



ROWAN COUNTY EMS

I M P R O V I N G C A R D I A C
A R R E S T S U R V I V A L

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SEPTEMBER 9, 2012

2:44

11:44:00 Mr. Taylor suffers a sudden cardiac arrest while stopped at an intersection after leaving PetSmart.

11:44:34 Cell phone caller calls Rowan 911 communications

11:44:53 Caller states a black truck ran up on the sidewalk and hit a telephone pole

11:45:41 Cell phone caller reports he has been pulled from the truck and they are doing CPR

11:46:35 EMD process completed. Rowan communications asks if there is an AED available.

11:46:44 Medic 851 and SFD Quint 1 dispatched



SEPTEMBER 9, 2012

7:40

11:50:32 Medic 851 Arrives

11:51:25 SFD Quint 1 Arrives

11:51:40 Intubation and First Defibrillation

11:53 IV access

11:54 ACLS pharmacological interventions begin

26:00

12:08 Ventricular Fibrillation terminated on 6th shock

12:10 Return of spontaneous circulation (ROSC)

12:11 Return of spontaneous respirations

12:12 Sedation and Hypothermia Protocol initiated Transport to hospital

35:00

12:19 Arrive at Rowan Regional Medical Center ED



BACKGROUND

Sudden Cardiac Arrest occurrence

US ≈ 300,000 last year

Rowan County 2011 255 worked arrests

Survival Rates

Seattle / King Co Washington ≈ 50%

Wake County NC ≈ 20%

Detroit Mi < 1%

Rowan County 2011

Approx 10 ROSC to the hospital

Survival to discharge unknown

< 3% ROSC



THE PLAYERS

130,000 Residents

21 First Responder Agencies

47 Departments

7 Paramedic Ambulances

2 Hospitals

CHANGES AND CHALLENGES

Documentation improvements

QA/QI process

Data should be systematically reviewed and compared internally to prior performance and externally to similar systems. Existing cardiac arrest registries can facilitate this benchmarking effort; examples include the Cardiac Arrest Registry to Enhance Survival (CARES)

Medical Direction

Protocol / Policy changes

Staff Training

First Responder Training

Feedback loop to all involved

PROTOCOL & POLICY CHANGES

Cardiac Arrest

History

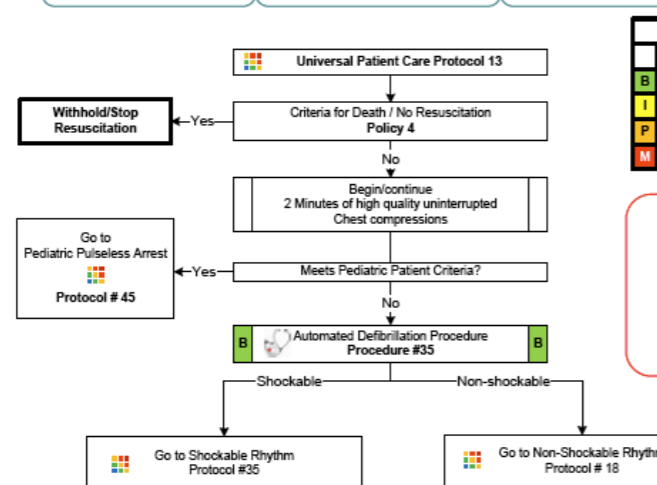
- Events leading up to arrest
- Estimated Downtime
- Past Medical History
- Medications
- Existence of terminal illness
- Signs of lividity, rigor mortis
- DNR, MOST, or Living Will

Signs and Symptoms

- Unresponsive
- Pulseless
- Apneic

Differential

- Medical or Trauma
- Shockable Rhythm



Pearls

- Exam: Mental Status**
- Success is based on proper planning and execution. Procedures require space and patient access. Make
- Reassess airway frequently and with every patient move.
- Maternal Arrest** – Treat mother per proper protocol with immediate notification to destination facility and
- Keep chest compression interruptions less than 20 seconds. Compression interruptions should only be for
- and electrical therapy delivery.
- Focus on high quality chest compression until adequate resource are available to perform other treatment
- Do not transport unless successful spontaneous return of circulation or other special circumstances...i.e. I
- Pediatric patients are defined as any child that can be measured and fits a Broselow-Luten Resuscitation

Protocol 20
This protocol has been altered from the original NCCEP Protocol by the local EMS Medical Director

Shockable Rhythm (Adult)

History

- Events leading up to arrest
- Estimated down time
- Past Medical History
- Medications
- Renal Failure / dialysis
- DNR, MOST, or Living Will

