of Pharmacology coursework came to play in understanding the mechanism of epinephrine in a cardiac arrest. Diagnostic reasoning strengthened the skills to appropriately interpret a heart rhythm and apply this knowledge in ACLS.

Organizational and Systems Leadership for Quality Improvement and Systems Thinking. Theories provide "the basis for the development of new practice approaches" (American Association of Colleges of Nurses, 2006, p. 9). The program emphasized the continuous pursuit of Quality Improvement (or QI) in our ever-evolving medical world. Our coursework consistently turned to QI, from a deep dive into the Institute for Healthcare Improvement trainings in Evidence Based Practice II to our application of QI in Translational Research, in which students grouped together to undertake goals. Specifically, my group aimed to implement the Marburg Heart Score system for suspected Acute Coronary Syndrome in an outpatient setting. This course provided the opportunity for students to understand the value of one avenue for QI: Implementing and translating research into practice for the benefit of patients.

DNP graduates lead change, with "emphasis on practice, improvement of health outcomes, and ensuring patient safety" (American Association of Colleges of Nurses, 2006, p. 10). It is this emphasis that elevates the DNP graduate, as one who is prepared to act as a leader to effect change at the organizational and political levels. This requires the skills obtained through several of our courses, namely Program Planning, Evaluating Outcomes, and QI; and Finance and Budget. These courses developed DNP student abilities to analyze systems, design

quality improvement interventions, and strategize sustainable changes. This work demands "balancing principals of business and policy to develop effective plans for new…systems to improve the quality-of-care delivery" (American Association of Colleges of Nurses, 2006, p. 11).

A leader in healthcare must have the tools to evaluate systems of care using a scientific approach. DNP graduates can collect data and use tools to make the data useful to stakeholders and decision makers. Design in Healthcare Delivery Systems provided the acquisition of such tools, including pareto charts, flowcharts, fishbone diagrams, A7s, spaghetti diagrams, and value stream mapping. These were used to visualize problems and streamline processes. These tools can be used to create a "lean" process and improve cost, patient experience, and employee satisfaction. I had the opportunity to analyze a clinic's problem with equipment storage and recommended use of a two-bin system to reduce the clinic's equipment shortages and improve flow.

Clinical Scholarship and Analytical Methods for Evidence-Based Practice**.** Clinical Scholarship and Analytical Methods for Evidence-Based Practice involves the meaningful use of data, synthesizing evidence, and applying findings to improve practices. This DNP essential involves "the translation of research in practice, the evaluation of practice, improvement of the reliability of health care practice and outcomes, and participation in collaborative research" (American Association of Colleges of Nurses, 2006, p.11).

The DNP project is an opportunity for student leadership in the first of many contributions in the deployment of scholarship (Moran, Burson, & Conrad, 2020). Courses previous to the project, such as "DNP Scholarly Project" described the purpose of the DNP project in preparation for this. The project challenged me in the scholarship of integration. The AHA is an excellent resource for those who seek the most up-to-date guidelines for the

management of cardiac arrest. But taking that evidence and putting it into practice can prove very difficult. In the Translational Research course, it was discussed that research findings which promote a practice change take an average of 17 years before they are routinely integrated into standards of practice. This number surprised me as a student, but after struggling to facilitate a practice change at the local level, I can appreciate the complexity.

Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care. Information systems and patient care technology have established expansive use in our modern medical world. Through the use of Electronic Medical Records (EMRs), patients, providers, and organizations have expedited access to more complete health information. These systems are likely to become ever more crucial in furthering quality improvement for patients and transforming healthcare. EMRs can be used to collect vast amounts and all varieties of data which can be analyzed to demonstrate patterns or problems, support the efficacy of a quality improvement effort, audit the activities of healthcare providers, and so much more.

