Pit Crew Resuscitation Process

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Condell Medical Center EMS System
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Objectives

Upon successful completion of this CE, the EMS provider will be able to:

1. Describe the minimum assessment to take to determine the stable from unstable patient.
2. Discuss the quick initial patient evaluation to perform when first approaching your patient.
3. Differentiate when the ABC approach is taken from the CAB assessment approach.
4. List the goals EMS employs with every call.
5. Discuss the Pit Crew resuscitation concept EMS can employ.
6. Build the roles of the Pit Crew resuscitation team including members for CPR, monitor/defib, airway, IV/IO/meds, team leader
7. Correlate the benefits of waveform capnography when utilized during cardiac arrest.

8. Define ROSC and list indications, contraindication, and process to induce hypothermia.

9. Categorize medical oversight as being off-line or on-line.

10. Choose the proper medication to use in the arrested patient.

11. Actively participate in review and correct identification of a variety of EKG rhythms.

12. Actively participate in the pit crew process of running a code by acting in a variety of roles.

13. Successfully complete the post quiz with a score of 80% or better.
Providing Patient Care Based on Stability of Patient

Assessment is the first step in any process

Need to determine stability of patient to determine treatment plan

What makes the patient stable versus unstable???

Check the level of consciousness

The first indicator to change

*The brain is VERY sensitive to oxygen and glucose supply levels*

Check the blood pressure (indirectly by evaluating the radial pulse)

The body uses all its compensatory processes to preserve perfusion

A dropping blood pressure is one of the last changes to occur when compensatory processes have been exhausted
Initial Patient Evaluation

We have moved away from touching our patients

We have all we need literally at our fingertips to properly make an initial assessment

As you arrive next to the patient, introduce yourself and say “hello”

①Watch the response of the patient

Tissue over the corneas are VERY sensitive to proper perfusion

When the patient is groggy answering back or can’t focus, you have an indication that the level of consciousness is altered

Do they still have a twinkle in their eyes?

Can they focus on you? Can they respond?
2. Lay your fingers on the radial pulse
Patient feels the touch as soothing contact; you are trying to determine presence of a radial pulse

*If a radial pulse is present, you know they have some kind of blood pressure to pump blood all the way to the periphery of the body – the radial area*

*This can also be a time to validate skin conditions such as temperature and moisture*

If the patient cannot focus on you, cannot answer back, you know they are in trouble

If they have an absent or poor radial pulse, it confirms a patient is in deep distress
Initial Patient Evaluation – ABC vs CAB

When patient appears to be alive, the approach follows the ABC’s
A – check if *airway* is open
B – check quality of *breathing* / ventilating
C – check for quality of *circulation* / perfusion / pulses

When patient appears to be in arrest, the approach follows CAB
C – check for *circulation* (check the pulse)
A – open the *airway* (after providing compressions as appropriate)
B – begin to ventilate / *breath* for the patient

*Residual oxygen is left in the lungs and in tissues*
*Maintaining circulation is more important than adding additional oxygen supply to the body*
Importance of Initial Patient Evaluation

Initial evaluation determines the stability of your patient

The speed with which you move can be determined at the first “hello”
Do you have time to move slower?
Do you need to move quickly?

If jobs/tasks are preassigned, no time is wasted in determining who does what and what needs to be done

Sudden cardiac arrest is one situation in which the faster care is provided the higher the chance of survival
Goals in EMS

We want to be great at our job; not just good
We want to do the right thing every time
We want to be efficient in our actions
We would like to have a good patient outcome on every call
  We realize we can’t save everyone
  We want our actions to contribute to a good outcome when possible

So, how do we do this???
Show Me The Code!

Run a code right now:

✓ Pick a response team
✓ Respond to “a call” for a 58 year old patient who suddenly collapsed in the bathroom
✓ Work the arrest as you would if the call came in right now

➢ Discuss what went well
➢ Discuss obstacles encountered
➢ How was your timing?
Efficiency in Motion

The NASCAR pit crews train like athletes
Notice everyone has a job
Each person carries their necessary “tools” with them

Take a look at efficiency in motion!

