



Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

March 2013

Cardiac Arrest Team Resuscitation

Diana Neubecker RN BSN PM
NWC EMSS In-Field Coordinator

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

"We would tear our department apart and rebuild it step by step, if we thought we were losing 4 to 6 citizens per year that should have been rescued from fires.

So, when we know that we can **save 4 to 6 additional people** every year from cardiac arrest--
are we as an agency going to step up and put the same energy into saving these CPR patients?

To the family—**dead is dead**, and equally tragic, so why would we spend any less effort saving these patients?"



Chief Russ McCallion, East Pierce Fire Rescue

Objectives

Note: Cardiac Arrest abbreviated CA

1. Discuss new knowledge related to CA resuscitation.
2. Review selected key elements of CA resuscitation.
3. Practice team resuscitation skills.
4. Improve documentation of CA resuscitation.

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

What are the key elements of CPR?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Key Elements

- What is "known" to improve outcome?
 - Quality compressions
 - Defibrillation
 - Post-ROSC care: TH & PCI
- What "might" improve outcome?
 - Medications
- What NOT shown to improve outcome?
 - Advanced airway

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Chain of Survival



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Key Elements

Discussion:

Should we delay doing something
“known” to improve outcome,
to do something that has NOT
been shown to improve outcome?

When is it important to remember this?

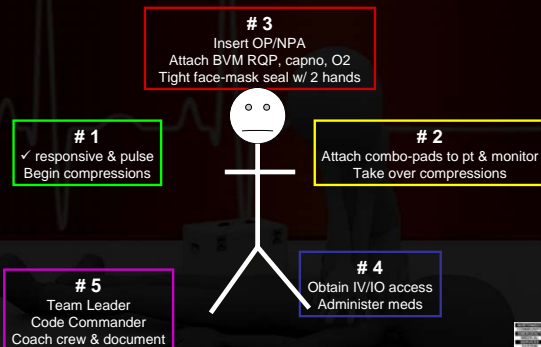
©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Why use the “pit-crew” approach?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

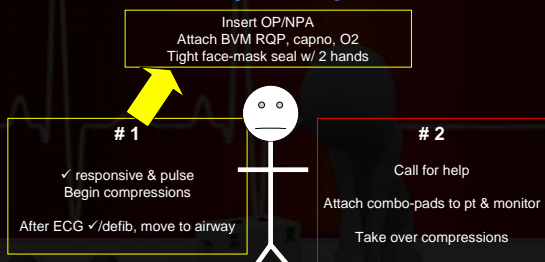
List “Pit-Crew” Roles - in order



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.



What if only 2 responders?



Do 2 person BLS CPR until help arrives

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Compressions

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Should pts be moved w/ CPR in progress?

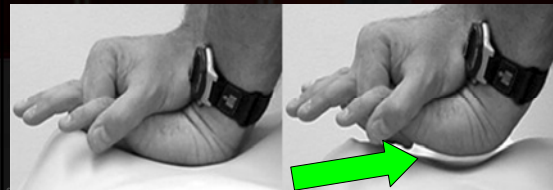
Why?



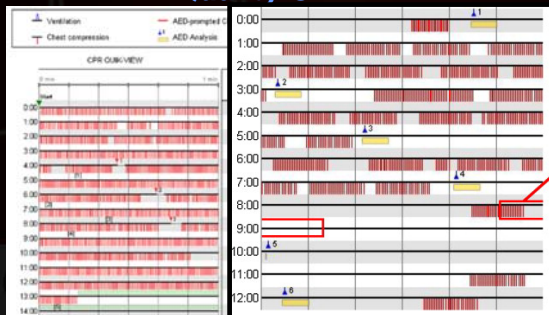
©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

RELEASE Completely

- Do NOT lean on chest
- Assure chest recoils completely after compressions
- Pressure between compressions creates positive intrathoracic pressure - which decreases heart & coronary artery refilling w/ blood



Quality CPR?

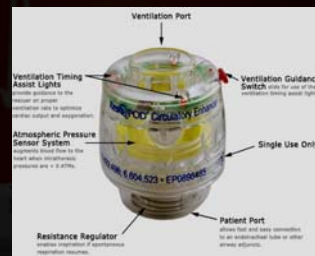


A detailed minute-by-minute record, with red hash marks depicting each compression, provides a quick overview showing compression consistency and any gaps in CPR such as to administer a shock, intubate a patient or transition EMTs between 2-minute stints of CPR. This allows medics to see areas that may need work.