Throughout our work in Informatics and Statistical Applications, I was introduced to current methods in which health information technology is advancing to better serve patients and improve outcomes. I had opportunities to analyze data via Microsoft Excel and create graphs to illustrate data via Microsoft Word. The application of such skills is sure to be useful in future clinic settings. The clinic setting of my DNP project was “low-tech”, as it is restricted to paper charting. The staff training portion of the project itself did involve web-based learning (an online pretest through the AHA) for members of the clinic. I had the opportunity to support those who struggled with the web-based format.

The DNP program included the opportunity to learn from other students' projects and experiences. While my project had very limited use of information systems and patient care technologies, I have appreciated the work of other DNP projects and noted this essential in their work as an observer. One project involved the implementation of a new Confusion Assessment Method (CAM) tool to assess delirium in a Cardiac Stepdown unit. This tool was already in use in the hospital's ICU, but an appropriate version for the Stepdown unit was yet to be made available. The student worked with the hospital's Information Technology team to offer the CAM tool through the EMR. Although the implementation of the electronic tool was limited during the timeframe of the project, the tool was piloted via a paper version, and demonstrated that the tool is likely to eventually yield data which may have a place in improving patient outcomes. Witnessing this student's efforts helped me to value the impact of information and technology systems in the improvement and transformation of healthcare.

Health Care Policy for Advocacy in Health Care. Health Care Policy involves the law and statutes at the state and national level that guide standards of healthcare. Through my coursework in Ethics, Law, and Policy, I recognize a claim and an obligation to a leadership role in policy on behalf of the public and the nursing profession. (American Association of Colleges of Nurses, 2006). As practitioners, we DNP graduates can recognize triggers that influence health policy change. We are in position to act as a "critical interface between practice, research, and policy" (American Association of Colleges of Nurses, 2006, p.14).

The DNP education is designed to support the development of the ability to analyze the policy process. In Ethics, Law, and Policy I had the opportunity to practice writing letters to advocate for policy change. My letter addressed a national healthcare organization and advocated for the patient's right to cost transparency.

Policy change can be an important part of translating research into practice. Policies facilitate adherence to guidelines at the local level. The DNP project provided insight into how difficult policy development and adoption can be when a workplace culture and behavioral change is required. This DNP project proposed organizational standards to create a framework to facilitate the delivery of high-quality cardiac resuscitation aligning with AHA guidelines and other evidence-based practices. These proposed policies were designed to impact practice regulation, safety, quality, and efficacy. Although this effort was stunted through key stakeholder choices, as a DNP graduate candidate, I understand and value the importance of policy development in creating systems that meet the needs of constituents- leadership, staff, patients, and the community. This experience has emboldened my practice as a contributor in transforming health care to improve outcomes for future organizations.

Interprofessional Collaboration for Improving Patient and Population Health Outcomes. Design of Healthcare Delivery Systems provided an opportunity for interprofessional collaboration with Engineering students, together in a single class. Throughout the coursework, we joined our aims to improve the function of healthcare processes and systems. We employed various models which highlight the formation of a team prior to a methodical design of an improvement effort.

Through the DNP project, I was provided the opportunity to play a central role in establishing and working with a team. I led meetings, made recommendations, provided follow-up, and presented scholarly findings. The American Association of Colleges of Nurses states "advanced communication skills and processes" lead quality improvement initiatives (American Association of Colleges of Nurses, 2006, p. 11). Project success demanded a show of leadership. To facilitate an in-situ training day a web of communication was created between myself, the

office manager, the staff, and the educator to facilitate this event. The clinic lacked processes for the management of cardiac arrest, thus I designed SOPs and proposed these to clinic leadership. Although these were not implemented in practice, this was a great opportunity to communicate ideas to develop processes and promote positive patient and process outcomes within the organization.

Clinical Prevention and Population Health for Improving the Nation's Health. The DNP graduate works to promote health and to prevent disease, for both individual health promotion and for public health. The coursework of Advanced Clinical I, II, III, and IV instructed students in preventative medicine and chronic diseases. The training emphasized the importance of lifestyle interventions in disease management, particularly in the management of hypertension, diabetes, hyperlipidemia, and obesity. This training addressed the value of an integrated approach- shared decision making, offering counseling, and proposing referrals to dietitians and physical therapists to guide exercise plans as appropriate.

