

Evidence Based EMS Performance Measures

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Prehosp Emerg Care 2008;12:141-151

SPECIAL CONTRIBUTIONS

EVIDENCE-BASED PERFORMANCE MEASURES FOR EMERGENCY MEDICAL SERVICES SYSTEMS: A MODEL FOR EXPANDED EMS BENCHMARKING
A STATEMENT DEVELOPED BY THE 2007 CONSORTIUM U.S. METROPOLITAN MUNICIPALITIES' EMS MEDICAL DIRECTORS (APPENDIX)

J. Brent Myers, MD, MPH, Corey M. Slovis, MD, Marc Eckstein, MD, MPH,

Nationally Agreed Upon Metrics

- Response time
- CPR "survival"

Nationally Agreed Upon Performance Metrics

Proposed Performance Measures

Destination

- STEMI
- Cardiac Arrest
- Stroke

Medical

- Cardiac Arrest
- STEMI
- Pulmonary Edema
- Asthma
- Seizures

Surgical

- Major Trauma

Airway

- System Metrics
- Individual Metrics

Transport Recommendations

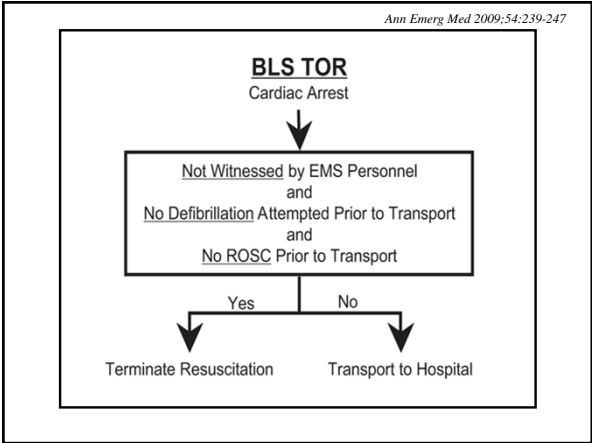
if available in your community

- Transport all STEMI patients to designated PCI Centers
- Transport all Cardiac Arrest Survivors to Resuscitation Centers that provide therapeutic hypothermia and have PCI immediately available.
- Transport all acute stroke patients to designated Stroke Centers.

Proposed Cardiac Arrest Metrics

- ### Cardiac Arrest Metrics and Performance Metrics
- Number of Adult and Pediatric Arrests
 - Initial Rhythm
 - 911 to First Shock or Rhythm Analysis
 - “Normal” or “Ambulatory Independent” at Hospital Discharge
 - TOR Percentages

- ### Unlikely To Survive CPR
- Delayed CPR (> 6 min)
 - Delayed Defibrillation (> 8 min)
 - Delayed ALS response (> 20 min)
 - Persistent AS
 - Persistent EMD-PEA



- All “Good Neuro” survivors identified (42/42)
- About 1/3 of pts would not be transported (36%)
- Use of 5 ALS criteria results in 10% more transports (25% TOR)

Ann Emerg Med 2009;54:239-247

Proposed STEMI Metrics

Proposed STEMI Metrics

- ASA Administration for Non-traumatic CP above age 21
- Performance of 12 Lead ECG
- EMS Alert to STEMI Center
- D₂B Time of Hospital (% < 90 min.)
- E₂B Time (% < 90 min.)

Prehosp Emerg Care 2005;9:282-284

TREATMENT OF SUSPECTED CARDIAC ISCHEMIA WITH ASPIRIN BY PARAMEDICS IN AN URBAN EMERGENCY MEDICAL SERVICES SYSTEM

Kevin E. McVaney, MD, Marlow Macht, EMT-P, Christopher B. Colwell, MD, Peter T. Pons, MD

ABSTRACT

Background. Aspirin (ASA) has unquestioned benefit to patients with cardiac ischemia. Previous studies indicate health

(EMS) systems, prehospital administration of ASA is considered a standard component of care for patients complaining of chest pain consistent with ischemic car-

- 232 pts. with ACS, 169 (73%) had no contraindications
- Only 54% of eligible patients got ASA
- **In patients getting NTG for ACS only 79% got ASA**
- **Only 35% of 453 pts. with non-traumatic C.P. (and no contraindication to ASA) received aspirin!**

Prehospital Emergency Care 2005;9:2-7

ORIGINAL ARTICLES

ERRORS OF OMISSION IN THE TREATMENT OF PREHOSPITAL CHEST PAIN PATIENTS

Jon C. Rittenberger, MD, Paul W. Beck, MD, Paul M. Paris, MD

ABSTRACT

Objective. Despite the widespread use of standard treatment protocols, there are few published data regarding paramedic protocol adherence. In this descriptive study, the authors sought to assess the frequency and nature of deviations from

umented for prehospital patients with chest pain is variable. The expected care described by written protocols does not correlate with the treatment documented. Key words: EMS; chest pain; prehospital; protocol; errors.