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

RQP/ITD

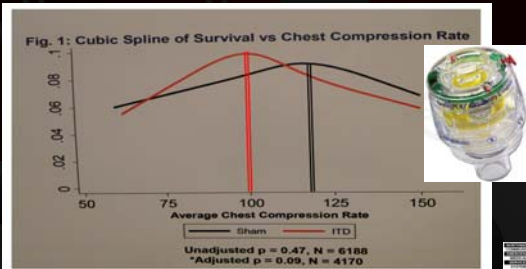
- Is the RQP/ITD a ventilation or circulation enhancing device?
- When does the RQP/ITD “work” – during compressions or ventilation?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

RQP & Compression Rates

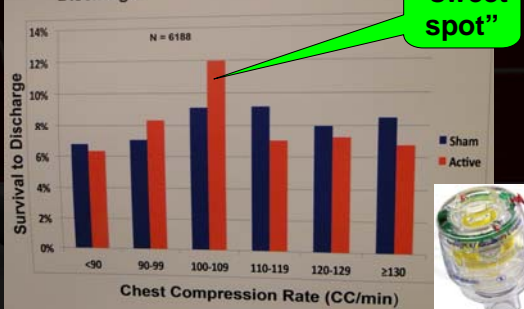
New human research demonstrates best outcomes when compression rates are 100/min (not 120/min)



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

RQP & Compression Rates

Sham vs Active ITD: Survival-to-Hospital Discharge



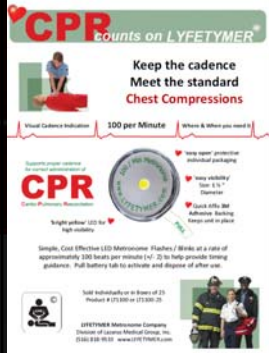
©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

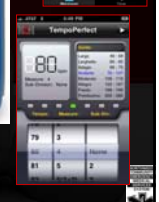
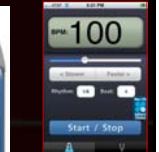
Compression Rates



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Metronome – USE ONE!

- Monitor
- Smartphone
- Device



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Real Time CPR Feedback



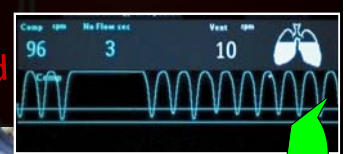
**Highly
Recommended**



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

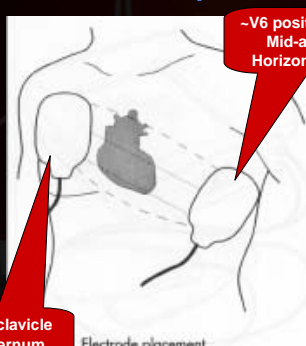
Real Time CPR Feedback

**Highly
Recommended**



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Where should combo-pads be placed?



**~V6 position (L) armpit
Mid-axillary line
Horizontal to nipple**

**Just under clavicle
Right of sternum**

Electrode placement

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

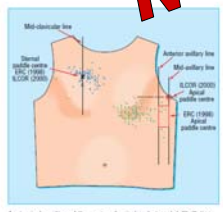
Do doctors position defibrillation paddles correctly?

Observational study

Richard M Heames, Daniel Sado, Charles D Deakin

NO

Defibrillation is necessary to restore normal sinus rhythm in a patient having a ventricular fibrillation arrest. Each minute of delay in restoring sinus rhythm increases mortality by 7-10%. Successful defibrillation requires depolarization of a critical mass of myocardium, which is most likely to be achieved if the defibrillation paddles are correctly placed. Recent guidelines from the European Resuscitation Council state that the sternal paddle should be placed "below the right clavicle in the mid-clavicular line" and that the apical paddle should be placed "over the left lower ribs in the mid/anterior axillary line". The limited literature available and our own observations suggest that these anatomical positions are not adhered to during defibrillation. We undertook an observational study to assess paddle positioning during defibrillation.



Methods and results

We recruited 103 doctors of all grades and acute specialties at Southampton General Hospital over a period of two weeks, who were unprepared and unaware of the nature of the study. They were shown an anatomically accurate male resuscitation manikin

Anatomical position of the centre of sternal and apical defibrillation paddles placed by 103 doctors. Positions recommended by the European Resuscitation Council (ERC) and the International Liaison Committee on Resuscitation (ILCOR) are also shown.

Conclusions: Adherence to... guidelines for defib paddle position is poor, resulting in incorrect paddle placement, particularly of the apical paddle, by most doctors... Apical paddle placement is usually too medial, reducing the separation of the paddles. Since this study was performed... published (AHA) guidelines... specify even more lateral placement of the apical defibrillation paddle, 'to the left of the nipple with the center of the electrode in the mid-axillary line. Incorrect placement will result in a greater percentage of current passing through non-cardiac tissue and will reduce the chances of successful defibrillation through failure to depolarise a critical mass of myocardium.