The coursework of Advanced Clinical I, II, III, and IV promoted public health by reviewing the schedule of routine immunizations for adults and children the recommended screenings such as the PSA, mammogram, and low-dose CT scan for smoking history. I routinely address these specific recommendations in the clinical setting in discussion with patients as applicable.

To promote public health on a community wide basis, the DNP graduate is prepared to develop appropriate interventions according to psychosocial dimensions and cultural diversity. Our coursework in Vulnerable Populations provided opportunity to consider the risks and resources for certain subgroups. My team focused on the Severely Mentally Ill. In future settings,

I will strive to recognize gaps in care for all individuals and populations that I serve and will work to coordinate care or develop appropriate interventions to address their needs.

Advanced Nursing Practice. This DNP essential addresses the preparedness of the DNP graduate to perform in an advanced nursing practice capacity. The program offered the foundational sciences, including Pathophysiology, Pharmacology, and Advanced Health Assessment, prior to our clinical rotations. In general, our coursework was inclusive of caring for rural populations. My clinical experiences then spanned various outpatient settings and two local communities: The Anchorage/Eagle River area and the Palmer/Wasilla areas in Alaska. While these locations are urban, many patients travel from rural areas for care. Settings have included outpatient Primary care, Pediatric Primary Care, Obstetrics and Gynecology, and Urgent Care. Although the Alaska State licensing board requires 500 clinical training hours, this program provided over 675. Both the quantity and quality of rich and varied learning experiences will inform my future advanced nursing practice.

As a graduate of a DNP program and a future provider, I will assess illness in a culturally sensitive manner; design, implement and evaluate science-based interventions; develop partnership with patients and their interdisciplinary team; develop an advanced level of clinical judgement; lead other nurses to achieve excellence in nursing; lead complex transitions for patients and healthcare organizations; and observe patterns within communities, organizations, and populations to recognize issues of concern (American Association of Colleges of Nurses, 2006, p.17).

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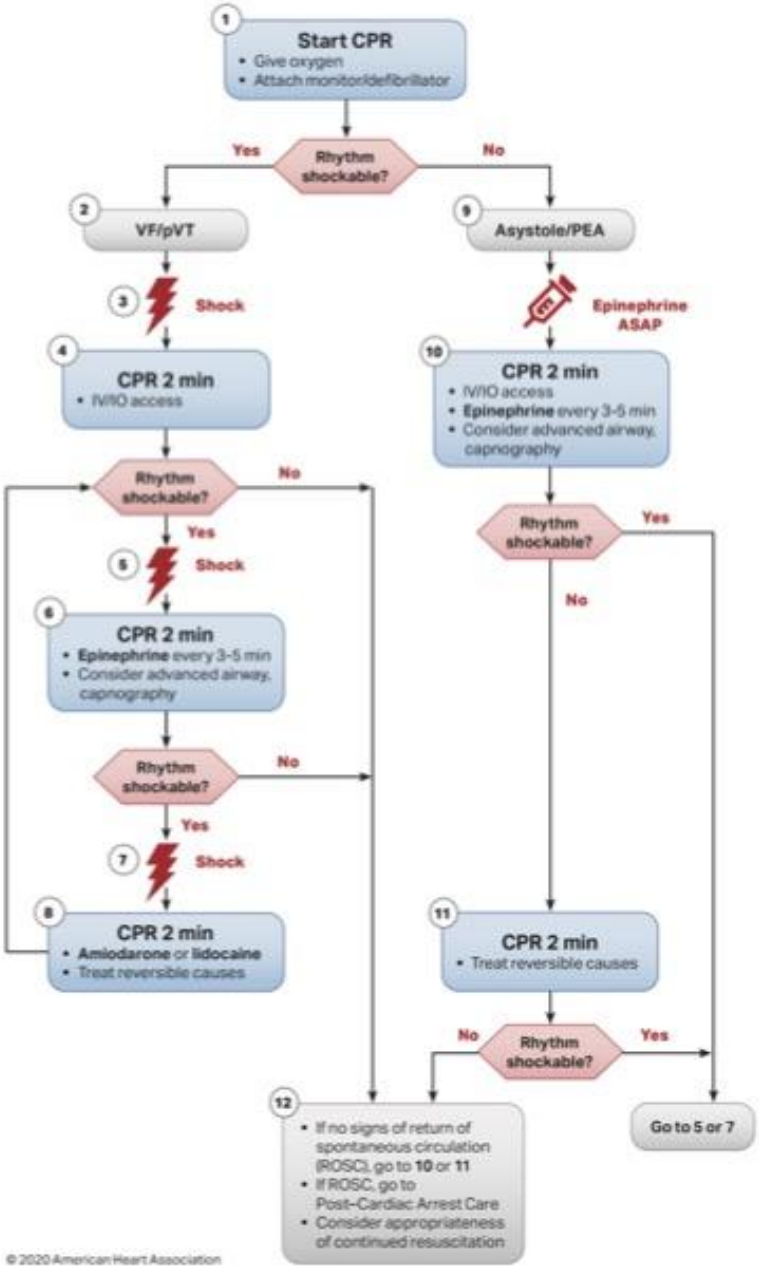
APPENDIX A