Click movie camera to watch
Pit Crew Resuscitation Process

A process to provide multiple complicated activities in an efficient time frame in an organized team approach

Follows the process of the NASCAR pit crews

We won’t resuscitate a patient in 12 seconds or less but we can take lessons from being organized

There is a team approach to resuscitation

*Each member of the team is assigned a job; knows what to do*

*Consider this organized chaos*
Pit Crew Concept For EMS

Focuses on good BLS and CPR
Minimizing interruptions of compressions to under 10 seconds
Jobs are defined ahead of time – who does what and when
Can be adopted to fit YOUR department and man-power

*Takes pre-planning and training to make it all work to the benefit of the patient*
Making Pit Crew Response Successful

What makes a NASCAR pit crew successful?
   Races have been won/loss on the efficiency of the pit crew!

The same pit crew approach can make the response work in EMS
✓ Good teamwork with defined roles
✓ Adequate workspace
✓ Excellent communication
✓ Smooth transitions
✓ Mutual respect

EMS add-on’s
✓ Rapid assessment
✓ High performance CPR
Pit Crew Philosophy Disclaimer

We are not here to tell you HOW to assign your roles
We are not here to tell you HOW to make the pit crew philosophy work for your department

We are here to share the process of success
This is not a new concept; it is a proven concept

Take our guidelines, work internally, and make it work for your department

*All we ask is: give it a try!*
Defining Your Work Space

Patients don’t always choose to collapse in the best working environments or space

Initial decisions for EMS to make
  Is the scene safe?
  Do you need additional resources?
  Number and severity of the patient(s)?

New question to add:
  Where is the ideal location to resuscitate this patient?

  Need enough room to perform your tasks: CPR (from both sides of the patient); room for the
  monitor/defibrillator; control of the airway; access to patient to initiate IV/IO
  First thing to do after identifying cardiac arrest is move the patient – quickly

Need to know where you are moving the patient to before you start moving them
What Are The Pit Crew Roles?

The only roles that switch are typically the CPR compressor
Switch every 2 minutes

*Usually trade / switch is between compressor and ventilator*

- Initial assessment ➔ begins CPR
- Attachment/interpretation of monitor
- Securing airway
- Vascular access and medication delivery
- Team Leader
- Family support
“Triangle of Life”

First 3 rescuers provide chest compressions, early defibrillation, and positive ventilations

First 3 rescuers allow patient to receive continuous, uninterrupted chest compressions

“Push hard and push fast”
Fist Step – Rapid Assessment

Patients in cardiac arrest DO NOT have the luxury of time on their side
Most of us can tell immediately when a patient is in cardiac arrest

What we now know:
Patients won’t die if we push on their chest while they have a pulse
Patients WILL die if we don’t push on their chests while they don’t have a pulse

*Can always stop CPR but can’t regain lost time if compressions were delayed*

*If in doubt (Do they have pulse? Is the pulse absent?)*

*START CPR!*
Benefit of Quality CPR

Best performance of CPR buys time for medications and oxygenation to work

While patient remains in ventricular fibrillation (VF), there is a chance/hope for resuscitation

Pauses <10 seconds allow for maximum compression time

Compression time = organ perfusion = improved chance of recovery

- Pause compressions < 10 seconds ONLY for ventilations (until airway secured with advanced airway), rhythm check, and delivery of shock
- Once airway secured with advanced device, pause compressions for <10 seconds for rhythm check and delivery of shock
Defined Role – First Person - CPR

Quick assessment to confirm unresponsiveness and pulselessness

Initiate chest compressions
- Compress at least 2 inches for the adult
  - Neonates and infants – 1 1/2”
  - Child about 2”
- Push fast at least at a rate of 100 compressions per minute
- Allow for chest to recoil

Rotate compressors every 2 minutes during the <10 second pause
- As soon as the pause begins, new compressor moves into place to avoid delay in resuming compressions
CPR Steps Per AHA Guidelines

Check for unresponsiveness – shake and shout
Look for signs of life – movement, breathing
Check 5 – 10 seconds for pulse
If pulse absence or unsure, begin chest compressions
After 30 compressions, administer 2 ventilations
Immediately resume chest compressions repeating compressions/ventilations for 5 cycles (2 minutes)
As soon as monitor/defibrillator ready to be viewed, stop CPR regardless of where you are in the cycle
Immediately after each shock is delivered, resume CPR
Defined Role – 2\textsuperscript{nd} Person - Monitor