Signs and Symptoms

- Pulseless
- Apneic
- Unresponsive
- Shock advised on AED
- Ventricular fibrillation or ventricular tachycardia on ECG

Differential

- Asystole
- Artifact
- Cardiac
- Endocrine / Metabolic
- Drugs
- Pulmonary



Pearls

- Exam: Mental Status**
- Consider Calcium chloride and Sodium Bicarbonate if hyperkalemia is suspected (renal failure, dialysis patients)
- Treatment priorities are: uninterrupted high quality chest compression, defibrillation, airway control, IV access, ACLS
- In polymorphic V-Tach (Torsades de Pointes) consider Magnesium Sulfate 2g slow IVP
- In refractory V-Fib consider Double Sequential Defibrillation if available
- If arrest not witnessed by trained emergency response personnel provide 2 minutes of effective CPR prior to 1st defibrillation
- Effective CPR and prompt defibrillation are keys to successful resuscitation
- Manufactures recommended energy delivery for defibrillations are as follows: Zoll 120J; Philips 150J; Medtronic 200J
- Do not transport unless successful spontaneous return of circulation or other special circumstances...i.e. High profile cases

Protocol 35
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Non-Shockable Rhythm (Adult)

History

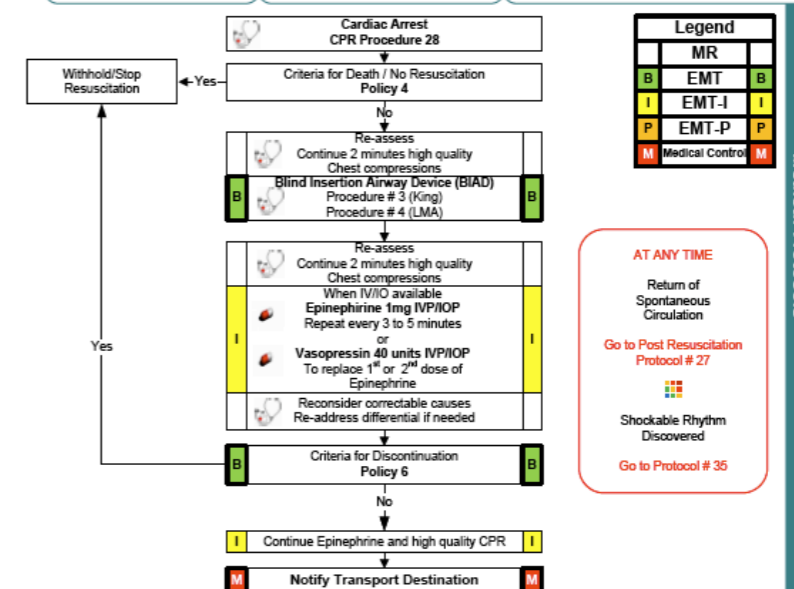
- Past medical history
- Medications
- Events leading to arrest
- End stage renal disease
- Estimated downtime
- Suspected hypothermia
- Suspected overdose
- DNR or Living Will

Signs and Symptoms

- Pulseless
- Apneic
- No electrical activity on ECG
- No auscultated heart tones

Differential

- Medical or Trauma
- Hypoxia
- Potassium (hypo / hyper)
- Drug overdose
- Acidosis
- Hypothermia
- Lead error
- Death



Pearls

- Exam: Mental Status**
- Always confirm asystole in more than one lead.
- Successful resuscitation of Asystole requires the identification and correction of a cause. Causes of Asystole include:
 - Acidosis
 - Hypovolemia
 - Hyperkalemia
 - Overdose (Narcotics, Tricyclic Antidepressants, Calcium Channel Blockers, Beta Blockers)
 - Tension pneumothorax
 - Hypoglycemia
- Do not transport unless successful spontaneous return of circulation or other special circumstances...i.e. High profile cases

Protocol 18
This protocol has been altered from the original NCCEP Protocol by the local EMS Medical Director