AMERICAN HEART ASSOCIATION CARDIAC ARREST ALGORITHM

Figure 4. Adult Cardiac Arrest Algorithm.



APPENDIX B

IOWA MODEL

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APPENDIX C

CARDIAC ARREST REGISTRY TO ENHANCE SURVIVAL

Cardiac Arrest Registry to Enhance Survival

CARES
Cardiac Arrest Registry to Enhance Survival

Part A. Demographic Information

1. Street Address (Where Arrest Occurred)

2. City | **3. State** | **4. Zip Code** | **5. County**

6. First Name | **7. Last Name**

8. Age ☐ Days ☐ Months ☐ Years ☐ DOB Unknown

9. Date of Birth ☐☐/☐☐/☐☐☐☐

10. Gender
☐ Male ☐ Female ☐ Non-Binary ☐ Female-to-Male, Transgender Male ☐ Male-to-Female, Transgender Female

11. Race/Ethnicity
☐ American-Indian/Alaska Native ☐ Asian ☐ Black/African American ☐ Hispanic/Latino ☐ Native Hawaiian/Pacific Islander ☐ White ☐ Unknown

Part B. Run Information

14. Date of Arrest ☐☐/☐☐/☐☐☐☐

15. Incident #

16. Fire/First Responder

☐ No First Responder dispatched

17. Destination Hospital

Part C. Arrest Information

18. Location Type
☐ Home/Residence
☐ Public/Commercial Building
☐ Street/Highway
☐ Nursing Home
☐ Healthcare Facility
☐ Place of Recreation
☐ Industrial Place
☐ Transport Center
☐ Other _____

19. Arrest Witness Status
☐ Unwitnessed
☐ Witnessed by Bystander
☐ Witnessed by 911 Responder

20. Presumed Cardiac Arrest Etiology
☐ Presumed Cardiac Etiology
☐ Trauma
☐ Respiratory/Asphyxia
☐ Drowning/Submersion
☐ Electrocution
☐ Exsanguination/Hemorrhage
☐ Drug Overdose
☐ Other _____

Resuscitation Information

21. Resuscitation Attempted by 911 Responder (or AED shock given prior to EMS arrival)
☐ Yes
☐ No

22. Who Initiated CPR
☐ Not Applicable
☐ Bystander
☐ Family Member
☐ Healthcare Provider (non-911 Responder)
☐ First Responder
Did Law Enforcement initiate CPR?
☐ Yes
☐ No
☐ EMS Responder (transport EMS)

25. Was an AED Applied Prior to EMS Arrival
☐ Yes, with defibrillation
☐ Yes, without defibrillation
☐ No

26. Who First Applied the AED
☐ Bystander
☐ Family Member
☐ Healthcare Provider (non-911 Responder)
☐ Law Enforcement First Responder
☐ Non-Law Enforcement First Responder