PREHOSPITAL EMERGENCY CARE 2005;9:2-7

- Documentation of key facts very variable
- **Aspirin missed in up to 25% of pts.**
- **Post treatment BP with NTG missed up to 70% of time**
- **Scene times often twice as long as transport time**

BMJ 2009;338:b1807

Association of door-to-balloon time and mortality in patients admitted to hospital with ST elevation myocardial infarction: national cohort study

Time is Muscle

N Engl J Med 2006;355:2308-2320

SPECIAL ARTICLE

Strategies for Reducing the Door-to-Balloon Time in Acute Myocardial Infarction

Elizabeth H. Bradley, Ph.D., Jeph Herrin, Ph.D., Yongfei Wang, M.S., Barbara A. Barton, R.N., Tashonna R. Webster, M.P.H., Jennifer A. Mattera, M.P.H., Sarah A. Roumanis, R.N., Jephtha P. Curtis, M.D., Brahmajee K. Nallamothu, M.D., David J. Magid, M.D., M.P.H., Robert L. McNamara, M.D., M.H.S., Janet Parlosowich, R.N., M.S.N., Jerod M. Loeb, Ph.D., and Harlan M. Krumholz, M.D.

6 Strategies Significantly Reduced Door to Balloon Time

- EM MDs activating Cath Lab
- Single call for activation
- Attending Cardiologist in-House
- Cath Lab ready within 20 minutes
- Real time feedback
- EMS 12 leads ECGs for pre-arrival activation

Circulation 2008;118:1066-1079

AHA Scientific Statement

Implementation and Integration of Prehospital ECGs Into Systems of Care for Acute Coronary Syndrome

A Scientific Statement From the American Heart Association Interdisciplinary Council on Quality of Care and Outcomes Research, Emergency Cardiovascular Care Committee, Council on Cardiovascular Nursing, and Council on Clinical Cardiology

Henry H. Ting, MD, MBA, Chair; Harlan M. Krumholz, MD, SM, FAHA, Co-Chair; Elizabeth H. Bradley, PhD; David C. Cone, MD; Jephtha P. Curtis, MD; Barbara J. Drew, RN, PhD, FAHA; John M. Field, MD; William J. French, MD;

"The current American Heart Association guidelines recommend that paramedics perform and evaluate prehospital ECGs routinely on chest pain patients suspected of having a STEMI."

We should only transport STEMI patients to PCI capable centers.

CHF – Pulmonary Edema Proposed Performance Metrics

CHF – Pulmonary Edema Performance Metrics

- Appropriate Use of Nitroglycerin
 - % used of total patient
 - % used when contraindicated
- Appropriate use of NIV
 - % intubation rate
- Use of Lasix
 - % use
 - % use inappropriate

JAMA 2005;294:3124-3130

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema Systematic Review and Meta-analysis

Josep Masip, MD
Marta Roque, BSc
Bernat Sánchez, MD
Rafael Fernández, MD
Mireia Subirana, RN
José Angel Expósito, BSc

Context In patients with acute cardiogenic pulmonary edema noninvasive ventilation may reduce intubation rate, but the impact on mortality and the superiority of one technique over another have not been clearly established.

Objective To systematically review and quantitatively synthesize the short-term effect of noninvasive ventilation on major clinical outcomes.

Data Sources MEDLINE and EMBASE (from inception to October 2005) and Cochrane databases (Library Issue 4, 2005) were searched to identify relevant randomized controlled trials and systematic reviews published from January 1, 1988, to October

- CPAP and BiPAP decrease mortality
- Decrease need for intubation by up to 50%

Ann Emerg Med 2008;52:232-241

EMERGENCY MEDICAL SERVICES/ORIGINAL RESEARCH

Out-of-Hospital Continuous Positive Airway Pressure Ventilation Versus Usual Care in Acute Respiratory Failure: A Randomized Controlled Trial

- CPAP decreased intubation from 50% to 20% (17/34 vs. 7/35)
- CPAP decreased mortality 35.3% to 14.3% (12/34 vs. 5/35)

CPAP reduced intubation rates by 30% and mortality by 21%.

Prehosp Emerg Care 2006;10:194-197

EVALUATION OF PREHOSPITAL USE OF FUROSEMIDE IN PATIENTS WITH RESPIRATORY DISTRESS

Jason Jaronik, MD, Paul Mikkelsen, MD, William Fales, MD, FACEP,
David T. Overton, MD, FACEP

ABSTRACT

Objective. To evaluate the appropriateness of prehospital use of furosemide. **Methods.** All patients over 18 years old re-

INTRODUCTION

Prehospital providers commonly administer intravenous furosemide to patients with suspected decom-

- 144 patients with presumed CHF
- All treated with Lasix
- 42% did not have CHF
- Many had sepsis, pneumonia or dehydration
- 7/9 who died did not have CHF

Proposed
Asthma – COPD
Performance Metrics

- Asthma – COPD
Performance Measures
- Use of beta agonist by first arriving unit with qualified personnel
 - “Appropriate” response to refractory patients and/or extremis

Status Seizures
Proposed Performance
Metrics


- Status Epileptics
Proposed Performance Measures
- Blood Glucose Determination (%)
 - Benzodiazepine Administration (%)
 - IV
 - IM
 - PR
 - RN
 - IO?