2011

Medical Protocols

3044

PROTOCOL & POLICY CHANGES

Post Resuscitation

History

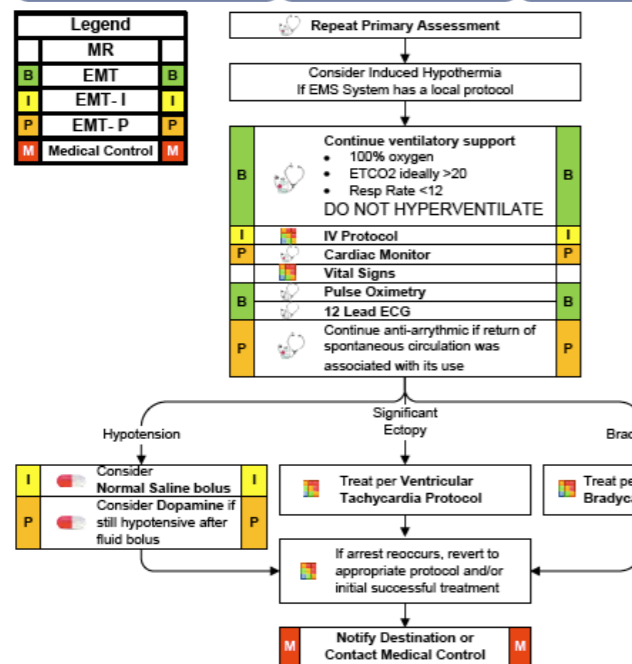
- Respiratory arrest
- Cardiac arrest

Signs/Symptoms

- Return of pulse

Differential

- Continue to address specific differentials associated with the original dysrhythmia



- Pearls**
- Recommended Exam: Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, &
 - Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the p phase and must be avoided at all costs.
 - Most patients immediately post resuscitation will require ventilatory assistance.
 - The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require appropriate post-resuscitation management may best be planned in consultation with medical control.
 - Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, pneumothorax reaction to ALS drugs.
 - Titrate Dopamine to maintain MAP >90. Ensure adequate fluid resuscitation is ongoing.

Protocol 27

Any local EMS System changes to this document must follow the NC OEMS Protocol Change Policy and be approved

Induced Hypothermia

History

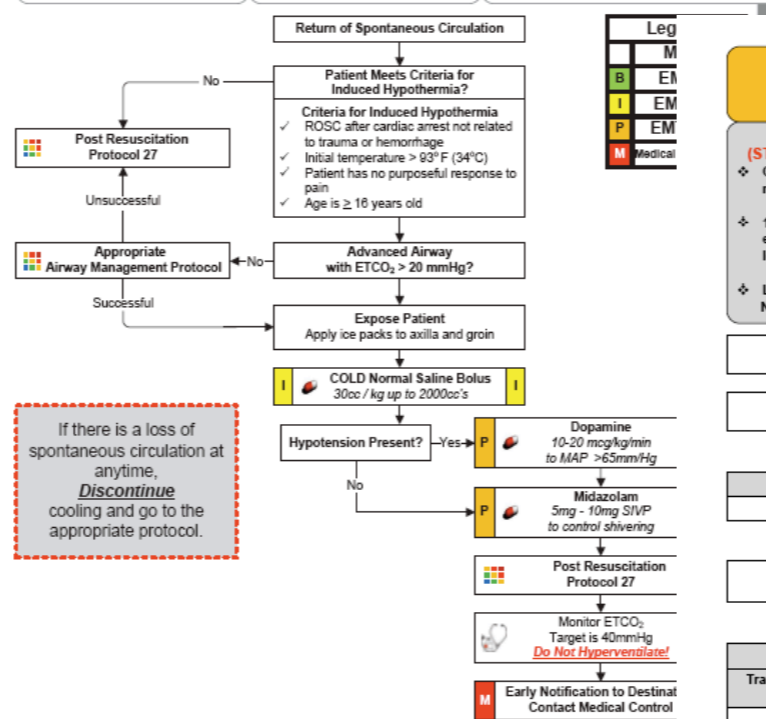
- Non-traumatic cardiac arrest (hanging and drowning permitted)

Signs and Symptoms

- Return of spontaneous circulation

Differential

- Continue to address specific differentials associated with the original dysrhythmia



If there is a loss of spontaneous circulation at anytime, **Discontinue** cooling and go to the appropriate protocol.

- Pearls**
- Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro
 - In absence of an advanced airway, cooling can be initiated only with a Medical Control Order.
 - Protect patient modesty, undergarments may remain in place during cooling.
 - Do not delay transport for the purpose of cooling.
 - Frequently monitor the airway for displacement.
 - Patients may develop metabolic alkalosis with cooling. Do not hyperventilate.
 - Target temperature after cooling is 90-93°F (32-34°C)

