TIME TO STOP BEATING A DEAD HORSE: TERMINATION OF RESUSCITATION

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FINANCIAL DISCLOSURE

• None
OBJECTIVES

• Understand the research behind the formulation of the OPALS BLS and ALS TOR criteria.
• Identify all of the BLS and ALS TOR criteria.
• Be familiar with the latest research validating the BLS and ALS TOR criteria.
• Understand why the appropriate duration of resuscitation is yet to be determined.
PROBLEMS WITH TRANSPORTING ALL CARDIAC ARRESTS
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- CPR quality effected
- Danger of lights and sirens
- Depletes resources
- Cost
SURVIVAL CHANCES IF NO PREHOSPITAL ROSC

- No prehospital ROSC is characteristic most predictive of death
SURVIVAL CHANCES IF NO PREHOSPITAL ROSC

- Bonnin, et al. JAMA 1993
  - Worked on scene for 25 minutes
  - 0.6% survival if no ROSC on scene
  - 495,607 patients in Japan
  - If no pre-hospital ROSC
    - 25.8 times more likely to die
    - 38.4 times more likely to have poor neuro outcome
TERMINATION OF RESUSCITATION (TOR)

- Ontario Prehospital Advanced Life Support (OPALS) study group proposed 2 termination of resuscitation rules
  - One rule for BLS providers
  - One rule for ALS providers
  - Patient must meet ALL the criteria in either rule to qualify for TOR in the field
TERMINATION OF RESUSCITATION (TOR)

- BLS criteria
  - Event not witnessed by EMS personnel
  - No AED used or manual shock applied in out-of-hospital setting
  - No ROSC in out-of-hospital setting
TERMINATION OF RESUSCITATION (TOR)

• Morrison, et al. NEJM 2006
  • Evaluation of 1240 patients treated by EMT-D’s
  • 776 (62%) met BLS TOR criteria
TERMINATION OF RESUSCITATION (TOR)

• Morrison, et al. NEJM 2006
  • Would have resulted in a 38% transport rate
  • Would have missed 4 survivors (0.5%)
TERMINATION OF RESUSCITATION (TOR)

• BUT.... 3 of the 4 survivors had a CPC score of 1 or 2!
TERMINATION OF RESUSCITATION (TOR)

- ALS criteria
  - Event not witnessed by EMS personnel
  - No AED used or manual shock applied in out-of-hospital setting
  - No ROSC in out-of-hospital setting
  - Arrest not witnessed by bystander
  - No bystander administered CPR
TERMINATION OF RESUSCITATION (TOR)

- Study to validate OPALS rules
- Analysis of 5505 cardiac arrest patients
- Overall survival to hospital discharge was 7%
TERMINATION OF RESUSCITATION (TOR)

  - 47% met BLS TOR
    - 53% transport rate
    - 5 (0.2%) survivors missed
TERMINATION OF RESUSCITATION (TOR)

• BUT….4 out of 5 who met BLS TOR had CPC score of 1 or 2
TERMINATION OF RESUSCITATION (TOR)

  - 22.7% met ALS TOR
    - 78.3% transport rate
    - 0 survivors missed
TERMINATION OF RESUSCITATION (TOR)

- Diskin, et al. Resus 2014
- Review of 322 patients
- Intra-arrest cold saline, mechanical CPR, comprehensive post resus care
TERMINATION OF RESUSCITATION (TOR)

- Diskin, et al. Resus 2014
- 75 (23%) patients met ALS TOR
- 0 survived
- Would have resulted in a 77% transport rate
- 208/283 of those that did not meet ALS TOR died
TERMINATION OF RESUSCITATION (TOR)

- Evaluation of implementation of BLS TOR
- 953 patients eligible
  - 199 (20%) met BLS TOR and terminated in the field
  - 80% transport rate
TERMINATION OF RESUSCITATION (TOR)

  - 198 (20.7%) met BLS TOR but transported anyway
  - Transport rate would have been 60%
  - All died
  - Common reasons: Family distress, public place, younger age, short transport time, on-line med control said no
ALS VS. BLS TOR