Place monitor near head of the patient
Turn monitor on
Attach monitor cables and defib pads to the patient
As soon as monitor is ready, call to pause CPR to check rhythm
    If shockable rhythm, charge defibrillator
    Compressor continues compressions during charging phase of monitor/defibrillator
If ANY delay in defibrillation, resume compressions
Defined Role – Next Task - Airway

Insert an oropharyngeal and/or nasopharyngeal airway
   Improves efficiency of bagging patients
Attach capnography to the BVM, if available
Secure BVM with good seal
   Airway person can use 2 hands to maintain seal of mask
   Person compressing can actually squeeze the bag
   *Ventilate with enough volume to make the chest barely rise*
   *Ventilate over 1 second*
Advanced airway is placed AFTER IV/IO established and when you have sufficient man-power available
Oro/nasopharyngeal Airways

Proper measurement/sizing important
The right tool for the right job!

Oropharyngeal airway
  Measure from the corner of the mouth to the angle of the jaw (or tragus of the ear)

Nasopharyngeal airway
  Measure from the nares to the angle of the jaw (or tragus of the ear)
Did You Remember?

In cardiac arrest state, metabolism is significantly slower
Therefore, need for oxygen supply to the body decreases
Sustained hyperventilation is bad!
   Over-inflation of the lungs increases intra-thoracic pressures
   Decreases venous return to the heart
   Negatively affects cardiac output and perfusion pressures
Hyperventilation blows off CO₂ which causes blood vessels to
reflexively vasoconstrict further minimizing blood flow to vital organs
like the brain
Benefit of Capnography

Evaluates end tidal (end of breath) CO$_2$ levels exhaled

- Reflects ventilation / breathing
  Movement of air in and out of the lungs
- Reflects diffusion
  Exchange of gases between alveoli and pulmonary circulation
- Reflects perfusion
  Circulation of blood necessary to pick up generated waste products to deliver them to the lungs to be exhaled
Capnography cont’d

- Reflects adequacy of CPR
  - Minimal waveform levels of 10 mmHg
  - Patients exhibiting levels >20mmHg statistically more likely to have ROSC

- Identifies correct placement of advanced airway devices by measuring expired CO₂ levels

- Identifies ROSC
  - Spike in CO₂ reading does NOT indicate great CPR technique!
  - You move to normal levels only when the heart beat is resumed
Defined Role – IV/IO & Meds Person

These tasks not to interfere with good CPR technique

IV access is obtained via peripheral site or IO

Once access established, medications can be administered following at least first defibrillation attempt

Medications administered during the compression phases of CPR

   Fluid boluses of 20 ml supports getting the medication into the circulation
Defined Role – Team Leader

Oversees activity and timing
Keeps tasks on-point
You can decide who would be your team leader

Ideas:

- One of the initial responders – they know the whole story
  Can be relieved of their task to step back and be Team Leader
- With limited man-power, the compressor or airway person may have this dual function
  They are stationed next to the patient and can oversee the site
  *Realize they both have roles that include counting their tasks though*
Return of Spontaneous Circulation - ROSC

✓ Identified by sudden rise CO₂ levels toward lower limits of normal (35 – 40 mmHg)
✓ Organized rhythm noted on cardiac monitor
✓ Pulse present

Next step:

➢ Immediately follow ABC assessment
  Verify presence of ventilations
    Support ventilations at 1 breath every 5-6 seconds if BVM or 6-8 seconds if advanced airway

Optimize oxygenation
  Continue to provide supplemental oxygenation
ROSC cont’d

Obtain vital signs
  B/P, pulse, respiratory rate

Obtain 12 lead EKG if able
  A percentage of cardiac arrest patients have an acute MI
  Outcome impacted with rapid recognition and transport to the cath lab

Perform mini-neurological exam
  Can the patient follow commands?