Southampton
Department of
Anaesthetics,
Southampton
General Hospital
NHS Trust,
Southampton
SO9 4XU
Richard M Heames
graduate registrar
Daniel Sado
medical student
Charles D Deakin
consultant
anesthetist
Correspondence to:
C D Deakin
cdeakin@southampton.nhs.uk
DOI: 10.1136/bmj-2012-001614

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Chest Compressions (CC)

What are acceptable reasons to interrupt CC?

- ✓ ECG rhythm (≤ 5 sec)
- Defibrillate (≤ 5 sec)



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Chest Compressions (CC)

Why not pre-charge defib, so PM can check ECG rhythm and shock in the same pause?

- Minimize time from last CC to shock delivery
- Checking ECG rhythm delays time from last compression to shock delivery
- Ideally shock as heart recoiling from last CC
- Every second matters!



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Chest Compressions (CC)

- How often should compressors be changed? Why?
- Should a compressor stop CC if another compressor is NOT in place/ready to take over compressions?
- What should be done if it's time to switch compressors and relief is NOT in place?
- How much time is allowed to both ✓ ECG rhythm & switch compressors?

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

ECG Rhythm ✓

What if ECG can't be determined that fast?

Rhythm ✓ objective

- Should it be shocked?
- Is it organized? (requiring pulse ✓)



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Team Work

What can be done to minimize the time delay from the last compression to shock delivery?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Ventilation

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Ventilation

Do not ventilate (squeeze bag) right before:

- ECG rhythm check (interferes w/ recognition)
- Defibrillation (decreases effectiveness)



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

OPA/NPA & BVM

Should EMS personnel delay BVM ventilation to insert an OP/NPA?

Why?

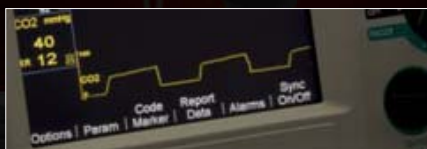


©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Capnography

How often should capnography be checked during CPR?

Why



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Capnography

How can it be used in CA resuscitation?

1. Prevent hyperventilation by showing ventilation rate
2. Monitor quality of chest compressions
3. Predict ROSC before pulse can be detected
4. Identify when ROSC unlikely

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Ventilation

- Avoid hyperventilation
- Watch both RATE and VOLUME



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

BVM ventilation

Why should 2-handed BVM ventilation be used prior to placement of advanced airway?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Advanced Airways

How soon should adv airway be placed?

- No evidence to support early placement
- Should preoxygenate for ≥ 3 min prior
- May attempt after 2nd or 3rd rhythm ✓/defib
- Sooner - if unable to BVM ventilate pt



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Advanced Airways

- Which is more important – defibrillation or ~~advanced airway placement~~?
- Placement of adv airways has been shown to cause delays in rhythm ✓ and defibrillation.
- What can be done to prevent this delay?



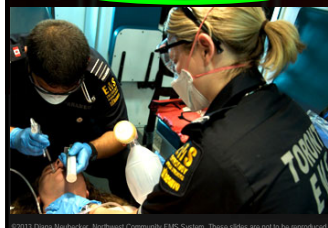
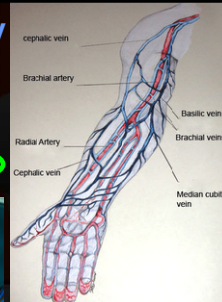
©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.



Priority

Which is a higher priority?

- ~~placement of adv airway?~~
- vascular access & meds?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Medications

- 1st med all pulseless = vasopressor
Can prepare before ECG ✓³d
- Prepare in advance,
so it's ready when time to give
- Give based on last ECG
do NOT delay until next ECG ✓
- Follow w/ 20-50 mL IVF bolus
If extremity IV: elevate x 20 sec



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Medications

How can med errors be prevented?

Medication cross-check



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Medications



Beyond the 5 Rights.....

**Check meds
w/ another PM
prior to giving**

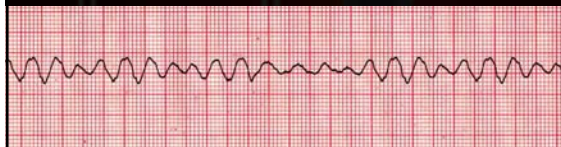


©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Persistent/Refractory VF

How is it different from "recurrent" VF?