27. Who First Defibrillated the Patient
☐ Not Applicable
☐ Bystander
☐ Family Member
☐ Healthcare Provider (non-911 Responder)
☐ Law Enforcement First Responder
☐ Non-Law Enforcement First Responder
☐ EMS Responder (transport EMS)

First Cardiac Arrest Rhythm of Patient and ROSC Information

29. First Arrest Rhythm of Patient
☐ Ventricular Fibrillation
☐ Ventricular Tachycardia
☐ Asystole
☐ Idioventricular/PEA
☐ Unknown Shockable Rhythm
☐ Unknown Unshockable Rhythm

30. Sustained ROSC (20 consecutive minutes) or present at end of EMS care
☐ Yes, but pulseless at end of EMS care (or ED arrival)
☐ Yes, pulse at end of EMS care (or ED arrival)
☐ No

31. Was Hypothermia Care Provided in the Field
☐ Yes
☐ No

32. End of Event
☐ Effort ceased due to DNR
☐ Pronounced in the Field
☐ Pronounced in the ED
☐ Ongoing Resuscitation in ED

Part E. Hospital Section

47. ER Outcome
☐ Died in the ED
☐ Admitted to hospital
☐ Transferred to another acute care facility from the ED

48. Was hypothermia care/TTM initiated or continued in the hospital
☐ Yes ☐ No

49. Hospital Outcome
☐ Died in the hospital
☐ Discharged alive
☐ Patient made DNR
Choose one of the following:
☐ Died in the hospital
☐ Discharged alive
☐ Transferred to another acute care hospital
☐ Not yet determined
☐ Transferred to another acute care hospital
☐ Not yet determined

50. Discharge from the Hospital
☐ Home/Residence
☐ Rehabilitation Facility
☐ Skilled Nursing Facility/Hospice

51. Neurological Outcome at Discharge from Hospital
☐ Good Cerebral Performance (CPC 1)
☐ Moderate Cerebral Disability (CPC 2)
☐ Severe Cerebral Disability (CPC 3)
☐ Coma, vegetative state (CPC 4)

General Comments

APPENDIX D

ESTIMATE FOR EDUCATION OUTREACH VISIT WITH BLS/ACLS CERTIFICATION

[redacted]
Anchorage, AK [redacted]
[redacted]

Estimate 1001

ADDRESS
[redacted]

DATE	TOTAL	EXPIRATION DATE
10/09/2021	$1,200.00	01/31/2022

DATE		DESCRIPTION	QTY	RATE	AMOUNT
	ACLS Renewal	4 hour refresher	5	200.00	1,000.00
	BLS Renewal	4 hour refresher	2	100.00	200.00

Please let me know if I can answer any questions or make any corrections. Class will include cost of a manual and card processing.

TOTAL $1,200.00

THANK YOU.

Accepted By

Accepted Date

APPENDIX E

AUDIT TOOL FOR PRE- AND POST-IMPLEMENTATION

Variable observed	Before Intervention	After Intervention
BLS Certified Medical Staff • **Current**	**1/7**	**7/7**
• **Previously Certified**	**6/7**	
ACLS Certified Providers • **Current**	**0/5**	**5/5**
• **Previously Certified**	**4/5**	
Resuscitation medications • **Epinephrine**	**Y**	**Y**
• **Atropine**	**N**	**Y**
• **Lidocaine**	**N**	**Y**
Resuscitation equipment • **Defibrillator/AED**	**Y**	**Y**
• **Oxygen**	**Y**	**Y**
• **Bag Valve Masks (2)**	**N**	**Y**
Crash Cart Checklist	**N**	**Y**
AHA 2020 Handbook	**N**	**Y**
Standard operating procedures for cardiac arrest	**N**	**Y**

APPENDIX F

AAFP CRASH CART CHECKLIST

CHECKLIST: EMERGENCY SUPPLIES FOR FAMILY MEDICINE OFFICES

The following checklist of recommended emergency supplies includes many expected items as well as several items less commonly found in family medicine offices. In deciding whether to include a particular item in your practice, consider your staff members' ability to use the item appropriately and your office's access and proximity to emergency services.