Re-evaluate airway control
ROSC Indications

- Cardiac arrest (presumed cardiac etiology)
- Remains unconscious and unresponsive
- ROSC for at least 5 minutes
- B/P maintained >90 with/without pressors (i.e.: Dopamine drip)
- Airway secured
ROSC Relative Exclusions

 filtro  Major head trauma or traumatic cardiac arrest
 filtro  Recent major surgery within 14 days
 filtro  Systemic infection
 filtro  Comas from other causes (i.e.: drug induced/overdose)
 filtro  Active bleeding
 filtro  Not recommended for isolated respiratory arrest
 filtro  Suspected hypothermia already present 34°C/93.2°F
Induction of ROSC – Cooling the Patient

- Ice packs placed in axilla, around neck and groin
- Ice pack over IV/IO access site
- If shivering, contact Medical Control for possible medication order

Notify receiving facility of patient status
Off-line medical oversight

Medical policies, procedures, and practices pre-approved by the Region X Medical Directors

- Allows EMS to follow pre-approved guidelines
- Provides standardized approaches to patient problems
- Provides a consistent level of care
- Provides a standard for accountability
On-line Medical Control

Method for EMS to have direct contact with the hospital ED physician
Allows for collaborative practice in interpretation of patient’s complaint and related potential interventions
Medical Control should be contacted whenever deviation from the SOP’s are anticipated
Medical Control should be contacted whenever EMS needs consultation
Using the SOP’s

These are medical guidelines

A physician can use them or change the order

EMS must follow the SOP’s (i.e.: Medical orders)
   To make a change, Medical Control MUST be contacted for permission
   This involves critical thinking skills to know when to follow the SOP’s as written and when appropriate deviation is required

Pull out your SOP’s to follow along with appropriate treatment interventions for the cases at the end
Medications in Arrested Patient

Meds always *FOLLOW* defibrillation attempt
Categories of medications are alternated
Medications are administered during phases of compressions

➡ Vasopressors
   Press on vessels to constrict vessels
   Appropriately constricted vessels improve perfusion to vital organs

➡ Antidysrhythmic
   Soothes irritability in the ventricles
Vasopressor - Epinephrine

Strength 1:10,000
Dose 1 mg IVP/IO

Repeated every 3-5 minutes (relatively short half-life)
  - Relatively healthier and younger patient can tolerate every 3 minute interval
  - Elderly and more debilitated patients (poor functioning kidneys or liver) should follow the 5 minute interval

Can put a strain on the heart by increasing the work load of the heart
Antidysrhythmic - Amiodarone

Dose 300 mg rapid IVP/IO used in arrested state
Repeated in 3-5 minutes at 150 mg IVP/IO

Acts on cardiac tissue
Relaxes vascular smooth muscle (which is why B/P could drop)
May decrease automaticity, conductivity and contractility
Putting It All Together

Interpret the following rhythm strips
Understand the steps in analysis
✓ Regularity
✓ Rate
✓ P waves
✓ PR interval
✓ QRS complex
✓ Name the rhythm; evaluate how the patient is doing

Discuss your interventions based on the stable versus unstable patient
Rhythm ID #1 – What Is This? What Would You Do?

2\textsuperscript{nd} degree Type I – Wenckebach

Can be a normal rhythm for patients; rarely symptomatic

Identified by irregular rhythm, lengthening PR interval with eventual drop in QRS

“Type I drops one”; Wenckebach “winks” as the QRS is dropped
Rhythm ID #2 – What Is This? What Would You Do?

Rapid atrial fibrillation
  Rapid, irregular, no discernable P waves

Hint: cover up the baseline, the irregularity really jumps out then

If patient is tolerating this, transport

These rhythms do not respond to Adenosine; Verapamil (calcium channel blocker) is used
  Verapamil MUST be given slowly; watch for hypotension
Rhythm ID #3 – What Is This? What Would You Do?

There is no pulse

PEA

Patient needs CPR, consideration of the H’s and T’s

Medications limited to Epinephrine – vasopressor properties

Pulse check appropriate with each CPR pause
Rhythm ID #4—What Is This? What Would You Do?

Sinus rhythm into VF

With rhythm/condition change, reasonable to confirm with pulse check

Immediately perform defibrillation – if hooked up and ready to go!