- **BLS TOR**
  - Lower transport rates (40-60%)
  - Possible risk of missing neuro intact survivors (0-0.5%)

- **ALS TOR**
  - Higher transport rates (70-80%)
  - Likely will not miss any survivors
FAMILY PERCEPTION
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- Studies indicate that non-transport approved by family
HOW LONG SHOULD WE WORK THEM?
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- Bonnin, et al. JAMA 1993
- Prospective evaluation of 1471 OHCA
- 370 achieved ROSC on scene
- All achieved ROSC within 25 minutes
- 6/952 that didn’t achieve ROSC on scene survived
- All 6 had persistent V. fib
HOW LONG SHOULD WE WORK THEM?

  - Observational study of 150 cardiac arrests
  - 115 nonsurvivors to hospital admission
    - All had end tidal CO$_2$ of 10mmHg or less after 20 minutes of ACLS
  - Observational study of 737 cardiac arrests
  - No ROSC in 335
    - All had end tidal CO$_2$ 14.3 mmHg or less after 20 minutes of ACLS
HOW LONG SHOULD WE WORK THEM?

- AHA 2015 Guidelines
- $\text{ETCO}_2$ 10mmHg or less after 20 minutes of ACLS care
- Above criteria should not be used in isolation
Duration of Prehospital Resuscitation For Adult Out-of-Hospital Cardiac Arrest: Neurologically Intact Survival Approaches Overall Survival Despite Extended Efforts

OBJECTIVE
- Out-of-hospital cardiac arrest (OHCA) guidelines suggest resuscitation beyond 30 minutes may be futile.
- Few studies address neurologic outcome for survivors of extended duration OHCA.
- The duration of prehospital resuscitation (DOR) that yields a reasonable probability of neurologically intact survival (NIS) is unknown.
- We assess whether DOR affects NIS from OHCA.

METHODS
- We conducted a retrospective cohort study of all OHCA patients in our urban/suburban advanced life support EMS system (pop 950,000) from 2005–2012.
- Excluded were resuscitations not attempted, age < 16, trauma patients, and EMS-witnessed arrests.
- DOR was measured from time of dispatch to end of prehospital resuscitation, defined by first return of spontaneous circulation, en-route hospital, or death.
- Primary outcome was NIS, defined as cerebral performance category (CPC) 1 or 2 at hospital discharge.
- Multivariate logistic regression determined the odds ratios with 95% confidence intervals (CI) for both survival and NIS adjusted for DOR and factors determined to have a significant relationship with NIS at the univariate level.

RESULTS
- Of 2905 eligible OHCA, patients were: mean age 64.6 years (sd=17.0) male 60.1%, bystander witnessed 38.9% and had bystander CPR 37.2%. Overall, 362 survived (12.5%) and 300 had NIS (62.9% of survivors). Median defibrillator to scene was 7 minutes (IQR 5-9).
- Overall median DOR was 38 min (IQR 29-48), with median DOR for NIS of 24 min (IQR 18-32). The 90th percentile for NIS was 40 min. Beyond 40 min, 29/42 survivors (69%, 95% CI 54-81%) were neurologically intact. The longest resuscitation that achieved NIS was 73 min.
- Controlling for OHCA protocol changes over time ("protocol phase"), adjusted OR (95% CI) was 0.91 (0.90-0.92) for both survival and NIS. Other predictors of NIS across models were initial rhythm, age, bystander witness, therapeutic hypothermia, and absence of advanced airway.

CONCLUSIONS
- In a retrospective analysis of OHCA, DOR is associated with declining survival and NIS, with NIS approximating the overall survival curve. DOR was within 40 minutes from time of dispatch for 90% of NIS. A large number of patients survived neurologically intact with DORs greater than previous guidelines would suggest. Further study should examine factors predictive of NIS in longer resuscitations.
CONCLUSION

• Termination of resuscitation in the field supported by research, EMS experts, and family

• TOR guidelines need to be constantly re-evaluated as new cardiac arrest therapies arise

• Duration of resuscitation needs to be studied further
REFERENCES


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