Who Do You Want on Your 911 Call?  
The ALS versus BLS Debate  

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Objectives

• ALS and BLS skill review
• Why is there a debate?
• What does the data show?
• Conclusions
ALS and BLS

- BLS or Basic Life Support (Emergency Medical Technician or EMT-B)
  - 120-150 hours of training
  - Vital signs, home medication administration
  - CPR, BVM, AED, bleeding, extremity injury care, baby delivery
- ALS or Advanced Life Support (Paramedic or EMT-P)
  - 1,200-1,800 hours of training
  - IV access, fluid resuscitation, drug administration
  - Cardiac monitoring, cardioversion and defibrillation, pacing, intubation, and chest needle decompression
Prehospital Cases to Consider

- Stab wound to L thigh, arterial bleeding on arrival
- Aggressive large male, suspected meth use, shouting “Get the aliens out!”
- GSW to R chest, diminished L lung sounds, hypotensive and altered
- Witnessed cardiac arrest in 50 yo M, bystander CPR
- 5 yo F, peanut allergy, audible stridor and wheezing, swollen face and mouth
BLS

• Suspected Pros:
  • Cost lower per provider -> More providers -> Shorter response times
  • Many true emergencies are “scoop and go” rather than “stay and play”

• Suspected Cons:
  • Pathophysiology knowledge is less
  • Turnover is high, experience is low
  • “If it was my family member, would I want the BLS provider?”
ALS

• Suspected Pros
  • Better understanding of the “why” behind sick patients
  • Better for longer transports
  • Seizures, refractory VT/VF, respiratory distress, anaphylaxis, agitation

• Suspected Cons
  • Expensive
  • Those calls where it makes a difference are relatively few
The Spock Principle

“The good of the many outweighs the needs of the few or even the one.”

Yes, for the system, an all BLS response would be cost saving, and mortality would be unchanged...

But, what if this was your wife/husband/child/parent? Then, how would you feel?

However, as studies show, you may still want the BLS response.
Where’s the Evidence?

• Many studies exist
• Four key studies today
  • OPALS
  • Two Meta-Analyses
  • Most recent (controversial) article
OPALS
Ontario Prehospital Advanced Life Support Study

• Largest prehospital study conducted worldwide at the time
• 17 cities
• >18,000 cases total
• Studied prehospital impact on:
  1. Cardiac arrest
  2. Major trauma
  3. Respiratory arrest
  4. Chest pain
  5. Pediatric
OPALS Background

- 1991-2002, Ontario, Canada
- Prior to study few agencies had defibrillators, or ALS
  - Overall survival of OHCA in Ontario was <2.5%
- Worldwide, OHCA survival variance was <1-20% at the time
- Utstein was just begun to be used in 1991
- In the US, ALS was generally how defibrillators arrived to OHCA
  - Five studies studies with BLS with defibrillators
OPALS Methods

• Eleven Ontario EMS base hospital programs urban and suburban
• Cohort study, multi-center, “before-and-after” study
• Base hospital programs share common characteristics:
  1. 911 emergency telephone system
  2. Ambulance defibrillation program
  3. Ability to provide at least 3 years retrospective data for cardiac arrest patients
• Data was pooled across communities
OPALS Study Population

• All cardiac arrest
  1. Presumed cardiac origin
  2. Out-of-hospital in the study communities
  3. Resuscitation is attempted by emergency responders

• Exclusion criteria
  1. Patients younger than 16 years;
  2. The “obviously dead”
  3. Non-cardiac origin
  4. Terminal Illness
OPALS OHCA Outcomes

• Primary: Survival to hospital discharge

• Secondary:
  • Neurological function at discharge and at 1 year
  • ROSC
  • Admission to hospital
  • Survival to 1 year
  • Quality of Life
  • Time intervals
  • ALS interventions
  • Direct costs
OPALS: OHCA Studies

• Three sequential phases:
  • Phase I, 36 months, baseline basic life support with defibrillation (BLS-D)
    • 4,690 patients, 1991 to 1995
  • Phase II, 12 month period, decrease response times <8 minutes for AED
    • 1,641 patients, 1994 to 1997
  • Phase III, 36 months, survival studied with full ALS programs in place
    • 4,247 patients, 1998 to 2002
OPALS Trauma

- 2867 patients enrolled in the BLS (n = 1,373) and ALS (n = 1,494)
- Two x 36 month long phases for BLS and ALS periods of study
- Inclusion criteria: >16 yo, trauma, ISS >12, transported by land, treated at one of 13 trauma hospitals
- Intervention: ALS care in second 36 month period by validated providers
- Primary outcome: Survival to hospital discharge
- Secondary outcomes: Functional independence scores by injuries
- Survival did not differ: 81.1% ALS v. 81.8% BLS; p = 0.65
- GCS < 9, survival was lower among ALS: 50.9% v. 60.0%; p = 0.02
- The adjusted odds of death for ALS v. BLS: 1.2; p = 0.16
OPALS Respiratory Arrest