Then start compressions (can be performed during charging phase of defibrillator)

Medications: epinephrine alternated with Amiodarone
VF

If see the change on the monitor, immediately defibrillate the patient; then perform CPR

If patient found in collapse, CPR performed while monitor/defibrillator is attached to the patient

Medications are epinephrine alternated with amiodarone
Rhythm ID #6 – What Is This? What Would You Do?

3\textsuperscript{rd} degree heat block – complete

Consider presence of acute MI causing this dysrhythmia

Patient is symptomatic due to slowed heart rate causing a decrease in cardiac output

Patient needs heart rate to be sped up: Atropine followed by preparation and application of TCP
Rhythm ID #7 – What Is This? What Would You Do?

Monomorphic VT

First determine patient stability – if unstable need cardioversion

If relatively stable, treat with Adenosine (might be SVT with aberrancy)

If no response to Adenosine, continue with Amiodarone drip
  150 mg in 100 ml D5W over at least 10 minutes
Rhythm ID # 8 – What Is This? What Would You Do?

SVT – narrow, regular, rapid

If patient is relatively stable, perform vagal maneuvers

If unsuccessful, administer Adenosine 6 mg rapid IVP/IO

If necessary, follow with 2nd dose after 1-2 minutes (12 mg rapid IVP/IO)

If patient is unstable, they do not have time to wait – synchronized cardiovert
Benefits of Pit Crew Philosophy

Performances more efficient

Everybody already knows their assignment prior to arriving at the patient

Less verbal communication means quieter environment and necessary conversation can be heard

Time is muscle; time is brain cells

There is no time to waste when patients present in cardiac arrest
“Load N Go” or “Stay and Play”? 

The cornerstone of any resuscitation attempt is to perform CPR as proficiently as possible.

Studies have demonstrated that the efficiency of CPR decreases during any patient movement.

Per consensus with the Region X Medical Directors:

“Stay and Play” when you can

No specific time frame to stay but reasonable to provide several rounds of defibrillation and medications before attempting transport.

Case-by-case basis but better CPR performance when you are not trying to move the patient.
Mutual Aid – Working As A Team

Just a thought...
If you had mutual aid on a full arrest, would you know how to work seamlessly as a team?
Have you had the discussion prior to the call regarding your roles?
You might want to have dialogue of how you would incorporate the idea of Pit Crew
   It can work the same for everyone by describing roles for the initial responders and then the roles for those entering the scene secondarily
Pit Crew Practice

Choose your response group
Pre-assign the roles
   Practice with variety of initial responders (i.e. 2, 3, 5)
Use equipment available
Try to run real time as much as possible
Critique the call; discuss lessons learned and areas of opportunity for improvement
How do you see this fitting into your department?
Ideal Pit Crew Roles in Review

1. CPR
2. Monitor/defib
3. Airway
4. IV/IO Meds
5. Team Leader
Case Scenario #1

EMS is responding to a private home for a person who collapsed

Upon arrival you find an unconscious person approximately 50 years-old on the floor

Begin your assessment
Case Scenario #2

EMS is responding to a church for a person who is “feeling ill”
Upon arrival, you note a female approximately 70 years-old laying on the floor
Citizen CPR is being provided
Begin your assessment
Case Scenario #3

EMS responds to a local theatre for a person not responding
Upon arrival at the scene you find a male approximately 30 years-old unresponsive in a chair
Begin your assessment
Case Scenario #4

EMS responds to the scene of a “full arrest”
Upon arrival you find a female approximately 60 years-old who is unconscious laying on the ground
Begin your assessment
Case Scenario #5

EMS responds to a call for a person “ill”

Upon arrival you find the patient, approximately 60 years-old in the bathroom slumped on the toilet

Begin your assessment
Case Scenario #6

EMS responds to a call for a person with trouble breathing
Upon arrival you find a 72 year-old male with agonal breaths
Begin your assessment
Case Scenario #7

EMS responds to a call for a person not breathing
Upon arrival you find a man in their 20’s slumped in a chair
Begin your assessment


Region X SOP’s; IDPH Approved April 10, 2014.

http://firstaid.about.com/od/Basic-Life-Support/ss/Pit-Crew-Cardiac-Arrest-Resuscitation.htm
http://www.ems12lead.com/2014/06/20/pit-crew-cpr-the-explicit-details/
http://cpr-professionals.com/blog/?p=95