What can be done to treat refractory VF?

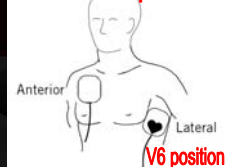


©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

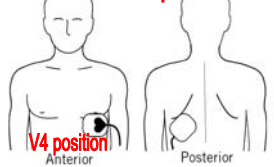
Persistent/Refractory VF

- Apply fresh/new set defib pads in alternate position
 - Minimize compression interruption placing posterior pad
- Defib using - new pads- in alternate position

STANDARD position

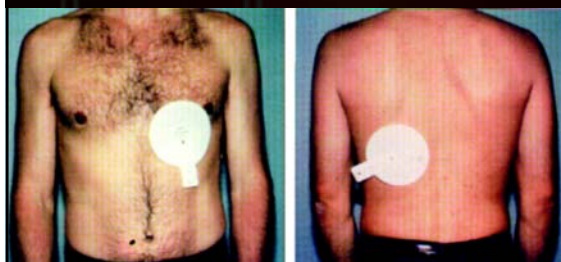


ALTERNATE position



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Second Set



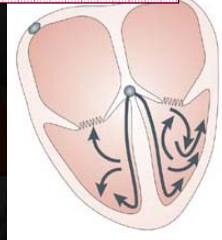
ALTERNATE position

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Persistent/Refractory VF



- Defib goal - stop electrical activity, to allow normal pacemakers to function
- VF has different vectors
- While anterior-lateral placement works for most VF....
- If it does not, changing pad placement may be effective



**Congratulations to LRFD PM's
who successfully did this!**

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

PEA

- What is the difference between true and pseudo PEA?
- Can the difference be determined in the field?



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWCC EMS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

PEA

- Is PEA a rhythm?
- What document in ECG section for pt in PEA?
- Can PEA rhythms be fast? slow?
- Can the QRS in PEA be narrow? wide?
- Which is associated w/ best/worst outcome?

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NMC EMS.

PEA – What are the causes?

- | | |
|---------------------|------------------|
| • HypoVOLEMIA | • Tension pneumo |
| • HypOXIA | • Toxins |
| • HypoGLYCEMIA | • Tamponade |
| • Hydrogen ion | • Thrombosis |
| • Hypo/hyperKALEMIA | • Trauma |
| • HypoTHERMIA | |

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NMC EMS.

How should PEA be treated?

- **IV** – begin rapid IVF bolus using pressure infuser
- **Glucose** ✓ (? hypoglycemia)
- **Lungs** ✓ (? tension pneumo)
- **Oxygen** ✓ (? patent airway, O2 supply)
- **PMH & meds** ✓ (? renal failure, toxins)

IGLOP

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NMC EMS.

Post ROSC Care

1. Monitor closely
2. Do NOT hyperventilate
– even if ↑ ETCO₂
3. Support BP/MAP
– maintain heart & brain perfusion
4. Acquire 12L
5. Initiate TH



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NMC EMS.

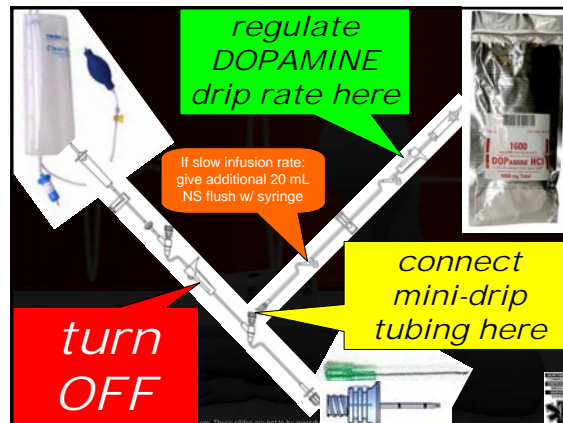
Post ROSC Care

BP support HIGHER priority than therapeutic hypothermia

- If hypotensive, begin DOPAMINE
- After dopamine started, then start 2nd line for cold IVF



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NMC EMS.



Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM

Therapeutic Hypothermia

4. Administer cold NS 30 mL/kg (max 2 L)
 - A. Amount
 - Greater than 50 kg (110 lbs) = 2000 mL
 - 35 – 50 kg = 1500 mL
 - Less than 35 kg: calculate based on 30 mL/kg
 - B. As fast as possible (less than 30 min)
 - Use pressure infuser maintained @ 300 mmHg
 - C. While enroute to hospital



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Rearrest

- After ROSC, how common is re-arrest?
 - 38%, most often in first 10 minutes
- What is the most common type of re-arrest?
 - PEA
- What are the risks associated w/ re-arrest?
 - Not detected quickly
 - Not treated aggressively
- If detected quickly & treated aggressively, does not worsen overall outcome!
- What can minimize risks of re-arrest?