Protocol 59

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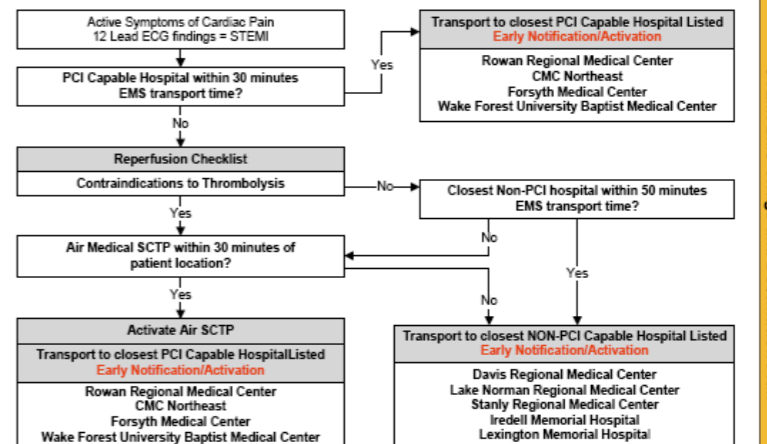
STEMI EMS Triage and Destination Plan

STEMI Patient (ST Elevation Myocardial Infarction)

- Cardiac Symptoms greater than 15 minutes and less than 12 hours
- 12 lead ECG criteria of 1mm ST elevation in 2 or more contiguous leads.
- Left Bundle Branch Block
- NOT KNOWN to be present in the past

The purpose of this plan is to:

- Rapidly identify STEMI patients who call 911 or present to EMS
- Minimize the time from onset of STEMI symptoms to coronary reperfusion
- Quickly diagnose a STEMI by 12 lead ECG
- Complete a reperfusion checklist (unless being transported directly to a PCI hospital) to determine thrombolytic eligibility
- Rapidly identify the best hospital destination based on a symptom onset time, reperfusion checklist and predicted transport time
- Early activation/notification to the hospital prior to the patient arrival
- Minimize scene time to 15 minutes or less (including a 12 lead ECG)
- Provide quality EMS service and patient care to the EMS Systems citizens.
- Continuously evaluate the EMS System based on North Carolina EMS performance measures



- Pearls and Definitions**
- All STEMI patients must be triaged and transported using this plan. This plan is in effect 24/7/365
 - All patient care is based on EMS Chest Pain and STEMI Protocol
 - Consider implementing a prehospital thrombolytic program if a STEMI patient cannot reach a hospital within 90 minutes using air or ground EMS transport
 - PCI (Percutaneous Coronary Intervention) Capable Hospital = a hospital with an emergency interventional cardiac catheterization laboratory capable of providing the following services to acute STEMI patients. Free standing emergency departments and satellite facilities are not considered part of the PCI hospital.
 - 24/7 PCI capability within 30 minutes of notification (interventional cardiologist present at the start of the case)
 - Single Call Activation number for use by EMS
 - Accepts all patients regardless of bed availability
 - Provides outcome and performance measure feedback to the EMS including case review
 - Non-PCI Hospital = a local hospital within the EMS Systems service area which provides emergency care including thrombolytic administration to an Acute STEMI patient but does not provide PCI services
 - Specialty Care Transport Program = an air or ground based specialty care transport program which can assume care of an acute STEMI patient from EMS or a Non-PCI hospital and transport the patient to a PCI capable hospital

Rowan County EMS System

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2009

PROTOCOL & POLICY CHANGES

Standards Policy Discontinuation of Prehospital Resuscitation



Policy:

Unsuccessful cardiopulmonary resuscitation (CPR) and other advanced life support (ALS) interventions may be discontinued prior to transport or arrival at the hospital when this procedure is followed.

Purpose:

The purpose of this policy is to:

- Allow for discontinuation of prehospital resuscitation after the delivery of adequate appropriate ALS therapy.

Procedure:

1. Discontinuation of CPR and ALS intervention may be implemented **prior to c** **Medical Control** if **ALL** of the following criteria have been met:

- Patient must be 18 years of age or older
- Adequate CPR has been administered
- Airway has been successfully managed with verification of device placement management techniques include orotracheal intubation, nasotracheal intubation, Insertion Airway Device (BIAD) placement, or cricothyrotomy
- IV or IO access has been achieved
- No evidence or suspicion of any of the following:
 - Drug/toxin overdose
 - Active internal bleeding
 - Hypothermia
 - Preceding trauma
- Rhythm appropriate medications and defibrillation have been administered local EMS Protocols for a total of 3 cycles of drug therapy without return of circulation (palpable pulse)
- All EMS paramedic personnel involved in the patient's care agree that discontinuation of resuscitation is appropriate

2. If all of the above criteria are not met and discontinuation of prehospital resuscitation is desired, **contact Medical Control**.

3. The **Deceased Subjects Policy** should be followed.

Document all patient care and interactions with the patient's family, personal physician, law enforcement, and medical control in the EMS patient care report (PCR).