New Engl J Med 2001;345:631-637

The New England
Journal of Medicine

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VOLUME 345 AUGUST 30, 2001 NUMBER 9



A COMPARISON OF LORAZEPAM, DIAZEPAM, AND PLACEBO FOR THE TREATMENT OF OUT-OF-HOSPITAL STATUS EPILEPTICUS

BRAN K, ALLREDFE, PHARM.D., ALAN M. GELA, M.D., S. MARSHALL ISAACS, M.D., MORGAN D. CONRY, E.M.T., P., M.A., FAYE ALLEN, M.D., SURESH KALING, E.D., M.S., MARGO D. GOTTFRAS, PHARM.D., NILES O'NEIL, E.R.N., M.S.N., JOHN M. NEUMANN, Ph.D., MARK R. SEGAL, Ph.D., AND DANIEL H. LOWENSTEIN, M.D.

- Benzodiazepines terminate status > placebo
- Termination: L = 59%, D = 43%, P = 21%
- Twice the Neuro and Cardiac Complications if no benzodiazepine used (10.5% vs. 22.5%)

Proposed Trauma Metrics

Proposed Trauma Performance Measures ACS Level 1 Trauma

- On scene time < 10 minutes
- exclusive of exceptions (e.g. entrapment)
- Transport to designated Trauma Center
- On scene waiting time less than estimated transport to hospital time in cases involving aeromedical transport

Proposed Airway Metrics

Individual and System Airway Metrics

Individual Metrics

- # of intubation attempts / mos or year
- # of successful intubations / mos or year
- # of practice intubations

System Metrics

- % successful intubation rate
- % reported esophageal intubations and % misplaced non-esophageal
- % ETCO₂ used

Ann Emerg Med 2007;50:246-252

How Would Minimum Experience Standards Affect the Distribution of Out-of-Hospital Endotracheal Intubations?

Henry E. Wang, MD, MS
Benjamin N. Abo, BS, NREMT-P
Judith R. Lave, PhD
Donald M. Yealy, MD

From the Department of Emergency Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA (Wang, Abo, Yealy); and the Department of Health Policy and Management, University of Pittsburgh, Pittsburgh, PA (Lave).

- Total intubations vs. total paramedics
- If only paramedics with > 5 intubations/yr were allowed to intubate, then 32% ↓ in total intubations.
- If ≥ 10 was minimum then 79% ↓
- Many paramedics do not intubate 1 pt/yr

Acad Emerg Med 1997;4:89-91

COMMENTARIES

Inadvertent Esophageal Intubation in the Field: Reliance on a Fool's "Gold Standard"

Steven J. White, MD, Corey M. Slovic, MD

■ The "gold standard" for ensuring the patient is unlikely in adults, correct endotracheal tube (ETT) Neck extension, and to a lesser degree, placement has been to visualize the tube lateral rotation can move a tube

esophageal intubation with equal bilateral breath sounds, normal epigastric auscultation, symmetric chest expansion, cuff palpation in the neck, and even "normal" chest radiography? In a controlled OR study, Anderson and Hald intentionally esophageally intubated 40 patients. They

- Experienced MDs intubate the esophagus up to 8% of time.
- At least 1/100 esophageal intubations will go unnoticed by MDs
- ETCO₂ detection prevents clinical mishaps

What would
performance metrics
get us?

TABLE 2. Numbers-Needed-to-Treat (NNT) by Clinical Scenario

Clinical Area	Elements	NNT	Harm Avoided
ST-Segment Elevation Myocardial Infarction (STEMI)	Aspirin 124and electrocardiograph (ECG) direct transport to percutaneous cardiac intervention (PCI) interval from ECG to balloon < 90 minutes ^{66,67}	15	Either a stroke, 2nd myocardial infarction, or a death
Seizure	Administration of benzodiazepines for status epilepticus ⁶⁸	4	Persistent seizure activity
Pulmonary edema	Noninvasive positive pressure ventilation (NIPPV) ⁶⁹	6	Need for an endotracheal intubation
Trauma	Patients with an Injury Severity Score (ISS) > 15 to trauma center ⁷⁷	11	1 death
Trauma	Patients over 65 years of age with ISS > 21 to trauma center ⁶⁸	3	1 death
Cardiac arrest	Defibrillator to the scene < 5 minutes rather than < 8 minutes ⁷⁵	8	1 death

Prehosp Emerg Care 2008;12:141-151

Nietzsche says...
 “Out of chaos
 comes order.”

Blazing Saddles