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Finger on Pulse first 10 minutes



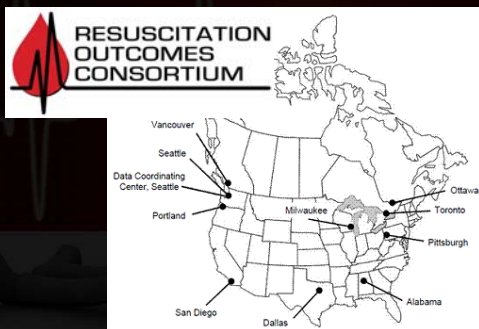
©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Improving Outcomes

- Does EMS make a difference?
- Should it be funded by tax \$\$\$?
 - Healthcare resources are limited
 - Funding will be based on outcomes
 - (not procedures that don't make a difference)
- Evidence based practice
 - Need to do what works and stop doing what does not
 - MAST, hyperventilation, bicarb, massive IVF for trauma
- How do we determine what works?

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

EMS Resuscitation Research



©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

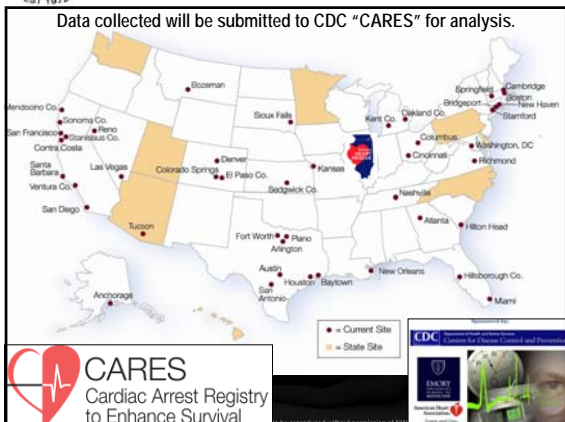
- NWC EMSS letter of support for \$2.5M grant to improve CA outcomes in IL
- Grant awarded; coordinated by UIC
- Key to improvement is measurement
- Measurement requires documentation

©2013 Diana Neubecker, Northwest Community EMS System. These slides are not to be reproduced without permission of NWC EMSS.

Continuing Education – March 2013

Cardiac Arrest: Team Resuscitation

Diana Neubecker RN BSN PM



Data - Information	
Medical History <ul style="list-style-type: none"> Cancer Diabetes Heart Dz Hyperlipidemia Hypertension Renal Dz Respiratory Dz Stroke 	<ul style="list-style-type: none"> Witnessed: seen or heard by another person. Etiology: Drowning, Electrocutation, Resp dz, AED applied (by whom) or used prior to EMS CPR initiated by: lay person, family member, lay medical, non-EMS first responder, police Bystander CPR: compressions only, ventilations only, compressions & ventilations Dispatch CPR instr provided? CPR feedback device used? 12L results: AWWMI, IWMI

Location	
<ul style="list-style-type: none"> Home / Residence – apartment, boarding house, institutional residence, halfway house, group home, dormitory, residential house, private driveway/garage/garden/walkways/swimming pool within private residence, yard of home. Public / Commercial – building used by general public: bank, cafe, state, public/private schools, casino, church, cinema, clubhouse, commercial shop, courthouse, dance hall, farm, fire station, daycare, hotel, jail, market, movie theater, music hall, nightclub, office building, opera house, parking garage, post office, public hall, restaurant, broadcasting station, store. Street / Hwy – public roadways, sidewalk or road not associated w/ residence or business. Nursing Home – medical residential institutions licensed as NH or assisted-living centers. Healthcare Facility – Doctor's office, dialysis clinic, free standing clinic Recreation – Amusement park, baseball field, basketball court, beach resort, cricket grounds, football field, golf course, gym, hockey field, holiday camp, ice palace, lake resort, mountain resort, playground, public park, racetrack, resorts, riding school, rifle range, skating rink, sports grounds, stadium, public swimming pool, tennis court, recreational locations within educational institution (such as playground, gym). Industrial – Building under construction, dockyard, dry dock, factory building or premises, garage (place of work), industrial yard, loading platform in factory or store, industrial plant, mine, quarry, railway yard, shop (place of work), warehouse, workshop. Transport Center – Bus station/terminal, train/subway station, ferry terminal, airport 	