Policy 6

This policy has been altered from the original 2009 NCCBP Policy by the local EMS Medical Director

Standards Policy Deceased Subjects



Policy:

EMS will handle the disposition of deceased subjects in a uniform, professional, and respectful manner.

Purpose:

The purpose of this policy is to:

- Organize and provide for a timely disposition of any deceased subject
- Maintain respect for the deceased and family
- Allow EMS to return to service in a timely manner.

Procedure:

1. Do not remove lines or tubes from unsuccessful cardiac arrests/codes unless directed by Medical Control.
2. Notify the law enforcement agency with jurisdiction if applicable.
3. If subject was found deceased by EMS, the scene is turned over to law enforcement.
4. If EMS has attempted to resuscitate the patient and then terminated the resuscitation, the EMS personnel may assist law enforcement with contacting the family physician (cases) or medical examiner (traumatic cases or family physician unavailable) to obtain information about the resuscitative efforts.
5. Transport arrangements should be made in concert with law enforcement and the wishes of the family.
6. If the deceased subject's destination is other than the county morgue, any line(s) placed by EMS should be removed prior to transport.
7. Document the situation, name of Physician or Medical Examiner contacted, the method of providing transport of the deceased subject, and the destination on the patient care report (PCR).

Policy 5

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Standards Policy Criteria for Death / Withholding Resuscitation



Policy:

CPR and ALS treatment are to be withheld only if the patient is obviously dead or a valid North Carolina **MOST and/or Do Not Resuscitate** form (see separate policy) is present.

Purpose:

The purpose of this policy is to:

- Honor those who have obviously expired prior to EMS arrival.

Procedure:

1. If a patient is in complete cardiopulmonary arrest (clinically dead) and meets one or more of the criteria below, CPR and ALS therapy need not be initiated:
 - Body decomposition
 - Rigor mortis
 - Dependent lividity
 - Blunt force trauma
 - Injury not compatible with life (i.e., decapitation, burned beyond recognition, massive open or penetrating trauma to the head or chest with obvious organ destruction)
 - Extended downtime with Asystole on the ECG
2. If a bystander or first responder has initiated CPR or automated defibrillation prior to an EMS paramedic's arrival and any of the above criteria (signs of obvious death) are present, the paramedic may discontinue CPR and ALS therapy. All other EMS personnel levels must communicate with medical control prior to discontinuation of the resuscitative efforts.
3. If doubt exists, start resuscitation immediately. Once resuscitation is initiated, continue resuscitation efforts until either:
 - a) Resuscitation efforts meet the criteria for implementing the **Discontinuation of Prehospital Resuscitation Policy** (see separate policy)
 - b) Patient care responsibilities are transferred to the destination hospital staff.

Policy 4

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2009

CHANGES

Philips MRx monitors with Q-CPR integration

King LT-d airway vs ET Tube

New Policy & protocols

Intensive one on one crew training

First responder training

Revised documentation standards

INDIVIDUAL PROFICIENCY

Technical skills

*protocols, procedures, rotating
compressors*

Emotional skills

dealing with family, bystanders

Organizational skills

new team dynamics

Stress management

Attitude



TEAM DYNAMICS

Dispatcher recognition / instructions

First responder effectiveness

Post resuscitation care

Hospital continuum of care

THE PIT CREW APPROACH

First responder officer coordinates and provides report to EMS

Concentrate on CPR

CPR 2" @ rate of 100

Full chest recoil

AED placement by 2 min mark

Airway management

Avoid hyperventilation

Rotate clockwise every 2 minutes

Continuous femoral pulse palpation

MOTIVATE DON'T MANDATE

Resuscitation is yours; We are there to assist.

Effective CPR and early defibrillation are the only proven treatments.

These are BLS skills

Paramedics are there for post resuscitation care and management

EMS POST ARREST CARE

Optimize cardiopulmonary function and vital organ perfusion

Transport patient to an appropriate hospital

Acute Coronary interventions

Neurological care

Goal-directed critical care

Hypothermia.

HOSPITAL POST ARREST CARE

Control body temperature to optimize survival and neurological recovery

Identify and treat acute coronary syndromes (ACS)

Optimize mechanical ventilation to minimize lung injury

Reduce the risk of multi-organ injury and support organ function if required

Objectively assess prognosis for recovery

Assist survivors with rehabilitation services when required



OUR RESULTS

March 1st - October 31st 2012

187 Cardiac Arrests

102 Treated with ALS interventions

44 Return of spontaneous circulation (ROSC from all rhythms) 43%

13 Discharged from the hospital 29.5%



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