Equipment
☐ Automated external defibrillator (AED)
☐ Bag mask ventilator (two bag sizes and three mask sizes for adult, pediatric, and infant)
☐ Blood pressure cuff (all sizes)
☐ Blood spill cleanup kit
☐ Cardiac board
☐ CPR barrier device
☐ Eye wash
☐ Glucometer
☐ Intravenous catheter/butterfly needles (18 to 24 gauge)
☐ Intravenous extension tubing and T-connectors
☐ Nasal airways (one set)
☐ Nasogastric tubes
☐ Nasal cannula for oxygen
☐ Nebulizer or metered dose inhaler with spacer and face mask
☐ Non-rebreather mask (three sizes)
☐ Oxygen mask (three sizes)
☐ Oxygen tank and flow meter
☐ Portable suction device and catheters, or bulb syringe
☐ Pulse oximeter for child and adult usage
☐ Resuscitation tape (color-coded)
☐ Universal precautions (latex-free gloves, masks, and eye protection)

Medications
☐ Acetaminophen (rectal suppositories)
☐ Albuterol
☐ Aspirin, chewable
☐ Atropine
☐ Ceftriaxone
☐ Corticosteroids, parenteral
☐ Dextrose 25% and 50%
☐ Diazepam, parenteral
☐ Diphenhydramine, oral and parenteral
☐ Epinephrine injection
☐ Flumazenil
☐ Glucagon
☐ Lidocaine
☐ Lorazepam, sublingual
☐ Morphine
☐ Naloxone
☐ Nitroglycerin spray
☐ Saline, normal

AAFP FPM

FPM Toolbox To find more practice resources, visit https://www.aafp.org/fpm/toolbox.

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APPENDIX G

CRASH CART CHECKLIST

ITEM		QUANTITY	DESCRIPTION
Top of Cart			
Defibrillator			
Handbook of Emergency Cardiovascular Care			
Drawer 1			
Disposable razor			
CPR micro shield			
Electrode jelly			
Cetacaine (topical anesthetic spray)			
Drawer 2			
Gauze 2X2			
Bioclusive dressing			
Defibrillator paper strip			
Syringe with luer lock	60 ml		
	20 ml		
	10 ml		
	5 ml		
	3 ml		
	1 ml		
IV catheter plug (male)			
Bandaids			
Alcohol pads			
Gauze 1X1 loose			
IV Catheter	16 g		
	18 g		
	20 g		
	22 g		
Butterfly vacutainer blood collector	21g, ¾ in		
	25g, ¾ in		
Filter needle, 19 g, 1½ in			
Fill needle	18 g 1½ in		
	22g 1½ in		
	25 g 1 in		
Surgipad			
Abdominal pad			

ITEM		QUANTITY	DESCRIPTION
Drawer 3			
Epinephrine 1 mg/ml			
Nitro 0.4 mg sl tabs			
Diphenhydramine 50 mg/ml			
Diphenhydramine tabs			
Solu-medrol 125 mg			
Clonadine 0.2 mg			
Aspirin 325 mg *chewable/non ec			
Aspirin 81 mg			
Glucose tabs			
Nasogastric stump	18 (rench)		
	12 (rench)		
Yankauer suction			
Gauze 2x2			
Drawer 4			
Foam electrodes (30 packs)			
Medical recording chart paper			
Drawer 5			
IV Tubing			
NS 1000 ml			
Drawer 6			
Ambu bags			
Nasal cannula			
Simple mask with tubing			
Non-rebreather			
Splint (small)			
(Needs to be placed appropriately)			
Naloxone			
IV Saline lock			
Saline syringes			
Atropine 1mg/ml			
Lidocaine 1%			
Epinephrine 10,000mg/mL			