- Design: 6 months BLS, 6 months ALS
- Study population: > 16 years of age; primary symptom was shortness of breath, including those assessed by EMS but not transported
- Exclusion criteria: Cardiac arrest before the arrival of EMS personnel, or patients whose primary symptom was not respiratory
- Primary outcome: Mortality in hospital
- Secondary outcomes: Intubation, aspiration, admission, LOS, destination post discharge, CPC score post discharge
- The primary outcome measure: mortality, decreased significantly
- CPC of level 1 increased significantly (from 52.3% to 62.5%, P<0.001).
OPALS Chest Pain and Pediatric Abstracts

• Designs:
  • 9 month evaluation for CP
  • 6 month periods for Pediatric

• CP Study:
  • 64.7% relative reduction in the primary outcome, overall mortality, from the BLS to the ALS phase (5.1% vs 2.8%; P < 0.001)

• Pediatric Study:
  • Most pts are not severely ill, most do not receive ALS interventions, there is a high rate of non-transport, and the vast majority are discharged home from the ED
Is advanced life support better than basic life support in prehospital care? A systematic review (Ryynänen, 2010)

- **Objective:** Compare ALS and BLS care effectiveness
- **Methods:** Review of comparison studies of ALS 1995-2008
- **Outcomes:**
  - Survival at hospital discharge or later
  - Neurological capacity or quality of life
- **Results from 46 studies**
  - Five studies made no distinction between chief complaint and found no difference between ALS or BLS
  - Thrombolytics for MI prehospital: 5 studies, better outcomes
Ryynänen 2010

• Results continued:
  • Cardiac arrest, five studies showed BLS > ALS, but not statistically significant
  • Respiratory distress: ALS is better in two studies
  • Trauma:
    • Penetrating: no difference or BLS is better
    • Blunt: no difference
    • TBI: HEMS ALS was better than BLS
• Discussion:
  • Definitions of ALS and BLS change, treatments change
  • Inclusion and exclusion criteria would give a different set of data if changed
  • Same data issues as other meta-analyses
  • Trauma and OHCA, BLS likely better
  • Seizures and respiratory problems, likely ALS
Advanced life support versus basic life support in the pre-hospital setting: A meta-analysis (Bakalos, 2011)

• Objectives:
  • Identify if ALS increases patient survival in pre-hospital treatment
  • Identify groups that would benefit

• Methods: Meta-analysis of cardiac arrests and trauma that received ALS and BLS treatment

• Primary Outcome: Survival at hospital discharge

• Secondary Outcome: Survival at hospital admission
Bakalos 2011

• Results:
  • Trauma: ALS survival at hospital discharge was 34% less than BLS
    • Sensitivity analysis showed results to be not significant
  • OHCA: ALS survival at hospital discharge was 47% higher than BLS
  • The authors did not think there was an obviously choice for OHCA or trauma

• Limitations: ALS included physicians on ambulances
  • Your meta-analyses are only as good as the studies within them
  • No RCTs, few pseudo-randomization trials
  • Only English studies included
Outcomes of Basic Versus Advanced Life Support for Out-of-Hospital Medical Emergencies (Sanghavi, 2016)

• Objective: To compare outcomes after ALS and BLS trauma, stroke, AMI or respiratory failure

• Methods: Observational study evaluating survival and neurological outcomes of ALS and BLS patients
  • To balance ALS and BLS distributions of observed characteristics, propensity score-based balancing weights
  • To adjust for differing ALS geographic penetration rates, instrumental variable analyses were calculated

• Data: Random sample of 20% of Medicare
• 2006-2011, fee-for-service beneficiaries
Sanghavi 2016

• Primary outcome: Survival at 30, 90, 365, 730 days after ambulance transport
• Secondary: (If) poor neurological function was coded
• Results: Pts receiving BLS tended to be older, have more comorbidities, be women, and black
  • Trauma: Survival with BLS was 6.1% higher two years later
  • Stroke: 7.0% higher with BLS
  • AMI: 1% higher at 90 days with ALS, however neurological function was lower
  • Respiratory Failure: 3.7% higher survival with BLS
• Conclusion: BLS would have saved $322 million less in 2011 with higher survival
Limitations of Sanghavi Study

- Level of care (ALS v. BLS) was denoted by billing codes
  - Treatment guidelines and scope of practice are not synonymous with actual care provided
- For patients with “out-of-hospital cardiac arrest”
  - ICD-9 code for cardiac arrest, combined with a "present on admission"
- Retrospective, Medicare only
- One MD, no EM or EMS physicians
- Published in Annals of Internal Medicine
- What communities are nonrural?
- Cardiac arrest patients were truly transported BLS only?
Conclusions

The definitions and practice of BLS and ALS are moving targets

- BLS
  - Trauma
  - OHCA
- ALS
  - Respiratory Distress
  - Seizures

Considerations: How would critical care paramedics and physicians prehospital change this conversation?
Works Cited


